

Lindsay J. Starkey

Encountering Water in Early Modern Europe and Beyond

Redefining the Universe through Natural Philosophy, Religious Reformations and Sea Voyaging

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Encountering Water
in Early Modern Europe and Beyond

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Encountering Water in Early Modern Europe and Beyond

*Redefining the Universe through Natural Philosophy,
Religious Reformations, and Sea Voyaging*

Lindsay J. Starkey

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Introduction: Why Water?

Abstract

This introduction presents the work's larger argument that fifteenth- and sixteenth-century European sea voyages caused Europeans to re-examine why water did not flood the earth. This introduction also proposes that the topic of water allows for the investigation of several historiographical questions: how Europeans viewed the relationship between the natural, preternatural, and supernatural from the ancient period into the sixteenth century; how Europeans viewed God's connection to the universe from the ancient period into the sixteenth century; and how these overseas voyages in the fifteenth and sixteenth centuries influenced Europeans' dependency on textual authorities for their worldviews. It also suggests that this study is of interest to those scholars working in blue cultural studies.

Keywords: wonder; blue humanities; history of water; religious reformations; overseas voyages

Dixit vero Deus congregentur aquae quae sub caelo sunt in locum unum
et appareat arida factumque est ita et vocavit Deus aridam terram
congregationesque aquarum appellavit maria at vidit Deus quod esset bonum.

– Genesis 1:9–10, Vulgate

Und Gott sprach: Es samle sich das wasser unter dem himel an sondere örter, das
man das trocken sehe. Und es geschach also. Und Gott nennet das trocken Erde,
und die samlung der wasser nennet er Meere. Und Gott sahe es fur gut an.

– Genesis 1:9–10, Martin Luther, *Biblia/ das ist/ die gantze Heilige Schrift
Deudsch* (1534)

God said againe, Let the waters under the heaven be gathered into one place, &
let the drye land appeare. And it was so. And God called the drye land, Earth, &
he called the gathering together of the waters, Seas: & God sawe that it was good.

– Genesis 1:9–10, *The Geneva Bible* (1559)

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The earth is surrounded by water, just as that is by the sphere of air, and that again by the sphere called that of fire (which is the outermost both on the common view and on ours). Now the sun, moving as it does, sets up processes of change and becoming and decay, and by its agency the finest and sweetest water is every day carried up and is dissolved into vapor and rises to the upper region, where it is condensed again by the cold and so returns to the earth. This, as we have said before, is the regular course of nature.

– Aristotle, *Meteorology* 2.2, 354b23–32¹

These texts provided the foundation through which many Europeans from the patristic period through the sixteenth century understood water's contemporary ontological and spatial relationships to the earth. Both the Book of Genesis and Aristotle's *Meteorology* provided explanations of how water related to the earth, including why water did not currently submerge dry land where it existed in the world. According to Genesis, primordial water had entirely immersed it until God commanded this primordial water to come together in one place on the third day of creation, thereby providing a dry place for people, animals, and plants to live, and fashioning the basis of the current layout of the world's waterways and landmasses. Whereas God is responsible for the ontological and spatial relationships between water and earth in Genesis, Aristotle viewed these relationships as a part of the regular course of nature. In his works on natural philosophy, or *libri naturales*, he divided the sublunary world into four concentric, elemental spheres with earth at the center, surrounded by the spheres of water, air, and fire in that order.² Recognizing that some dry land stuck out above water, Aristotle juxtaposed an assertion of the existence of these four concentric, elemental spheres with an explanation of a hydrologic cycle, implying, though not actually stating, that water's natural process of change from a liquid to a vapor and back to a liquid allowed for earth to emerge above water wherever it did so in the world.³

1 Aristotle, *Complete Works of Aristotle*, 577.

2 Aristotle's *libri naturales* included his *Physics*, *On the Heavens*, *On Generation and Corruption*, *Meteorology*, and *On the Soul* along with some brief treatises that circulated in the medieval and early modern periods under the title, *Parva naturalia*; Grant, *History of Natural Philosophy*, 143–238.

3 For a discussion of Aristotle's conception of water's relationship to the earth and its impact on Europeans through the seventeenth century, see Grant, *In Defense of the Earth's Centrality and Immobility*, 22–27. See also, Goldstein, "Renaissance Concept of the Earth in its Influence upon Copernicus," 29–35.

Whether attributing water's relationship to earth and their spatial arrangement to God or nature, both Genesis and Aristotle's *libri naturales* still left open the possibility that water could and perhaps should currently inundate the dry land, drowning plants, animals, and people alike wherever they existed. Whereas the flood narrative of Genesis 6–9:17 showed what had happened when God ceased to hold water back from the earth to punish people for their sins, Aristotle ultimately wrote very little on the actual relationship between the spheres of water and earth. The ontological status of the dry land's existence and its location vis-à-vis water sparked commentary from and discussion among European exegetes, natural philosophers, geographers, and cosmographers from the patristic period into the sixteenth century. Though this commentary and discussion persisted for more than a millennium, the explanations these European authors gave of the water-earth relationship and their spatial arrangement changed, depending on the time period in which they were written. Though patristic and medieval writers tended to argue that the natural order God had established through creation and the promise he gave to Noah in Genesis 9:11 explained why the dry land currently existed where it did,⁴ sixteenth-century authors of exegetical, natural philosophical, geographical, and cosmographical texts provided a much wider variety of explanations for the water-earth relationship and placement, claiming that this relationship and placement were natural, preternatural, supernatural, a miracle, or even a wonder. The discussion of water vis-à-vis the earth in Augustine of Hippo's (354–430) fourth- and fifth-century works, the *Literal Meaning of Genesis* (*De Genesi ad litteram*) and the *City of God* (*De civitate dei*), and John Calvin's (1509–1564) *Commentaries on the First Book of Moses Called Genesis* (*In primum Mosis librum qui Genesis vulgo dicitur*, 1554) illustrates some of these differences. For Augustine, all processes in the world could be understood as simultaneously miraculous and natural as he claimed that creation itself was a miracle that God had implanted with all possibilities for future natural processes.⁵ His explanation for the contemporary water-earth relationship in *De Genesi ad litteram* focused on this natural order, though. His first explanation posited that water was different before the third day of creation. He argued that before the third day, primordial water could have been a thin vapor,

4 In the Vulgate, Genesis 9:11 reads, "statuam pactum meum vobiscum et nequaquam ultra interficietur omnis caro aquis diluvii neque erit deinceps diluvium dissipans terram." In the NRSV, Genesis 9:11 reads, "I establish my covenant with you, that never again shall all flesh be cut off by the waters of a flood, and never again shall there be a flood to destroy the earth."

5 Augustine, *City of God*, 21.6–9. For an explanation of Augustine's views on miracles as they relate to the natural order, see Ward, *Miracles and the Medieval Mind*, 1–4.

much like a cloud, which hovered over the entire earth. It only became the denser, less expansive substance people currently experienced in nature after God commanded it to gather into one place. In his second explanation, Augustine pointed to the earth's natural position to explain why water did not currently submerge it. According to this explanation, the earth settled during creation, providing hollow places within it for the primordial waters to flow. Since the earth rested on solid supports, it naturally extended over the primordial water that filled its caverns and hollow places.⁶ In contrast, John Calvin argued vehemently that water's failure to flood the dry land was an illustrious miracle.⁷ Drawing on Aristotle's notion of concentric, elemental spheres that should nestle inside one another, Calvin argued that water would entirely flood the earth if it were to follow its natural propensity, and he credited God's active and continued intervention into the world to restrain water from the dry land.⁸

This book explores how authors of this wide range of texts from the patristic period into the sixteenth century understood water's ontological and spatial relationships to the earth. It seeks to explain why the relative agreement between patristic and medieval authors about water's relationship to dry land began to break down in the sixteenth century. It argues that the influx of ancient texts, religious reformations, and fifteenth- and sixteenth-century European sea voyages led these authors to reconsider the relationship between the water and earth, including the layout of the world's landmasses and waterways. Though newly perused ancient texts and different understandings of how God related to the universe and to people certainly led these authors to examine their basic understandings of the world, fifteenth- and sixteenth-century sea voyages to sub-Saharan Africa and the Americas led them to conduct this re-examination in the context of water and its relationship to the earth. Discovering that water did not entirely submerge the Southern Hemisphere of the globe as many medieval authors had argued and encountering the people who lived there either directly or through rumors and printed works, these authors focused on the topic of water as a means through which to redefine a universe that experience revealed to be different than they had previously imagined.⁹

6 Augustine, *Literal Meaning of Genesis*, 1.12.26 and 2.1.1–4.

7 "Hoc quoque illustre est miraculum, quod aquae suo discessu habitandi locum hominibus dederunt"; Calvin, *In primum Mosis librum*, 4.

8 Ibid.

9 Though the water of the Southern Hemisphere caught sixteenth-century European authors' attention, they did not write much about water in the far Northern Hemisphere, assuming based on ancient precedent that water there was either iced over or that flowing water surrounded

Water was a significant topic for sixteenth-century authors of the genres of texts of concern to us here. Whereas commentators on Genesis dealt with God's creation of water and his fashioning of its relationship to the earth, authors of natural philosophical texts focused on the relationship between the elements of water and earth, and authors of geographical and cosmographical texts focused on how water related to the earth as they explained the relative positions of bodies of water and landmasses and these positions' relationship to the heavens. The authors of these texts also had much in common. The vast majority were university educated, and most of them tended to write in Latin. Rigid boundaries did not exist between academic disciplines or textual genres in the sixteenth century, and university education was also structured so that those who had degrees in theology also likely had some training in natural philosophy and even cosmography.¹⁰ For example, an author such as Philipp Melanchthon (1497–1560) who had achieved a *baccalaureus biblicus* (bachelor of biblical studies) as well as a master of arts degree could and did write both a commentary on Genesis and a natural philosophical text.¹¹

Despite similar training and background, the authors of these texts looked to different models for their works and often wrote for different purposes. For instance, whereas a commentator on Genesis often drew on previous exegeses of the biblical text while attempting to explicate the meaning of the entire biblical book,¹² an author of a natural philosophical text typically turned to Aristotelian sources and commentaries on his works to explain the universe and its phenomena.¹³ Therefore, the discussions of water and its relationship to the earth found in these texts cannot be simply equated with one another. Instead of assuming that authors of all these types of texts held the same or even similar conceptions of water, this book analyzes each type in detail, alongside the ancient, patristic, and medieval models on which their authors drew, so that the convergences and divergences between them can all be seen clearly. It begins with the

the northern portions of landmasses there just as it did the western portion of the Europe. On these far northern waters, see, Ginsberg, *Printed Maps of Scandinavia and the Arctic, 1482–1601*, and Van Duzer, "Hic sunt dracones."

10 On the history of universities and their curricula, see Rashdall, *Universities of Europe in the Middle Ages*; Daly, *Medieval University, 1200–1400*; Cobban, *Medieval Universities*; Siraisi and Demaitre, eds., *Science, Medicine, and the University: 1200–1550*; Ijsewijn and Paquet, eds., *Universities in the Late Middle Ages*; and Ridder-Symoens, *History of the University in Europe*.

11 Kusakawa, *Transformation of Natural Philosophy*.

12 Smalley, *Study of the Bible in the Middle Ages*.

13 Grant, *History of Natural Philosophy*, 143–238 and 274–78.

specific discussions of water and its relationship to the earth found in these texts without equating these discussions. It then examines the resonances between these various discussions and what these resonances can show about the assumptions sixteenth-century authors shared when they wrote about water and its relationship to the earth. As Anne Scott argued for the authors of medieval epics, romances, allegories, and fabliaux in her analysis of aqueous moments in these texts, "It is very clear that these stories draw upon an understanding and perception of water and its physical and metaphorical properties common and accessible to all persons."¹⁴ Despite their significant differences, the authors of these texts also shared underlying presuppositions about water, which an analysis of their works will reveal.

Comparing patristic, medieval, and sixteenth-century characterizations of water's relationship to the earth and their understandings of their actual arrangement, we find that authors of exegetical, natural philosophical, geographical, and cosmographical texts both implicitly and explicitly drew on the categories of the natural, preternatural, and supernatural to define this relationship and arrangement. Modern scholars have provided us with some insights into the history of these categories. Lorraine Daston and Katharine Park have argued that there was a tendency from the twelfth century especially among university-trained theologians and philosophers to differentiate between these ontological categories and to define them carefully under the influence of the newly introduced works of Plato and Aristotle. Many of these university-trained theologians and philosophers argued that God had implanted an order of nature during creation that operated in a regular pattern through more or less consistent secondary causes. They tended to consider occurrences that happened according to this pattern and through their usual secondary causes to be natural. For them, preternatural events were those that fell outside the normal pattern of the universe but that still occurred through secondary causes. Many authors classified these preternatural events as wonders. Supernatural events were those that went against the typical order of nature and occurred not through secondary causes but through God's direct intervention into the world. These supernatural events were often seen as miracles. Daston and Park have also argued that these categories began to shift in the sixteenth century as authors expanded the category of the preternatural, thus redefining the boundaries of the natural and the supernatural.¹⁵

14 Scott, "Come Hell or High Water."

15 Daston and Park, *Wonders and the Order of Nature 1150–1750*.

Comparing sixteenth-century European discussions of water's relationship to the earth to those from the medieval and patristic periods shows, much as Daston and Park have argued, that the ontological categories of the natural, preternatural, wonderful, supernatural, and miraculous were up for debate in the sixteenth and seventeenth centuries in a way that they had not been previously. In addition to confirming that such a shift was occurring in the sixteenth century, a focus on the topic of water allows for an exploration of why the meaning of these categories came into question specifically in this historical context. As Terje Tvedt and Terje Oestigaard have argued, histories of the ideas of water can teach us much about the societies that produced these ideas due to people's biological need for water. "Since human existence and social development have always been dependent on water, people have developed ideas and images of water – from the first myth of Sumer, where Enki brings order and life to the earth by pouring water into the beds of the Tigris and Euphrates, to the present day visions of Armageddon, where global warming is turning frozen water into running water and drowning civilizations."¹⁶ Therefore, as a substance with which people continually interacted, studying the ways in which conceptions of water shifted across time in a particular culture provides insight into changes in that culture, including why Europeans began to rethink the ways in which they categorized the universe's phenomena.

Looking specifically at sixteenth-century European discussions of water in these texts reveals that the impact of religious reformations on conceptions of the universe and its phenomena was one significant aspect of the redefinition of these categories. Debates about Christian theology shaped how contemporaries viewed the universe and people's abilities to sense, investigate, and understand that universe because it was understood to be God's creation through which he communicated with human beings.¹⁷ Modern scholars have typically focused on two aspects of the ways this notion influenced people's understandings of the universe. Whereas some scholars such as Philip M. Soergel have focused on how the particularly Protestant emphasis on God's providential control led people to view the world's phenomena as signs and portents,¹⁸ others such as Peter Harrison in his *The Fall of Man and the Foundations of Science* (2007) have focused on how

¹⁶ Tvedt and Oestigaard, *Ideas of Water*, 2–3.

¹⁷ Debus and Walton, eds., *Reading the Book of Nature*; Howell, *God's Two Books*; Debus and Walton, eds., *Book of Nature in Antiquity and the Middle Ages*; and Killeen and Forshaw, eds., *Word and the World*.

¹⁸ Soergel, *Miracles and the Protestant Reformation*.

Protestant notions of postlapsarian anthropology led to the development of experimental methodologies and inductive epistemologies in the late sixteenth and seventeenth centuries.¹⁹

Focusing on water's relationship to the earth draws together these two strands of investigation that have largely been explored separately in modern scholarship. God's relationship with water as depicted in the account of Genesis 1 made it an ideal topic through which Christian authors explored both God's connection to the universe and the human ability to perceive and understand it. For sixteenth-century authors, God's command to the waters to gather together in Genesis 1:9 was both the determinative moment for its relationship to the earth as well as the moment in which God made the earth habitable for people, plants, and animals.²⁰ As most Christians explicitly or implicitly turned to this Genesis account in their discussions of water, these discussions tended to include both extensive comments on God's providential control over the universe and the human ability to observe this providential control in the universe and to perceive God's revelation there. Examining Christian conceptions of the universe demonstrates the need to consider their notions of creation, revelation, providence, and human anthropology as integral aspects of their understandings of it.

Though the impact of religious reformations on Christian understandings of providence and the impact of original sin might explain why many sixteenth-century authors began to reassess the universe's phenomena, including the layout of the world's landmasses and waterways, and redefine the ontological categories of the natural, preternatural, supernatural, wonderful, and miraculous, it does not explain why such reassessment occurred specifically in the context of discussions of water and water's relationship to the earth. It was ultimately the interaction between the texts meant to explain the universe and fifteenth- and sixteenth-century sea voyages to sub-Saharan Africa and the Americas that led these discussions to take place in the context of the dry land's existence and placement. This context suggests the impact of European overseas voyages and encounters with previously unknown peoples and places on the intellectual history of Europe. J.H. Elliott provided the classical argument for how these voyages began to reshape the ways in which sixteenth- and seventeenth-century Europeans viewed their world in his *The Old World and the New 1492–1650* (1st ed., 1970; rev. ed., 1992).²¹ He claimed that Europeans' interest in an-

19 Harrison, *Fall of Man and the Foundations of Science*.

20 Williams, *Common Expositor*.

21 Elliott, *Old World and the New: 1492–1650*, 1970, and the revised edition, 1992.

cient texts initially retarded their ability to perceive the novelty of the new discoveries. According to him, as information about these discoveries continued to accumulate to an extent that these traditional sources could not accommodate, this overwhelming amount of information eventually ended the European dependence on books, opening up more intellectual possibilities. More recently, authors such as Anthony Grafton, April Shelford, and Nancy Siraisi, along with Christine R. Johnson, have challenged this interpretation. In their *New Worlds, Ancient Texts: The Power of Tradition and the Shock of Discovery* (1992), Grafton et al. argued that Europeans' reliance on a traditional canon of books had more to do with reshaping European intellectual trends than the discovery of and encounters with new people and places.²² They claimed that as Europeans started to rediscover a broader range of ancient texts during the course of the Renaissance, they also encountered the many disagreements between the authors of these texts. For Grafton et al., these disagreements both shaped European conceptions of the new worlds they now interacted with and caused the cracks in this bookish culture because Europeans could not reconcile these competing ancient authorities. Grafton et al. even go so far as to argue that many Europeans "would have reached a newfound historical land even if no one had reached America."²³ Johnson has continued this revisionist trend in her *German Discovery of the World: Renaissance Encounters with the Strange and the Marvelous* (2008). Focusing specifically on the case of Germany and how Germans responded to Spanish and Portuguese voyages of discovery and conquest, she has argued that these Germans "persistently and successfully used existing techniques of knowledge and established areas of expertise to make sense of the overseas world."²⁴ As she does so, she emphasizes the flexibility of traditional structures of Renaissance thought, which allowed Germans to perceive and understand overseas environments in ways that made these places familiar and comprehensible to them.

Sixteenth-century European discussions of the ontological and spatial relationships between water and earth suggest a slightly different way in which to understand the impact of European voyages on their scholarship and intellectual history. Much as Grafton et al. and Johnson have emphasized, sixteenth-century discussions of water did draw on ancient texts, whether of long-standing authority such as the Christian scriptures, the *libri naturales* of Aristotle, and medieval commentaries on these books, or more recently

22 Grafton et al., *New Worlds, Ancient Texts*.

23 *Ibid.*, 242.

24 Johnson, *German Discovery of the World*, 3.

translated works such as Ptolemy's *Geography*. For example, when an author classified the dry land's existence as a miracle, they tended to use God's command to the waters located in Genesis 1:9 to support his argument.²⁵ When an author classified the water-earth relationship as natural, they tended to point to a thirteenth- or fourteenth-century interpretation of Aristotle's works to explain how the earth could stick out from the water's sphere.²⁶ Though European bookish culture continued to reign when it came to explaining this relationship, this bookish culture cannot explain why particularly sixteenth-century European authors were interested in it, when previous authors were not. Much as Elliot has claimed, discussions of water suggest that the experience of sailing across oceans and seas that were difficult and dangerous led to a focus on the topic. The experience of sea voyages piqued European interest in water and its relationship to the earth, but they also continued to explore these topics through the bookish culture Grafton et al. and Johnson have outlined. In other words, though encounters with sub-Saharan Africa and the Americas did not cause an immediate change in the methods of comprehending the world, this experience did influence which questions many Europeans asked about that world and to which they applied their bookish methods. Asking different questions about water likely also had implications for how Europeans in the period viewed and interacted with peoples of the Americas, Asia, and Africa – topics, which fall outside the scope of this book, but which deserve further study.²⁷

In addition to addressing questions of interest to historians of early modern Europe, this study is also cognizant of the rising interest among current literary scholars in what has been called, "blue cultural studies" and "blue humanities." Conceptualized originally by modern scholar, Steve Mentz, the "blue humanities" seek to shift scholars' attention from land to sea in order to explore how people and water as well as the environment have interacted in the past, do interact in the present, and could interact in the future.²⁸ Though not engaging directly with such works, focusing on shifting conceptions of water and earth's ontological and spatial relationships in Europe in the ancient, patristic, medieval, and beginning of the early modern periods as this study does can provide those scholars interested in

25 See, for example, Zwingli, *Farrago annotationum in Genesim*, sig. aiiiiv, and Luther, *Genesisvorlesung*, 25–26.

26 See, for example, Zabarella, *De rebus naturalibus libri XXX*, sigs. VIr–X2v.

27 See, for example, Greenblatt, *Marvelous Possessions*; Campbell, *Wonder and Science*; and Wey Gómez, *Tropics of Empire*.

28 Mentz, *At the Bottom of Shakespeare's Ocean*, and his *Shipwreck Modernity*, as well as Brayton, *Shakespeare's Ocean*, and Gillis, "Blue Humanities."

the blue humanities with a historically specific analysis of how Europeans interpreted water and its relationship to the earth, as they explored what James L. Smith has called “the broad polyvalence of water.”²⁹

This book begins with a chapter that provides an analysis of how Europeans conceived of water’s relationship to the earth in the ancient, patristic, and early medieval periods. The rest of the book is divided into two sections. The first section includes the specific analyses of how authors of medieval and sixteenth-century exegetical, natural philosophical, geographical, and cosmographical texts conceptualized the ontological and spatial relationships between water and the dry land. Each type of text is examined in detail to explore how its authors tended to categorize the dry land’s existence – whether natural, preternatural, or supernatural – and how they understood the layout of the world’s landmasses and waterways. This analysis reveals that discussions of water and its ontological and actual relationship to the earth occurred on an unprecedented scale in all these types of works during the sixteenth century especially. It also shows that the possibilities for the classification of this relationship expanded greatly during this period. Tracing the resonances in these texts, this section ultimately makes the argument that sixteenth-century Europe did witness an unprecedented re-examination of the world’s constituent parts as well as the ontological categories of the natural, preternatural, and the miraculous much as Daston and Park have argued. It also raises the question of why this re-examination occurred specifically in the context of discussions of water and its relationship to the earth.

To answer this question, the second section explores the basic assumptions that undergirded these texts. It argues that three different trends contributed to this particularly sixteenth-century interest in water and its relationship to the earth: the influx and wider distribution of ancient texts not known to previous generations of Europeans, shifting conceptions of God and his providence in the wake of the debates accompanying religious reformations, and sea voyages and encounters with people living in the Southern Hemisphere. Whereas the influx of ancient texts and shifting conceptions of God and his providence certainly contributed to sixteenth-century re-examinations of the universe, sea voyages to the Americas, Africa, and Asia, places Europeans had previously thought uninhabitable, and encounters with people who lived there made the topics of water and its relationship to the earth of particular significance in the redefinition of these ontological categories and the universe, as water provided the pathway to these travels and encounters.

29 Smith, *Water in Medieval Intellectual Culture*, 32.

Sixteenth-century European intellectuals encountered a world that was different than the one they had conceptualized in earlier periods. Turning to texts such as the Bible and the works of Aristotle which had long held cultural prestige in Europe, sixteenth-century Europeans continued to rely on bookish methods to understand the world in which they lived. However, their conceptions of the universe and notions of water's relationship to the earth existed alongside increasingly many reports of significantly different spatial relationships between landmasses and waterways in the Southern and Western Hemispheres. These voyages ultimately led the authors of sixteenth-century water texts to reinterpret their canonical works so that they could conceive of an altered relationship between water and earth, even as they also attempted to incorporate recently discovered ancient works into this canon and debated God's connection to the universe and the human perception of that connection. As they reconciled their interpretations of texts with these new discoveries and developments in religious practice and doctrine, their discussions of water and its relationship to the dry land ultimately provided Europeans with new models of the universe, drawing them to understand and eventually dominate its seas and oceans and having implications for how we view the relationship between water, earth, and people in the twenty-first century.

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1. Athens and Jerusalem on Water

Abstract

This chapter examines European conceptions of water and its relationship to the earth in the classical and patristic periods. It argues that these texts provided the dual heritage from which medieval and sixteenth-century Europeans drew in order to develop their own notions of water and why it did not flood the earth. This chapter ultimately argues that though no two authors writing during this time period had exactly the same conception of water's relationship to the earth and the layout of the world's landmasses and waterways, most classical and patristic authors viewed water's failure to flood the earth, the resulting existence of the dry land, and the locations of that earth and water as natural occurrences.

Keywords: Augustine of Hippo; Aristotle; four elements; Plato; Bede; Isidore of Seville

Any statements by those who are called philosophers, especially the Platonists, which happen to be true and consistent with our faith should not cause alarm, but be claimed for our own use, as it were from owners who have no right to them.

– Augustine of Hippo, *De doctrina christiana* 2.144 (c.397 CE)¹

Augustine of Hippo (354–430 CE) provided an influential discussion of the relationship between pre-Christian learning and the study of the Christian scriptures in the second book of his fourth-century *De doctrina christiana*. In this work, he argued at length that the study of pre-Christian or “pagan” learning was permissible even encouraged, provided Christians used it

¹ “Philosophi autem qui vocantur si qua forte vera et fidei nostrae accommodata dixerunt, maxime Platonici, non solum formidanda non sunt sed ab eis etiam tamquam ab iniustis possessoribus in usam nostrum vindicanda”; Augustine, *De doctrina christiana*, 124–25.

to understand the scriptures. Noting the various dangers associated with pagan learning such as the threat of idolatry or the wasting of one's time on education ultimately irrelevant, Augustine nevertheless argued that there were some treasures in these pagan works that Christians must dig out and use for their true function of understanding scripture and preaching the Gospel.² Though certainly not uncontested in Augustine's day and into the sixteenth century, this notion of the study of secular subjects as handmaids to the study of scripture and theology became a dominant strain in the development of education in the Latin West.³ For example, even as most educated Christians ultimately understood the world as God's creation, they conceptualized the functioning of the world's phenomena through the teachings of ancient authors such as Plato and Aristotle, whose works and the commentaries on those works comprised large portions of Europeans' educational curricula. When sixteenth-century Christians commented on water's relationship to the earth, they drew on both an ancient and a patristic heritage in their discussions.

Athens on Water

Water was a major concern for those ancient Greek and Roman authors whose notions sixteenth-century European writers of exegetical, natural philosophical, geographical, and cosmographical texts cited and discussed in their works. Though the ontological status of the dry land's existence was not as significant a question for them as it would later be for sixteenth-century Europeans, their discussions of water and earth were influential for many later authors' conceptions of these two substances. Discussions of them and their relationship appeared in the mythological works of Homer (c.750 BCE?) and Hesiod (eighth century BCE) as well as in Greek scientific works from the sixth century BCE, both of these appropriated and bequeathed by the later

2 "Sic doctrinae omnes gentilium non solum simulate et superstitiosa figmenta gravesque sarcinas supervacanei laboris habent, quae unusquisque nostrum duce Christo de societate gentilium exiens debet abominari atque devitare, sed etiam liberales disciplinas usui veritatis aptiores et quaedam morum praecepta utilissima continent, deque ipso uno deo colendo nonnulla vera inveniuntur apud eos. Quod eorum tamquam aurum et argentum, quod non ipsi instituerunt sed de quibusdam quasi metallis divinae providentiae, quae ubique infusa est, eruerunt, et quo perverse atque iniuriose ad obsequia daemonum abutuntur, cum ab eorum misera societate sese animo separat debet ab eis auferre Christianus ad usum iustum praedicandi evangelii"; *ibid.*

3 See the discussion in Lindberg, *Beginnings of Western Science*, 152.

Roman empire to the early Middle Ages.⁴ Greeks and Romans discussed the subject of water in many different types of texts ranging from dialogues on cosmology such as Plato's *Timaeus* (427–348/47 BCE) to scientific treatises such as Aristotle's *libri naturales*, to poetic works such as Lucretius's *On the Nature of Things* (*De rerum natura*; 99/98–55 BCE), to geographical texts such as Strabo's (64 or 63 BCE–23 or 24 CE) and Ptolemy's (c.100–170 CE) *Geography*, and to encyclopedias such as Pliny the Elder's *Natural History* (*Naturalis historia*; 23–79 CE), Seneca's *Natural Questions* (*Naturales quaestiones*; c.4 BCE–65 CE), and those written in late antiquity and the early middle ages by Solinus (early third century), Macrobius (c.410 CE), and Martianus Capella (c.410–439 CE). Though no two ancient or early medieval authors had the same view of water and its relationship to the earth, three themes appeared frequently where they wrote about these substances. First, many ancient authors stressed the orderly and rational aspects of the universe's phenomena and water and earth as some of its constituent aspects. They explained in their discussions of water that this fundamental substance had a stable, natural relationship with the earth, governed by a series of intelligible causes and effects. Second, those writing specifically about the spatial relationships between the earth's landmasses and its waterways speculated about the existence of other unknown, inhabited dry land separated from the known part of the world, or the *ecumene*, by impassible bands of water and extreme climates. Third, whether writing from an elemental-ontological or a geographical perspective, some authors also stressed the destructive power of water, describing it as a substance that had the potential to destroy the earth through flooding. All three of these themes provided significant starting points for patristic, medieval, and sixteenth-century authors when they considered the water-earth relationship.

All three of these themes developed in conversation with the model of the world that mythological texts such as Homer's *Iliad* and Hesiod's

4 The distinction I make here between the more mythological writings of Homer and Hesiod and the scientific writings of the sixth-century-BCE Greek Ionians and their successors builds on those made in the works of Marshall Clagett and G.E.R. Lloyd. For Clagett and Lloyd, whereas Homer and Herodotus frequently turned to supernatural intervention to explain the world's phenomena, Greeks from the time of Thales of Miletus sought natural explanations for these phenomena, setting aside the intervention of supernatural beings and forces. Both Clagett and Lloyd argue that this focus on natural explanations was the beginning of science, or “the orderly and systematic comprehension, description, and/or explanation of natural phenomena and, secondly, the tools necessary for that undertaking.” This definition is offered in Clagett, *Greek Science in Antiquity*, 4, and explicitly cited in Lloyd, *Early Greek Science*, 1. See also the discussion in Wilbur and Allen, *Worlds of the Early Greek Philosophers*, 17–19.

Theogony proposed. David Furley, a modern scholar, summarizes this model thus:

The world picture presented by the earliest surviving Greek literature is tolerably clear. It consists of a flat earth, surrounded by the waters of the Ocean, with the solid dome of the heaven stretched over the top of all. Underneath is Tartarus, where the earth has its roots. Tartarus is as far below the earth as the sky is above it. The sun makes a journey across the heavens every day and sinks into the Ocean at night, to make his way somehow around the earth and rise again in the east in the morning. The stars perform a similar journey at night, except that some of them, the Pole Star and those close to it, never dip into the Ocean at all.⁵

As Furley here indicates, early Greek literature proposed that the waters of the Ocean entirely encircled the flat, circular ecumene. Homer suggested this arrangement between water and earth in *Iliad* 18.607 as he described the imagery of Achilles' shield, which presented a microcosm of the universe.⁶ After describing the circular shape of the shield and the contents of its center, Homer explained, "He [Hephaestus] put on it the great might of Okeanos, along the well-made shield's outer rim," indicating that the Ocean surrounded the inhabited earth.⁷ The fifth-century-BCE author, Herodotus, explicitly stated that earlier Greek writers had held that the Ocean encircled the earth, as he wrote in *Histories* 4.8, "They [the Greeks] affirm in words that Okeanos, beginning from the sun's risings, flows round the whole earth, but they give no effective demonstration of this."⁸ In addition to proposing an influential model of the Ocean's relationship to the ecumene, Homer also gave the Ocean a special role in the generation of gods and other living beings. During Hera's borrowing of Aphrodite's belt, Hera explains in *Iliad* 14.200: "For I am going to see the limits of fertile earth, Okeanos begetter of gods and mother of Tethys,"⁹ and Sleep tells her later in response to her request to put Zeus to sleep that, "Another of the everlasting gods would I easily send to sleep, even the streams of river Okeanos who is the begetter of all; but Zeus son of Kronos would I not approach, nor send to sleep except

5 Furley, *Cosmic Problems*, 14.

6 Germaine Aujac, "Foundations of Theoretical Cartography in Archaic and Classical Greece" (prepared by the editors from materials supplied), in Harley and Woodward, eds., *Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*, 130–47, at 131–32.

7 This translation appears in Kirk et al., eds. and trans., *Presocratic Philosophers*, 10.

8 *Ibid.*

9 *Ibid.*, 13–14.

that he himself so bid me.¹⁰ These notions of an encircling or circumambient Ocean and of water's ability to generate life proved influential from Homer's day into the sixteenth century.

As some Greek authors began to focus on natural causes and set aside supernatural explanations authors such as Homer and Hesiod offered, these earlier notions of water and its relationship to the earth still remained significant for their own understandings of water. Beginning in Ionia in the sixth century BCE, Greek thinkers began to speculate on the world's phenomena, specifically on the relationship between the appearance of the world and its eternal existence. They asked questions about the connection between sense perception of a seemingly changing world and its underlying reality and about what caused material changes in the sensible world, searching for unity behind the appearance of disorder.¹¹ In doing so, they built on more traditional Greek worldviews while proposing water as a constituent aspect of the universe that had a stable relationship to the earth. The statements attributed to Thales of Miletus (c.585 BCE) exhibit both trends. According to Aristotle in his *Metaphysics*, Thales was the first philosopher to argue that there was an underlying principle in the world through which and in which all material changes occurred, and Thales viewed water as this principle. Aristotle explained:

Of the first philosophers, most thought the principles which were of the nature of matter were the only principles of all things; that of which all things that are consist, and from which they first come to be, and into which they are finally resolved (the substance remaining, but changing in its modifications), this they say is the element and the principle of things, and therefore they think nothing is either generated or destroyed, since this sort of entity is always conserved, as we say Socrates neither comes to be absolutely when he comes to be beautiful or musical, nor ceases to be when he loses these characteristics, because the substratum, Socrates himself, remains. So they say nothing else comes to be or ceases to be; for there must be some entity – either one or more than one – from which all other things come to be, it being conserved. Yet they do not all agree as to the number and the nature of these principles. Thales, the founder of this school of philosophy, says the principle is water (for which he declared that the earth rests on water), getting the notion perhaps from seeing

¹⁰ Ibid.

¹¹ Lloyd, *Early Greek Science*, 16–22; Lindberg, *Beginnings of Western Science*, 28–30; and Grant, *History of Natural Philosophy*, 6–18.

that the nutriment of all things is moist, and that heat itself is generated from the moist and kept alive by it (and that from which they come to be is a principle of all things). He got this notion from this fact, and from the fact that the seeds of all things have a moist nature, and that water is the origin of the nature of moist things.¹²

Based on Aristotle's description, Thales taught both a specific relationship between the water and the earth as well as a special role for water in the universe, while likely also building on earlier conceptions of water's relationship to the earth.¹³ Thales' notion of earth floating in water resembles Homer and Hesiod's model of a flat earth encircled by water as well as the relationship between earth and water proposed in Egyptian and Mesopotamian sources and in the Hebrew Bible.¹⁴ Aristotle's explanation for why Thales viewed water as the underlying principle also resonates with the notion that Thales' water, much like Homer and Hesiod's Oceanus, was a generator and sustainer of all life. However, the notion of water as a first principle rather than as the god, Oceanus, puts Thales' work in a different category, and other Greek philosophers built on this notion to describe a stable, natural relationship between water and earth. Rejecting Thales' and others' notions that there was only one principle underlying the world, Empedocles (c.450 BCE) taught that there were four roots or elements that composed all things, and he numbered earth and water as two of these four roots along with air and fire.¹⁵ According to the early sixth-century-CE author, Simplicius of Cilicia, Empedocles taught that all things in the universe came through a combination of these four roots. "So insofar as they have learned to grow one from many, and again, as the one grows apart grow many, thus far do they come into being and have no stable life; but insofar as they never cease their continual interchange, thus far they exist always changeless in the cycle."¹⁶ Even though these roots did not exist in pure forms in the world, they did compose all things in the universe through a cycle of continual change caused by love and strife among the roots. Simplicius offers a further quote from Empedocles that states this capacity for mixture and cycle even more forcefully. "From them [the roots] come all that was and is and will be in the future – trees have sprung up and men and women, beasts and birds

12 Aristotle, *Complete Works of Aristotle*, 1555–56.

13 On the complexity of distinguishing Thales' teachings from his successors' based on Aristotle's descriptions, see Kirk et al., *Presocratic Philosophers*, 88–95.

14 *Ibid.*, 92–93.

15 See the discussion in Aristotle, *Complete Works of Aristotle*, 1558.

16 As quoted in Kirk et al., trans. and eds., *Presocratic Philosophers*, 287.

and water-bred fish, and long-lived gods, too, highest in honor. For there are just these [the roots], but running through each other they assume different appearances: so much does mixture change them."¹⁷ For both Thales and Empedocles, water and earth were significant aspects of the universe and ones that had a consistent, natural relationship to one another.

Plato and Aristotle developed this notion of water and earth as elements again emphasizing them as constituent principles of the universe with an intelligible relationship to one another. Though both authors built on the works of their predecessors, their model of the universe differed greatly from the flat landmass surrounded by water that Homer, Hesiod, and perhaps Thales of Miletus had proposed. According to Furley, by the time of Plato and Aristotle, many educated Greeks viewed the earth as spherical. The sky, too, was conceptualized as a sphere with the earth located at its center and with the celestial bodies revolving around the earth once a day in basically circular orbits.¹⁸ Furley claims that this worldview emerged in the Italian Peninsula and became known to Plato during his visit to the southern portion of it, allowing Plato to be the first Greek to describe the spherical earth fully in his *Phaedo*.¹⁹ Writing about water and earth in his *Timeaus*, Plato retained Empedocles' notion of them as elements that provided the basis for all the material objects with which people came into contact. Plato's discussion of these elements differed from Empedocles', however, in turning to geometry to describe their shape and combination. In doing so, Plato proposed a specific model of interaction between earth and water that stressed both their abilities to transform into one another as well as the relative ratios of each element in the world. As Plato argued, "In fact the world was to be solid in form, and solids are always conjoined, not by one mean, but by two. Accordingly, the god set water and air between fire and earth, and made them, so far as was possible, proportional to one another, so that as fire is to air, so is air to water, and as air is to water, so is water to earth, and thus he bound together the frame of the world visible and tangible."²⁰ Later in his text, Plato assigned plain figures to each one of the elements with fire associated with a pyramid, air with an octahedron, water with an icosahedron, and earth with a cube.²¹ He claimed that these plain figures were constantly in motion, and as they came together, they

17 Ibid., 293.

18 Furley, *Cosmic Problems*, 14–15.

19 Ibid., 24. Furley notes that it is possible Parmenides (c.475 BCE) mentioned a spherical earth in passing before Plato wrote the *Phaedo*.

20 Plato, *Plato's Cosmology*, 44.

21 Plato's discussion of the geometrical composition of the elements begins on *ibid.*, 212.

would break each other apart, causing the material changes in the universe. As he stated, “Moreover, in the course of suffering this treatment, they are all interchanging their regions. For while the main masses of the several kinds are stationed apart, each in its own place, owing to the motion of the Recipient, the portions which at any time are becoming unlike themselves and like other kinds are borne by the shaking towards the place of those others to which they become like.”²² Made up of these different plain solids with their variety of faces, Plato also suggested that there was more fire in the universe than air, more air than water, and more water than earth.²³ This ratio of water to earth, earth’s general solidity and immobility, and the constant motion of the elements meant that water and earth combined together in a rational pattern to form the substances people experienced on a day-to-day basis. For Plato, water was an underlying principle that combined with earth and the other elements in an orderly manner to help produce the sensible world.

Though setting aside Plato’s geometrical descriptions of the elements of water and earth and his geometrical explanations of their combinations, Aristotle retained the notion of earth and water as two of the four elements of the world, which mixed together in an orderly and rational manner to produce all the substances people experienced in the world. Aristotle argued that the four elements – fire, air, water, and earth – composed all the objects in the terrestrial realm or the portion of the universe in which people lived. He also assigned each element a sphere within this realm based on that element’s relative heaviness, with earth at the center, surrounded first by water, then air, and then fire, the element closest to the celestial realm of the planets and stars.²⁴ Aristotle’s discussion of the elements suggests that he did not think people actually encountered pure forms of them in the terrestrial realm, however. This is because the elements’ contrary qualities of hot and cold, wet and dry – and not the love or strife among them – caused them to combine, divide, and continually recombine into compounds. He intimated this notion in the second book of *On Generation and Corruption*. “In fact, however, fire and air, and each of the bodies we have mentioned, are not simple, but combined. The simple bodies are indeed similar in nature to them, but not identical with them. Thus the simple body corresponding to fire is fire-like, not fire; that which corresponds to air is air-like; and so

22 Ibid., 228.

23 Ibid., 179.

24 Aristotle, *Complete Works of Aristotle*, 474. See also Grant, *History of Natural Philosophy*, 37–42.

on with the rest of them.”²⁵ Aristotle here seems to argue that what people actually encountered in the terrestrial realm were compounds made up of mixtures of elements, and these compounds, as compounds, did not divide themselves into strictly separated elemental spheres. Instead, the compounds found their natural locations in the terrestrial realm depending on the prevailing element in each compound, and these natural locations only approximated the position of the elemental spheres. Applying this articulated theoretical framework to the water and earth people interacted with in their daily lives, these substances were not actually elemental water and elemental earth but compounds of all the elements mixed together. Compound water would contain some elemental earth, and compound earth would contain some elemental fire, air, and water. The specific mixture of elements in compound water and compound earth therefore meant that some of the compound earth could be lighter than compound water, causing it to stick out above it. For Aristotle, the differing qualities in the elements allowed them to combine together and form mixtures, and because of the elements’ tendency to mix together, water’s current relationship to the earth was a constituent part of the rational and orderly cosmos.

Plato and Aristotle’s works proved to be especially influential in the centuries after their deaths with the development of schools in Athens for the teaching of different philosophical traditions and the dispersal of Greek philosophy and its intermingling with other philosophical traditions through Alexander the Great’s (356–323 BCE) conquests. Whether studying the teachings of Plato and Aristotle or developing new ones in the case of Epicurus (341–270 BCE) and Zeno of Citium (c.334–262 BCE), who both stressed the study of philosophy to eliminate the fear of the unknown and the superstitions they associated with such fear, these philosophers continued to write about the relationship between water and the earth and to view this relationship as a rational one based on natural principles.²⁶ Those studying the teachings of Plato and Aristotle often sought unity between their ideas.²⁷ In doing so, they especially stressed the natural relationship between water and earth and the naturalness of water’s failure to flood the earth as found in the contrary qualities of the elements Aristotle had discussed. Alexander of Aphrodisias’s late second- to early third-century-CE commentaries on Aristotle’s works, and Calcidius’s fourth-century-CE partial translation and commentary on Plato’s *Timaeus*, proved especially

25 Aristotle, *Complete Works of Aristotle*, 541.

26 On these developments, see Lindberg, *Beginnings of Western Science*, 67–81.

27 Sorabji, “Ancient Commentators on Aristotle,” in his, *Aristotle Transformed*, 1–30, at 2–8.

influential in the period and into the sixteenth century and exhibit these trends.²⁸ Alexander's commentary on the supposed fourth book of Aristotle's *Meteorology* focused specifically on the four qualities that came together to compose the elements.²⁹ As Alexander emphasized, there are "four tangible powers, heat, coldness, dryness, and moisture" and "from the coupling of these powers, the elements come to be."³⁰ His text focused especially on the ways in which these qualities led the elements to come together to form mixtures, stressing much as Aristotle had implied that people do not encounter pure examples of the elements on earth in the material world. As Alexander stated, "He [Aristotle] says that all things mixed of earth and water must be classed with the thing of which they contain more, with water if the water is more, or with earth if the earth is more," and he went on to describe the ways in which things containing both water and earth could solidify as well as rarefy, depending on the qualities present in and acting on that mixture, implying in the case of earth and water that there is a balance between the water and earth in the world.³¹ In contrast, Calcidius developed Plato's geometrical descriptions of the elements' compositions and added arithmetical proofs for their existence and relationship to each other,³² while retaining an interest in the qualities of the elements much as Aristotle and Alexander had done. As Calcidius explained, "For earth has two proper qualities, coldness and dryness [...] Similarly, water is found to consist of two qualities, namely moistness and coldness; and dryness is the proper quality in the case of earth whereas moistness is the one in the case of water and common to both is the nature associated with coldness. Now, whenever the broad expanse of earth is by degrees transformed into water, then its dryness will be changed into moistness while the coldness common to both abides in its proper state."³³ Much like Alexander, Calcidius

28 On Alexander of Aphrodisias, see *ibid.*, 1. On Calcidius, see the introduction to Calcidius, *On Plato's Timaeus*, pp. vii–xvii.

29 Eric Lewis explains in the introduction to his translation of Alexander of Aphrodisias's text that scholars from shortly after Aristotle's life into the modern period do not think this particular book was actually a part of Aristotle's original *Meteorology*. Lewis argues, however, that Alexander viewed the treatise as a continuation of Aristotle's argument in *On Generation and Corruption* that the four elements were composed of the four contrary qualities and that Alexander explored this theme in particular in his commentary on this treatise. Alexander of Aphrodisias, *On Aristotle's Meteorology* 4, 9–17.

30 *Ibid.*, 65.

31 *Ibid.*, 103–4.

32 Calcidius's geometrical and arithmetical proofs appear in Calcidius, *On Plato's Timaeus*, 133–59.

33 *Ibid.*, 616–17.

adapted the discussion of the contrary qualities to describe the ways in which water and earth mixed together to form substances even as he retained Plato's emphasis on the geometric composition of the elements and their arithmetical coming together.

While these commentators were expanding the works of Plato and Aristotle and developing the more recent teachings of Epicurus and Zeno of Citium, other scholars working in portions of the growing Roman empire began to focus on the spatial relationship between the earth's landmasses and its waterways in a developing textual genre that has come to be known as, "geography."³⁴ These works were in dialogue with those of Homer, Hesiod, and those from Greek philosophical traditions, and as such, they tended to assume many of these texts' ideas were common, general knowledge.³⁵ For example, Strabo (c.64 BCE–25 CE) mentioned the elements of water and earth and their spherical shape, stating that water rides on the earth and together they form a sphere at the center of the universe.³⁶ Rather than delving into the question of the four elements and their relationships as Plato, Aristotle, and their later commentators had done, Strabo, Pomponius Mela (active 40s CE), and Ptolemy focused on the nature of the ecumene. In doing so, Strabo and Pomponius Mela speculated about the existence of other unknown, inhabited hemispheres of the world separated from the ecumene by impassible bands of water and extreme climates and water's capacity to flood the earth. Ptolemy, on the other hand, offered a different notion of the world's landmasses and waterways while also providing a discussion of earth's relationship to the heavens and of how to construct maps based on locational data points. These notions had a long life into the sixteenth century as they figured prominently in how Europeans viewed water's actual spatial relationship to the earth, especially as Strabo's and Ptolemy's texts were translated into Latin only during the late Middle Ages.³⁷

Strabo, Pomponius Mela, and Ptolemy shared the same general notion of the ecumene as they divided it into the three continents of Africa, Asia, and Europe and claimed that the waters of the Ocean washed the shores of at least a large portion of it. They also claimed that this Ocean broke into the landmasses at various points to form major bodies of water such as the Mediterranean and Caspian seas and that these large bodies of

34 On the development of this genre in antiquity and its characteristics, see Paassen, *Classical Tradition of Geography*.

35 See the discussion in Ptolemy, *Ptolemy's Geography*, 5–17.

36 Strabo, *Geography*, 1: 205–7 and 1: 431.

37 On Ptolemy, see Ptolemy, *Ptolemy's Geography*, 41–52. On Strabo, see Stahl, *Roman Science*, 59–61.

water helped to separate one continent from another.³⁸ Whereas Strabo and Pomponius Mela claimed that the Ocean entirely surrounded these continents,³⁹ Ptolemy held a different view, arguing, “The known part of the world has been laid out as having the Ocean in no wise flowing around it, but rather [the Ocean] borders only the boundaries of Libye [Africa] and Europe that are drawn in the directions of [the winds] *Iapyx* and *Thraskias*, in agreement with the researches of the more ancient [writers].”⁴⁰ Ptolemy also claimed that the ecumene was not entirely known due to its vast size and human carelessness, and his text invited people to continue to explore the ecumene to provide the best locational data so that ever more accurate representations of it could be constructed.⁴¹ In doing so, he expressed the opinion that there was much less water in the world than many of his contemporaries thought and that the ecumene extended to the east well beyond what others had taught.

Whereas Ptolemy downplayed the amount of water in the world, focused on the ecumene, and encouraged his readers to do likewise, Strabo and Pomponius Mela built on the theories of the late sixth- and early fifth-century-BCE philosopher, Parmenides, and of the second-century-BCE thinker, Crates of Mallus, to speculate about whether there was other inhabited land in the world and whether people living in the ecumene could travel to it. Whether this land existed and whether people living in the ecumene could reach these other inhabited lands depended on both water’s spatial relationship to the dry land and the supposed climate zones in the world. Strabo summarized Crates’ teaching thus:

For Crates, following the mere form of mathematical demonstration, says that the torrid zone is occupied by Oceanus and that on both sides of this zone are the temperate zones, the [one] being on our side, while the other is on the other side of it. Now, just as these Ethiopians on our side of the Oceanus, who face the south throughout the whole length of the inhabited world, are called the most remote of the one group of peoples, since they dwell on the shores of Oceanus, so too, Crates thinks, we must conceive that on the other side of Oceanus also there are certain Ethiopians, the most remote of the other group

38 Strabo takes up the question of the layout of the ecumene in the fifth section of his second book. This section begins on Strabo, *Geography*, 1: 419; see also Pomponius Mela, *Pomponius Mela’s Description of the World*, 108–9.

39 Strabo, *Geography*, 1: 9–19, and Pomponius Mela, *Pomponius Mela’s Description of the World*, 34.

40 Ptolemy, *Ptolemy’s Geography*, 117.

41 *Ibid.*, 63.

of peoples in the temperate zone, since they dwell on the shores of the same Oceanus; and that they are in two groups and are sundered in twain by Oceanus.⁴²

According to Strabo, Crates argued that there were two bands of Ocean that ran around the spherical globe, dividing it into four separate parts, and that people lived on landmasses in each one of these parts. For Strabo, the nature of these Ocean bands as well as the climate of the earth kept people in the ecumene from traveling to these other inhabited sections of the earth. Not only was the Ocean too large to cross, but Strabo also claimed that the globe was broken into five climate zones, a notion Parmenides had earlier proposed: the northern and southern frozen zones; the northern and southern temperate zones; and the torrid zone around the equator and in one of the Ocean bands. Though people, plants, and animals could live in the northern and southern temperate zones, the torrid zone was impassible for them due to its heat. Therefore, the Ocean's breadth and the climate of the world at the equator meant that those from the ecumene could not access the southern temperate zone, forcing the geographer to focus solely on the ecumene.⁴³ Writing slightly later, Pomponius Mela indicated a similar notion of the Ocean and the climate zones in his text as he explained:

In the middle of this unity the uplifted earth is encircled on all sides by the sea. In the same way, the earth also is divided from east to west into two halves, which they term hemispheres, and it is differentiated by five horizontal zones. Heat makes the middle zone unlivable, and cold does so to the outermost ones. The remaining two habitable zones have the same annual seasons, but not at the same time. The Antichthones inhabit one, we the other. The chorography of the former zone is unknown because of the heat of the intervening expanse, and the chorography of the latter is now to be described.⁴⁴

In addition to proposing similar notions of water's relationship to the earth's landmasses and the existence of other, inaccessible inhabited lands, Strabo and Pomponius Mela also proposed that the Ocean occasionally flooded the ecumene, specifically due to the Ocean's tides. In this regard, they emphasized water's potentially destructive power. Pomponius Mela explained

42 Strabo, *Geography*, 1: 113.

43 Ibid., 1: 361–71.

44 Pomponius Mela, *Pomponius Mela's Description of the World*, 34.

that, “After it [the Ocean] floods out from its center point, equally onto all the shores of land and island, even though they lie in different directions, Ocean gathers itself back into its center point from those shores and returns to its original position. It always moves with so much force that it even drives back great rivers and either sweeps away the creatures of the earth or else strands marine life there.”⁴⁵ Strabo in contrast took a historical view arguing that, “one may admit that a great part of the continents was once covered by water for certain periods and was then left bare again [...], just as we might admit, of course, that the part of the earth above water, on which we live, is subject to all the changes mentioned by Erastotenes himself.”⁴⁶ In their attempt to describe the ecumene, Strabo, Pomponius Mela, and Ptolemy proposed influential models of the world’s landmasses and waterways that contained both the possibility for yet unknown but inhabited land and water’s flooding of the earth.

Both Greek philosophical traditions and this interest in geography found readers and further dispersal in the Roman empire. As the modern scholar, William H. Stahl, explained, Roman science tended to be derivative of earlier Greek science because of the culture of the Roman upper classes. They especially prized medicine, logic, and rhetoric but also found a basic knowledge of science lent one a certain prestige.⁴⁷ Stahl explains that Romans were not overly invested in scientific speculation, preferring to focus on more practical topics of study, and so they tended to seek knowledge of theoretical science in popularized forms such as handbooks and compendia of earlier Greek teachings that used concise and clear writing while offering a broad range of information about the natural world.⁴⁸ Those handbooks and compilations that Lucretius, Seneca, and Pliny the Elder wrote provide a good example of this trend toward compiling the views of earlier, especially Greek thinkers. In doing so, these authors continued to reflect on both the ontological and the spatial relationship between water and earth. As a compilation of Hellenistic ideas, these works included aspects of all three themes related to water and its relationship to the earth that earlier writers had touched on. Whereas they, too, focused on the orderliness of the universe and described water and earth as some of its constituent aspects much as Greek philosophers had, they also discussed the possibility of water’s flooding the earth and

45 Ibid., 103.

46 Strabo, *Geography*, 1: 185–87.

47 Stahl, *Roman Science*, 7–9. See also the discussion in Lindberg, *Beginnings of Western Science*, 132–36.

48 Stahl, *Roman Science*, 65–72.

of the existence of inhabited continents outside the ecumene from which bands of water and extreme climates separated them, much as Strabo and Pomponius Mela had. In that way, these Roman writers began to convey some portions of Greek scholarship to a Latin-language readership in their own day, and it was largely through their works that early medieval people learned about Greek scholarship.

Building on earlier Greek philosophy in Latin popular forms, both Lucretius and Seneca held similar ethical motivations for the study of natural phenomena, similar notions of water and earth as significant components of the universe, and similar views of how water could entirely destroy the current world. Both authors built on philosophical teachings that had developed in Athens after Plato and Aristotle's deaths, with the focus of Lucretius's poem, *De rerum natura*, on popularizing Epicurus' teachings, and that of Seneca's discussion of meteorology in his *Naturales quaestiones* on Stoic notions that had arisen from the teaching of Zeno of Citium. According to the modern scholar, David Lindberg, both Epicureans and Stoics were more interested in ethics than the physical world, but they viewed its study as crucial for their ethical aims. For both, the ultimate goal of human life was happiness. Epicurus and his followers, however, taught that people could only achieve such happiness by getting rid of the fear of the unknown and the supernatural through the study of the physical world. For Stoics, on the other hand, such happiness could only come through living in accordance with nature and to live so required knowledge of the physical world.⁴⁹ Basing himself on earlier teachings, Seneca argued that both water and earth were elements and that these two in particular were closely related. As he addressed why the flowing of rivers into the sea did not cause the sea to overflow, he argued that earth could easily change into water and vice versa because both were heavy and dense.⁵⁰ He also argued that there were channels under the surface of the earth through which large quantities of water flowed much like the arteries and veins in human bodies and that these underground channels helped replenish rivers and springs.⁵¹ In contrast to Seneca's view of water and earth as elements, Lucretius built on Epicurus' teachings on atoms and the void to explain natural phenomena.⁵² He argued strongly against the existence of the elements, claiming that if they were to exist, the world would tend to destruction. "For whatever by being changed

49 Lindberg, *Beginnings of Western Science*, 76–81.

50 Seneca, *Natural Questions*, 31.

51 *Ibid.*, 34.

52 Lindberg, *Beginnings of Western Science*, 139.

passes outside its own boundaries, at once this is the death of that which was before.”⁵³ Despite denying water’s status as an element, Lucretius did focus on the substances of water and earth in his discussion of the world’s coming to be, proposing a close relationship between them. He explained that the particles of the world began in a confused mass and then started to separate and divide out the various features of the world, including earth and water. For him, earth was formed first out of the particles, and sea, sky, and sun appeared through future developments of the earth. “For in plain fact firstly all bodies of earth, being heavy and entangled, came together in the midst and took the lowest place; and the more entangled they came together, the more they squeezed out those particles which could make sea, stars, sun, and moon and the walls of the great world; for these were all made of seeds more smooth and more round and far smaller elements than the earth.”⁵⁴ As the ether, fire, and air separated from earth and water,

when these bodies were withdrawn, suddenly the earth sank down where now the blue expanse of the sea extends so wide, and drowned its hollows with the salt flood. And day by day, the more the tide of ether and the sun’s rays compressed the earth into compactness with frequent blows from all sides upon its outermost confines, so that thus beaten it was packed together and came together upon its own center, so much the more did the salt sweat, squeezed out of its body, by its oozing increase the sea and the swimming plains [...].⁵⁵

Despite disagreeing about whether water and earth were elements, both Lucretius and Seneca argued that water and earth were significant aspects of the current universe with a physically close relationship to each other that allowed one to mix with and change into the other.

Though both Lucretius and Seneca stressed the ways in which natural phenomena tend to balance each other out so that water did not normally flood the earth,⁵⁶ they also discussed the possibility that water could rise and entirely flood the earth, killing all life upon it. Lucretius made such an argument in his discussion of the balance between fire and water. Stressing that the sun and heat were at constant war with water, he described water’s power thus: “so plentiful a supply do the rivers bring up, and further threaten

53 Lucretius, *De rerum natura*, 65.

54 *Ibid.*, 413.

55 *Ibid.*, 415–17.

56 *Ibid.*, 399, and Seneca, *Natural Questions*, 31.

to deluge the whole from the deep gulf of the sea,” and he claimed that both fire and water had each won this war once.⁵⁷ Seneca included a similar discussion in his text. “Water and fire lord it over terrestrial things; they bring about creation, they bring about destruction. So whenever the world decided on revolution, the sea is sent crashing down over us; just as heat and fire are when another form of extinction is approved.”⁵⁸ He explained that the sea is at the same level as the earth and that the two of them together combine to form the shape of a globe, making it especially easy for water to swallow up the earth when its level starts to rise.⁵⁹ Though water and earth were significant aspects of the universe that were usually in balance with one another, both Lucretius and Seneca argued that water had flooded the earth in the past and that it could and would do so in the future.

Pliny the Elder’s *Naturalis historia* contained similar discussions of the ontological status of water and earth while also including teachings on the spatial arrangement of the world’s landmasses and waterways that were very similar to those found in the works of Strabo and Pomponius Mela. Pliny’s text was especially significant for the spread of Greek science to a Latin-language audience as the thirty-seven books of his encyclopedia survived intact and circulated widely during the Middle Ages.⁶⁰ In his second book, Pliny explained that the existence of the four elements – fire, air, earth, and water – was a common, accepted teaching. He also located earth at the center of the universe, stating, “suspended by its force in the center of the space is poised the earth, and with it, the fourth element, that of the waters.”⁶¹ He also argued that earth and water unite in a mutual embrace to the extent that water penetrated into the earth and ran through it through a series of veins under the earth’s surface much as Seneca had done.⁶² Much like Lucretius and Seneca, though lacking the notion of a coming flood that would destroy the current earth, Pliny also posited that water could be harsh in comparison to the earth, arguing, “Water rises in mist, freezes into hail, swells in waves, falls headlong in torrents; air becomes thick with clouds and rages with storms; but earth is kind and gentle and indulgent, ever a handmaid in the service of mortals.”⁶³ Pliny’s text differed from Lucretius’s and Seneca’s, though, in the inclusion of a description of the

57 Lucretius, *De rerum natura*, 409.

58 Seneca, *Natural Questions*, 49.

59 *Ibid.*, 48.

60 On Pliny’s work and its influence, see Stahl, *Roman Science*, 101–19.

61 Pliny the Elder, *Natural History*, 1.177.

62 *Ibid.*, 1: 301.

63 *Ibid.*, 1: 291.

world that resonated with similar discussions in the geography texts of the period. Much like Strabo and Pomponius Mela, Pliny argued that the Ocean entirely surrounds the ecumene, and he included the teachings about the ocean bands that along with the torrid climate zone supposedly separated the ecumene from other inhabited land stemming from at least the time of Crates of Mallus. Pliny explained, "Thus there are seas encircling the globe on every side and dividing it into two, so robbing us of half the world, since there is no region affording a passage from there to here or from here to there."⁶⁴ Pliny's work transmitted both the notion of water and earth as constituent elements of the universe as well as the notion that there were inhabited landmasses on the other side of the globe from which bands of water and the torrid zone separated those living in the ecumene.

The legacy of Lucretius, Seneca, and Pliny continued into the early Middle Ages as many authors such as Solinus, Macrobius, and Martianus Capella produced their own handbooks and compendia of scientific knowledge based primarily on earlier Roman works. In doing so, they communicated some of the earlier teachings about water's relationship to the earth and about the spatial relationship between the earth's landmasses and its waterways to early medieval Christian writers. According to William Stahl, authors such as Solinus, Macrobius, and Martianus Capella were interested in cosmography more broadly and tended to take their information from more recent compendia such as Pliny's *Naturalis historia* as a way to gain mastery of a field of knowledge as quickly as possible.⁶⁵ Solinus's *Collection of Memorable Things* (*Collectanea rerum memorabilium*), also known in the Middle Ages as *Polyhistor*, provides a good example of Pliny's influence as Solinus drew heavily on Pliny's text to describe the various wonders of the world.⁶⁶ Macrobius's *Commentary on the Dream of Scipio* and Martianus Capella's *Marriage of Philology and Mercury* surveyed a wider range of earlier sources than Solinus had, and their works became influential sources for European cosmology and Neoplatonism into the fourteenth century.⁶⁷ All three of these works classified water and earth as elements, communicating the ancient teaching of water's constituent place in the universe to later readers.⁶⁸ Macrobius and Martianus Capella also discussed the geographical

64 Ibid., 1: 305. The discussion of the climate zones appears on 1: 307.

65 Stahl, *Roman Science*, 135–42.

66 Ibid., 136–42.

67 Ibid., 151–90.

68 Solinus, *Excellent and Pleasant Worke of Iulius Solinus Polyhistor*, sig. niir; Macrobius, *Commentary on the Dream of Scipio*, 182; and Martianus Capella, *Martianus Capella and the Seven Liberal Arts*, 224.

teachings stemming from Crates of Mallus that posited the existence of two ocean bands and the five climate zones that separated the ecumene in the northern temperate zone from possibly inhabited land in the southern temperate zone. The form in which Macorbius's work circulated during the Middle Ages was especially influential in conveying this teaching to later generations, as his text frequently circulated with zone maps.⁶⁹ Macrobius explained:

The Ocean which is generally supposed to be the only one is really a secondary body. The main course actually flows around the earth's torrid zone, girdling our hemisphere and the underside, and follows the circumference of the equator. In the east, it divides, one stream flowing off to the northern extremity, the other to the southern; likewise, in the west, streams flow to the north and south, where they meet the streams from the east at the poles. As they rush together with great violence and impetus and buffet each other, the impact produces the remarkable ebb and flow of Ocean [...].⁷⁰

In addition to describing the Ocean bands and the torrid climate that separated those living in the Northern Hemisphere from the Southern Hemisphere, he also stressed that the torrid zone located at the equator kept “the races we are privileged to know, whether Romans, Greeks, or barbarians” from meeting those in the southern temperate zone, for “by whom it is occupied, we have never been permitted to learn and never shall be, since the torrid zone lying between denies the people of either zone the opportunity of communicating with each other.”⁷¹ Though containing similar teachings about the climate zones and the two ocean bands, Martianus Capella's work allowed more scope for navigation of these oceans, providing some possibility that people living during his own day could navigate the ocean that surrounded the ecumene.⁷² He argued, “Voyages in all directions prove that a circumambient ocean girds the shores of the globe [...] From the pillars consecrated to Hercules at Cádiz all the way around the Arabian Gulf, the southern Ocean is navigable, as has been attested in many instances [...] I consider the fact that these seas have been navigated on all sides to

69 Stahl in Macrobius, *Commentary on the Dream of Scipio*, 50.

70 *Ibid.*, 214.

71 *Ibid.*, 203.

72 For Martianus Capella's discussion of these climate zones, the two ocean bands, and the inhabited southern temperate zone, see Martianus Capella, *Martianus Capella and the Seven Liberal Arts*, 224–26.

be proof that the lands of the upper hemisphere are girded by a sea that stretches over a circular course."⁷³

As we have seen from this survey of ancient and early medieval texts, ancient Greek and Roman authors as well as those from the Middle Ages who borrowed directly from their texts wrote extensively about water and its relationship to the earth. For them, water was both a significant, usually underlying, aspect of the universe as well as a geographical boundary around the known world. Since the sixth century BCE, many Greek philosophers had argued that water and earth were elements through which all the material substances in the world came to exist. They tended to depict the relationship between water and earth as a natural one, based on the qualities or the shapes of these elements, positing a balanced, orderly relationship between them and the other two elements of fire and air that allowed the elements to mix together in rational, stable ways. This interest in water and earth perhaps developed through the supposed spatial relationship between bodies of water and dry land in the world, as the earliest Greek literature had posited and experience had shown that the waters of the Ocean entirely encircled the known dry land. Greek thinkers retained this notion of the spatial relationship between water and earth even as they began to abandon the conception of the earth as a flat disc in the fifth century BCE and subscribe to the view of the world as a sphere. From the time of Crates of Mallus in the second century BCE, some even posited the existence of other inhabited continents in other sections of the globe from which the two ocean bands separated those living in the ecumene, again emphasizing water's ability to define the boundaries of the world. Despite the emphasis on the stable relationship of water and earth, whether from an ontological perspective or from a spatial one, there was a counter-tendency in some of these Greek works and their Roman and early medieval successors to also view water as potentially dangerous, again perhaps based on the experience of living so close to the unpredictable and large Mediterranean Sea.⁷⁴ From the time of the Greek geographers and the Roman encyclopedists, the notion that water could destroy the earth became common and was carried into the Middle Ages through their works and later handbooks and compendia. Though sixteenth-century European authors read and discussed these ancient works as they explained the water-earth ontological and spatial relationships, they also encountered many of them indirectly through the

73 *Ibid.*, 230–31.

74 On the physiographic, climatic, and biological features of ancient Mediterranean Europe, see Hoffman, *Environmental History of Medieval Europe*, 20–43.

works of patristic authors such as Basil of Caesarea (c.330–379 CE), Ambrose of Milan (c.340–397 CE), and Augustine of Hippo. As these patristic authors attempted to explain various biblical passages, they tended to mingle such ancient philosophical notions with their theological and pastoral teachings as, “many of the Fathers had been educated in pagan surroundings and personally accepted whatever of science and philosophy did not conflict with their religion.”⁷⁵ Patristic texts were the other major heritage through which sixteenth-century Europeans understood the dry land’s existence.

Jerusalem on Water

Water and its relationship to the earth were also significant concerns for patristic authors as they explained God’s creation of the world and his continued connection to it. The Book of Genesis included a description of how God had created water and earth and established the relationship between them, and this biblical text provided the foundation of patristic authors’ discussions of these two substances. It explains that “in the beginning” God created heaven and the earth, but that this earth was not the earth people now encountered. Instead, the text states that it was formless and empty, and it suggests that primordial water entirely covered it.⁷⁶ According to Genesis, on the second day, God divided the primordial water apart, placing some above the heavens while leaving some below the heavens, presumably still covering the earth.⁷⁷ According to the text, it was only on the third day of creation that water and earth began to take their familiar (to people) shape. At God’s command, the remaining primordial water gathered together into one place, allowing the dry land to appear, and God labeled this water, “seas,” and the dry land, “earth.” This concentration of the waters in one location prepared the earth for the growth of plant life, which took place on the same day after a further command from God.⁷⁸

75 Robbins, *Hexaemeral Literature*, 2.

76 In the Vulgate, Genesis 1:1–2 reads, “In principio creavit Deum caelum et terram. Terra autem erat inanis et vacua et tenebrae super faciem abyssi et spiritus Dei ferebatur super aquas.”

77 In the Vulgate, Genesis 1:6–8 reads, “Dixit quoque Deus fiat firmamentum in medio aquarum et dividat aquas ab aquis et fecit Deus firmamentum divisitque aquas quae errant sub firmamento ab his quae errant super firmamentum et factum est ita vocavitque Deus firmamentum caelum.”

78 In the Vulgate, Genesis 1:9–12 reads, “Dixit vero Deus congregentur aquae quae sub caelo sunt in locum unum et appareat arida factumque est ita et vocavit Deus aridam terram congregationesque aquarum appellavit maria et vidit Deus quod esset bonum et ait germinet terra herbam virentem et facientem semen et lignum pomiferum faciens fructum iuxta genus suum cuius semen in semet ipso sit super terram et factum est ita et protulit terra herbam virentem

In the form of homilies and commentaries, patristic authors such as Basil, Ambrose, and Augustine attempted to explain not only how the primordial waters had gathered together during creation but also what this gathering meant for the contemporary relationship between water and earth. As they did so, they built on both earlier and contemporary Jewish interpretations of creation such as those of Philo of Alexandria (c.20 BCE–50 CE) and the *Genesis Rabbah* (c.400 CE) and on ancient and contemporary Greek and Roman scientific teachings that were a significant aspect of their educational and cultural contexts.⁷⁹ While they attempted to explain the six days of creation or *hexaemeron* to their audiences in Caesarea and Milan in the form of sermons or to the members of their religious community in Hippo through written works, Basil, Ambrose, and Augustine drew from Jewish exegetical and midrashic traditions the notions of God as a creator and of a creation fashioned specifically for people, while also frequently appropriating concepts from Greek and Roman philosophy and geography to elucidate the specific ways in which the creator God had fashioned the world's phenomena. In contrast to Greek and Roman scientific works, these patristic texts gave God the credit for the active creation and fashioning of the universe, though they frequently depicted God's creation of the world as his instilling of an order into it and explained the current relationship between water and earth as a constituent aspect of this created, orderly, rational universe much as earlier and contemporary Greek and Roman writers had done. Augustine also reckoned with the teachings of Crates of Mallus on the possibility of other inhabited zones of the world that large expanses of water and an extremely hot equatorial zone separated from the ecumene, providing an influential denial of such an inhabited land for theological rather than philosophical reasons. Augustine and these other patristic authors therefore incorporated philosophical teachings to understand both contemporary water and earth and the created world in which they lived – a process medieval and early modern Christians would maintain as they described water's relationship to the earth in the range of texts under investigation here.

These patristic authors' incorporation of philosophical ideas to interpret Genesis's description of water's relationship to the earth had an influential precedent among Jewish commentators, especially in Philo of Alexandria's

et adferentem semen iuxta genus suum lingumque faciens fructum et habens unumquodque sementem secundum speciem suam et vidit Deus quod esset bonum.”

79 Robbins, *Hexaemeral Literature*, 2–23; Clagett, *Greek Science in Antiquity*, 130–45; Williams, *Common Expositor*, 3–25; and Smalley, *Study of the Bible in the Middle Ages*, 2–26.

first-century-CE *On the Creation of the Cosmos according to Moses*. As Marshal Clagett argued,

Christian thought of late antiquity owed much to the fundamental attitudes and opinions of the Jews who flourished in Alexandria from the time of the translation of the Pentateuch or Books of Moses into Greek, about 260 B.C. until the first century after Christ [...] the attempt to use Greek philosophy by the Jews of Alexandria, and particularly by their outstanding philosopher, Philo of Judaeus, whose activity extended until about A.D. 40, resulted in the elaboration of some basic philosophical and religious views that were stamped on the whole succeeding religious philosophy of the late antique Greek Christians, of the Syriac Christians, of the Islamic and Jewish medieval philosophers, and finally of Latin medieval schoolmen.⁸⁰

Philo's description of the separation of primordial water from the dry land on the third day exhibits this incorporation of philosophy to explain Genesis. Much as we saw above in the discussion of Greek and Roman notions of water and earth, Philo referred to both as elements throughout his description. He explained that these elements were mixed together "into a single indistinct and shapeless nature" prior to God's command to the waters.⁸¹ For Philo, water and earth assumed their present, stable relationship at God's command. Philo's description of the results of this command stresses that this current relationship between the elements of water and earth was meant to provide plants and by extension animals and people with the nourishment they needed to survive. Philo explained that God's command to the waters to separate from the dry land actually caused only the salt water to assemble into one place and form the seas because salt water would cause infertility in plants. In contrast, the sweet or fresh water was left behind on the earth both to provide the earth with some needed moisture and to make it fertile for plants. Philo even employed nursing imagery in his description of this relationship between fresh water and earth. In doing so, he adapted the notion of veins or channels running under the surface of the earth as sources of rivers that we saw in the works of Seneca and Pliny

80 Clagett, *Greek Science in Antiquity*, 130. David T. Runia also notes Philo's influence on Christian thinkers, arguing that it was Christians who preserved Philo's works because they found them so attractive that "they gave him a post mortem conversion." See his introduction to Philo of Alexandria, *On the Creation of the Cosmos according to Moses*, p. xiii.

81 Philo of Alexandria, *On the Creation of the Cosmos according to Moses*, 55.

and many subsequent authors. Philo explained, “He proceeded to flood its veins in the manner of breasts, and these, when they had obtained a mouth, would pour forth as rivers and springs. Similarly he also extended invisible moisture-bearing capillaries throughout the rich and fertile soil, so that it would yield a most copious supply of crops.”⁸² Philo’s description of God’s command to the waters and earth therefore resonates with the Greek and Roman philosophical conceptions of elements, of the notion that water runs through channels in the earth, providing the sources of rivers and springs, and of the understanding of water and earth as elements with a rational, stable relationship. His text differed from theirs, though, in attributing the existence of these elements and their stable relationship solely to God and in his emphasis that their existence and relationship had a teleological function – to sustain the earth and make it fertile, ultimately providing God’s chosen people with nourishment and drink.

In contrast to Philo, *Genesis Rabbah* focused more on the teleology behind God’s fashioning of water’s current relationship to earth, though it still incorporated some contemporary philosophical aspects. *Genesis Rabbah* was the midrash on the Book of Genesis that shaped the ways in which medieval and early modern Jewish commentators on this book viewed God’s fashioning of water and earth, as well as the views of Christians who read Jewish commentaries and engaged in exegetical discussions with Jews. According to the modern scholar, Jacob Neusner, this midrash came together in its current form around 400 CE during a significant period for the Jewish community. The late fourth and early fifth century was a difficult time for Jews living in the Roman empire as Christianity became the official religion, and the freedoms Jews had enjoyed to practice their religion were curtailed. In this climate, some Jewish scholars turned to the Book of Genesis looking for explanations of Jews’ current experiences, believing that what had happened at the beginning, during creation, between God and Israel was also occurring in the present and would occur in the future, thereby providing the struggling Jewish community with hope for the future through learning about their past. *Genesis Rabbah* was the result of such reflection.⁸³ As Neusner explains, *Genesis Rabbah* took the form of other midrash in which a scholar used a base verse from Genesis and paired it with another verse from the Hebrew Bible so that the true theological meaning could emerge through the juxtaposition of the two verses.⁸⁴ As

82 Ibid.

83 Neusner, *Confronting Creation*, 9–10.

84 Ibid., 13.

noted above, *Genesis Rabbah's* juxtapositions with Genesis 1:9–10 in its fifth chapter, the verses in which God is said to gather the waters together and expose the dry land, emphasized teleological aspects of this gathering and exposure. This chapter of *Genesis Rabbah* begins by pairing Genesis 1:9 and Psalm 104:7, which explains that the waters flee at the sound of God's rebuke and thunder.⁸⁵ The scholars then developed this juxtaposition to show that water, unlike people, completely and entirely serves God's will so that when people began to disobey God flagrantly, he punished them with water in the form of the flood.⁸⁶ Though this reading of Genesis 1:9 contrasted nature's obedience with human disobedience and perhaps provided fifth-century Jews with some explanations of their current suffering, it also incorporated a contemporary philosophical notion into its discussion just as Philo and ancient authors had done. When describing the location into which the primordial waters gathered, *Genesis Rabbah* argues that this water gathered together into the Ocean, which resonated with Greek and Roman notions of a circumambient Ocean surrounding the ecumene. "The waters ascended mountains and descended into the depth until they came to the Ocean, as it is written, 'They ascended the mountains, they descended into valleys until the place which Thou has founded for them' (Ps. CIV, 8): which place hast Thou founded for them? The Ocean."⁸⁷ The influence of this contemporary philosophical notion even affected the midrash, as the scholars asked about the contrast between God's plural name for the gathering of the primordial waters, "seas," and the notion of a single Ocean, implying that this plural noun came from human experiences with different bodies of water even though there is only one sea or Ocean.⁸⁸ Even the *Genesis Rabbah*, which was largely focused on teleological questions about the ways in which God's fashioning and treatment of water and earth reflect his relationship to the people of Israel, incorporated contemporary philosophical doctrines.

Basil, Ambrose, and Augustine all composed influential commentaries on the six days of creation that incorporated the emphases on God as the creator of the universe and the teleological purpose of that creation much as earlier and contemporary Jews had done while also describing the outcomes of that creation through Greek and Roman philosophical notions associated with the ontological conceptions of water and earth. Unlike their Jewish predecessors and contemporaries, Basil, Ambrose, and Augustine were

85 *Midrash Rabbah: Genesis*, 1: 34.

86 See the analysis of this section of *Genesis Rabbah* in Neusner, *Confronting Creation*, 45–47.

87 *Midrash Rabbah: Genesis*, 1: 36.

88 *Ibid.*, 1: 39.

especially interested in the relationship between the elements of water and the earth due to primordial water's covering of earth prior to the third day of creation.⁸⁹ They asked what would keep water from flooding the dry land into the present day when water had previously covered it. Basil, Ambrose, and Augustine all argued that God had created the natures of both primordial water and earth throughout the process of creation and that these natures after the third day protected the earth from inundation, even if they described these natures slightly differently. Though ascribing these natures to God rather than to some intrinsic quality of water and earth, Basil, Ambrose, and Augustine ultimately underscored the natural, rational, orderly relationship between contemporary water and earth much as Greek and Roman philosophers had done.

According to Frank E. Robbins, Basil of Caesarea's *Hexaemeron* was the earliest Christian work focused solely on the six days of creation and as such, it "was much imitated in later times and from it were drawn many of the topics which constantly recur [in other hexaemeral literature]."⁹⁰ Basil answered the question of why water did not currently flood the earth through a focus on God's command to the primordial waters on the third day of creation. In his fourth homily on Genesis, he specifically connected God's command to these waters with the fashioning of its current nature and the natural order more broadly. Basil began his description of this connection between the natural order and God's speech with the claim that his audience currently experienced water's natural tendency to run down slopes and into hollow places. He then stated that water had this natural tendency only because God's voice makes nature, and because on the third day of creation, God commanded the primordial waters to gather together into one place. Basil then linked this relationship between the natural order and God's speech to a temporal frame as he explained, "Reflect that the voice of God makes nature, and the command given at the time of creation provided the future course of action for the creatures."⁹¹ Stating that God's command created the future actions for all creatures, he implied that this command created a natural order that continued into the present moment.⁹² God's command may have begun water's current nature, but it was the order of nature that resulted from this speech that accounted

89 Basil, *Exegetic Homilies*, 56–57; Ambrose of Milan, *Saint Ambrose: Hexameron, Paradise, and Cain and Abel*, 71; and Augustine, *Literal Meaning of Genesis*, 33–34.

90 Robbins, *Hexaemeral Literature*, 42.

91 Basil, *Exegetic Homilies*, 57.

92 *Ibid.*

for water's contemporary failure to flood the earth. In addition to drawing on this concept of a natural order, Basil also appropriated contemporary conceptions of the elements to describe the relationship between earth and water further. He ascribed the same qualities to each of the four elements as Aristotle and many subsequent commentators had – hot or cold, dry or moist. He then explained, “Thus, through their combining qualities each receives the faculty of mixing with the other; and, in fact, each through a common quality mixes with its neighboring element, and through the union with that which is near, it combines with its opposite [...] Thus it becomes a circle and a harmonious choir, since all are in unison and have mutually corresponding elements.”⁹³ This emphasis on the harmony of the elements as they mixed together further underscored the notion of an orderly nature, a view that Basil stressed when he discussed why God had called the formation of the seas, good. He ended this homily with statements about how the purpose of the seas reveals this goodness. He explained that it provided the earth with much needed moisture, fresh water for people to drink after it moved through subterranean channels and came forth in rivers and springs, rain, and a passageway between the various islands and other landmasses in the world.⁹⁴ For Basil, God also gave water all of these crucial purposes when he provided contemporary water and earth with their natures during the process of creation.

Ambrose of Milan based much of his own *Hexaemeron* on Basil's work, bringing Basil's ideas to a Latin-language audience in Milan and to subsequent generations of Latin speakers and readers.⁹⁵ In doing so, Ambrose included very similar discussions of how God created the current natures of water and earth through his command on the third day, water and earth as two of the four elements, the harmony between the elements, and the functions that God's gathering of the primordial waters allowed water to play in the current universe.⁹⁶ Much as they had in Basil's, these aspects of Ambrose's homily underscored the notion of a natural order that God instilled into the world throughout creation and that currently kept water from flooding the earth. Ambrose's homily differed slightly, however, in that he appropriated more Greek and Roman philosophical teachings. For example, he made mention of a circumambient Ocean in his discussion of where God had gathered together the primordial waters much as Greek geographers and Roman encyclopedists

93 Ibid., 63.

94 Ibid., 63–65.

95 Robbins, *Hexaemeral Literature*, 58, and Williams, *Common Expositor*, 5.

96 Ambrose of Milan, *Saint Ambrose: Hexameron, Paradise, and Cain and Abel*, 71–73 and 80–83.

had.⁹⁷ Ambrose also made water's contemporary relationship to the earth and by extension the current natural order much more contingent on God's will. Beginning his explanation of water's current relationship to the earth where Basil had begun his, Ambrose first argued that people might currently see water's natural propensity to flow downward, but that God's command provided water with this nature. Further defining the character of God's speech through a contemporary philosophical notion that does not appear in Basil's homily, Ambrose then stated that God's command was the efficient cause of water's nature.⁹⁸ In doing so, he likely meant to reference Aristotelian notions of causation. According to Aristotle, the efficient cause was the thing or being that caused another thing or being to move or to change.⁹⁹ Invoking this notion, Ambrose was effectively claiming that primordial water was ontologically different before the third day when God's command changed its nature. He followed up on this notion in the next section of his homily as he argued against those who denied that God's command had caused the dry land to appear and in doing so, he made water's contemporary relationship to the earth much more contingent on God's command than Basil. Pointing to various biblical incidents where God controlled water, such as during the flood and the Israelites' crossing of the Red Sea, Ambrose stated that during these occurrences, "nature obeyed and the habitual character of an element was changed by God's command" and "let them learn that nature can be changed" from such examples.¹⁰⁰ In doing so, Ambrose implied that God as the creator had given primordial water one nature during the first day of creation, that he had then changed this nature on the third day, that he had subsequently changed this new nature at multiple times in Israel's and in the Christian past, and that he could possibly change the current nature of water and any other creature at any time. Though retaining the link between God's command and the fashioning of an order in the universe found in Basil's works often through the use of the same examples, Ambrose made this order much more contingent on God's command.

Building on this earlier hexaemeral tradition, Augustine offered three different interpretations of the Book of Genesis that continued many of the themes found in Basil's and Ambrose's homilies. His exegesis of Genesis became particularly influential to later Latin writers on creation.¹⁰¹ First,

97 Ibid., 77–78.

98 Ibid., 71–73.

99 Aristotle, *Complete Works of Aristotle*, 1600–1.

100 Ambrose, *Saint Ambrose: Hexameron, Paradise, and Cain and Abel*, 74.

101 Robbins, *Hexaemeral Literature*, 64.

Augustine also described water, earth, air, and fire as elements, and he drew on Aristotelian notions of their heaviness and relative positions to describe the composition of the terrestrial realm.¹⁰² Nature's dependence on God's creation of it was also a theme Augustine expressed through his emphasis on the simultaneously miraculous and natural character of all the world's processes.¹⁰³ As we saw in the introduction, Augustine emphasized the natural aspects of the contemporary relationship between water and earth especially in his *De Genesi ad litteram*. He offered two explanations for what had happened to primordial water when God commanded it to gather together and expose the dry land – that it had been in a vaporous state prior to the third day and then condensed into a liquid at God's command on that day, and that hollow places had appeared in the earth as it settled during creation, providing the waters with a place to flow at God's command.¹⁰⁴ Both of these explanations suggested that God had implanted a natural order and created a stable contemporary relationship between the elements of water and the earth that continued into the present day and kept water from inundating the dry land even as Augustine drew on contemporary philosophical teachings to describe aspects of this order as Basil and Ambrose had.

In addition to arguing for a natural order and discussing the relationship among the four elements, Augustine also took up the question of the existence of unknown, inhabited land in the Southern Hemisphere that had been a topic of discussion among Greek geographers and Roman encyclopedists since Crates of Mallus. Augustine denied the possibility of such land largely for theological reasons, but in arguing so, he also proposed a spatial relationship between the ecumene and water that influenced many later Christian writers. Augustine addressed this question in the sixteenth book of his *De civitate dei*. After explaining that previous authors had no real evidence of the existence of such unknown inhabited land and had only hypothesized its existence based on their cosmological theories about the

102 Augustine, *Literal Meaning of Genesis*, 49–50. Augustine did explicitly contrast scripture's authority and philosophical theories in certain instances. For example, Genesis 1:6–8 argued that God had placed waters above the heavens, and Aristotelian theories would preclude the existence of such supercelestial waters. Noting a contradiction between Aristotelian theory and scripture, Augustine argued, "Certain writers, even among those of our faith, attempt to refute those who say that the relative weights of the elements make it impossible for water to exist above the starry heaven [...] But whatever the nature of that water and whatever the manner of its being there, we must not doubt that it does exist in that place. The authority of Scripture in this matter is greater than all human ingenuity"; 51–52.

103 See the Introduction, pp. 000–00.

104 Augustine, *Literal Meaning of Genesis*, 34.

spherical universe, he explained that such a land could not possibly exist because the descendants of Adam could not have reached such land to people it. To elaborate, he stated both that boundless tracts of ocean kept these descendants from reaching any such land and that if such a land did exist, it is possible that water entirely covered it.¹⁰⁵ Accordingly, he suggested that the Southern Hemisphere could be entirely filled with water and that the ecumene was the only inhabited land in the world.

For Basil, Ambrose, and Augustine, God's creation of water and the earth and specifically his commands throughout the first six days of creation fashioned an order that these authors and their contemporaries currently experienced. Since God's command to the primordial waters "to gather together and let the dry lands appear" was a part of this creation process, then water's current failure to flood the earth and the locations of the dry land was a part of the contemporary natural order. Once God commanded the primordial waters to gather together on the third day of creation, this command created a perpetual natural order. Whereas Basil and Augustine implied that this natural order would continue into the future, Ambrose's discussion suggested that God could and had changed the nature of water and the current natural order of which it was a part through a verbal command. All three authors, however, incorporated philosophical teachings about the elements and their mixture to describe the natural order God created and to explain the stable relationship between water and the earth. Not all philosophical theories were conducive to these patristic authors, however, as Augustine rejected the over 500-year-old theory of Crates of Mallus on the existence of unknown, inhabited continents as it seemed to contradict what the scriptures taught on the creation and dispersal of human beings.

Christian encyclopedists of the early Middle Ages such as Isidore of Seville (c.560–636 CE) and the Venerable Bede (672/3–735 CE) incorporated the teachings of Greek and Roman philosophers and geographers as well as patristic commentaries on the scriptures into their works. Their writings provide a good example of the ways in which these two traditions – the ancient and the patristic – came together to influence medieval Christian thought on water's relationship to the earth. Though crediting God with the creation of water and earth much as Jewish and patristic authors had, they continued to discuss the ontological and spatial aspects of water's current relationship to the earth in ways that we saw in Greek and Roman sources. For example, Bede's *De rerum natura* not only argued that water

¹⁰⁵ Augustine, *City of God*, 5: 49–51.

was an element,¹⁰⁶ but he also included a long quotation deriving ultimately from Pliny's *Naturalis historia* about the relationship between water and the earth. Bede described their relationship, thus:

The Creator encircled the globe around the middle with water, which included toward the center of the earth from every direction and laboring toward the interior could not fall off. In consequence, since the parched and thirsty earth was unable to cohere on its own and without moisture, and the waters in turn were unable to remain without the sustaining earth, they were joined in a mutual embrace, with the one opening her bosom and the other permeating the whole, within, without, above, below, by means of veins running throughout like bonds, and even bursting out in the highest mountain ranges.¹⁰⁷

This description contains many aspects that we have already seen in earlier works. There is the notion that water currently encircles the earth and the idea that the earth requires water's moisture, and water, earth's sustaining presence in the middle of the universe. There is also the notion of channels below the earth's surface through which water flows. The major difference between Bede's work and Greek and Roman discussions of these two substances has to do with his emphasis on the Christian creator God as the architect of this particular relationship between water and earth. Bede expanded on God's control over water in his own commentary on the Book of Genesis. He appropriated Augustine's discussion of primordial water's change from a vaporous state to a condensed, liquefied one in this text to explain what had happened to it on the third day of creation, claiming that it would not be absurd to believe that water was a thin vapor prior to the third day of creation that condensed into the substance people now experienced and that this condensed substance flowed into the hollows of the earth at the creator's order.¹⁰⁸ For Bede as for Basil, Ambrose, and Augustine, God's command on the third day changed the nature of water and established a natural order in the universe that kept the water from flooding the dry land in its current locations, and he used the works of Pliny the Elder to describe the natural order God had established between water and earth.

One of Bede's main sources, Isidore of Seville, also helped to communicate these ancient and patristic teachings to the early and later Middle Ages,

¹⁰⁶ Bede, *On the Nature of Things and On Times*, 75–76.

¹⁰⁷ *Ibid.*, 97.

¹⁰⁸ Bede, *Libri quartuor in principium genesis*, 13–14.

though his encyclopedic works, *Etymologies* (*Etymologiae*) and *De rerum natura*, include a much wider range of themes earlier authors associated with water than Bede's would come to do. Isidore's *De rerum natura* stressed water and earth as constituent elements of the contemporary universe with a particularly close relationship while also arguing that the Ocean surrounded the current inhabited earth. His description of the elements emphasized the mixture of water and earth as he characterized water as "thick, blunt, and mobile" and earth as "thick, blunt, and immobile" and claimed that earth, "which is indeed thick, blunt, and immobile, combines with the thickness and bluntness of water."¹⁰⁹ He also quoted Ambrose of Milan on how the "linkable qualities" of hot and cold, wet and moist allowed earth and water to come together "by the affinity of their cold quality," again emphasizing the tendency of these two elements to mix together "by a certain kinship of nature."¹¹⁰ When it came to the spatial relationship between the world's landmasses and its waterways, Isidore offered a view that differed markedly from that of Crates of Mallus and from the one Macrobius and Martianus Capella included in their earlier texts. Instead, he seems to continue Augustine's denial of an inhabited southern continent, occluding the possibility of inhabited land in the Southern Hemisphere. Quoting Augustine, Isidore explained "the size of the ocean is said to be beyond compare and its width impassable. Moreover, the philosophers say that there is no land beyond the ocean."¹¹¹ Isidore's *Etymologiae* contained similar discussions of the elements and the Ocean's surrounding of the ecumene while also including further speculations on water's possible destructive power.¹¹² Describing the various elements in his thirteenth book by drawing on Pliny's work, Isidore stated, "The element of water rules over all the rest, for water tempers the sky, makes the earth fertile, gives body to the air with its exhalation, ascends to the heights, and claims the sky for itself."¹¹³ He offered particular examples of water's ability to rule the rest of the elements in his discussion of floods in the same book. He explained that the Latin word for flood, "diluvium," was related to the Latin verb *delere*, "to destroy," and that this etymological link was born out in the way a flood "destroys everything it washes over with a scourge of water."¹¹⁴ After

109 Isidore of Seville, *On the Nature of Things*, 130.

110 *Ibid.*, 131.

111 *Ibid.*, 168.

112 Isidore's discussion of the elements and of the Ocean's surrounding of the earth appear in Isidore of Seville, *Etymologies of Isidore of Seville*, 272 and 285.

113 *Ibid.*, 276.

114 *Ibid.*, 282.

listing three separate historical floods, including that at the time of Noah when, “the entire world was covered, everything was destroyed, and there was a united expanse of sky and sea,” he explained that current rivers also swelled beyond their normal magnitude and that this brought destruction in the present moment.¹¹⁵ For Isidore, water was currently both an element that mixed with the element of the earth and provided an impassable boundary through which he and his contemporaries could not pass and one that had the ability to overcome the other elements, especially in its flooding of the earth.

Bede and Isidore’s works contain the traces of over a millennium’s worth of conceptualizing the ontological and spatial relationships between water and earth. As Christians, Bede and Isidore explicitly drew on earlier Judeo-Christian authors such as Basil, Ambrose, and Augustine to argue that God had created these two elements and fashioned their relationship to each other to form a habitable, fertile place for people to live. As educated men, Bede and Isidore also built on the heritage of ancient Greek and Roman philosophers and geographers to describe the ways in which this relationship functioned, incorporating notions of water and earth as elements that have consistent, intelligible relationships to one another due to the natural order, of an inhabited landmass water entirely surrounds, and of water as a potentially destructive force. The popularity of their works ensured that this dual heritage would be transmitted to their successors.¹¹⁶ As later European Christians read their works and others containing traces of this dual heritage, what they found was the idea that water, though potentially threatening to earth, tended to have a stable relationship to it according to the natural order, one which God had specifically ordained and that he continued to support in the contemporary period so that people, plants, and animals would have a dry, safe, and fertile place to live. Therefore, people did not need to be concerned about water flooding the dry land in its current locations so long as God continued the current natural order, and they could even study this natural order to learn more about this relationship. These ancient, patristic, and early medieval texts provided significant foundations for later authors as they explained where the dry land was located and what about the water-earth relationship kept water from deluging that dry land, even as authors of each type of text appropriated different aspects of this dual heritage.

115 Ibid., 282–83.

116 Stahl, *Roman Science*, 212–32.

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Part I

Water in Exegetical, Natural Philosophical,
Cosmographical, and Geographical Texts of
c.1000–1600

2. Gathering Water in Exegetical Texts

Abstract

This chapter analyzes thirty-eight different sixteenth-century commentaries on Genesis and their medieval Christian and Jewish predecessors, focusing specifically on exegeses of Genesis 1:9–10. These biblical verses recount God's separation of the waters from the earth on the third day of creation. This chapter argues that in contrast to patristic and medieval Christian and Jewish understandings of why water did not flood the earth, sixteenth-century Christian exegeses of Genesis 1:9–10 show that authors offered a wide variety of categorizations for the dry land's existence with the majority insisting that God kept the water from the earth through his supernatural power.

Keywords: Book of Genesis; John Calvin; Martin Luther; Rashi; Jewish exegesis; Maimonides

But if water covered the whole wide world, where would it go in order to leave some of the land exposed? Could it be that water in a rarefied state, like a cloud, had covered the earth, and that it was brought together and became dense, thus disclosing some of the many regions of the world and making it possible for dry land to appear? On the other hand, it could be that the earth settled in vast areas and thus offered hollow places into which the flowing waters might pour; and dry land then would appear in the places from which the water had withdrawn.

– Augustine, *Literal Meaning of Genesis* (393–94 CE)¹

Therefore, it is by divine power that the waters do not press in on us. God therefore performs for us to this day and until the end of the world that same miracle, which he performed for the people of Israel with the Red Sea [...] For it is most true that the sea is much higher than the earth. Therefore, God to this day

1 Augustine, *Literal Meaning of Genesis*, 34.

orders the waters to hang suspended and holds them by his Word, so that they do not burst in on us, as they burst in [on the earth] during the Flood.

– Martin Luther, *Lectures on Genesis* (1535–45)²

Insisting that God's command to the primordial water on the third day of creation fashioned its relationship to the earth, Augustine of Hippo intimated that this command created the current natural order in which primordial water condensed into a liquid state and flowed into hollow places in the earth, allowing for some dry land naturally to stick out above the water where it was currently located. As we saw in the last chapter, Augustine's interpretation of Genesis 1:9–10 turned out to be influential on early medieval commentators such as Isidore and the Venerable Bede. Though drawing on these as well as other earlier Judeo-Christian exegeses of Genesis, Martin Luther (1483–1546) offered a different classification of the water-earth relationship than these predecessors. Luther insisted repeatedly in the first section of his *Lectures on Genesis* (1535–45) that this relationship was miraculous because water failed to submerge the earth despite its natural propensity to do so. He stated that water's location was higher than the earth's, especially as the earth was at the center of the world, and that God's Word alone kept the water from inundating the actual dry land and killing all living things there, including people. Luther also emphasized the miraculous nature of this relationship through the comparison of his contemporaries' experiences with water to that of the people of Israel and that of prediluvian people. For Luther, he and his contemporaries were much more like the Israelites than those alive at the time of the flood, as God protected them from the waters just as he had parted the Red Sea to protect the people of Israel. However, though not entirely inundating the earth, water could still cover portions of the dry land such as small islands, according to Luther, which he claimed displayed God's power over the waters.³

The clash between Augustine's natural explanation of the water-earth relationship and Luther's insistence that the dry land's existence was a miracle that God currently performed to provide people with a safe place on which to live was not unique. Biblical commentators from the eleventh

2 “Ergo virtute divina fit, ne aquae in nos grassentur, et adhuc hodie usque in finem mundi miraculum illud nobiscum Deus facit, quod in rubro mari fecit enim populo Israel [...] Quia verissimum est, longe altius esse mare quam terram, Deus igitur adhuc hodie aquas pendere iubet et verbo tenet, ne in nos erumpant, sicut erupere in diluvio”; Luther, *Genesisvorlesung*, 26.

3 Ibid.

through the fifteenth centuries continued to draw on Augustine's classification of the water-earth relationship partly through the works of Isidore and the Venerable Bede. Their emphasis on the naturalness of this relationship therefore continued in this period, though there were those such as Thomas Aquinas and many Jewish exegetes who also argued that God had established this initial relationship during creation against the original natures of primordial water or earth. This overwhelming agreement about the naturalness of the dry land's existence disappeared in the sixteenth century. Though there were some authors who continued to attribute primordial water's gathering together to the natural order, there were many more who ascribed this action to God's power against water's nature (*contra naturam*). Still others labeled this action that continued to go against water's nature as a "wonder" or a "miracle" much as Luther did, thereby emphasizing the preternatural or even God's supernatural power to provide the dry, safe places in which people currently lived. For both these latter groups of authors, current water shared primordial water's propensity to cover the whole earth, and for many of them, only God kept the water from submerging them and their contemporaries.

This chapter analyzes thirty-six sixteenth-century commentaries on Genesis alongside those from the eleventh through fifteenth centuries that were influential into this period in order to illustrate that the typical ontological classification of the water-earth relationship in biblical commentaries changed in the sixteenth century. I have selected these commentaries in two ways. First, I have analyzed those earlier works that sixteenth-century biblical commentators themselves cited and discussed.⁴ Second, I have also drawn on the checklist of Renaissance commentaries on Genesis provided in the bibliography of Arnold Williams's *The Common Expositor: An Account of the Commentaries on Genesis 1527–1633* (1948). This checklist includes sixteenth-century commentaries on Genesis as well as those earlier commentaries that were particularly influential into this century.⁵ As Williams noted, "Above everything else, Genesis meant to the intelligentsia of the Renaissance the commentaries on Genesis, wherein this large and heterogeneous bulk of material in many languages from several ages and diverse sources was organized and rendered accessible to all who could read Latin."⁶ These commentaries were therefore one significant lens through which educated Europeans

4 See, for example, the discussion in Musculus, *In Mosis Genesim plenissimi commentarii*, 19–26.

5 Williams, *Common Expositor*, 269–77.

6 *Ibid.*, 6.

explored and understood water's ontological and spatial relationship to the earth in the sixteenth century. Examining the ways they refocused this lens in their biblical commentaries starts to provide the evidence that the relationship between water and the earth was under discussion and debate in this period in ways that it had not been in previous ones.

Gathering Water from the Eleventh through the Fifteenth Centuries

Building on earlier exegeses, many eleventh- through fifteenth-century commentators on Genesis 1:9–10 continued the link between God's work as a creator and the fashioning of a natural order found in patristic and early medieval texts to explain why primordial water had gathered into one place on the third day of creation and continued to allow for the existence of dry land where it was currently located. A new explanation for how God established this natural order does appear, however, in this period, as some commentators began to stress that God had actually gone against the primordial natures of water and earth to establish the dry land during creation. They ultimately continued their predecessors' emphasis on the current dry land's natural existence, as they further argued that the contemporary relationship between water and earth was natural, or that, at least, God currently worked alongside nature to continue this relationship. The context of these medieval exegeses of Genesis 1:9–10 might account for some of these differences. Whereas Augustine's three commentaries on Genesis developed through polemical engagement with Manichean claims about matter and the Old Testament,⁷ Basil and Ambrose delivered their exegeses in the form of sermons for socially varied audiences that were then written down and circulated. From the eleventh through fifteenth centuries, Christian and Jewish exegetes wrote their commentaries in Arabic, Hebrew, or Latin, likely to educate a small, select group of Europeans in the contexts of the development of the university, Jewish-Christian polemics, and the influx of Greek philosophical texts and of commentaries of Muslims and Jews on those texts.⁸ Sixteenth-century authors frequently referenced these earlier interpretations in their own commentaries on Genesis even as many reclassified water's current relationship to earth as a wonder or miracle.

7 See Taylor's introduction to Augustine, *Literal Meaning of Genesis*, 1: 1–5.

8 See the discussion in Colish, *Medieval Foundations of the Western Intellectual Tradition, 400–1400*.

Augustine's specific explanation of primordial water's behavior on the third day of creation had the largest impact on Christian descriptions of the water-earth relationship from the eleventh through the fifteenth centuries. Most Christian authors during this period attributed water's current position either to God's changing of primordial water's substance from a vapor into a fluid, or to its gathering into caverns in the earth, which God had prepared prior to the third day, or to a combination of both much as Augustine had done in his *De Genesi ad litteram*. The Venerable Bede's incorporation of Augustine's explanation proved especially significant during this period, as it was cited specifically to explain the dry land's current existence in the *Glossa Ordinaria* (or "standard gloss" of biblical commentaries)⁹ and in Peter Lombard's (1096–1164) *Sentences*.¹⁰ Hugh of St. Victor (1096–1141), Hugh of St. Cher (1200–1263), and Nicholas of Lyra (c.1270–1349) also all argued something similar to Bede. Hugh of St. Victor stressed specifically the pre-existing caverns into which God gathered the primordial water on the third day of creation in his *Adnotationes* or notes on the Pentateuch.¹¹ Both Hugh of St. Cher and Nicholas of Lyra focused on how primordial water was different before the third day of creation. According to Hugh's literal reading of Genesis 1:9–10, primordial water as a vapor had filled the entire space of the air until God commanded it to gather together into the caverns he had prepared in the earth.¹² Lyra explained that God had made primordial water denser on the third day of creation. This change in its nature meant that it now took up less space and could be gathered together into the cavities in the earth that God had created to receive it.¹³ For all of these authors, God's command on the third day changed the nature of primordial water and established a natural order in the universe that currently kept the water from flooding the earth.

There is a similar explanation in the work of the fifteenth-century author, Denis the Carthusian (1402–1471). Denis, too, claimed that primordial water was in a vaporous state prior to the third day of creation, when it then condensed into the substance experienced by Denis's contemporaries.¹⁴

9 *Biblia Latina cum glossa ordinaria* 1, sigs. a6r–v. On the composition and the influence of the *Glossa Ordinaria* in the medieval period, see Margaret Gibson, "Place of the *Glossa ordinaria* in Medieval Exegesis," in Jordan and Emery, eds., *Ad litteram*, 5–27.

10 Peter Lombard, *Sententiae in IV Libris distinctae*, 2.14.7.1.

11 Hugh of St. Victor, *Adnotationes elucidatoriae in Pentateuchon*, 34–35.

12 Hugh of St. Cher, *Biblie cum postilla domini Hugonis Cardinalis*, fol. 17v.

13 Nicholas of Lyra et al., *Postilla litteralis in vetus et novum testamentum*, sig. ciiiiv.

14 Denis the Carthusian, *Enarratio in Genesim*, 119. On his theology, see Kent Emery Jr., "Denys the Carthusian and the Doxography of Scholastic Theology," in Jordan and Emery, eds., *Ad litteram*, 327–59.

His explanation for the causes of this gathering also continued the linking of God's command to the fashioning of the natural order found in both patristic and earlier medieval works. Yet, he gave a more specific categorization of water both before and after the third day of creation than previous authors had, which further underscored the naturalness of the contemporary water-earth relationship. Denis's discussion of water's changing ontological characteristics drew on contemporary notions of substance and accidents, suggesting that contemporary philosophy likely influenced his understanding of water. Whereas a substance related to the essence of a thing, an accident was only a property of that thing that did not necessarily relate to its essence.¹⁵ Denis argued that God had initially created all of the elements to be distinct in their substances during the first two days of creation, indicating that current water in its essence existed from the beginning of creation. However, he claimed that these substantially distinct elements were all mixed together prior to the third day of creation, making the primordial water accidentally different than what his contemporaries currently experienced. It was only on the third day with God's command to primordial water to gather together into one place that it acquired the accidental properties, qualities, and powers that it continued to have into the present period.¹⁶ Denis's comparatively complicated discussion of substances and accidents stressed that the natural order was ultimately responsible for water's behavior even as it drew on contemporary philosophical discussions to give a detailed description of how God instilled that order into the elements during creation.

This continued emphasis on God's command and its establishment of the natural order also appeared in Thomas Aquinas's *Summa theologiae*, though he complicated the connection between God's command and the natural order and this connection's ability to explain the current water-earth relationship in a manner not frequently found in patristic and earlier medieval texts or in those of his Christian contemporaries. Arguing that the divine command gave bodies their natural movement, Aquinas (1225–1274) claimed that God had actually changed primordial water's nature on the third day of creation. According to him, prior to this day, it was a natural characteristic of primordial water to cover the earth. God's command to it changed its nature on the third day, allowing for the existence of the dry land.¹⁷ Though this connection between God's speech

15 Aristotle, *Complete Works of Aristotle*, 3–17 and 1623–44.

16 Denis the Carthusian, *Enarratio in Genesim*, 119.

17 Thomas Aquinas, *Summa theologiae*, 1.69.1, ad 2.

and the natural order resonates with earlier discussions of these biblical verses especially with that found in Ambrose's homily, Aquinas' further discussion of the dry land in this question of his *Summa* also allowed for the possibility that God might have established water's current behavior without reference to the natural order. Aquinas offered this interpretation as he explained why it was necessary for the primordial waters to gather together in the first place. According to him, plants, animals, and people – the works of days three, five, and six of creation – required the existence of dry land before they could live on the earth. Citing both Job 38:8 and Jeremiah 5:22,¹⁸ he argued that God's divine power alone was responsible for providing them with this dry place to grow and to live. He even argued against a group of philosophers who supposedly had claimed that the sun was responsible for drawing up water vapor to such an extent that it uncovered the earth.¹⁹ Though retaining an explicit focus on the connection between God's command and the natural order, Aquinas's further explanation of the dry land's existence strongly implied that God alone, and not the natural activities of sun, water, and earth, was responsible for the current water-earth relationship.

Medieval Jewish commentators also explored this relationship. Living primarily in the Iberian Peninsula and in northern France and focusing on the grammar and the *peshat* or the plain meaning of the Hebrew Bible, Jewish exegetes, such as Rabbi Shlomo Yitzchaki (Rashi) (1040–1105), Abraham Ibn Ezra (1089–1167), Rabbi Samuel ben Meir (Rashbam) (1085–1158), Moshe ben Maimon (Maimonides) (1135–1204), and Aquinas's contemporary, Moses ben Nahman (Nahmanides) (1194–1270), did attribute more responsibility to God for the dry land's current existence than contemporary Christians tended to do.²⁰ Despite giving more credit to God for the dry land's existence, all these authors ultimately attributed the post-creation relationship between water and earth to the natural order God had established during the creation process. Rashi's and Maimonides's explanations are the most similar to those of their Christian contemporaries. Whereas Rashi just stated that God had gathered together the primordial waters into what is now the Ocean without

18 In the Vulgate, Job 38:8 reads, "quis conclusit ostiis mare quando erumpebat quasi de vulva procedens." Jeremiah 5:22 reads, "me ergo non timebit is ait Dominus et a facie mea non dolebitis qui posui harenam terminum mari praeceptum sempiternum quod non praeteribit et commovebuntur et non poterunt et intumescent fluctus eius et non transibunt illud."

19 Aquinas, *Summa theologiae*, 1.69.1, ad 4.

20 On medieval Jewish exegesis, see Lesley Smith, "Exegetical and Hermeneutical Legacy of the Middle Ages: Christian and Jewish Perspectives," in Saebø, ed., *From the Renaissance to the Enlightenment*, 49–75.

further explanation,²¹ Maimonides stressed the naturalness of water's current relationship to the earth in his quest to reconcile the Hebrew Bible with ancient Greek philosophy in his *Guide for the Perplexed*. He explained that the reference to "earth" during the first day of creation was actually a shorthand for all the elements. God did not distinguish water's current nature until he divided the waters on the second day of creation. As he did so, Maimonides explained that primordial water split into three forms – the waters above the firmament, the firmament itself, and the water that currently makes up the seas. As some of the primordial water went to forming the firmament and the upper waters, God could gather the remaining water so that it uncovered the earth.²²

Rashbam, Ibn Ezra, and Nahmanides gave God a larger role in the initial separation of the primordial waters and the dry land than Rashi and Maimonides, while also suggesting that the current relationship between water and earth, which their contemporaries experienced, was natural. For Rashbam, God had initially used the winds as an agent to separate the primordial water from the dry land during creation – a relationship that then continued into the present day.²³ Though also claiming that the wind was the agent of God's clearing of the dry land, Ibn Ezra's explanation was more complex than Rashbam's. He did argue that God had created the earth so that it would naturally be under the primordial water.²⁴ However, he then claimed that the agents through which God dried the earth established the contemporary relationship between water and earth. He explained that the wind and the light of the second day were and continue to be responsible for the dry land's existence. His explanation also hints that the elements during these first three days of creation were not in their current state until the light began to shine on them.²⁵ Nahmanides made a similar argument. He, too, claimed that earth should naturally be below water due to its weight and that God was responsible for fashioning the dry land.²⁶ Yet, his explanation of God's calling the separation of earth and primordial water "good" suggests that God then established a different nature for water and the earth through this verbal description. For Nahmanides argued that God's declaration that this relationship was good established its duration.²⁷

21 Rosenbaum and Silbermann, trans and eds., *Pentateuch with Targum Onkelos, Haphtaroth and Prayers for Sabbath and Rashi's Commentary*, 4.

22 Maimonides, *Guide for the Perplexed*, 2.29–30.

23 Samuel ben Meir [Rashbam], *Rabbi Samuel Ben Meir's Commentary on Genesis*, 41.

24 Abraham Ibn Ezra, *Commentary on the Pentateuch*, 30.

25 *Ibid.*, 34.

26 Nahmanides, *Commentary of Nahmanides on Genesis Chapters 1–6*, 44.

27 *Ibid.*, 45.

Two other fourteenth- and fifteenth-century authors came the closest to declaring the current relationship between water and earth a miracle, as many sixteenth-century commentators would eventually do. Both of these authors' opinions resonated with those found in eleventh- through thirteenth-century Jewish exegesis, while emphasizing God's role in clearing the primordial water from the land more than earlier Jewish commentators had done. The context of northern French Jewish exegesis seems to have directly influenced the first, Levi ben Gershom (Gersonides) (1288–1344). Gersonides, an influential thinker in the areas of astronomy, mathematics, and biblical exegesis, ultimately continued Nahmanides' emphasis on the current natural relationship of water and earth. In his philosophical work, *The Wars of the Lord*, Gersonides insisted that water should naturally cover the earth and that God went against the primordial nature of earth when he raised a portion of it above the waters.²⁸ Despite attributing earth and water's primordial relationship directly to God, though, he argued that an aspect of the current natural order was responsible for the contemporary dry land's continued elevation above water. For him, the motion of the supralunar bodies according to the natural order continued to keep water from submerging the earth.²⁹ For Gersonides, then, though God went against earth's and water's primordial natures during creation to establish their current relationship, the continued existence of the dry land also had natural causes.

We find a similarly complex discussion of the relationship between water and earth in Paul of Burgos's (c.1351–1435) *Additiones* to Nicholas of Lyra's *postilla* or commentary on the biblical text. Paul was born to a wealthy Jewish family on the Iberian Peninsula. He converted to Christianity around 1391 and spent much of the rest of his life serving in various positions within the Roman Catholic church and trying to convert Jews.³⁰ In his *Additiones*, Paul explicitly rejected the explanations of earlier Christian exegetes for why water did not currently flood the earth. He argued that the amount of water in the sublunar sphere meant that even if God had caused the primordial waters to condense or gathered them in cavities in the dry land – the most common Christian explanations for the dry land's existence since the time of Augustine – water still would have flooded the earth.³¹ Instead, Paul claimed that God had gathered the primordial water into the Southern

28 Levi ben Gershom [Gersonides], *Wars of the Lord*, 6.1.13.

29 Staub, *Creation of the World according to Gersonides*, 4–36, and Toutai, *La pensée philosophique et théologique de Gersonide*, 185–87.

30 Hailperin, *Rashi and the Christian Scholars*, 252–59.

31 Paul of Burgos et al., *Postilla litteralis in vetus et novum testamentum*, sigs. fiiiv–fiiir.

Hemisphere of the sublunar world, thereby submerging any land located there, and as God did so, he raised the earth's sphere so that land would stick out above water in the Northern Hemisphere, providing people there with a place on which to live. Though his explanation for the dry land's existence emphasized God's actions against the natures of water and earth and provided a description of the spatial relationship between them, his ontological classification of this action is significant. Rather than calling the current relationship between water and earth a miracle that God's Word had caused, he stressed instead that the divine law worked with nature, and he labeled this working together, as "connatural."³² Though both Gersonides and Paul of Burgos stressed God's intervention against primordial water's and earth's natures, both also ultimately attributed the current ontological and in Paul of Burgos's case, even spatial, relationship of water and earth either to an aspect of the natural order or to God's working with this natural order.

Comparing the works of eleventh- to fifteenth-century Jewish and Christian commentators on Genesis with those found in the patristic and early medieval periods, we find that the ontological classification of water's relationship to the earth did expand during the high Middle Ages and the late medieval periods. Most Christian interpreters of Genesis continued to claim that water's current relationship to earth was natural, often drawing on explanations for this relationship dating back to Augustine's work. Some, such as Denis the Carthusian, even emphasized the naturalness of the dry land's existence more than Augustine and those who appropriated his explanation by introducing vocabulary and discussions from contemporary philosophy into their interpretations. Yet others such as Thomas Aquinas and Paul of Burgos, along with the vast majority of Jewish commentators, understood the relationship between water and earth somewhat differently. They drew a distinction between the primordial and current relationship between the two substances. Whereas Thomas Aquinas hinted that God might be responsible for this primordial relationship, Rashbam, Ibn Ezra, Nahmanides, Gersonides, and Paul of Burgos all either intimated or claimed that God's separation of water and earth during creation was a miracle that went against the primordial natures of both water and earth. For all of these authors, though, the current relationship in their everyday lives was not miraculous, as other aspects of the natural order or God's will working with this natural order kept water from the dry land. For these commentators, the natural order God had established during creation provided their ability to live safely on dry, fertile land.

32 "ex certa lege divina habeat inclinationem connaturalem"; *ibid.*, sigs. fiiiiv–fvv.

Gathering Water in the Sixteenth Century

This general agreement about the naturalness of water's current relationship to the earth dissolved in the sixteenth century. Beginning in the 1520s, many Europeans wrote commentaries on the Book of Genesis. These commentaries appeared in slightly different contexts than in previous periods. Though some began as lectures given in universities or as sermons preached to congregations, they were eventually copied down and printed for wider distribution.³³ These commentaries show that the possibilities for categorizing water's behavior expanded greatly in this century beyond those offered in earlier works on Genesis, even as commentators continued to cite and draw on these earlier works in their own exegeses. Some sixteenth-century commentators did continue to offer explanations that resonated with those of previous periods, pointing to the natural order God had fashioned during creation to explain the dry land's current existence. Many others offered descriptions and categorizations of this existence that had not appeared in earlier texts, arguing that the water-earth relationship was preternatural – a wonder, or even supernatural – a miracle. Examined alongside those characterizations and explanations offered in the earlier works explored in Chapter 1 and the previous section, which continued to provide contexts and models for interpretation of Genesis 1:9–10, this proliferation of categorizations of water's relationship to the earth in sixteenth-century biblical commentaries offers evidence that specifically these European authors had begun to rethink this relationship.

During the sixteenth century, some authors continued to categorize and explain the contemporary dry land's existence in much the same way as earlier exegetes. Whereas some authors simply mentioned that water failed to flood the earth and did not explain how this relationship between water and earth occurred,³⁴ others either argued that God's creation of

33 On these commentaries, see Williams, *Common Expositor*.

34 Those who did not classify water's failure to flood the earth tended to offer an allegorical reading of this passage or to focus specifically on the meaning of the Hebrew text. For allegorical readings of the passage, see Pepin, *Expositio in Genesim iuxta quodruplicem Sacrae Scripturae sensum*, sigs. biiiir–v, and Brocard, *Mystica et prophetica libri Geneseos*, sigs. Bbir–Bbiiiv. For a focus on the Hebrew text, see, Steuco, *Recognitio veteris testament ad hebraicam veritatem*, sigs. bviiv–bviiir; Capito, *Hexameron Dei opus explicatum*, sig. A2v; Becker, *Christiana trium linguarum elementa*, sigs. B1r–C4r; and Oleaster, *Commentaria in Mosi Pentateuchum*, sigs. a4r–v. For other authors who did not characterize water's failure to flood the earth, see Lippomano, *Catena in Genesim*, sigs. ciir–cviiiv; Fabricius, *Commentarius in Genesim*, sigs. B6r–B7r; and Pezel, *In primum librum Mosis*, sigs. B1v–B2r.

nature or secondary causes could explain the water-earth relationship. Converging with the earlier explanations offered by Basil and Ambrose, Victor Stringel (1524–1569), professor of philosophy at Jena and later professor of ethics and history at Heidelberg, argued that God arranged the waters vis-à-vis the earth as people now witnessed. Describing why God called the gathering of the primordial waters into one place and the exposing of the dry land, good, Stringel stated that this order between water and earth came from the divine mind and that it was “suitable or pleasing to nature,” suggesting that God had created the natural order during creation that people currently witnessed and experienced.³⁵ Philipp Melanchthon also stressed the ways in which God’s Word provided water with its current nature, arguing “that the waters are held in mid-air by God’s Word.”³⁶ He ultimately considered water’s suspension from the earth as its natural behavior, however. This categorization emerges in his comparison between his contemporaries’ experiences with water and biblical events in which it figured prominently. Melanchthon claimed, “we see examples where water falls back [on the earth] by God’s Word against nature, as in the Flood and the Exodus from Egypt,” thereby implying that what he and his contemporaries experienced on a daily basis was water’s natural behavior that God’s Word had established during creation.³⁷ Wolfgang Musculus (1497–1563), professor of theology at Bern from 1549, was even more explicit about the relationship between God’s Word and the fashioning of water’s current nature. He also drew on his contemporaries’ personal experiences with water’s behavior to describe the connection between God’s work during creation and water’s current nature. Citing Basil’s homily on the subject, Musculus argued:

After God’s command, it was revealed what kind of motions water would have, which are by nature unstable, fluid, and tending toward sloping places. Truly what kind of motions would have existed by nature before God’s command that the waters were to be gathered into one place was neither seen nor heard by anyone. Therefore, do not think about what was prepared by its nature before God’s mandate, but attribute to God’s Word all that we see pertains to the nature and quality of the waters as they are

35 “Bonum est quidam ordinatum a mente divina, & conveniens naturae, seu iuuans naturam”; Stringel, *Primus liber Moysi*, sig. B2v.

36 “Haec cum considerant sancti, aquas, terram suspensas esse verbo dei”; Melanchthon, *In obscuriora aliquot capita Geneseos annotationes*, sig. A8v.

37 “Et vidimus exempla ubi aquae cesserunt verbo dei contra naturam, sicut in diluuiio in profectione ex aegypto”; *ibid.*

now – that they are clearly carried by something in perpetual motion, they run back and forth, they are unstable, and they enjoy sloping places.³⁸

For Stringel, Melanchthon, and Musculus as for many of their patristic and medieval predecessors, the current water-earth relationship was a part of nature that God had fashioned during the process of creation.

Those authors who relied on secondary causes to explain the dry land's existence drew on an explanation frequently offered in the medieval period and dating back to the works of Augustine – the change in primordial water's characteristics on the third day of creation from a vaporous to a condensed state. We see the continued significance of Augustine's interpretation in the 1548 commentary of Jakob Ziegler (c.1470–1549), a scholar known for his work in geography and astronomy, and a professor of mathematics at Ferrara. Though neither citing nor discussing Augustine directly, Ziegler argued that prior to the third day, primordial water had been in a thinner state much like a cloud and that only on that day gained its denser, heavier nature – a nature “which is seen today in the element of water.”³⁹ Cardinal Thomas Cajetan (1469–1534) took this argument a step further, explicitly explaining the secondary causes through which the primordial waters changed from a vapor into a liquid in his 1539 *Commentaries on the Five Books of Moses* (*Commentarii in quinque Mosaicos libros*), much as Denis the Carthusian had done in the fifteenth century. Cajetan argued that there was a change in motion on the third day of creation “through which the waters were condensed and from being sparse, they were made dense.”⁴⁰ According to Cajetan, these denser waters then occupied less space in the world, leaving some space to the air that currently

38 “Post praeceptum quidem Dei manifestum est, quales sint aquarum motiones, quam sint natura instabiles, fluidae, & loca declivia petentes. Verum quales extiterint natura antequam praecepto Dei in unum locum congregari iuberentur, nec vidit quisquam, nec a quopiam auditum est. Quare non est de illis sentiendum, quod natura sua sic fuerant ante mandatum Dei comparatae, ut nunc sunt, sed verbo Dei tribuendum hoc totum quod iam ad illarum pertinere naturam & qualitatem videmus, quod videlicet perpetuo quodam motu feruntur, currunt ac recurrunt, instabiles sunt, & locis declivioribus gaudent”; Musculus, *In Mosis Genesim plenissimi commentarii*, sig. b4v.

39 “Ita ipsae ex diffusione sua densatur in corpulentiorum naturam, quae hodie videtur elementi aquae”; Ziegler, *Conceptionum in Genesim mundi et Exodum commentarii*, sig. D1v.

40 “Congregatio aquarum non significat purum localem motum sed significat motum alterationis quo aquae condensatae sunt & ex raris factae sunt densae: ac per hoc per modum congregationis occupauerunt minorem locum reliquentes multas sui, loci partes quas occuparunt partim aer mixtus qui penes nos est, & partim elevatae quaedam partes terrae”; Cajetan, *Commentarii in quinque Mosaicos libros*, sig. bivr.

surrounds people and some for the elevation of parts of the earth above the waters.⁴¹ Ziegler's and Cajetan's explanations for water's failure to flood the earth continued the patristic and medieval emphasis on the naturalness of the primordial waters' gathering together in one place much as Stringel, Melanchthon, and Musculus did, even as they appropriated what had become a traditional explanation for the dry land's current existence to explain the gathering.

Still other sixteenth-century authors' descriptions of the water-earth relationship resonated with the discussion that Thomas Aquinas had offered in his *Summa theologiae*. Much like Aquinas, they, too, attributed this relationship to God and did not discuss how God's actions related to the natural order. Their explanations for how God caused this gathering together differed, however. For example, Wenzeslaus Linck (1483–1547), an early associate of Martin Luther's in the faculty of theology at Wittenberg and later a reformer in Nuremberg, and Martin Borrhaus (1499–1564), a teacher of philosophy at the University of Basel, attributed the gathering of the primordial waters and their continued restraint to God's Word without explicitly mentioning how God's action related to the natural order.⁴² This association between God's Word and the dry land's continued existence also appeared in the later part of the century in works written by both David Chystraeus (1530–1600), one of the authors of the Formula of Concord (1577), and Christoph Pelargus (1565–1633), superintendent of the Mark Brandenburg, as they, too, argued that God's Word was responsible for the gathering of the primordial waters.⁴³ Still others credited this gathering together to a different attribute of God. Gervase Babington (1549–1610), then bishop of Llandaff and eventual bishop of both Exeter and Worcester, and Jean Mercier (c.1510–1570), a professor of Hebrew at the Collège Royale, who was forced to leave France during the French religious wars, claimed that this gathering of the primordial waters occurred specifically through God's power. Whereas Mercier argued that God provided a dry place for people to live through his power and goodness when he pulled back the primordial waters – a power and goodness people should contemplate through this example⁴⁴ – Babington warned his readers to avoid excessive speculation on why the waters did not currently flood the earth. He argued,

41 Ibid.

42 Linck, *Annotation in die fünf Bücher Mosis*, sig. Bir, and Borrhaus, *In Mosem, divinum legislatorem*, sig. a3v.

43 Chytraeus, *In Genesin erratio*, sig. E2v, and Pelargus, *In Prophetarum omnium oceanum sive Genesin sacram mosaicam*, sig. C2v.

44 Mercier, *In Genesin commentarius*, sig. biiiir.

“The same power that is able to upholde all the frame of this world without any earthy prop, is able to holde those waters there in their place, to that ende that his wisdom hath ordayned therein for, and this should content us.”⁴⁵ Finally, Cyriacus Spangenberg (1524–1604), a student at Wittenberg and later a minister in Eisleben, argued that God’s providence was responsible for the dry land’s continued existence, fashioning a dry, fruitful place for human beings.⁴⁶

Still other sixteenth-century categorizations resonated with those found in Jewish commentaries on Genesis 1:9–10, as they focused on God’s power over the universe during the process of creation. As we saw above, eleventh- through fifteenth-century Jewish commentators tended to argue that God went against the primordial natures of water and/or earth in fashioning the dry land, but they also claimed that another aspect of the natural order currently accounted for the dry land’s existence, indicating that water and earth currently behaved naturally for them. Whereas some sixteenth-century authors claimed that God went against water and/or earth’s primordial natures on the third day of creation much as earlier Jewish commentators on Genesis had, these authors also emphasized that God’s power over these elements occurred not just during creation but also into the present day. For these authors, God’s power alone not only gathered the primordial waters together and exposed the dry land during creation, but also currently kept water from flooding the earth. These authors labeled this action as “unnatural.” This explicit labeling of water’s current failure to flood the earth as “unnatural” sets these sixteenth-century authors apart from their Jewish predecessors, and begins to show the expansion of the categorizations they used to describe the current water–earth relationship. Huldrych Zwingli (1484–1531), reformer of Zurich, was the vaguest about which element – the water or the earth – behaved unnaturally after the third day of creation. However, his use of present-tense verbs emphasizes that the current layout of the world’s waterways and landmasses is an unnatural action God’s power alone continues to cause, as he argued that, “in so far as the earth stands out from the waters, it is through God’s power and not nature.”⁴⁷ Paul Fagius (1504–1549), a Hebraist, and Konrad Pellikan (1476–1556), professor of Hebrew, Greek, mathematics, and cosmography

45 Babington, *Certain Plaine, Brief, and Comfortable Notes upon Every Chapter of Genesis*, sig. B6v.

46 Spangenberg, “Tabula 1: Creatio Totus Mundi,” in his *In sacri Mosis Pentateuchum tabulae ccvi*, sig. A2r.

47 “Quod autem terra aquis eminet, potentia Dei est, non natura”; Zwingli, *Farrago annotationum in Genesim*, sig. aiiiiv.

at the Franciscan monastery of St. Katherina in Rouffachand and later at the Universities of Pforzheim and Tübingen, both attributed the unnatural existence of the dry land specifically to the current unnatural behavior of water. Fagius stressed much as others had done that God's command (*iussus*) to primordial water had caused it to gather into one place and let the dry land appear against primordial water's nature. He further claimed that "earth's sticking out above the waters is not from the nature of the earth, since it is heavy, but from the power of the divine Word by which even a little bit is held back."⁴⁸ Pellikan also stressed water's current unnatural (*contra naturam*) behavior, even as he claimed that God's command (*iussus*) to the primordial waters to gather in one place currently provided people with life as God in his grace not only exposed dry land but also irrigated the earth with the water, making it fruitful.⁴⁹ Antonio Honcala, a doctor of theology and a canon of the church of Ávila, argued that God's Word caused both the water and the earth to behave unnaturally since the third day of creation as "water naturally should be above the earth, and the earth should be below the water."⁵⁰ Whereas the commentaries of Zwingli, Fagius, Pellikan, and Honcala resonated with those of their contemporaries and predecessors who stressed God's power over water during creation, their works also added a new emphasis. They explicitly argued that the elements of water and/or earth had behaved unnaturally since the third day because they went against the primordial arrangement by which water had covered the earth.

Though the sixteenth-century categorizations of water's relationship to the earth already explored recall those found in previous centuries in that they largely ascribed it to an attribute of God or to the natural order he instilled into the world, there were other categorizations of water's or earth's current behavior that did not frequently appear in earlier commentaries on Genesis 1:9–10. This again reveals the increasing number of ontological characterizations that sixteenth-century commentators used to describe their relationship. One such classification hinted at the preternatural work of God and labeled the dry land's existence a perspectival wonder. This appeared in the 1551 work of Ambrosius Catharinus Politus (1483–1553), bishop of Minori and later archbishop of Conza. The beginning of Politus's

48 "Non enim ex natura terrae esse, cum ponderosa sit, quod supra aquas emineat: sed ex virtute verbi divini, qua vel tantillum cesante"; Fagius, *Exegesis sive expositio dictionum Hebraicorum literalis & simplex*, sig. C1r.

49 Pellikan, *In Pentateuchum sive quinque libros Mosis*, sig. a2r.

50 "Nam & aqua quidem naturale est terrae superferri & rursum terrarium est aquis subsidere"; Honcala, *Commentaria in Genesim*, sig. B1v.

account of the primordial water's gathering together resonated with those dating back to the works of Basil and Augustine. Sounding themes found in Basil's homily, Politus noted that "water's original nature was to cover the whole earth" so that the earth was "uninhabitable and infertile" and that "it was necessary to distinguish earth from water" and therefore "another nature was introduced by the Word of God."⁵¹ Reflecting Augustine's commentary, Politus also claimed that this different nature God's Word had introduced during the third day of creation caused primordial water to become denser and gather into one place. His categorization of water's behavior after it received this second nature is different than either Basil's or Augustine's, however, and begins to set his explanation for the dry land's existence apart from his predecessors'. For Politus insisted that this action was wonderful (*mirabile*) from the perspective of human beings. His insistence that primordial water's separation from the earth was a wonder "in our eyes" suggests that for Politus, God and human beings had different understandings of the universe. Whereas God had full knowledge of the world's processes, human beings did not, and so their understanding of water meant that its behavior appeared to violate the natural order based on what people knew about the four elements. "I hold as a more likely opinion that the waters ought to be placed above the earth according to their particular nature as the earth is more known as the small and heavy element, just as air is spread out above them both, as air is light, and thus as fire is above the air, as fire is lighter."⁵² However, Politus pointed out that such an arrangement would be dangerous to the larger and more general good. Therefore, "God provided water with the [second] nature so that it was gathered into one place," allowing people, plants, and animals a dry place to live.⁵³ Politus ultimately categorized water's current behavior as natural, but in doing so, he argued that understanding its naturalness required people to try to

51 "Cum enim aquae hactenus iuxta primam suam naturam, excepto Paradiso, universam terram occuparent, & consequenter si ita mansissent, eandem reddidissent inhabitabilem atque infructuosam, iccirco necessaria fuit earum a terra distinctio, quibus etiam aliam quodammodo natura inderetur verbo Dei, non solum ut densarentur, sed ut congregarentur in unum locum, sicut, & factum videmus, & est mirabile in oculis nostris"; Politus, *Enarrationes in quinque priora capita libri Geneseos*, sig. Bviiiv.

52 "Istud ego probabilius existimo, aquas iuxta suam naturam particularem super terram tamquam nobilium minus ve grave elementum poni debuisse, sicut aer super utrunque collectus est ut leve: & sic etiam ignis super aerum ut levius"; *ibid.*

53 "Sed quia maiori & universaliori bono noceret, si ubique terma operirent aquae (non enim posset illa producer foetus suos: nec animalia servati, nec plantae potuissent) ideo Deus optimus maximus providit hanc aquis naturam ut in unum congregarentur, neque (ut ait Psalmista) converterentur operire terram"; *ibid.*

view the element and the world from God's perspective. Urging his readers to consider God's wonderful (*admirabilis*) providence, he argued:

How it is natural ought to be grasped in two ways. First the particular nature of the thing must be considered, and second the nature of the universe must be considered. From which in respect of these diverse meanings, water is both natural and unnatural and in such a way continues how it remains not covering the earth. It is natural according to the nature of the universe [...] but it is unnatural according to the proper nature of that element. Nevertheless, it should not be conceded that [water's behavior] is violent because [the universal nature] is added to it above its particular nature. In fact, it is not of God to violate the natures of things (as the divine Dionysius teaches well), but by his prudence he moderates it thus so that what is conducive to the more universal good, it claims for itself the superior part. And that preferably should be called natural.⁵⁴

For Politus, when one explored the particular nature of water, one would judge that water's behavior was unnatural because water as an element should flood the earth just as primordial water had; however, water's current relationship to the earth could ultimately be considered natural from God's and the universe's perspective because the dry land's existence allowed for human, animal, and plant life on earth – for Politus, a greater good. God ultimately kept water from following the particular nature it had had since the beginning in order to preserve the universal natural order of the world. Though eventually arguing for a “natural” categorization of water's behavior, Politus's commentary showed that, depending on one's perspective – divine versus human or universal versus particular – one could potentially understand water's current behavior as either natural, a wonder, or unnatural.

The second specifically sixteenth-century classification of water's behavior from the third day of creation categorized it as a miracle. Authors

54 “Quomodo id quod naturale est dupliciter debet accipi. Primo quidem modo considerata cuiusque rei particulari natura: altero vero considerata natura universali. Unde respectu diversae huius acceptionis, & naturale & innaturale est aquis sic esse, & sic manere quomodo manent non operientes terram. Naturale quidem secundam naturam Universi hoc ipsum exigentem. Innaturale autem secundum propriam ipsius elementi naturam. Non tamen conceditur id esse violentem, quod supra particularem naturam est illis additum. Non est enim Dei (ut D. Dionysius egregie docet) rerum violare naturas, sed sua prudentia ita tempore, ut quod ad universalium bonum conducit, partes sibi vendicet superiores, & illud potius naturale vocetur”; *ibid.*, sig. Bviiiir.

who described its behavior as miraculous included Calvin; Luther; Johannes Oecolampadius (1482–1531); Paul von Eitzen (1522–1598), superintendent of Schleswig and general provost for the ducal share of Holstein; Augustin Marlorat (1506–1562), a pastor ministering to communities under the cross in France; Peter Martyr (1499–1562); Benedict Pereira (1536–1610), a Jesuit philosopher and theologian; and Jerome Zanchi (1516–1590), a professor at the University of Heidelberg and later at the Casmirianum in Neustadt – all contrasted the behavior of water from the third day with what the natural philosophers expected of the elements. As with Calvin and Luther, all of these authors pointed out that the inherent characteristics of the elements meant that water should continue to submerge the earth, as primordial water had indeed done. However, they all claimed God continued to intervene into the world to keep the waters from flooding it. All labeled this action a “miracle.”⁵⁵ Going beyond a discussion of the elements’ expected locations and God’s miracle as found in these authors’ works, only Zanchi offered further explanation of how God’s causing of that miracle related to the natural order. According to Zanchi, “the philosophers say that [water’s failure to cover the earth] was done for the benefit of Nature. But who then is that nature? Certainly [the dry land’s existence] is not according to [Nature]. Therefore, it is principally according to God. It is a clear miracle in Nature that the earth sticks out a little bit over the waters, and since it sticks out, the earth seems to have been established above the waters.”⁵⁶ Still others took their explanations of water and earth’s miraculous relationship to another level, arguing that there were multiple miracles included in God’s restraining of the waters from the earth. For Nikolas Selnecker (1530–1592), court preacher and musician in Dresden and another of the authors of the Formula of Concord, two miracles occurred on the third day of creation and continued into the present: the earth’s seeming immobility in the center of the waters as well as these waters’ failure to flood the earth.⁵⁷ Johann Wild (1497–1554), a member of the Franciscan order and eventual preacher in the

55 Calvin, *In primum Mosis librum*, 4; Luther, *Genesisvorlesung*, 25–26; Oecolampadius, *In Genesim enarratio*, fols. 13v–14r; Eitzen, *Commentariorum in Genesin liber primus*, sig. B3v; Marlorat, *Genesis cum catholica exposition ecclesiastica*, sig. aiiiv; Martyr, *In primum librum Mosis*, sig. A4v; Pereira, *Commentariorum et disputationum in Genesin*, sigs. F6v–G3v; and Zanchi, *De operibus Dei intra spacium sex dierum creatis opus*, sig. X4r.

56 “Philosophi aiunt hoc esse factum beneficio Naturae. Sed quaenam haec Natura? Non certe secunda. Est enim potius contra Naturam. Est igitur prima Deus. Est enim apertum miraculum in Natura, quod terra minor Aquis, emineat: atque ita emineat, ut videatur fundata super Aquas”; Zanchi, *De operibus Dei intra spacium sex dierum creatis opus*, sig. X4r.

57 Selnecker, *In Genesin commentarius*, sig. F5r.

cathedral of Mainz, increased the number of miracles further, arguing that there were four involved: that God's Word alone could remove the waters into one place, that this Word could continue to keep the water in one place against its nature, that all the water gathered into the seas without the seas overflowing, and that the earth sat in the middle of these waters without being submerged.⁵⁸ Drawing on the philosophical teachings of their day on the relationship between the four elements as well as the description in Genesis of primordial water's covering of the earth before the third day, all these authors argued that the dry land's current existence was clearly a miracle. In doing so, they added a categorization of water's behavior not found in their predecessors' commentaries on Genesis.

Commentaries on Genesis 1:9–10 began to reclassify water's current relationship to the earth particularly in the sixteenth century. They continued to draw on earlier interpretations of Genesis, especially Basil's homily and Augustine's commentary, which had been influential from the patristic period and ascribed the water-earth relationship to aspects of the natural order, but sixteenth-century authors offered numerous and varied categorizations for this relationship, frequently claiming it was preternatural or even supernatural. Even when they opted for a "natural" categorization, their works contain much more detailed explanations than their predecessors' to justify this particular classification, often citing both the work of natural philosophers and the writings found in the Psalms. A close reading of these newer commentaries alongside their exegetical antecedents therefore shows that the possibilities for categorizing water's behavior from the third day of creation expanded greatly in the sixteenth century especially as the authors sought to explain how and why people currently enjoyed the dry, safe, and fertile places on which they lived. This proliferation of categorizations raises the question of why such possibilities expanded particularly in this century, despite authors' repeated and consistent drawing on earlier works in which the preternatural and supernatural characterizations of water's behavior did not appear. As we shall see after exploring similar trends in sixteenth-century natural philosophical, geographical, and cosmographical works, a focus on previously unavailable ancient and medieval texts, a desire to reconsider the relationship of God, the world, and human beings, and especially the circulation of information about European sea voyages to the Southern Hemisphere explain the expansion of these ontological classifications particularly in this century.

58 Wild, *In totam Genesim*, sigs. B4r–v.

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3. Defining Water in Natural Philosophical Texts

Abstract

This chapter explores some of the most frequently printed and widely circulated natural philosophical texts of the sixteenth century along with their medieval predecessors. It focuses on each author's conception of water and his classification for why water did not flood the earth. This chapter argues that most of these authors did ultimately classify the dry land's existence as a natural occurrence. However, it also shows that their arguments for this naturalness were longer and more convoluted than previous discussions, incorporating redefinitions of the proper subject matter of natural philosophy to do so. These longer, more complex discussions suggest that water was of more particular interest to sixteenth-century authors of natural philosophical texts than to previous ones.

Keywords: nature; four elements; Philipp Melanchthon; Jean Bodin; Gregor Reisch

For there is earth, placed, as it were, as the center in the middle of it all, about which is water, about water air, about air fire [...] Three of them, in turn [fire, air, and water], surround the earth on all sides spherically, except in so far as the dry land stays the sea's tide to protect the life of animate beings.

– John of Sacrobosco, *On the Sphere* (c.1230)¹

Th: Why does water not cover the earth, since earth is heavier than water?

M: Aristotle is in difficulties here, since he admits that the earth ought to be surrounded by water, but the water is properly back from a certain part of the earth for the safety of birds and reptiles. From this it follows that the first cause

1 John of Sacrobosco, *Sphere of Sacrobosco and its Commentators*, 119.

freely removes the water and that it is not bound by any natural law, contrary to what Aristotle asserts. But how much more wonderful (*mirabilius*) is it that the earth floats on water, hanging in the air?
 – Jean Bodin, *Universae naturae theatrum* (1597)²

Th: It seems to be against nature (*contra naturam*) that the heavier [earth] is not carried down [below the lighter water].

M: It would have been absurd that nature would remain established for so long in opposition to nature. Earth was founded above the waters, which were able to preserve the earth's stability for many millions of years. For this we have not only the testament of Scripture (Psalm 24) but also it is proved by experience: thus the water encloses the earth, desired and surrounded by the sea so that it seems to forge one nature from two.
 – Jean Bodin, *Universae naturae theatrum* (1597)³

In the second book of his 1596 *Theater of Nature* (*Universae naturae theatrum*), Jean Bodin (1529 or 1530–1596) pointed out that water's failure to flood the earth did not seem to fit with what he had previously written about these elements in this natural philosophical textbook.⁴ Drawing on Aristotelian notions of the elements' comparative heaviness, natural positions, and spherical shape, he explained that people should expect water, as a lighter element than the earth, to submerge the dry land entirely. Yet, experience showed this arrangement was not the case. For Bodin, the behavior of water vis-à-vis the earth therefore required further clarification. In giving this clarification, he offered three, different categorizations of the relationship between these elements as we see in the section of his text that begins this chapter. First, he suggested that the dry land's existence was miraculous, claiming that the first cause or God and not some law of nature was responsible for this existence.

2 “Th: Cur cum terra gravior fit aquis, non tamen ab illis obruitur? M: Hic Aristoteles haeret, quia confitetur terram aquis circumfusam esse oportere, sed quadam sui parte rerectam ad volatilium & reptilium salutem: ex quo sequitur primam causam libere agere, nec ullis naturae legibus obligari, contra quam Aristoteles contendit. At quanto mirabilius est terram aquis in aere pensilibus innatare?”; Bodin, *Universae naturae theatrum*, sigs. M4r–v.

3 “Th: Id videtur contra naturam fieri, ut gravia deorsum non ferantur. M: Absurdum esset naturam repugnante natura tamdiu constituisse, aut terram super aquas fundatam, tot annorum millibus stabilitatem suam tueri potuisse: id autem non modo sacris literis testatum habemus, sed etiam experientia comprobatur: sic enim mare terram appetens & circumfusum claudit, ut una ex duabus naturis conflata videatur”; *ibid.*, sigs. M5r–v. The citation of Psalm 24 occurs in the margins of the text on sig. M5r.

4 On this work, see Blair, *Theater of Nature*.

Second, he indicated through a comparison that his readers could understand the relationship between water and the earth as wonderful (*mirabilis*), even if it was not quite as wonderful as water's ability to hold up the earth as the earth was also suspended in the air. Third, he argued that this relationship should be considered natural because it had lasted for such a long time, and he cited both Psalm 24 and people's experience with coastlines as evidence for the naturalness of water and earth's relative positions.

By the time Bodin wrote his textbook, the question of water's current relationship to the earth had long occupied Europeans studying the physical world. Many originally encountered this question during university astronomy lectures based on John of Sacrobosco's (c.1195–c.1256) *On the Sphere* (c.1230). This text served as the standard way of introducing university students to the study of astronomy for at least twelve generations.⁵ As we see in the passage from his work that begins this chapter, even though he drew on ancient notions of the four elements as well as their natural locations and shape, all of which suggested water should submerge the earth, Sacrobosco did state that water currently does not entirely flood the dry land. Rather than try to classify the water-earth relationship, however, Sacrobosco instead provided a teleological explanation for the dry land's existence. For him, water did not entirely submerge the earth because animate creatures needed somewhere to live.⁶ Later commentators on Sacrobosco's text elaborated on this passage in order to explain water's relationship to earth more fully. For example, Robertus Anglicus offered three different explanations for the dry land's existence in his 1271 course of lectures on Sacrobosco's work given at either the University of Paris or the University of Montpellier.⁷ Robertus's commentary credited both God as well as two aspects of the natural order for water's failure to flood the earth. After explaining that the divine will provided the dry land for the salvation of animate creatures, he also stated that the earth's inherent dryness allowed it to drink in some of the water, causing both the earth's fertility and the existence of the dry land. He also ultimately attributed the earth's dryness to celestial bodies, stating that their conjunctions caused some of the earth to dry out and therefore led this dried-out earth to drink in water.⁸

5 On this work and Sacrobosco's life more generally, see Pederson, "In Quest of Sacrobosco."

6 For a discussion of the arguments of Sacrobosco on the water-earth relationship, see Grant, *In Defense of the Earth's Centrality and Immutability*, 22–27, and Goldstein, "Renaissance Concept of the Earth in its Influence upon Copernicus," 29–35.

7 On Robertus Anglicus, see Thorndike's introduction to John of Sacrobosco, *Sphere of Sacrobosco and its Commentators*, 28.

8 Anglicus, in John of Sacrobosco, *Sphere of Sacrobosco and its Commentators*, 150.

Bodin's discussion of water's relationship to the earth was therefore one that built on centuries of precedent. What set Bodin's work apart from Sacrobosco's explanation of water's relationship to earth and from those later commentaries on Sacrobosco's text, however, was his focus on the ontological status of this relationship as simultaneously miraculous, wonderful, and natural and his explicit incorporation of secondary and first causes into his explanation. Exploring other sixteenth-century natural philosophical texts such as the last five books of Gregor Reisch's (c.1470–1525) *Philosophical Pearl* (*Margarita philosophica*, 1503), Frans Titelmans' (1502–1537) *Compendium of Natural Philosophy* (*Compendium philosophiae naturalis*, 1530), Philipp Melanchthon's *Introduction to Physics* (*Initia doctrinae physicae*, 1549), and Jacopo Zabarella's (1533–1589) *On Natural Things* (*De rebus naturalibus*, 1590), we find that these authors also wrote, often at some length, about the ontological status of water's relationship to the earth, frequently incorporating discussions of both God's creation of and providential control over the world and of the secondary causes of the natural order. Though frequently building on earlier explanations for the dry land's existence found in the works of their predecessors, many of these sixteenth-century authors of natural philosophical works were preoccupied with characterizing this existence as either natural, preternatural, or supernatural as they explicitly defined the parameters of natural philosophical study in a manner earlier authors had not done. This shared concern with classifying water's relationship to the earth and defining natural philosophy's subject matter in these natural philosophical texts also provides evidence that the water-earth relationship and the arrangement of the world's landmasses and waterways were under new scrutiny specifically during the sixteenth century, much as we saw in the previous chapter's exploration of sixteenth-century commentaries on Genesis, even though authors of natural philosophical texts drew fewer clear boundaries between water and earth than biblical commentators had due to their focus on the combinations of the four elements.

This chapter compares the categorizations of the water-earth relationship found in the sixteenth-century natural philosophical texts of Reisch, Titelmans, Melanchthon, Zabarella, and Bodin to those in a selection of eleventh- through fifteenth-century works that also inquired into the physical world.⁹ I have chosen this selection of eleventh- through fifteenth-century

9 My definition of "natural philosophy" draws on that of Edward Grant. He argues that natural philosophy was a discipline that crystalized through the works of ancient Greek authors, especially Aristotle's, and that this discipline continued to be influential into the eighteenth century. See Grant, *History of Natural Philosophy*, xi–xiv and 1.

works based on their wide circulation into the sixteenth century and their influence on the teaching of natural philosophy during the medieval period as well as the ways in which these texts reflect the trends then current in the study of the physical world.¹⁰ Reisch, Titelmans, Melanchthon, Zabarella, and Bodin's texts were all used as pedagogical tools throughout Europe as the use of textbooks to teach natural philosophy rather than direct readings of ancient texts such as Aristotle's *libri naturales* became more common throughout the sixteenth century.¹¹ These particular works have been chosen for two reasons. First, their origins are both chronologically and geographically diverse, spanning the time period from 1503 to 1596, and ranging from modern-day Belgium, Germany, Italy, and France. This chronological and geographical diversity allows for the examination of whether and how the classifications of the current water-earth relationship changed throughout the century or were different in particular geographical and educational contexts. Second, these texts were some of the most frequently printed and most widely circulated natural philosophical texts of the sixteenth and early seventeenth centuries.¹² Though a comparison of these works will not demonstrate to us how students and these texts' readers conceived of water's relationship to the earth, the frequency of their copying and printing as well as their regular use as basic texts with which to teach about the physical world suggest that their authors' notions did resonate with the opinions of other Europeans as they both reflected more common assumptions about water's relationship to the earth and shaped European students' understandings of that relationship for more than 500 years.

10 See the discussion in *ibid.*, 95–238.

11 Schmitt, "Rise of the Philosophical Textbook."

12 There were at least twelve sixteenth-century editions of Reisch's *Margarita philosophica*. See Cunningham and Kusakawa, trans and eds., *Natural Philosophy Epitomised*, pp. xvii–xix, and Lohr, "Latin Aristotle Commentaries: Authors Pi–Sm," 685–86. Titelmans' *Compendium naturalis philosophiae libri doudecim* was printed thirty-six times in the sixteenth century alone with distribution centers in Antwerp, Lyon, and Paris. See David A. Lines, "Teaching Physics in Louvain and Bologna: Frans Titelmans and Ulisse Aldrovandi," in Campi et al., eds., *Scholarly Knowledge*, 183–203. There were at least nineteen editions of Melanchthon's *Initia doctrinae physicae* printed in the sixteenth century. Though the vast majority of them were printed in Wittenberg, Melanchthon's text was also published in Basel, Frankfurt, Lyon, and Leipzig. See Lohr, "Latin Aristotle Commentaries: Authors L–M," 576–82. Zabarella's *De rebus naturalibus* was printed at least seven times before 1617. On the influence of this text on seventeenth-century natural philosophical textbooks, see Mikkeli, *Aristotelian Response to Renaissance Humanism*, 19–20, and Reif, "Textbook Tradition in Natural Philosophy, 1600–1650," 20. Three Latin editions of Bodin's *Universae naturae theatrum* were printed before 1605 along with a French edition in 1597. See Blair, *Theater of Nature*, 180–224.

Defining Water from the Eleventh through the Fifteenth Centuries

The study of the physical world changed a great deal between the eleventh and fifteenth centuries in Europe. Producing works for cathedral schools and for aristocratic patrons, eleventh- and early twelfth-century authors largely drew on the Neoplatonically based encyclopedias of the early Middle Ages such as Macrobius's *Commentary on the Dream of Scipio* and Martianus Capella's *Marriage of Philology and Mercury* or the even more eclectic works of Isidore of Seville and the Venerable Bede for their information. By the later twelfth and thirteenth centuries, however, the influence of Aristotle's *libri naturales*, the translation of and commentaries on Aristotle's works coming from West Asia, northern Africa, and the Iberian and Italian Peninsulas, and the development of the medieval university had produced a change in the study of the physical world. Teaching and writing after these institutional and content changes, medieval European teaching masters followed Aristotle in defining the subject matter of natural philosophy as that of mobile bodies, and they focused on these natural bodies in their lectures and commentaries to explain and describe specifically natural phenomena.¹³ This focus on mobile bodies intensified in the fourteenth century in particular as European authors such as Jean Buridan developed their own explanations for natural phenomena that could even contradict what Aristotle and his medieval commentators such as Averroes and Avicenna had taught and written, though they continued to focus on the secondary causes they argued structured the natural order to do so. When Europeans began producing new translations of ancient works – both previously known and unknown – in the late fourteenth and fifteenth centuries, fifteenth-century authors of natural philosophical texts had a great deal of information from which to choose as they put together their works. Despite these significant changes in the ways in which Europeans undertook and understood the scholarly study of the physical world from the eleventh through fifteenth centuries, authors of such commentaries and texts during this period almost all viewed the dry land's existence and therefore the contemporary water-earth relationship as natural, explainable through secondary causes inherent in the physical world. Though some medieval authors mentioned God in their works, they only ascribed the natural order to his creation without exploring that creation process and its effects on the physical world in much detail. Their insistence that the

13 Ann Blair, "Natural Philosophy," in Park and Daston, eds., *Early Modern Science*, 365–406, at 365.

current water-earth relationship was natural and understandable through a focus on secondary causes contrasts strongly with those of Reisch, Titelmans, Melanchthon, Zabarella, and Bodin, who, even when ultimately categorizing earth's lack of submersion in water as natural, considered many other ontological categories and the expansion of natural philosophy's traditional focus, itself, to explain the existence of the dry land on which people, plants, and animals currently lived.

Much as they had during the sixth and eighth centuries when Isidore and Bede were writing their works on the study of the physical world, Macrobius's *Commentary on the Dream of Scipio* and Martianus Capella's *Marriage of Philology and Mercury* and through them, Plato's *Timaeus* provided much of the content of works on the physical world in the eleventh and twelfth centuries. These authors included among them the Pseudo-Bede (late eleventh or early twelfth century?), Adelard of Bath (c.1080–1152), Bernard of Silvester (c.1085–1178), and William of Conches (c.1090–after 1154). They all offered a natural categorization of the water-earth relationship while also drawing in discussions of the equatorial Ocean and the battle between the water's moisture and the sun's heat that we saw in Chapter 1, traceable to Stoic and Epicurean works and contained in the encyclopedias of the early Middle Ages. For example, the author currently known as Pseudo-Bede wrote that “natural philosophers report that the true ocean is situated in the middle of the burnt up zone, in order that the fire of the Sun and of the other planets should be tempered by the water. For heat draws moisture to itself, and is nourished thereby.”¹⁴ William of Conches' *Dragmaticon philosophiae* of 1144–49 contained a similar discussion of the equatorial Ocean and the opposition of the heat of the planets, especially the sun, to water's moisture – a text, which he composed in a dialogue format likely to educated Geoffrey of Anjou (1113–1151) and his sons, including the future Henry II of England (1133–1189).¹⁵ Also written in dialogue format, Adelard of Bath's *Questions on Natural Science* endorsed the notion of an Ocean that flowed through the middle of the world in the equatorial torrid zone.¹⁶ Drawing especially on Plato's *Timaeus* as relayed in the encyclopedic tradition of Macrobius and Martianus Capella, Bernard of Silvester, too, ascribed to the notion that the heat of fire and the moisture of water complemented each other, as “the universe labored in ceaseless pain under the affliction

14 Pseudo-Bede, *De mundi celestis terrestrisque constitutione*, 23.

15 William of Conches, *Dialogue on Natural Philosophy*, 109–10. On William's intended audience, see Ronca and Curr's introduction, xvii.

16 Adelard of Bath, *Adelard of Bath: Conversations with his Nephew*, 187.

of the poundings and vexations which it suffered whenever an irruption or inundation due to an excess of heat or moisture, disturbed the accustomed course of nature," in his *Cosmography (Cosmographia)*.¹⁷

Though containing similar notions of an equatorial Ocean and the balance between celestial heat and watery moisture, each of these four authors gave a different explanation for the dry land's current existence. Despite their diverse views on how it existed, all four either implicitly or explicitly ascribed this existence to secondary, natural causes, however. Pseudo-Bede offered the least complicated explanation for the water-earth relationship by denying much of a boundary between them, explaining only that the two elements were intermingled and that it was not obvious which of the two elements had the higher position. He based his conclusion on practical experience, stating that "we see water on the surface of the earth, and we find it in its sinews when we dig."¹⁸ Adelard of Bath, Bernard of Silvester, and William of Conches all offered longer discussions of this natural relationship, citing various aspects of the teaching on the four elements for this arrangement, which stemmed back to those of ancient Greek philosophers. For example, Adelard of Bath stressed that people do not encounter pure elements in the contemporary world in a discussion of how plants grew from the earth, again eschewing clear boundaries between the two elements. He explained:

No one has ever touched, "earth" or "water," no one has ever seen "air" or "fire." These composite things that we perceive with the senses are not the elements themselves but from the elements themselves. Therefore, as the Philosopher [Plato] says, they should not be called earth, water, air, or fire, but the earthy, the watery, the airy, and the fiery. Nevertheless, they have acquired this name from the element which is more prevalent in a particular composition.¹⁹

For Adelard, each thing with which people currently interacted was made up of a mixture of all four of the elements, though one of them could prevail over the others. The prevalent element in a composition then provided that mixture with its nature. According to Adelard's logic, pure water might be lighter than pure earth, but since the actual earth and water with which people interacted were not in their pure forms but rather mixed with various

17 Bernard of Silvester, *Cosmographia of Bernardus Silvestris*, 74–75.

18 Pseudo-Bede, *De mundi celestis terrestrisque constitutione*, 23.

19 Adelard of Bath, *Adelard of Bath: Conversations with his Nephew*, 93.

quantities of other elements, that meant that some water could actually be heavier than some portions of the earth, thereby exposing the dry land where it currently existed. Rather than focus on the composite nature of substances, Bernard of Silvester focused on the relationship between the elements themselves to explain why water did not flood the earth. Building on Platonic notions of the initial chaos of creation, he viewed the development of the elements out of this initial chaos as a unity or harmony arrived at through the oppositional qualities of the various elements, which then provided the underlying order of the cosmos. He described:

When each of these bodies had taken up the abode to which it was most readily drawn by material affinity, the earth rested firm, fire darted far above, and air and water assumed intermediate positions. This balancing and mediating tendency was interposed so that under its peace-making influence the elements, *by imposing boundaries on themselves*, might establish friendly and cooperative dominions.²⁰

Bernard later described the boundaries established between water and earth, indicating the division of the land into three parts with one part covered by water; one, by wilderness; and the other, marked as the small expanse, left bare.²¹ For both Adelard and Bernard, then, there was something innate in the elements themselves that accounted for the current water-earth relationship – whether it was the elements’ natural tendency to mix together and form composites or their intrinsic characteristic to fix their own boundaries.

Whereas Adelard and Bernard implicitly attributed the dry land’s existence to characteristics of the physical realm, William of Conches did so explicitly. His explanation for why some of the earth was currently exposed above the water relied on the relationship between celestial bodies and water. He explained that in the first creation primordial water entirely submerged the earth but that the heat of the heavenly bodies dried out the water, exposing the land, and he attributed this contemporary arrangement between the heavens and water ultimately to God, who, for William, “knowing beforehand that nothing can live without heat and moisture and that the earth is cold and dry, to enable life to exist on it, placed the source of all heat – namely the sun – above the middle of the earth so that it could heat it equally on both sides.”²² Despite giving God the ultimate credit

20 Bernard of Silvester, *Cosmographia of Bernardus Silvestris*, 72. Emphasis added.

21 Ibid., 79.

22 William of Conches, *Dialogue on Natural Philosophy*, 109.

for the current arrangement between water and earth, William insisted earlier in his text that the world's phenomena functioned according to the natural order. When asked by his interlocutor whether there could be actual water above the firmament even in the form of ice as suggested in the Book of Genesis and as stated in the Venerable Bede's work, William insisted that this reference was only to water vapor raised into the air in the form of clouds. He stating emphatically that, "What is more foolish than to assume that something exists simply because the Creator is able to make it? Does He make whatever He can? Therefore, whoever says that God makes anything contrary to nature should either see that it is so with his own eyes, or show the reason for its being so, or demonstrate the advantage of its being so."²³ Pseudo-Bede, Adelard, Bernard, and especially William of Conches categorized the dry land's current existence as natural and focused on the secondary causes inherent in the natural order to do so, even if, for them, God was the first cause of it.

Writing of the legacy of the works of Adelard, Bernard, and William of Conches, Edward Grant has noted:

Although [they], and all of their other twelfth-century colleagues, had to rely on a relatively meager body of natural philosophical literature, they had already developed a critical, rationalistic attitude that often prompted them to reject traditional authoritarian opinions and interpretations. The approach they developed and nourished was their legacy to the scholastic tradition that would be built on the new knowledge that entered Western Europe via translations in the twelfth and thirteenth centuries and that became the basis for the university curriculum of the late Middle Ages.²⁴

As Grant has here noted, what separated the works of twelfth-century authors such as Adelard, Bernard, and William of Conches from those of many thirteenth-century Europeans was not so much different attitudes toward the study of the physical world but rather the availability of more ancient works in Latin translations, especially Aristotle's *libri naturales*, as well as the development of a new institution in which this study took place – the medieval university. Beginning in the later twelfth century, natural philosophy became one of the basic areas of study in the newly developing European universities. Natural philosophy was defined as the study of mobile bodies in this context, and students acquired knowledge

²³ Ibid., 40.

²⁴ Grant, *History of Natural Philosophy*, 129.

of these mobile bodies primarily through hearing lectures on Aristotle's works. Most university curricula required students to hear these natural philosophical lectures when they were candidates for both a bachelor's and a master's degree and before they could proceed on to the higher faculties of law, medicine, and theology. These lectures also frequently led to written commentaries on Aristotle's works that circulated primarily among members of university communities.²⁵

Despite these significant content and institutional changes in the study of nature, the vast majority of European authors of texts that explored the physical realm still continued to insist that the current water-earth relationship was natural by discussing the secondary, natural causes for the dry land's existence and by drawing on concepts appearing in the works of Aristotle and his later commentators such as Averroes and Avicenna in order to explain how this existence naturally occurred. The section of Vincent of Beauvais's (d. 1264) *Speculum maius* (Great mirror; c.1235–60) that focuses on the physical world, the *Speculum naturale* (Mirror of nature), provides a great example of both the expanded content from which thirteenth-century authors could draw for their natural philosophy as well as the continued insistence on the natural characteristics of the water-earth relationship explainable through a focus on secondary causes.²⁶ The *Speculum naturale* is largely a commentary on the Book of Genesis; however Vincent used the days of creation as outlined in Genesis as a framework to explore the natural phenomena fashioned on each day through multiple revisions of the text. As he explored these phenomena, he incorporated explanations for them that came from twelfth-century works such as those of William of Conches as well as from Aristotle and from commentaries on Aristotle's works.²⁷ Throughout the course of this section of his encyclopedia, Vincent ascribed the dry land's current existence to four different natural causes. Resonating to some extent with Adelard of Bath's explanation of denying clear boundaries between them, he pointed first to the qualities of the elements and their tendency to mix together to explain this relationship. For him, though each element contained an abundance of natural qualities such as the water's being cold and moist, each element could also contain

25 On the development of natural philosophy from the eleventh through seventeenth centuries, see *ibid.*, 143–238. See also Grant, *Nature of Natural Philosophy in the Late Middle Ages*, 276–311.

26 On the *Speculum maius* more generally, see Paulmier-Foucart and Lusignan, "Vincent de Beauvais et l'histoire du *Speculum Maius*."

27 Paulmier-Foucart and Duchenne, *Vincent de Beauvais et le grand miroir du monde*, 47 and 50–51. Paulmier-Foucart with Duchenne also note that Vincent's focus on the third day of creation expanded in later editions of this text, 45–46.

other qualities accidentally, and the presence of these accidental qualities in each element allowed them all to mix together and placed some earth above the water.²⁸ Building on the teachings of William of Conches, Vincent also claimed that primordial water had covered earth at the beginning of the creation process, but that the heat of celestial bodies and the element of fire had caused some of this water to turn into a vapor and expose the dry land. In doing so, he even insisted that the natural order caused this process. “Truly water, having been suspended as a vapor above the air, was driven out by the order of nature so that the water’s flowing was diminished and the earth appeared.”²⁹ In his sixth book, which focused directly on the third day of creation, Vincent offered two additional natural explanations that stemmed back to the time of Augustine and were also found in the works of Bede: that primordial water became more dense at God’s command to gather together, and that even though there was ten times more water than earth, water’s current ability to change from a dense liquid to a rare vapor that formed clouds and back again allowed the dry land to appear, as did liquid water’s tendency to flow down into the hollow places in the earth. He even added a twist not found in Augustine or Bede’s works that stated water’s inherent humidity or moisture dissolved the dry earth, causing even more hollow places in which it could then flow, even further breaking down boundaries between the two.³⁰ Lest his readers were confused about the relationship between God’s responsibility for the current water-earth relationship and that of the natural order, Vincent also stated explicitly that God and the natural order were responsible for the current dry land’s existence in his seventh book on the earth. Starting the fifth chapter of this book with the question of how the earth was founded above the water, he stressed both that God had given both water and earth their current positions during creation so that plants, animals, and people had a dry place to live and that the continued arrangement between them was a natural one, again pointing to the mixing of the elements through their contrary qualities to explain why earth stuck out above the waters.³¹ Offering an encyclopedic work on natural phenomena as they developed from God’s initial creation of the universe and drawing on some of the new translations of his day, Vincent’s stated again and again in his *Speculum naturale* that the dry land’s current

28 Vincent of Beauvais, *Speculum naturale*, 3.6.9–10.

29 “Aqua vero super aerem vaporaliter suspensa ordo naturalis exigebat ut aqua labili diminuta appareret terra”; *ibid.*, 3.26.

30 *Ibid.*, 6.1–4.

31 *Ibid.*, 6.5.

existence was natural and understandable through secondary causes, as God had made such natural existence part of his original creation.

Those authors who were associated with medieval universities as either students and/or teachers – such as Sacrobosco, William of Auvergne (c.1180–1249), Albertus Magnus (c.1200–1280), and Roger Bacon (c.1219–1292) – also drew on the new translations of ancient works in their natural philosophical texts. The vast majority built on the conceptions of the elements in these translations to show that the current water-earth relationship was natural, explainable through secondary causes, though William of Auvergne offered a more nuanced classification of this relationship than his contemporaries. As we saw at the beginning of this chapter, Sacrobosco offered a teleological explanation for the water-earth relationship in his influential textbook, stating only that the dry land existed so that people, plants, and animals had a safe place to live. In contrast, Roger Bacon and Albertus Magnus along with other thirteenth-century European authors incorporated opinions that resonated with those appearing in the twelfth century that also insisted on the naturalness of water's contemporary behavior vis-à-vis the earth and the ways in which inherent aspects of the two elements caused this natural behavior. Writing his *General Principles of Natural Philosophy* (*Communium naturalium*) around 1260 under the patronage of Cardinal Guy de Gros de Foulque, then archbishop of Narbonne and eventual Pope Clement IV (r. 1265–68), Bacon, for example, claimed both that people did not encounter pure elements in the world, thereby denying clear boundaries between water and earth, as well as that water had a natural tendency to run down toward the center of the world. Both the mixed bodies people currently encountered and water's running down toward the center of the earth offered a natural explanation for the dry land's current existence. During his discussion of the elements, Bacon explained, "And water in its lower part becomes like earth and earth [in its higher part], like water, the sign of which is that there is mud at their common boundary, which is neither pure earth nor pure water."³² Describing a thought experiment in which water would run out through a hole in the bottom of a vase, Bacon also claimed that water has a natural inclination to flow toward the center of the world, thereby presumably revealing some of the dry land.³³ Albertus Magnus included a similar argument in his commentary on Aristotle's *On*

32 "Et aqua in inferiori parte assimilatur terre et terra aque, cuius signum est quod in eorum confinio fit lutum quod nec est pura terra nec pura aqua"; Roger Bacon, *Communium naturalium Fratris Rogeri partes tertia et quarta*, 272–73.

33 *Ibid.*, 367–68.

the Heavens, a work that likely developed out of his teaching responsibilities at the Universities of Paris and Cologne. In chapter 6 of the second tract on the fourth book of the work, Albertus discussed the accidents of lightness and heaviness in the elements. He argued here that the congealing of water was an accident that came out of its mixed nature with other elements rather than its simplicity.³⁴ Taking up the question of water and earth's heaviness and lightness in the eighth chapter of the same section of this text, Albertus argued that water was not absolutely light in comparison to all portions of the earth. After he stated that water was heavy in comparison to fire and air, he explained, "but in earth's place [water] is not absolutely light, since it does not rise up from the earth, it happens that it is poured out from beneath the earth, as we said above."³⁵ The mixture of elements and their accidental properties allowed some earth to stick out above the water naturally, and a focus on the properties of these elements explained their natural relationship for Albertus.

William of Auvergne was one thirteenth-century European author who offered a more nuanced classification of water's relationship to the earth in his 1231 work, the *Universe of Creatures* (*De universo*), insisting based on his reading of the Christian scriptures that though this relationship might be considered natural now, it actually went against the primordial nature of water. Describing the third day of creation, William argued first that God's command to the primordial waters to gather into one place created the natural position of water. "For the natural arrangement of water, either its position or its situation, is surrounding the earth."³⁶ However, he then clarified that the origins of this arrangement between water and the earth during the creation process went against water's original, natural propensity:

Moreover because the waters withdrew in part and they as yet stood above the mountains just as the other prophet says: that 'the waters stood above the mountains,' [Psalm 104] they were not in an unnatural place for them against the nature of their weight and fluidity. Clearly, the translation and collection of water in another place happened not through some other natural power but only through the Word and command of the Creator

34 Albertus Magnus, *De caelo et mundo*, 265.

35 "Gravitas autem aquae se habet ad levitatem suam sicut tria ad unum, quia in loco suo est gravis et in duobus locis superiorum elementorum, sed in loco terrae non absolute levis est, quia non ascendit a terra, licet terra produndetur sub ipsa, sicut superius diximus"; *ibid.*, 268.

36 "Naturalis enim ordinatio aquarum, sive positio, aut situs earum, circa terram est"; William of Auvergne, *Guillielmi Alverni episcopi Parisiensis*, 1: 641.

as we say, and their congregation was not a new work of creation but now of the works already created.³⁷

For William, primordial water's natural location had been to submerge the earth until God's command through his Word rearranged his initial works so that water no longer flooded the earth, creating a new nature for it. He completed this comparatively complicated analysis by declaring that the study of the current location of the waters after they had been gathered together belonged partly to the natural sciences and partly to the divine ones because of its complicated causation.³⁸ William's description of water's natural relationship with the earth was much more involved than either Roger Bacon's or Albertus Magnus's, including a focus on both first or primary and secondary causes. His training and job position while writing his text may help explain his focus on both types of causes in his natural philosophical text as he had been a professor of theology at Paris since 1225 and became bishop of Paris in 1228 prior to writing his text.³⁹ As a theologian and a bishop, William would have had both the training and institutional position to teach and write about both natural philosophy and theology, even though most thirteenth-century authors of natural philosophical works in similar positions such as Roger Bacon, Albertus Magnus, and Thomas Aquinas tended not to mix their theology into their natural philosophical works, instead focusing on providing natural explanations through the focus on secondary causes for natural phenomena in such works.⁴⁰

As university students continued to study and teachers continued to teach Aristotle's *libri naturales* into the fourteenth century, two textual genres came to the forefront of natural philosophy – the commentary and the questions text on Aristotle's works. Whereas commentaries tended to work their way through Aristotle's works linearly, presenting section-by-section comments, questions texts proposed a series of yes-or-no questions based on Aristotle's works and offered an answer to those questions after exploring both the affirmative and negative sides. These genres, especially the questions text, helped lead teachers and authors to develop their own

37 "Quia autem in partem secesserunt, & super montes aquae etiam stant: sicut dicit alius propheta: quia super montes stabant aquae, & quod non in loco non naturali sibi sunt contra naturam ponderositatis, & fluiditatis suae: factum est, non naturali aliqua virtute, sed solo verbo & imperio ut diximus, creatoris, & ista congregatio non novem creationis opus fuit, sed iam creati operis, videlicet aquarum in locum alium translatio, & collectio"; *ibid.*

38 *Ibid.*

39 See Teske's introduction in William of Auvergne, *Universe of Creatures: Selections*, 13–16.

40 See the discussion in Grant, *Nature of Natural Philosophy in the Late Middle Ages*, 91–118.

explanations of natural phenomena that sometimes did not appear in the Aristotelian tradition or even contradicted aspects of that tradition.⁴¹ Jean Buridan (before 1300–1358/61), Nicole Oresme (1320/25–1382), and Albert of Saxony (c.1320–1390) partook in these developing trends of natural philosophical teaching, learning, and writing. As they did so, they continued to insist that the dry land's current existence was natural, even though they offered much longer discussions to explain their natural categorization of this relationship that focused on different secondary causes than most previous authors and included influential descriptions of the spatial arrangement between water and earth. Their works were in dialogue with one another as Buridan was teaching at the University of Paris by the time Oresme and Albert of Saxony were students there. Though it is extremely unlikely given the locations of their births that Buridan was the supervising teaching master to either Oresme or Albert, it is possible that Oresme and Albert attended a lecture or two of Buridan's, and it is likely that they heard him engage in disputations and read his natural philosophical commentaries and questions texts, which circulated widely at the University of Paris.⁴² All three authors explicitly examined the reason why some of the actual dry land stuck out above the water in their commentaries and questions texts. Their explanations for the dry land's existence all included a discussion of the relationship between the universe's center, the earth's center of gravity, and the earth's center of magnitude. In this period, the universe's center was understood to be the geometric center of the celestial spheres. The earth's center of magnitude was defined as the geometric center of it. The earth's center of gravity, however, was specified as the midpoint of a line at which the earth could be divided so that there was equal weight on both sides of that line. Since the earth was understood to be at rest at the center of the universe, its center of magnitude was thought to coincide with the universe's center. However, the earth's center of gravity would only be at the centers of the universe and of its magnitude if the earth were homogeneous. Otherwise, the earth would have different centers of gravity and magnitude.⁴³

Both Buridan and Oresme argued that the earth's heterogeneity caused it to have different centers of gravity and magnitude, and so they attributed the dry land's contemporary existence to these different centers. Buridan made this argument most forcefully in his questions text on *On the Heavens*

41 Grant, *History of Natural Philosophy*, 179–83.

42 For the relationship between Buridan, Oresme, Albert of Saxony, and Marsilius of Inghen, see Courtenay, "University of Paris at the Time of Jean Buridan and Nicole Oresme."

43 Grant, *In Defense of the Earth's Centrality and Immutability*, 20–22.

where he asked whether the whole earth was habitable. He ultimately argued that water submerged much of the earth but that some of the earth did naturally stick out above the water. He offered two different explanations for this arrangement, both of which focused on the natures of water and earth, therefore providing a natural classification of their relationship through a focus on secondary causes. He first gave an argument that stems back to the ancient period. He argued that both water and earth's spheres were concentric with the universe's center; however, water's (natural) tendency to flow down toward the universe's center made much of it pour into the bowels of earth as well as to evaporate and mix with air, leaving some of the earth exposed.⁴⁴ He then offered the following explanation based on the earth's different centers of magnitude and gravity:

And there is a conception that in the uncovered part the earth is altered by air and the sun's heat, and much air is mixed with it, so that this earth becomes rarer and lighter and has many pores filled with air or subtle bodies. However, the part of the earth covered with waters is not altered by the air and sun and therefore remains denser and heavier. And therefore, if the earth were divided through the center of its magnitude, one part would be much heavier than another, but that part which is uncovered would be much lighter. It seems, then, that there is one center of magnitude of the earth and another center of gravity. For the center of gravity is where the heaviness is just as much on one side as on the other, but as we said, this is not in the middle of the magnitude [...] It is because of this that the earth is raised above the water on one side and is wholly under water on the other side.⁴⁵

Since the natural relationship between water, air, and earth made some of the earth lighter than other portions of it, it caused portions of the earth to rise above water, even if water covered the rest of the heavy earth. Buridan therefore offered both a natural explanation for the water-earth relationship as well as a spatial description of that relationship. Oresme also attributed the existence and the location of the dry land to the earth's different centers of gravity and magnitude, though he credited both God and nature alike for

44 Jean Buridan, *Quaestiones super libris quattuor De caelo et mundo*, 159. Edward Grant has offered a translation of this text in Grant, ed. and trans., *Source Book in Medieval Science*, 622–23.

45 The translation is Grant's and appears in Grant, ed. and trans., *Source Book in Medieval Science*, 623. See for the Latin original, Buridan, *Quaestiones super libris quattuor De caelo et mundo*, 159.

this arrangement in his *Le livre du ciel et du monde* (Book on the heavens and the world; 1370–77), a text in which he offered a French translation of and commentary on Aristotle's *On the Heavens* at the behest of his patron, King Charles V of France (1338–1380). Making a similar argument that the water-covered portions of earth were heavier than those exposed to the air so that the earth's centers of magnitude and gravity did not coincide, Oresme explained, "God and nature have ordained that the earth should be thus exposed so that men and animals can live there; and accordingly, this part is the nobler and, in a sense, constitutes the front or face of the earth; the rest or remainder is enveloped by the water and clothed or covered by the sea as with a hood or cap: The deep, like a garment, is its clothing."⁴⁶ Even though Oresme attributed the dry land's existence to both God and nature, he and Buridan relied on a very similar natural explanation focused on secondary causes to explain both why water did not currently flood the earth and the actual location of that earth.

Though also writing at some length about the earth's heterogeneity and its possibly different centers of gravity and magnitude, Albert of Saxony ultimately rejected this opinion in his questions on both the *Physics* and *On the Heavens*, which likely developed out of his teaching at the University of Paris and as rector of the University of Vienna.⁴⁷ Who or what caused the dry land's existence for Albert is unclear as he gave different explanations for it in his works. His answer to the fifth question on the fourth book of the *Physics* on the earth's position relative to water's and whether this position was natural proposed a natural explanation for water's contemporary failure to cover the earth that again focused on secondary causes to explain the natural relationship. Here Albert proposed that earth and water actually formed an aggregate single sphere and that this aggregate sphere's centers of gravity and magnitude coincided with that of the universe. He explained that the sun and the air dry out some of the earth portion of this aggregate sphere, creating pores in the earth into which water flows, thereby exposing the dry land.⁴⁸ Reading Albert's *Physics* commentary we find a natural explanation for the dry land's existence and one that broke with millennia of precedent, as he located earth and water in a single sphere rather than in two separate ones, thereby largely dissolving the boundaries between them. When we turn to his questions *On the Heavens*, however, we find

46 Oresme, *Le livre du ciel et du monde*, 568–69.

47 Albert of Saxony et al., *Quaestiones et decisiones physicales insignium virorum*, fols. XLVIr and CXIXr.

48 *Ibid.*, fol. XLVIr.

that Albert rejected this notion of an aggregate sphere of water and earth and attributed the dry land's existence both to God and the heat of the sun as he discussed whether the whole earth was habitable. Maintaining that water covered most of the earth, Albert argued that "God from eternity had ordained the deformities in the earth for the salvation of animals and plants" and that the sun uncovered parts of the earth which were currently covered by water, due to the sun's heat causing evaporation.⁴⁹ The causation Albert assigned to the dry land's existence in his *On the Heavens* commentary, then, dovetails with that Oresme had offered, as both men attributed a current safe space on which animals and plants could live to God's working through the secondary causes of the natural order.

Beginning in the fourteenth century, Europeans began to find, translate, and print many ancient texts. These newly rediscovered texts had the potential to change the ways in which Europeans conceptualized the water-earth relationship, but they do not seem to have made much of an impact in the fifteenth century. As Grant noted in the preface to his work, *A History of Natural Philosophy* (2007), "I have said almost nothing about natural philosophy in the fifteenth [and eighteenth] centuries, largely because I do not believe any dramatic changes occurred in those periods."⁵⁰ We see the continuance of the natural explanations for water's failure to flood the earth in Ermolao Barbaro's (1454–1493) *Compendium of Aristotelian Science* (*Compendium scientiae naturalis ex Aristotele*). Barbaro wrote the work likely as part of his position as a professor of philosophy at the University of Padua, and the text seems to have circulated widely in the fifteenth century. It was printed in 1547 under the direction of Barbaro's nephew, Daniele Barbaro (1514–1570). Much as Buridan, Oresme, and Albert of Saxony had done, Barbaro took up the question of the water-earth relationship explicitly, asking why water did not currently cover the whole earth, as we should expect given the elements' relative heaviness and lightness. Barbaro explained only that water covered parts of the earth, while other parts were exposed, and he attributed this dry land to the influence of the heavens, making no mention of God.⁵¹

The eleventh- through fifteenth-century works on the physical world explored above provided the context in which Reisch, Titelmans, Melanchthon,

49 "Deformatem ab eterno deus ordinavit pro salute animalium et plantarum"; *ibid.*, fol. XLVIv.

50 Grant, *History of Natural Philosophy*, xii.

51 Barbaro, *Hermolai Barbari patritii veneti compendium scientiae naturalis ex Aristotele*, sigs. Cir–v.

Zabarella, and Bodin wrote their natural philosophical textbooks in the sixteenth century. As we saw, the study of the physical world and natural philosophy more specifically changed a great deal over the course of these centuries both in terms of the content from which medieval European authors of these works drew as well as in terms of the institutions in which they undertook such study. Despite these significant changes, the vast majority of authors from the eleventh through fifteenth centuries ascribed the dry land's current existence to the secondary causes inherent in the natural order, thereby categorizing the earth-water relationship as natural, whether they pointed to the heavens' ability to evaporate water, the elements' mixing together, water's natural density after the third day of creation, water's natural tendency to run down into the bowels of the earth, or the earth's different centers of magnitude and gravity to do so. Even William of Conches, Vincent of Beauvais, Nicole Oresme, and Albert of Saxony, who argued that God was ultimately responsible for the dry land's contemporary existence, indicated that God worked through the secondary causes of the natural order, but without exploring either the creation process or the relationship between primary and secondary causes at any length. William of Auvergne came the closest to attributing the water-earth relationship specifically and exclusively to God, as he did discuss the relationship between primary and secondary causes, but he, much like many of the ancient and medieval authors of commentaries on the Book of Genesis, ultimately claimed that God had changed primordial water's nature during the process of creation so that it naturally no longer threatened to flood the earth and that the secondary causes, which were part of the natural order from that day of creation, could therefore explain the water-earth relationship. As we will see in our analysis of texts by Reisch, Titelmans, Melanchthon, Zabarella, and Bodin, this acceptance of water's current natural relationship to the earth and its explanation through secondary causes so common in the medieval period was questioned in the sixteenth century just as Europeans began to learn more about the actual arrangement of water and earth in other parts of the globe.

Defining Water in the Sixteenth Century

The context in which natural philosophical investigation took place began to change in the sixteenth century. Though it continued as a cornerstone of most European university curricula and though Aristotle's *libri naturales* remained the basis of much university education in natural philosophy as

they had since the mid-thirteenth century, authors of sixteenth-century natural philosophical texts, much like their late twelfth- and thirteenth-century predecessors, also had different sources on which they could draw as well as different institutional locations in which to undertake their study of natural philosophy. In addition to new Latin and Greek editions of Aristotle's works and the circulation of newly recovered ancient commentaries on those texts, sixteenth-century authors began to draw on the works of Plato, Seneca, Epicurus, Sextus Empiricus, and Lucretius as well as those attributed to Hermes Trismegistus to aid their study of the physical world. Some of those authors who did use these sources worked in noble and royal courts rather than in universities. Sixteenth-century natural philosophical works also had the potential to reach a wide audience, as authors' utilizations of the printing press allowed their works to circulate among far-flung university communities and other educated readers.⁵²

Writing in the midst of such changes, Reisch, Titelmans, Melanchthon, Zabarella, and Bodin explored the ontological status of the contemporary water-earth relationship in much greater detail than their ancient and medieval predecessors, drawing in explicit discussions of God's creation of and providential control over the world's landmasses and waterways rather than focusing exclusively on secondary causes as had been typical in the medieval period. Reisch, Melanchthon, Zabarella, and Bodin all ultimately classified this relationship as natural. Yet, whereas Melanchthon and Zabarella explicitly separated the focus on secondary causes of traditional natural philosophy from the discussion of God as the first cause undertaken in the study of theology and explained the dry land's current existence through secondary causes much as most previous authors of natural philosophical texts had done, Reisch and Bodin expanded the traditional subject matter of natural philosophy to include an explicit, detailed discussion of God's initial creation of the universe to elucidate the dry land's natural existence. Though also expanding natural philosophy's traditional focus on secondary causes to incorporate the evidence of creation and providence, Titelmans argued that water's contemporary relationship to the earth must be supernatural – attributable to God's continued providential control over the world. Their discussions of water's behavior vis-à-vis the earth that also incorporated larger questions about the nature of natural philosophy, itself, ultimately reveal that the water-earth relationship was of interest to sixteenth-century authors of natural philosophical texts in a way it was not in earlier periods.

52 Blair, "Natural Philosophy," in Park and Daston, eds., *Early Modern Science*, 372–90 and 403–5.

Philipp Melanchthon's *Initia doctrinae physicae* (1549) was a reworked edition of his manuscript, *Physicae seu naturalis philosophiae compendium* (Compendium of physics, or natural philosophy; 1543). This text as well as his categorization of water's current relationship to the earth developed out of his varied educational background as well as his concern for the faculty of arts at the University of Wittenberg. Melanchthon first studied at grammar schools in Bretten and Pforzheim before entering the University of Heidelberg in 1509. In 1511, he took his bachelor's degree there, and in 1512, he moved to the University of Tübingen to continue his studies. He took his master's degree there in 1514. In 1518, Melanchthon was hired to teach Greek at the University of Wittenberg where he completed his *baccalaureus biblicus* in 1519. From 1519 until 1560, Melanchthon was a professor of both Greek and theology there. In his capacity as rector for the University of Wittenberg, he composed a new set of statutes for the arts faculty in 1545. These regulations stipulated that there should be two lectures on natural philosophical topics, and Melanchthon likely wrote the *Initia doctrinae physicae* to provide the basis for these lectures.⁵³ Drawing on Aristotle's *libri naturales* as well as other ancient sources, the three books of this work covered physics, materials and the qualities in materials, and the elements, their qualities, alterations, and mixtures. Unlike many previous authors of natural philosophical texts, Melanchthon included long discussions of both astrology and medicine in his work. Melanchthon's *Initia doctrinae physicae* was particularly influential. It not only circulated widely through the nineteen different printed editions of the text, but was also used to train a whole generation of students at Wittenberg and in other central European universities, who often drew on Melanchthon's natural philosophy during their own teaching careers.

Melanchthon's discussion of the relationship between first and secondary causes in the study of the physical world signaled that his explanation for the dry land's existence would be one relying on natural causation, as he separated carefully between the subject matter of natural philosophy and theology. In his introductory epistle, he did argue that the study of natural philosophy should teach people that God existed, that he had designed the universe, and about some of God's attributes, but Melanchthon also argued that knowledge of God's essence and of his promise of salvation to human beings was not the proper subject matter for natural philosophy. Leaving these questions to those studying the Bible, Melanchthon explained that his natural philosophical work would focus on the natural order or secondary

53 Kusakawa, *Transformation of Natural Philosophy*, 144–88.

causes that God had implanted into the universe during creation. Focusing on these secondary causes would teach students about the universe and that God was the creator of that universe.⁵⁴ We see such an attitude toward the division of theology and natural philosophy as he began his third book on the nature of the elements – the book in which he addressed water’s relationship to the earth:

Yet, it is pleasing to consider the wonderful art of God’s works. Although there are various mutations, alterations, mixtures, coagulations, dissipations, manipulations, exhalations, putrefactions, corruptions, and generations of bodies, as we will name some of their type below, nevertheless, God wanted a few primary qualities such as heat, cold, humidity, and dryness to guide such variety.⁵⁵

In this passage, Melanchthon explicitly stated that his text would focus on the primary qualities of hotness, coldness, wetness, and dryness to explain the changes natural bodies underwent, even as he attributed the creation of such first qualities ultimately to God and argued that studying them would allow people to learn that the universe was God’s creation. He made his focus on natural causation in this work even clearer, as he explained the source from which he would take his information on those changes these bodies underwent. “Let us preferably hold fast to the simple teaching of Aristotle, which was built up in right order from true principles and experience.”⁵⁶ Aristotle and the various Aristotelian traditions developed prior to the sixteenth century were Melanchthon’s primary sources for his natural philosophical text.

Assuming Aristotle and his commentators taught the proper information about secondary causes, Melanchthon largely limited his explanation for the dry land’s existence to a focus on natural explanations. The attributes of the natural order on which he chose to focus resonate with the ones that had been implicit in Aristotle’s *Meteorology* and appeared explicitly since the work of Adelard of Bath. “For the utility of animate beings and living

54 Melanchthon, *Initia doctrinae physicae*, sigs. Aiv–Aviii.

55 “Deinde iuuat etiam considerare admirandam Dei opifices artem. Cum tam variae sint corporum mutationes, alterationes, mixtiones, coagulationes, dissipationes, tractiones, exhalationes, putrefactiones, corruptiones, generationes, ut infra species aliquas recitabimus, tamen varietatem tantam a paucis qualitatibus primis, scilicet calore, frigore, humiditate, & siccate gubernari Deus voluit”; *ibid.*, sig. mvii.

56 “Retineamus potius simplicem Aristotelis doctrinam, quae recto ordine ex veris principiis & experientia extructa est”; *ibid.*, sig. mviii.

things (*res nascentes*), the elements are not entirely pure, as we see that water is mixed together with earth. For pure water is insipid, and the earth would not supply the moisture needed for living things, if it were pure."⁵⁷ Much as Adelard and many commentators who came after him had done, Melanchthon claimed that people did not encounter pure elements in the sublunary world, as these elements lacked clear boundaries. Instead, he argued that a mixture of the various elements made up all the objects people encountered in the world. Much as Sacrobosco had argued, though, Melanchthon also suggested a teleological cause for this mixture's existence, stating that living beings needed the natural mixture of the elements of water and earth in order to survive. Separating the study of the first cause, God, from the secondary causes of the natural order, Melanchthon ultimately categorized the current water-earth relationship as natural.

Much like Melanchthon, Jacopo Zabarella also explicitly focused on the natural order and the characteristics of the elements to explain the dry land's existence in his *De rebus naturalibus*, which was printed posthumously in 1590. His educational background was similar to Melanchthon's as well. Zabarella was born in Padua to a noble family. He studied at the University of Padua where he took a doctorate in 1553. Returning to the same university to teach in 1564, he spent his entire career there, holding chairs in logic and natural history. While teaching, he wrote works on logic, including his *Opera logica* (Works on logic; 1578) and on natural philosophy, including *The Foundations of Natural Science* (*De naturalis scientiae constitutione*, 1586) as well as *De rebus naturalibus*. These works provided the foundation of many seventeenth-century natural philosophical textbooks, especially those that were written in Protestant parts of the Holy Roman Empire.⁵⁸

In his introductory letter to Pope Sixtus V (1585–90), Zabarella declared the utility of natural philosophy for Christians,⁵⁹ but he carefully distinguished the subject matters and the methodologies of natural philosophy and theology in his natural philosophical text. This separation appeared most clearly in his discussion of Aristotle's unmoved mover, who, Aristotle had claimed, was responsible for all the motion in the universe. Medieval Christians had frequently identified this unmoved mover with God as the

57 "Propter utilitatem animantium, & res nascentes, Elementa non sunt prorsus pura, ut videmus aquis admixtam esse terram. Nam pura Aqua insipida esset. Nec terra humorem suppeditare rebus nascentibus, si pura esset"; *ibid.*, sig. niiv.

58 Mikkeli, 18–20.

59 Zabarella, *De rebus naturalibus libri XXX*, sigs.): (2r–v.

first cause, as Zabarella, himself noted. Rather than doing so, however, Zabarella explained that he would approach this question through the principles of Aristotle's philosophy and what people could discuss through the focus on the secondary causes of the natural order. "We will speak here on the question following the principles of Aristotle's philosophy, and we will consider such knowledge (*notitia*) of substances separated from the material that we arrive at through the natural way, omitting thoroughly the knowledge of those things, which we accept through divine revelation and supernatural illumination."⁶⁰ Much like Melanchthon, Zabarella separated between natural philosophy that explored secondary causes largely through Aristotle's works and what people learned about God, the first cause, through the study of theology.

Turning to his discussion of the elements, Zabarella did not directly address the dry land's existence in his text much as we saw in Aristotle's works. Instead, he wrote about the different qualities of the elements and how they combined together to form mixtures.⁶¹ In describing the primary qualities of these elements, however, Zabarella strongly suggested that he viewed the location of the various elements as natural. He assigned the usual primary qualities to each element, pointing out that the earth was cold in comparison to water and that coldness caused heaviness and density, making the earth the heaviest and most dense element of them all and leaving water to be not as dense and heavy as the earth. He then stated, "since the elements obtain these qualities from heaven on account of the position, which they have in respect to the heaven, the position that every element has is natural to each one according to its kind. It must be acknowledged, which we just now said, that these are the natural qualities for each element."⁶² Exploring the location of the elements in connection to the heavens, Zabarella argued that they occupied their natural place based on their natural qualities, offering a natural explanation for water's relationship to the earth much as Melanchthon had done.

Though also arguing that the relationship between water and the earth was ultimately natural, Gregor Reisch and Jean Bodin did so through the

60 "Hac praemissa protestatione, nos hac de re secundum principia philosophiae Aristotlis esse loquuturos, & illam tantum substantiarum a materia abiunctarum notitiam, quam via naturali adipiscimur, consideraturos, omissa penitus earumdem cognitione, quam revelatione divina, & lumine supernaturali accepimus"; *ibid.*, 253.

61 *Ibid.*, 481–540.

62 "Quoniam autem has qualitates obtinent elementa a Coelo, nempe ratione situs, quem habent respectu Coeli, & situs, quem singula habent, est singulis naturalis, quantus talia sunt, fatendum est eas, quas modo diximus, esse singulis elementis qualitates naturales"; *ibid.*, 511–12.

inclusion of explicit discussions of God's creation and continued providential control over the world in their natural philosophical works, thereby expanding the typical subject matter and sources of natural philosophy. Reisch was educated and eventually taught as a master at the University of Freiburg. Joining the Carthusian order there, he wrote the *Margarita philosophica* in 1503 during his time at Freiburg-im-Breisgau likely to educate younger members of his order.⁶³ Offering an epitome of all of philosophy, his work included discussions of grammar, dialectic, rhetoric, arithmetic, music, geometry, astronomy, natural philosophy, and moral philosophy that would hopefully allow the members of his order to complete the philosophy course as quickly as possible.

Unlike Melancthon and Zabarella's later works, Reisch specifically addressed the existence of the dry land and its location relative to most of the world's water in his text. He argued that God's initial design of the world ensured both that water did not flood the earth and that this failure should be understood as natural, thereby incorporating explicit discussions of God's creation of the world into his natural philosophy. He drew on the Book of Genesis to describe God's initial creation of the primordial water and earth and his fashioning of their relationship on the third day of creation, citing an explanation dating back to the patristic period, as we saw in Chapter 2 especially in the works of Augustine of Hippo and the Venerable Bede. "The water in the original creation enclosed the whole surface of the earth in the form of the thinnest cloud and went all the way to the higher part. But by the command of the Creator the firmament divided the waters from the waters, and those waters left below the firmament gathered in one place in the cavities of the earth so that animate beings could live on the earth's surface."⁶⁴ Turning to the water-earth relationship after the third day of creation, though, Reisch offered a natural explanation for water's continued failure to flood the earth – one that dated back to the time of Jean Buridan and that reveals traces of the influence of Albert of Saxony's commentary on Aristotle's *Physics*. Reisch described the water-earth relationship after primordial water had condensed in the following manner. "Therefore one spherical body is made up from the entire substance of earth and water, of which the philosophers assign two centers – one of gravity and one of

63 Cunningham and Kusakawa, ed. and trans., pp. xvii–xix.

64 "Qua in primordialiali rerum creatione ad modum nebulae tenuissimae totam terrae circumdedit superficiam, & usque ad superiora progrediebant. Sed iussu Creatoris firmamentum aquas ab aquas divisit: & quas sub firmamento relictas sunt in locum unum terrae concavitates congregant ut terrae animantium in eiusdem superficie possent habitare"; Reisch, *Margarita philosophica*, sig. oiiiir.

magnitude.”⁶⁵ Much as Buridan, Oresme, and Albert of Saxony in his *Physics* commentary had done, Reisch then went on to explain that this combined water-earth sphere had different centers of magnitude and gravity, as the earth under the water was heavier than the earth exposed to the air and the sun’s heat. For him as for these fourteenth-century predecessors, this difference in weight allowed a portion of the earth to stick out above the water in the combined sphere’s Northern Hemisphere, entirely submerging any land in the southern portion of it. Since this arrangement was the one God had given the universe during creation with his command to primordial water to gather together in one place and since this arrangement had not changed since the third day of creation, it must be understood as natural.

Jean Bodin’s ultimate categorization of water’s failure to flood the earth in his *Universae naturae theatrum* of 1596 as well as the way in which he expanded the subject matter of natural philosophy in order to justify this categorization resonates with Reisch’s, though it lacked the sophisticated philosophical argument found in the *Margarita philosophica*. Bodin was born in Angers, where he began his studies at a Carmelite monastery. He likely then went to Paris around 1545 for his bachelor’s and master’s studies. He took a degree in law from the University of Toulouse in the 1560s. The audience for Bodin’s natural philosophical text was different than that of the other works that we have discussed above. Whereas Melancthon, Zabarella, and Reisch worked as teachers of the arts and wrote works aimed at a university or *studium* audience, the *Universae naturae theatrum* was meant for a wider, more general audience, providing a broad coverage of many natural philosophical topics through a question-and-answer format.⁶⁶

For Bodin much as for Reisch, water’s current failure to flood the earth was a natural occurrence, but people could only understand the contemporary water-earth relationship as a natural occurrence if they also thought about how and why God had created the world. As we saw in the passages that began this chapter, however, the path through which he reached this conclusion implicitly touched on other ontological classifications of water’s behavior vis-à-vis the earth along the way. This discussion helps clarify what he meant by “the natural” when he ultimately applied this ontological category to water’s relationship to the earth. The first part of his explanation seems to reject a natural explanation of this relationship, as Bodin pointed out that Aristotle had had a hard time explaining why water did not

65 “Ex tota itaque terrae & aquae substantia unum corpus sphericam est constitutum cuius Philosophi duplex centrum secundum gravitatis & magnitudinis assignabant”; *ibid.*

66 Blair, *Theater of Nature*, 9–15.

flood the earth with his focus on secondary causes. Bodin then attributed this arrangement to God as the first cause so that people and other living things had a dry place to live. Bodin next indicated through a comparison that water's failure to flood the earth could be viewed as preternatural, as he pointed out that the dry land's existence was less wonderful than the earth's current stability in the midst of air and water. Though the earth's stability at the center of the universe was more wonderful, Bodin implied here through the use of the comparative adjective, *mirabilius*, that the dry land's existence was also wonderful, too, even if wonderful to a lesser degree and that both the arrangement of the universe and the dry land's existence could and should provoke wonder precisely because it was God's creation. In the next section of this discussion, however, Bodin offered his final, explicit classification of this relationship as natural. He stated that if earth's sticking out above water had truly been against nature, then the arrangement between these two elements could not have remained stable for such a long period of time. He therefore linked God's creation of both of these elements to the natural order, as he implied through the citation of Psalm 24 that what God had created must be understood as part of the natural order.⁶⁷ Bodin's discussion of the current water-earth relationship therefore collapsed all three of these ontological categories together to a certain extent. Though water's failure to flood the earth must ultimately be understood as natural, this natural order only existed because God created the universe and wanted that creation to provoke wonder in those people who viewed and studied this theater of the world. In collapsing these categories, Bodin also began to collapse some of the boundaries that had traditionally separated natural philosophy from theology much as Reisch had also done.

When we compare these four authors' categorizations of the contemporary water-earth relationship to Frans Titelmans' classification in his *Compendium philosophiae naturalis* of 1530, we find a further indication that sixteenth-century authors of natural philosophical texts were more concerned to explain the dry land's current existence in relation to the earth than their predecessors and that they explored and expanded the traditional content of natural philosophy in order to do so. Born in Hasselt, Titelmans studied at the University of Louvain. After taking his master's degree there in 1521, he was invited to teach in "De Varken," the college at Louvain in which he had studied. He joined the Franciscan order shortly thereafter. While studying scripture and theology at the local Franciscan *studium*, he

67 Bodin, *Universae naturae theatrum*, sigs. M4r–M6r.

was asked to teach scripture as well as dialectic and natural philosophy there. Titelmans has become most famous for his debate with Erasmus of Rotterdam (1466–1536) and Jacques Lefèvre d'Étaples (c.1455–1536) over the proper approach to the Bible and the validity of the Vulgate.⁶⁸ In contrast to Melanchthon, Zabarella, Reisch, and Bodin, he categorized water's failure to flood the earth as supernatural because he fully expanded the scope of natural philosophy to include evidence of God's continued relationship to the world.

Titelmans ultimately argued that the dry land's contemporary existence must be supernatural because he incorporated evidence from God's creation of and providential control over the world. After describing the ways in which the spheres of air and fire entirely surround the other elements, he concluded, "From this it is apparent, that the position of water, which it now has, is not entirely natural to it, but its natural position ought to go nearly around and encircle the earth's sphere in its whole part."⁶⁹ To elucidate why water did not flood the earth, he compared two possible explanations for the arrangement – one according to the natural order and the other to supernatural intervention. First, he described the planetary influences that could affect water and earth according to the natural order. Titelmans argued that Saturn's dry and cold nature could perhaps affect water so that it did not overwhelm the earth. Second, he also pointed to the earth's natural disposition as another possible natural explanation, indicating that earth could be naturally disposed to float on water much like a bobbing cork.⁷⁰ For Titelmans, the problem with these natural explanations was that people could not be certain that either was the actual cause of the dry land's current existence. Rather than trust uncertain theories, Titelmans claimed:

Truly, as [we discussed] previously, what we teach from the infallible doctrine of the sacred Scriptures surpasses what is entirely uncertain (if we were able to define whether the power (*virtus*) was in some way in the earth or in the heavenly constellations of such extent to be sufficient for that thing). For by divine power the earth was uncovered by the Word and command of omnipotent God, saying (as it is written in the first chapter of Genesis): Let the waters under the heaven be in one place, and let the

68 Lines, "Teaching Physics in Louvain and Bologna," in Campi et al., eds., *Scholarly Knowledge*, 183–85.

69 "Unde apparet, hunc aquae situm quem nunc habet, non esse prorsus illi naturalem, sed iuxta situm naturalem debere ipsum ambire & circundare ex omni parte spheram terrae"; Titelmans, *Compendium naturalis philosophiae*, sig. Lviiiir.

70 *Ibid.*, sigs. Lviiir–v.

dry land appear. Due to the most powerful, efficacious words of which, we believe that water is at every point now in its position permanently and in the place, which it then received, in which it is now discerned. Thus certainly it does not fully encircle the earth, how it was in the beginning, but as though it encircles a large part of bare earth.⁷¹

According to Titelmans, people did not know the powers inherent in the earth and the heavens. Rather than trust uncertain theories, he claimed that people had to turn to the one source that specifically discussed the relationship between the water and the earth – the creation account in the Book of Genesis. This book taught that God had commanded the primordial waters to stay away from the earth since the third day of creation, causing water to go against its natural disposition. For Titelmans, God's active intervention into water's relationship with the earth continued into the present day as God alone kept water from following its natural propensity to flood the earth. For him, the only certain evidence people could find about the water's relationship to the earth appeared in the Christian scriptures and showed that this relationship was supernatural – a miracle, which provided people with a dry place to live. He concluded: "Therefore, in this way, Scripture attributes this miracle to God, from which we see that it is unnecessary to seek another cause."⁷²

When we compare the classifications of the current water-earth relationship found in the works of Reisch, Titelmans, Melanchthon, Zabarella, and Bodin as well as their focus on both primary and secondary causes to explain this relationship to those classifications and explanations offered in medieval texts on the study of the physical world, we find that the ontological categories sixteenth-century European authors of natural philosophical texts employed expanded greatly as did the sources through which they supported their classifications. This expansion is particularly noteworthy, as these sixteenth-century authors ultimately all drew on explanations for

71 "Verum enim praedicta sint omnino incerta (quis enim definire nobis poterit an virtus aliqua talis sit in terra, vel in coelestibus constellationibus ad eam rem sufficiens) praestat, quod ex infalibili doctrina sanctae scripturae didicimus, nempe Divina virtute terram esse discoopertam, verbo & iussione omnipotentis dei, dicentis (ut primo capite Geneseos scribitur) Congregentur aquae sub coelo sunt in locum unum & appareat arida. Cuius verba sane potentissimi efficacia, credimus usque nunc permansisse aquam in eo situ & loco quem tunc accepit, & in quo nunc cernitur: ita scilicet ut terram non, quomodo ab initio ex omni parte circundet, sed ex magna parte nudam velut circumlambat"; *ibid.*, sig. Lviiiiv. Note that the phrase, "certior sententia," also appears in the margin next to this passage.

72 "His ergo modis cum scriptura totum hoc miraculum Deo ascribat, nobis videtur super-vacaneum aliam causam quaerere"; *ibid.*, sig. Mir.

this relationship that had been part of the study of the physical world since the ancient and medieval periods. Much like their medieval predecessors, Melanchthon, Zabarella, Reisch, Bodin, and Titelmans all discussed the possibility that the elements' propensity to mix together, the heavens' influences on the terrestrial realm, and the earth's different centers of magnitude and gravity accounted for the dry land's existence and its actual placement vis-à-vis the world's waterways. However, unlike their predecessors, these sixteenth-century authors explored different ontological classifications for this existence and placement, indicating that it was perhaps simultaneously or exclusively natural, preternatural, and/or supernatural. Most of these authors also incorporated specific discussions of evidence that came from scripture, especially from the Books of Genesis and Psalms in order to do so. The expansion of this categorization and the widening of the traditional focus of natural philosophy to include an exploration of the relationship between first and secondary causes even while drawing on earlier works on the physical world resonate with what we saw in our exploration of exegeses of Genesis 1:9–10 in the previous chapter, even though authors of sixteenth-century natural philosophical texts did not draw clear boundaries between elemental water and earth in the same way that biblical commentators tended to. As we now turn to this century's geographical and cosmographical texts, we will find that they, too, expanded the ontological categories for the water-earth relationship and focused more on the spatial arrangement between waterways and landmass than their ancient and medieval predecessors, even as they tended to draw clearer boundaries between water and earth than contemporary authors of natural philosophical texts.

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4. Describing and Depicting Water in Cosmographical and Geographical Texts

Abstract

This chapter investigates the relationship between water and the earth and the world's landmasses and waterways described and depicted in fifteenth- and sixteenth-century cosmographical and geographical texts and their medieval predecessors. This chapter argues that many medieval authors claimed that there was more water than earth in the world and that this water was located especially in the southern hemisphere of the world, exposing the ecumene in the northern hemisphere. Sixteenth-century authors of such texts argued for more land than water in the world and proposed different spatial relationships between waterways and landmasses than their predecessors had, but the maps that accompanied their texts show that they still tended to depict the southern hemisphere as especially water filled.

Keywords: Crates of Mallus; world maps; Antipodes; Sebastian Münster; Marco Polo; sea monsters

But in regard to the story of the Antipodes, that is, that there are men on the other side of the earth where the sun rises when it sets for us, who plant their footprints opposite ours, there is no logical ground for believing this. Its authors do not claim that they have learned it from any historical evidence, but offer it as a sort of logical hypothesis. Their theory is that the earth hangs suspended within the heavenly sphere, so that the lowest and middle points of the world are one and the same. From this they conjecture that the other half of the earth, which lies beneath our portion, cannot lack human occupants. They fail to observe that even if the world is held to be global or rounded in shape, or if

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some process of reasoning should prove this to be the case, it would still not necessarily follow that the land on the opposite side is not covered by masses of water. Furthermore, even if the land there be exposed, we must not jump to the conclusion that it has human inhabitants. For there is absolutely no falsehood in the Scripture, which gains credence for its account of past events by the fact that its prophecies are fulfilled. And the idea is too absurd to mention that some men might have sailed from our part of the earth to the other and have arrived there by crossing the boundless tracts of ocean, so that the human race might be established there also by descent from the one first man.

– Augustine of Hippo, *De civitate dei*, 16.9¹

Surely for us and for a very long time before us, no one among the learned did not think that the whole strength of water from the beginning of creation was not hurled back into that sea and that the water itself there was heaped together into a large mass so that it was not possible for dry land to appear there in whatever manner. But they are all wrong, who were of that opinion, since islands project everywhere in the sea whether you are sailing to the west or to the east or are traversing the south or north.

– Sebastian Münster, dedicatory letter to Philippe von Gundelsheim, Prince-Bishop of Basel, in Ptolemy, *Geographia universalis* (1540)²

In his *De civitate dei*, Augustine attacked a geographical model common among ancient Greek and Roman philosophers and encyclopedists while at the same time proposing a relationship between the earth's landmasses and its bodies of water that remained influential into the sixteenth century. As we saw in Chapter 1, authors of texts on geography such as Strabo, Ptolemy, and Pomponius Mela and encyclopedists such as Pliny tended to focus their discussions on the ecumene or the known world, locating it in the Northern Hemisphere, dividing its landmasses into three continents – Europe, Asia, and Africa – and their surrounding islands, and arguing that the Ocean entirely surrounded these continents much as Homer and Hesiod

1 Augustine, *City of God*, 5: 49–51.

2 “Certe nostro & maiorum nostrorum aevo nemo inter doctos non putabat totam aquarum vim a principio creationis in illud pelagus reiectam, & aquam ipsam illic in magnam coaceruatam molem, ut possibile non fuerit ibi aridam quoquo modo apparere, sed falsi sunt omnes, qui in hac fuere sententia, cum nullibi non in mari emineant insulae, sive ad occidentem ieris sive ad orientem, sive meridiem lustres, sive septentrionem”; sigs. aa2v–aa3r. Münster included an almost verbatim passage in an earlier preface, entitled, “Typi cosmographici et declaratio et usus,” to Grynaeus, *Novus orbis regionum ac insularum veteribus incognitarum*, sig. d6r.

had earlier done. Many of these ancient Greek and Roman writers as well as those early medieval authors who extracted from their works such as Macrobius and Martianus Capella also drew on the notions of Crates of Mallus and Parmenides to speculate that the ecumene was located in only one quadrant of the world and that there could be inhabited land in the other three quadrants, though most of these authors also argued that the scorching hot climate of the torrid zone at the equator and unnavigable, large expanses of water totally separated these three unknown quadrants from the people living in the ecumene. Ptolemy was the one major exception to this general trend, as he extended the ecumene further to the east than other previous authors had and denied the notion of a circumambient Ocean surrounding the ecumene, thereby intimating that there was more land than water in the world.

While arguing strenuously against the notion of inhabited, unknown landmasses in other quadrants of the world whose existence many ancient authors had hypothesized in the passage quoted above, Augustine also proposed here that even if such landmasses did exist, they could be entirely submerged under water and therefore uninhabitable. This passage focuses on the hypothetical inhabitants of these unknown landmasses, known as Antipodes because their feet would be situated opposite those of people living in the ecumene as they dwelled on the other side of the spherical world.³ Augustine denied their existence as well as doubted the actuality of the landmass on which they would theoretically live for theological reasons. As he indicated in the passage, scripture taught that all people in the world descended from Adam and then again from Noah after the flood and that the Apostles had taken the Gospel to the four corners of the earth. If impassable heat and large expanses of water truly separated people in the ecumene from those on unknown landmasses as ancient geographers and encyclopedists taught, then scripture would have lied, which Augustine clearly viewed as an impossibility. Augustine's questioning of the existence of dry landmasses in the other hemispheres proved particularly influential throughout the Middle Ages, as author after author either denied the existence of the Antipodes altogether or redefined the term to indicate people or landmasses in some distant part of the ecumene. Many also developed

3 Though the word, "Antipodes," originally referred to a group of people, often understood to be one of the monstrous races due to their unnatural feet, it was also frequently applied to the hypothetical and eventually actual landmasses diametrically opposed to the ecumene, on which they were supposed to live, as we will see throughout the course of this chapter. On the Antipodes, see Hiatt, *Terra Incognita*, and Goldie, *Idea of the Antipodes*.

his idea that the other hemispheres could be entirely filled with water to argue that the water-landmass relationship was actually as Augustine had speculated, locating dry land only in the Northern Hemisphere and placing the majority of the water primarily in the Southern Hemisphere as we saw in the exegesis of Paul of Burgos and the natural philosophical texts of Jean Buridan and Gregor Reisch.

Sebastian Münster (1488–1552) and his sixteenth-century contemporaries knew that Augustine and those subsequent people he had influenced had been wrong about both the existence of unknown, inhabited landmasses in other quadrants of the world as well as these landmasses' submersion in water. As Münster indicated in the passage quoted above from his dedicatory epistle to a new edition of a Latin translation of Ptolemy's *Geography* in 1540, many learned people prior to the sixteenth century had thought that the sheer amount of water gathered together and restrained on the third day of creation meant that land could not appear outside of the ecumene; however, Münster pointed out that contemporary experience of sailing to the west and east and traveling to the north and south had revealed that there were exposed landmasses throughout the world's entire sphere. In making such a claim, he was one of many sixteenth-century authors of cosmographical and geographical texts who began to reconsider the relationship between water and earth.⁴ Much as we saw in Chapters 1 and 2, authors of sixteenth-century cosmographical and geographical texts such as Münster also discussed the ontological categorization of water's relationship to the earth much more frequently than their medieval predecessors. They did so in slightly different contexts, however. As authors of exegetical and natural philosophical texts wrote at length about the ontological status of the current water-earth relationship as we have seen, authors of geographical and cosmographical texts focused more on the layout of the world's landmasses and waterways, though ontological categorizations of this relationship do emerge in their discussions of these spatial arrangements. Focusing on these spatial arrangements, they accepted the existence of the Antipodes and argued that water and earth combined to make one surface in the terrestrial realm through which people could sail from landmass to landmass. Despite what appears at first glance as a relatively rapid acceptance of a combined water-earth surface, the world maps that accompanied these texts also depicted large amounts of water in the Southern Hemisphere as well as fearsome sea creatures in waterways with which Europeans had little experience. These

4 For the significance of contemporary experience of the sea on these reconfigurations, see Vogel, "Sphaera terrae."

maps and their accompanying illustrations provide yet more evidence that sixteenth-century cosmographers, geographers, and mapmakers grappled with water's current relationship to the earth and the ontological status of that relationship in a manner not seen in earlier centuries, resonating with the trend we have seen in biblical commentaries and natural philosophical texts in the period.

Frequently basing their work on the definitions found in Ptolemy's *Geography*, the differences between the study of cosmography and geography were theoretically clear in the sixteenth century, but in practice the two tended to overlap. Peter Apian's (1495–1552) *Cosmographicus liber* (Cosmographical book; 1524) provides a good example of the standard definition of both cosmography and geography from the period. According to Apian, cosmography, as its name implies, is about the entire cosmos – both the celestial realm of the planets and stars and the terrestrial realm of the four elements – as well as the effects of the motions of the celestial bodies on the various portions of the terrestrial realm.⁵ Apian then explained that geography, in contrast, was about the earth (*tellus*) as a whole and all its constituent parts such as its landmasses and bodies of water. In doing so, he also differentiated geography from chorography, which focused only on the specific parts of the whole earth.⁶ Though these disciplines seem differentiated in Apian's definitions, they often overlapped in practice. Those authors writing chorographical works often situated their chosen section of the earth in the earth as a whole, and those people writing geographical works often started with a description of the terrestrial realm in relationship to the celestial bodies to explain how their movements affected the landmasses found at particular locations on the earth. Authors writing cosmographical texts might also have started with a description of the celestial bodies' movements, but they also frequently incorporated discussions of how these movements affected the terrestrial realm along with explorations of its specific parts. Therefore, the terms “cosmography” and “geography” tended to be used interchangeably in the sixteenth century to refer to what authors would technically classify as either cosmography or geography, as we see, for example, in the titles of the many different editions of Latin translations of Ptolemy's work with some editions being entitled, *Cosmographia* and some, *Geographia*.⁷

5 Apian, *Cosmographicus liber*, fol. 2r.

6 *Ibid.*, fol. 3r.

7 For a discussion of the development of cosmography and geography and the use of these terms in the sixteenth century, see McLean, *Cosmographia of Sebastian Münster*, 45–142.

Due to the inexact manner in which sixteenth-century Europeans used the terms, “cosmography” and “geography,” this chapter explores texts from the eleventh through the sixteenth centuries whose authors classified their works as either cosmography, geography, or both. This exploration reveals once again that the water-earth relationship was reconsidered in the sixteenth century to an extent it had not been in previous ones. Much as I did in Chapter 3, I have analyzed those medieval works that continued to affect the teaching of cosmography and geography into the sixteenth century and that reflect the trends current in the description and exploration of the world’s landmasses and bodies of water in the medieval period. For sixteenth-century texts, I have analyzed all Latin-language editions of Ptolemy’s *Geography* printed from the late fifteenth century and throughout the sixteenth century. I have also examined twenty-one additional printed cosmographical and/or geographical texts, many of which were circulated widely in the sixteenth century through multiple editions.⁸ Manuscript cosmographies that scholars and pilots working primarily for the kingdoms of Castile and Portugal wrote have been left out of this study, as these works tended to be kept private as part of Iberian political rulers’ proprietary knowledge of trade routes and early colonial possessions.⁹ As they were treated as proprietary, these works typically did not circulate widely, and therefore, though they certainly reflected wider cultural understandings of the relationship between water and earth, these works did not shape Europeans’ understanding of that relationship in the manner of the frequently printed, commonly discussed, and widely disseminated works analyzed here.

Describing Water from the Eleventh through the Fifteenth Centuries

According to the modern scholar, Matthew McLean, there were two different geographical or cosmographical traditions developed during the ancient period – the mathematical and the descriptive – only one of which affected how medieval Europeans understood the relationship between the world’s

8 For my selection of cosmographical and geographical texts, I drew on McLean, *Cosmographia of Sebastian Münster*, as well as on Vogel, “Sphaera terrae.” For my selection of maps and mapmakers not a part of these texts, I based my selection on Shirley’s *Mapping of the World* and Karrow’s *Mapmakers of the Sixteenth Century and their Maps*.

9 See the discussion in Brotton, *Trading Territories*.

landmasses and its bodies of water. Eratosthenes (c.276–c.194 BCE) and Ptolemy were the most significant authors McLean associates with the mathematical tradition. Whereas Eratosthenes relied on mathematics to measure the earth and to develop locative information, Ptolemy used mathematical techniques based on locative data points in order to construct representations of the world.¹⁰ McLean argued that Strabo was the most significant practitioner of the other tradition – descriptive geography. To do so, Strabo focused on the human beings who inhabited each part of the ecumene and placed these descriptions within a larger discussion of the structural relationship of these parts. For Strabo, a people's past was closely tied to where they lived, and therefore, he argued for the integration of the study of history and geography.¹¹ Largely due to Pliny's adoption of the descriptive method of geography in his *Naturalis historia*, medieval Europeans tended to develop this particular tradition of geography, and it was not until the translation of Ptolemy's *Geography* into Latin in the early fifteenth century that the mathematical tradition was explored on a large scale in Europe.¹²

This focus on descriptive geography and its close connection with the study of the past in the medieval period meant that the vast majority of geographical speculations tended to feature in works of history and natural philosophy or in travel accounts as cosmography or geography did not yet appear as separate genres like they would in the sixteenth century. The authors of these works tended to follow the ancient tradition in dividing the earth's landmasses into the three continents of Europe, Asia, and Africa and in placing a large circumambient Ocean around them. They also often drew both directly and indirectly on Augustine's discussion of the existence of the Antipodes either by denying the existence of unknown landmasses due to the location of large amounts of water in the Southern Hemisphere on which these people could have lived or by reclassifying the Antipodes as a monstrous race and/or location in Asia or Africa. In doing so, most medieval authors endorsed the notion that there was more water than earth in the world and that the circumambient Ocean was unnavigable. A few authors such as Roger Bacon, Albertus Magnus, and Pierre d'Ailly (1350–1420) did argue that there was less water in the world than most people had assumed and that this water was navigable – a sentiment the travel writers Marco Polo (1254–1324) and Sir John Mandeville (active, mid-fourteenth

10 McLean, *Cosmographia of Sebastian Münster*, 47–50.

11 *Ibid.*, 50–55.

12 *Ibid.*, 55–65.

century) also endorsed. However, throughout these medieval discussions, these authors either did not address the ontological status of the current relationship between water and earth at all, or, with one exception, they explicitly classified it as natural in much the same way as the vast majority of medieval exegetes and those writing about the physical world in the eleventh through fifteenth centuries. This silence about the contemporary water-earth relationship and the explicit classification of it as natural contrasts with what we will find in some sixteenth-century cosmographical and geographical texts as many more sixteenth-century authors described the current water-earth relationship as miraculous than had been common in earlier periods.

The section of Vincent of Beauvais's *Speculum maius* known as the *Speculum historiale* reveals the close connection between history and geography as well as the appropriation of the ancient conception of the earth's landmasses and waterways typical in the medieval period. Beauvais's *Speculum historiale* was the most widely disseminated part of his *Speculum maius*, and it provided a history of the world from creation to his present day.¹³ His description of the world appears in the section of the text where he discusses the dispersal of Noah's three sons after the flood across the three known continents of the ecumene. Citing Isidore's *Etymologiae*, Beauvais argued that the world was divided into three parts – Asia, Europe, and Africa – and that the Ocean, which surrounded them, cut into the landmasses at various points to create the divisions among these continents.¹⁴ We see here yet again the division of the earth into three landmasses surrounded by a circumambient Ocean. After giving this general overview, Beauvais also offered descriptions of each of the landmasses and addressed the existence of Antipodes while doing so. Describing the Antipodes as a monstrous race with their feet turned opposite of those in the rest of the ecumene, he located this monstrous race in Africa, on the extremes of the known world,¹⁵ thereby tacitly responding to Augustine's theological challenge that there could not be unknown, inhabited landmasses and suggesting that there is more water than earth in the world.

This appropriation of ancient conceptions of the world's landmasses and bodies of water continued for some centuries as we see in the text of

13 Paulmier-Foucart and Lusignan, "Vincent de Beauvais et l'histoire du *Speculum Maius*," 109–12 and 121–22; Paulmier-Foucart and Duchenne, *Vincent de Beauvais et le grand miroir du monde*, 77–104.

14 Vincent of Beauvais, *Speculum historiale*, fol. 8v.

15 *Ibid.*, fol. 12r.

Hartmann Schedel's (1440–1514) *Liber chronicarum* (1493), known more commonly as the *Nuremberg Chronicle*, even though he did endorse the existence of landmasses across the unnavigable Ocean unlike Augustine and Vincent of Beauvais. The first edition of this text included a Ptolemaic map under which Schedel described the three known landmasses – Asia, Europe, and Africa – as well as the circumambient Ocean that broke into these continents at various points to form their separation.¹⁶ In his discussion of Africa, however, Schedel argued for the existence of unknown land lying in the Southern Hemisphere to which, he explained, the extreme heat of the torrid zone kept people from the ecumene from traveling – ideas stemming back to Crates of Mallus and Parmenides. Despite drawing on a different ancient tradition than was typical in the medieval period, Schedel expressed doubt that this southern hemispheric landmass was inhabited in keeping with the theological condemnation of the notion of the Antipodes from the patristic period. In his discussion of the monstrous races, he provided the traditional description of the Antipodes and pointed out that uneducated opinion (*vulgi opinionem*) suggested their existence while Augustine had denied it.¹⁷ He also mentioned that the Southern Hemisphere was the location in which many claimed the Antipodes lived as he discussed the possibility of an unknown landmass there, but he marked such discussions as fabulous (*fabulose*).¹⁸ Though endorsing an unknown landmass in the Southern Hemisphere much as Crates of Mallus had originally taught, Schedel's focus on the ecumene and the surrounding circumambient Ocean was similar to the discussions of his medieval predecessors and contemporaries, including yet again Augustine's influential denial of inhabited land in the Southern Hemisphere.

Zaccaria Lilio was the regular canon from Vincentia in Venice in the late fifteenth century, and he wrote a work in 1496 entitled *Contra Antipodes*, which continued many of these trends while reflecting directly on the spatial relationship between water and earth in the world.¹⁹ Endorsing Augustine's denial of the existence of the Antipodes, Lilio argued strongly for the traditional conception of the earth's three continents and bodies of water much as Vincent of Beauvais had done, while also stating unequivocally that there was more water than earth in the world and that this water congregated in the Southern Hemisphere in contrast to what Schedel had

16 Schedel, *Liber chronicarum*, fols. 12v–13r.

17 *Ibid.*, fol. 12r.

18 *Ibid.*, fol. 14r.

19 Campos, *Technology, Scientific Speculation, and the Great Discoveries*, 512.

claimed just three years before. Lilio's work therefore belongs to a trend that we have seen beginning in the fourteenth century in both exegetical and natural philosophical texts, which held that there was more water than earth in the world and that this water filled the Southern Hemisphere, allowing the dry land to appear in the Northern Hemisphere.²⁰ In the beginning of his text, Lilio claimed that he had taken up the question of the existence of the Antipodes because it had appeared frequently in ancient texts. He then cited Augustine's and Lactantius's (c.250–325) denials of their existence based on theological grounds, stating that "such a notion [of the Antipodes' existence] is false, as Scripture testifies, and it should not be believed by anyone."²¹ Lilio took two tactics to support his denial of the Antipodes' existence – one based on the experience of earlier and contemporary travelers and the other based on the supposed contemporary relationship between water and earth. Surveying the travels of Europeans from Alexander the Great to fifteenth-century Iberians, Lilio argued that none of them had been able to prove the existence of the Antipodes, even though they had investigated the whole world.²² He then turned to the question of whether the Southern Hemisphere was even inhabitable, and in doing so, he argued that this hemisphere was flooded with water. "Since truly nearly all people are in consensus that the earth is suspended in the middle of the element of water, as it is said in books, is it not childish absurdity to think or believe it [the existence of the Antipodes], where the people would pass like fish in the water?"²³ Lilio here strongly ridiculed those, who might believe in the existence of the Antipodes, based on his supposition that water flooded the Southern Hemisphere so that any people living there would have to be like fish in order to survive. He stated his notion of a water-filled Southern Hemisphere in the next passage of his text, even as he gave credit to God for the existence of dry land in the Northern Hemisphere – one of the few medieval cosmographical or geographical writers to do so. He stated, "for it comes together among all authors – the Greeks, Latins, and barbarians – that water pours around the earth everywhere except for that part which that foremost God, who rules this world, reserved for the use of living creatures.

20 On this text, see Allegro, "Bottom of the Universe," and the reply to this article by Nothaft, "Zaccaria Lilio and the Shape of the Earth."

21 "Quod falsum esse ac nulla romne credendum sacrae literurae testantur"; Lilio, *Contra Antipodes*, sig. eiiv.

22 *Ibid.*, sigs. eiiiiir–fiiir.

23 "Cum vero omnium fere mortalium consensu, in medio aquarum elemento suspensa tellus librari dicatur. non ne puerilium prope deliramentorum est, id opinari aut credere: ut instar piscium homines degant in aquis?"; *ibid.*, sig. fiiir.

Therefore, the earth, of which all is cultivated by us, is a certain, small island [...].”²⁴ For Lilio, there was much more water in the world than earth, and therefore water surrounded the three continents, Europe, Asia, and Africa, to such an extent that only God could currently keep the water from flooding the earth for the sake of living things.

Whereas the vast majority of medieval authors sided with Beauvais and Lilio and even Schedel in viewing the amount of water as vastly exceeding the amount of earth in the world especially locating this water in the Southern Hemisphere, there were a few other medieval authors such as Roger Bacon, Albertus Magnus, and Pierre d’Ailly who argued precisely the opposite, and whose works influenced many Europeans in the late fifteenth and sixteenth centuries. Roger Bacon addressed the question of the inhabitable portions of the earth in the fourth part of his *Opus maius* (Greater work; c.1267) in which he explored those disciplines associated with mathematics. Taking up the question, Bacon argued that both the power of the sun and the amount of water in any one place determined whether it was inhabitable, much as Lilio would come to do two centuries later.²⁵ Citing the teachings of Ptolemy’s astronomical works, Aristotle, Averroes, Seneca, Pliny, Jerome, and the fourth book of Esdras, Bacon argued that more than a quarter of the earth was inhabitable and that water therefore occupied less space than people tended to think. He concluded, “and therefore it follows that that quantity of inhabitable land is great and that covered by water ought to be moderate.”²⁶ He also stated later “the sea covers less than three quarters of the earth, as it is estimated,” and that the amount of water between Africa and India was quite small, suggesting the circumambient Ocean was navigable.²⁷ Writing 150 years later, Pierre d’Ailly, a French theologian and eventual cardinal of Cambrai and chancellor of the University of Paris, lifted this passage almost verbatim from Bacon’s text for the eighth chapter of his *Imago mundi* (Map of the world; 1410), “De quantitate terre habitabilis” or “On the quantity of inhabitable earth.”²⁸

24 “Nam terram circumfusam undique aquis inter omnes convenit auctores, graecos, latinos, & barbaros: praeter eam partem quam princeps ille Deus qui hunc mundum regit, ad usum animantium reservavit. Est enim terra omnis quae colitur a nobis, parva quaedam insula [...]”; *ibid.*, sigs. fiiiir–v.

25 Roger Bacon, *Opus Majus of Roger Bacon*, 1: 290.

26 “Et ideo secundam haec quantitas habitabilis magna est et quod aqua cooperitur modicum debet esset”; *ibid.*, 1: 291.

27 “Non igitur mare cooperoet tres quartas terrae, ut aestimatur”; *ibid.*, 1: 292.

28 Pierre d’Ailly, *Ymago Mundi*, 1: 206–15. See the discussion of this borrowing in Randles, “Classical Models of World Geography,” 28.

Bacon's contemporary, Albertus Magnus, also offered a conception of the world's landmasses and waterways that posited more dry land than water in his *De natura loci* (On the nature of place), unlike most medieval authors. In the seventh chapter of his first tractus, Albertus Magnus took up the question of whether there were people living in the Southern Hemisphere. In the course of his discussion, he explained that those who argued against the existence of inhabited land there cited the scorching heat of the torrid zone and the submersion of the Southern Hemisphere in water as proof for their arguments.²⁹ In contrast, he cited a number of authorities, who provided evidence that people actually did live in the torrid zone, adding, "as we see with our own eyes," and he stated that the land south of the equator and toward the southern meridian is inhabited and inhabitable "according to nature," referring people to his commentary on Aristotle's *On the Heavens* for why those people were wrong who claimed that only the northern portion of the earth's sphere stuck out above the water's.³⁰ For Bacon, Albertus Magnus, and d'Ailly – unlike for most other medieval Europeans – there was more land than water in the world, and Albertus Magnus even insisted explicitly that this relationship between the world's landmass and its bodies of water was natural.

As the modern scholar, W.G.L. Randles, has argued, the relationship between dry land and water that Bacon, Albertus Magnus, and d'Ailly had proposed was largely ignored into the late fifteenth century with the vast majority of scholars arguing as Beauvais and Lilio had that there was much more water in the world than earth and that this water was especially located in the Southern Hemisphere, leaving only the ecumene exposed to the air.³¹ The travel accounts of Marco Polo and those attributed to Sir John Mandeville also suggested a larger amount of dry land in the world than most scholars claimed in their implicit and explicit discussions of the navigability of the circumambient Ocean. Though Polo's impact seems to have been somewhat limited in the fourteenth century, the work became more significant to scholarship and mapmaking after around 1400, and Mandeville's work was particularly popular from its first appearance, indicating that a variety of Europeans, especially those who frequented noble courts, were at least exposed to the notion that there might be less

29 Albertus Magnus, *De natura loci*, 12–13.

30 "Et nos hoc falsum esse videmus, cum oculis videamus in hac quarta homines hanc quartam aquilonarem inhabitare. Nos autem salvo meliori iudicio dicimus aliquam partem quartae, quae est ultra aequinoctialem ad meridiem, esse habitabilem secundam naturam et etiam habitatam"; *ibid.*, 13.

31 Randles, "Classical Models of World Geography," 28–34.

water in the world and that the supposed circumambient Ocean could be more navigable than medieval scholarship might have led them to believe.³² Polo did not address the water-earth relationship or the navigability of the circumambient Ocean directly, but his description of the Indian Ocean and what he called the Sea of Cin, meaning what we would now call the Sea of Japan and the South China Sea, suggested that there was more dry land in the world than people realized and that people could perhaps navigate from Europe to Asia by sailing west. He described the Sea of Cin thus, “so extensive is this eastern sea, that according to the report of experienced pilots and mariners who frequent it, and to whom the truth must be known, it contains no fewer than seven thousand four hundred and forty islands, mostly inhabited.”³³ He also located this sea in the circumambient Ocean, explaining, “In terming this sea the Sea of Cin, we must understand it, nevertheless, to be a part of the ocean; for as we speak of the English Sea or the Aegean Sea, do so the eastern people of the Sea of Cin and the Indian Sea, whilst all of them are comprehended under the general term of ocean.”³⁴ Though Polo did not directly assert that the circumambient Ocean was navigable nor that there was more dry land in the world than people typically thought, his location of such large numbers of inhabited islands to the east of Asia about which Europeans did not know strongly implied both, because it suggested that Europeans could sail west from Europe and make their way from island to island in the circumambient Ocean until they reached the Asian mainland. Whereas Polo did not address the navigability of the circumambient Ocean or the relationship between earth and water, Mandeville did so directly by asserting that one could navigate throughout the entire world due to the spatial relationship between earth and water. Though we cannot be sure who wrote Mandeville’s *Travels*, recent scholarship suggests that the author wrote in an Anglo-Norman literary context around the middle of the fourteenth century and that his text includes a wide variety of material borrowed from earlier travel accounts rather than an eyewitness account of the author’s travels.³⁵ In his description of India, Mandeville explained, “Therefore, I say with certainty that a person who has a ship is able to go all around the world, above and beneath, and return to his own country. He’ll always find people, nations,

32 On the popularity of Marco Polo’s work in the medieval period, see Lerner, *Marco Polo and the Discovery of the World*, 131–50. On the popularity of Mandeville’s *Travels* in the medieval period, see Campbell, *Witness and the Other*, 122–61.

33 Marco Polo, *Travels of Marco Polo the Venetian*, 241.

34 *Ibid.*, 241–42.

35 Anthony Bale’s introduction to Mandeville, *Book of Marvels and Travels*, pp. x–xvi.

islands in these regions.”³⁶ Just like Polo, Mandeville articulated the notion that there were so many inhabited islands in the Ocean that one could navigate across the entire world – both in the Northern (above) and Southern (beneath) Hemispheres.

Whether one held with Beauvais and Lilio and the vast majority of medieval writers that there was much more water than earth in the world primarily in the Southern Hemisphere and that the circumambient Ocean was unnavigable or with Bacon, Albertus Magnus, d’Ailly, Polo, and Mandeville that there was more dry land in the world than Europeans knew and that the Ocean was navigable, the vast majority of the medieval authors who explicitly addressed the current ontological status of the relationship between water and earth in the medieval period in the cosmographical and geographical sections of their texts insisted that this relationship was natural, with Lilio’s *Contra Antipodes* being an exception. We have already seen one such instance in our discussion of Albertus Magnus’s *De natura loci*. As he addressed whether the Southern Hemisphere could be or was inhabited, he asserted that it both could be and actually was according to nature.³⁷ Though Albertus Magnus did not explain what aspects of the natural order allowed for the inhabitation of the Southern Hemisphere, Dante Alighieri (c.1265–1321) in his *Question of the Water and the Land (Quaestio de aqua et terra, 1320)* argued that the relationship between the celestial bodies and the terrestrial realm allowed for the dry land to appear, thereby providing a natural explanation for water’s current failure to submerge the earth. Dante’s text appeared toward the end of his life as part of a dispute in Mantua over the question of the location and shape of the elements, water and earth.³⁸ After stating that all the elements in the terrestrial realm needed a place to come together to mix, Dante here argued, “Therefore, inasmuch as all nature is obedient to the purpose of Universal Nature, it was necessary for earth, besides its simple nature, which is to fall downwards, to have another nature, whereby it should be obedient to the purpose of the Universal Nature – namely that it should suffer itself to be partially drawn up by the efficiency of heaven, as if obedient to its teacher.”³⁹ For Dante, though the

36 Mandeville, *Book of Marvels and Travels*, 80.

37 Albertus Magnus, *De natura loci*, 13.

38 Alighieri, *Translation of the Quaestio de aqua et terra with a Discussion of its Authenticity*, 191–201.

39 “Unde cum intentioni naturae universalis omnis natura obediatur; necesse fuit etiam praeter simplicem naturam terrae, quae est esse deorsum, inesse aliam naturam per quam obediret universalis naturae; ut scilicet pateretur elevari in parte a virtute coeli, tanquam obediens a praecipiente”; *ibid.*, 32–33.

particular nature of earth was to go downwards, universal nature or the natural order as a whole required a place where all the elements could meet and mix together, and he explained in this passage that the influence of celestial bodies drew some of the earth upward according to this universal nature to provide such a place, thereby exposing some of the land. He went on to state this land appeared only in the Northern Hemisphere from Cadiz to the Ganges, indicating that the Southern Hemisphere was filled with water.⁴⁰ Much like Lilio would come to do, Dante also argued that there was dry land only in the Northern Hemisphere and that water filled the entire Southern Hemisphere; however, unlike Lilio, Dante insisted that this relationship between water and earth was natural – set up for the benefit of the entire natural order.

From the eleventh through fifteenth centuries, the study of the spatial relationship between the world's landmasses and bodies of water tended to appear in works of history or natural philosophy as these authors drew on the descriptive tradition of ancient geography and cosmography. These works show that the ancient conceptions of the *ecumene* and Augustine's denial of the existence of people, known as *Antipodes*, living on unknown, unreachable landmasses remained extremely influential throughout the period. The geographical sections of these works tended to focus on the three known continents of the world, Europe, Asia, and Africa, and to stress the large, unnavigable amount of water that surrounded them especially in the Southern Hemisphere, though there were some authors such as Hartmann Schedel, who incorporated Crates of Mallus's notion of unknown landmasses in the Southern Hemisphere, or Roger Bacon, Albertus Magnus, Pierre d'Ailly, Marco Polo, and Sir John Mandeville, who stressed that there was less water in the world than people typically thought and that the Ocean was navigable. The vast majority of these authors did not address the ontological relationship between water and earth, but for those who did, only Lilio attributed the dry land's existence to God's intervention into the world against water's nature. The rest, such as Albertus Magnus and Dante, argued that this relationship was part of the natural order. As we turn now to sixteenth-century texts, we will find that these authors argued for a different spatial relationship between water and earth and included many more discussions of their current ontological status with more sixteenth-century authors describing this relationship as miraculous than their predecessors.

40 *Ibid.*, 36–37.

Describing Water in the Sixteenth Century

Beginning in the sixteenth century, some authors began designating their texts as belonging specifically in the genres of cosmography and geography. As they did so, they drew on both the mathematical and the descriptive traditions of geography developed in the ancient period as both Ptolemy's and Strabo's works had been translated into Latin at the beginning of the fifteenth century.⁴¹ The development of these independent genres and the reliance on both the mathematical and descriptive traditions were two things that set these sixteenth-century works apart from their medieval predecessors. Another major difference between these sixteenth-century texts and their medieval predecessors' was the later authors' notions of the spatial relationship between the world's landmasses and its bodies of water. Whereas most medieval scholars had focused on the ecumene and its circumambient Ocean, denying the existence of unknown, inhabited landmasses often because of their assumption of the large amounts of water in the world, sixteenth-century authors of cosmographical and geographical texts sided more with the previously largely ignored works of Bacon, Albertus Magnus, d'Ailly, Polo, and Mandeville and argued that there was more land in the world than people thought. In doing so, they revised the traditional conceptions of the spatial relationship between the world's landmasses and its bodies of water, both arguing for the existence of land in the Southern Hemisphere as well as the Antipodes, now mostly described as landmasses rather than a monstrous race, and explaining that water and earth combined together to form one surface within this sphere. As they did so, many more of these authors explicitly classified the current earth-water relationship than had been common in previous centuries, and some of these authors characterized this relationship as miraculous. These different notions of the layout of the world's landmasses and bodies of water, this new conception of the contemporary water-earth relationship, and this especial focus on classifying that relationship mirrors what we have already seen in sixteenth-century exegetical and natural philosophical texts and shows that Europeans in this particular period were especially interested in water's current failure to flood the earth.

The first things that separated these sixteenth-century cosmographical and geographical texts from their medieval predecessors were their authors' insistence that there was land in the world about which the ancients had

41 See the discussion in McLean, *Cosmographia of Sebastian Münster*, 45–47 and 87–126.

not known, especially in the Southern Hemisphere, and that this land in part constituted or contained the Antipodes, despite Augustine's and Lactantius's influential denials. This notion of previously unknown lands especially in the Southern Hemisphere and the existence of the Antipodes shaped how these authors conceptualized the spatial relationship between the world's landmasses and bodies of water. The argument for unknown lands in the Southern Hemisphere in particular appears as early as the 1503 pamphlet, *Mundus novus* (New world), attributed to Amerigo Vespucci (1454–1512). This pamphlet claims to include the Latin translation of a letter Vespucci wrote to Lorenzo Pietro di Medici (1492–1519) after his third voyage. The authenticity of this pamphlet has long been in question with some scholars arguing that it was a fictionalized version of several of Vespucci's genuine letters perhaps done by Giovanni Giocondo (c.1433–1515), an Italian Franciscan.⁴² Whether Vespucci wrote the pamphlet, it circulated widely under his name, and in the very first paragraph, the author stated that there was land south of the equator about which Europeans had not previously known and that “it is more densely inhabited by people and animals than our Europe, or Asia, or Africa.”⁴³ Several years later, Matthais Ringmann (1482–1511) in his *Introduction to Cosmography* (*Cosmographiae introductio*, 1507), meant to accompany Martin Waldseemüller's (c.1470–1520) wall map, *Universal Cosmography* (*Univeralis cosmographia*), included these previously unknown, inhabited lands as the fourth part of the earth to go with the three previously known continents of Europe, Asia, and Africa. He explained, “now truly both these parts [Europe, Asia, and Africa] have been more widely brought to light and another fourth part has been discovered by Amerigo Vespucci (as will be heard in the following section).”⁴⁴ This emphasis on a previously unknown fourth part called increasingly after the publication of Ringmann's text and Waldseemüller's map as “America” became the common way in which Europeans described the layout of the world's landmasses in the sixteenth century, as we see toward the end of the century in the evangelical preacher, Johannes Rauw's (d. 1600) *Cosmographia* (1597). Rauw ended the first chapter of his work by stating, “Other than these three parts of the world [Europe, Africa, and Asia] there is still one, which

42 On these scholarly debates and this pamphlet's authenticity, see Omodeo, “Authenticity of Amerigo Vespucci's *Mundus Novus* and Information Untold about his Third Journey.”

43 “Hec mea ultima navigatione declaravit cum in partibus illis meridianis continentem inveniim frequentioribus populis et animalibus habitatam, quam nostrum europam seu asiam vel africanam”; Vespucci [?], *Mundus novus* [, 4].

44 “Nunc vero & haec partes sunt latius lustratae & alia quarta pars per Americum Vesputium (ut in sequentibus audietur) investa est”; Ringmann, *Cosmographiae introductio*, sig. Ciiiv.

one should name the fourth part of the earth, called America, which was discovered for the first time a few years ago.”⁴⁵

The discovery of this previously unknown, inhabited land in what they frequently described as the fourth part of the world led many Europeans to reassert the existence of the Antipodes, though they tended to reclassify the Antipodes as a geographic location while doing so. We find one of the earliest such examples in Apian's *Cosmographicus liber* in which he offered a perspectival definition of the Antipodes based on an observer's particular geographical location on the world's sphere. Much like Ringmann and Rauw, Apian began this discussion by asserting that the earth is divided into four parts, each containing a corresponding habitation zone. According to Apian, if you started with one of the zones, the land and people in the zone diametrically across a meridian from that original zone on the world's sphere was known as the Antipodes. He went on to explain that the Antipodes are the place located across a meridian from your chosen point on the earth's sphere and that these two locations experience the opposite of one another, such as one experiencing daylight when the other experiences night and winter when the other experiences summer, and he cited Spain and India as examples of Antipodes. He also explicitly addressed Lactantius's and Augustine's theological denial of the Antipodes' existence, stating that there were records of apostles taking Christ's message into India.⁴⁶ Though Apian directly addressed the medieval precedent of denying the Antipodes' existence, later authors of cosmographical and geographical texts did not, even as they continued to define the Antipodes as those places and/or people diametrically across a meridian from one another on the world's globe. The English doctor, William Cuningham's (active mid-sixteenth century) *The Cosmographical Glasse* (1559) provides a good example. Cuningham wrote his work as a dialogue between a teacher and a student, and he claimed that his work was the first cosmographical text written in English.⁴⁷ In his discussion of meridians, he had the student state, "Then by your words I gather that the inhabitants whiche be directly under us (the Geographers name them Antipodes) are under the same meridian lyne, that we be," and his teacher responded, "verely it is true."⁴⁸

While arguing for the existence of lands about which their predecessors had not known, these authors' description of what kind of lands they

45 "Über diesen Theilen ist noch eins, welches man wol das vierdte Theil der Welt nennen mag, heist America, welches vor wenig Jahren allererst erfunden worden"; Rauw, *Cosmographia*, 140.

46 Apian, *Cosmographicus liber*, fols. 54–56.

47 Cuningham, *Cosmographical Glasse*, sigs., Avir–v.

48 *Ibid.*, sig. Cvr.

were – whether a continent, island, or peninsula – and where they were located relative to the three known continents of the world also affected these Europeans’ understanding of the spatial relationship between the earth’s landmasses and its bodies of water. The vast majority of sixteenth-century authors classified what was coming to be known as the Americas as an island or series of islands, though there was disagreement between them on these islands’ locations in relationship to the eastern portion of Asia and the Pacific Ocean. We find the description of the Americas as an island or islands early in the century in Ringmann’s *Cosmographiae introductio*. He explained, “In this manner, it is now known, with the earth being divided into four parts, that three parts are continents, and the fourth is an island.”⁴⁹ Other sixteenth-century authors explicitly arguing that the Americas were an island or a series of islands include Apian; Johann Schöner (1477–1547), a German mathematician with a reputation for globe making and cosmography; Münster; Oronce Finé (1494–1555), a French mathematician and cartographer; Nicolaus Copernicus (1473–1543); Gemma Frisius (1508–1555), a Dutch mathematician, physician, and cartographer; and Cuningham.⁵⁰ Though there seems to have been basic agreement about the island-status of the Americas for much of the sixteenth century, there was some disagreement about where these islands were located relative to Asia, as we see in Frisius’s work. Writing of the Americas, Frisius explained, “Many have joined that part of the earth to Asia, and they said that it was connected.” He then went on to cite the evidence of contemporary voyages to conclude that “America is not connected with Asia.”⁵¹ Yet other Europeans speculated about the possibility of further unknown landmasses in the world, especially in its Southern Hemisphere. Abraham Ortelius (1527–1598), a cosmographer from Antwerp, articulated this expectation in his *Theater of the World* (*Theatrum orbis terrarum*, 1570). Describing the contents of his world map, Ortelius explained, “This map contains and exhibits a likeness of the whole earth and the circumambient Ocean, which whole globe of

49 “Hunc in modum terra iam quadripartia cognoscitur: & sunt tres primae partes continentes: quarta est insula”; Ringmann, *Cosmographiae introductio*, sig. Ciiiv.

50 Apian, *Cosmographicus liber*, fol. 57; Schöner, *Opusculum geographicum*, sig. E5r; Münster, “Typi cosmographici et declaratio et usus,” in Grynaeus, *Novus orbis regionum ac insularum veteribus incognitarum*, sigs., d4r–v; Finé, *De mundi sphaera sive cosmographia*, sig. Avr; Copernicus, *De revolutionibus orbium coelestium*, sig. aiir; Frisius, *De principiis astronomiae et cosmographiae*, sig. B4v; and Cuningham, *Cosmographical Glasse*, sig. Liiv–Liiir.

51 “Hanc partem terrae multi Asiae adnectunt dicuntque continentem esse.” In a marginal note, Frisius concludes, “America cum Asia non coniungitur”; Frisius, *De principiis astronomiae et cosmographiae*, sig. M3v.

the earth the ancients (to whom the new part of the globe had certainly not yet been made known) divided into three parts – into Africa, Europe, and Asia, but with America having been discovered, our age added it for the fourth part, and it awaits the fifth part situated under the southern axis.”⁵² As these authors argued for the existence of landmasses that previous generations had not known, they tended to classify these new lands as islands and locate them relative to the ancients’ ecumene, especially in the Southern Hemisphere.

The description of this previously unknown land put pressure on the common medieval view that there was much more water in the world than earth and that only the northern portion of the earth’s sphere stuck out above the water, leading these sixteenth-century Europeans to side both implicitly and explicitly with Bacon, Albertus Magnus, d’Ailly, Polo, and Mandeville about the larger quantity of earth in the world than Europeans had thought. The French physician, Jean Fernel’s (1497–1558) *Cosmotheoria* (1528) provides a good example of those sixteenth-century authors, who argued for that point of view. Fernel made this argument first based on mathematics. He argued that if we assume as many predecessors and contemporaries did that the relationship between the elements is ten to one, with there being ten times more water than earth, ten times more air than water, and ten times more fire than air, then the terrestrial realm would far exceed the estimate for the size of the world, and therefore, these traditional suppositions about the amounts of each element in the world must be incorrect.⁵³ He then applied this insight into the relative amounts of water and earth, stating, “hereafter, who will not be persuaded more than enough that all the water in the world (even as it fills up rivers, springs, pools, and individual lakes) ought to be reduced far more than the earth, since consequently, that is now in the position of the elements, the vastness of the earth is more than of the sea, with its spread at the same time nearly the greatest?”⁵⁴ Copernicus also argued for less water in the world than earth, stating, “thus it has been

52 “Haec tabula comprahendit & exhibit totius terrarum & circumambientis Oceani effigiem; quem universum terrarum orbem veteres (quibus novus nempe Orbis nondum innotuerat) in tres partes divisere: in Africam scilicet, Europam, & Asiam: Sed inventa America, eam pro quarta nostra aetas adiecit: quintamque expectat sub Meridionali cardine iacentem”; Ortelius, *Theatrum orbis terrarum*, 1.

53 Fernel, *Cosmotheoria*, sig. Bvr.

54 “Porro, quis non plus satis sibi persuadebit aquam totam (etsi flumina, fontes, stagna, lacusque singulos aggeret) in orbem longe maiorem terra redigi debere, quum eo, qui nunc est, elementorum situ, terrae quam maris maior sit profunditas, stante eadem fere extensione suprema?”; *ibid.*

proper that there is less water than earth, so that the whole earth is not swallowed up by the water.”⁵⁵

Now that these authors of cosmographical texts argued that there was more earth in the world than Europeans had traditionally held, many began to develop a different notion of the water-earth spatial relationship that posited the two elements made up a single surface or even a single sphere in the world. Apian was the earliest sixteenth-century author of a cosmographical text to argue as such, stating it as justification for dividing the world into the five traditional climate zones, as he began, “since the surface (*superficies*) of the earth is one with water [...]”⁵⁶ A more comprehensive discussion appeared in Fernel’s work just a few years later, as he argued against the notion of the earth’s different centers stemming back to Jean Buridan. Fernel explained, “All philosophers approve at first, especially Aristotle in the second book of *On the Heavens* and it by his reasonings, which are certainly natural, that the face of the inhabited earth is joined with water so that they make one, round surface, the center of which and of the universe being the same.”⁵⁷ Whereas Apian and Fernel had argued that water and earth combine together to form a single surface, Copernicus and many other cosmographers and geographers writing after 1543 changed their definition slightly to claim that the water and earth formed a single globe or sphere. Copernicus devoted the entire third chapter of his first book to the topic, giving it the title, “How the earth with water constitute one sphere (*globum*).”⁵⁸ This notion caught on widely with five other authors of cosmographical texts after 1543 also claiming explicitly that the earth and water made one sphere: Antoine Mizauld (1510–1578), a French astronomer and physician, in 1552; Frisius in 1553; Cuningham in 1559; Rauw in 1597; and Francesco Barozzi (1537–1604), a mathematician and independent scholar in Venice, in 1598.⁵⁹ By the time Barozzi wrote in 1598, he just stated that the

55 “Itaque minus esse aquarum quam terrae oportebat, ne totam absorberet aqua tellurem”; Copernicus, *De revolutionibus orbium coelestium*, sig. aiv.

56 “Quum terrae et aque superficies sit una [...]”; Apian, *Cosmographicus liber*, fol. 10.

57 “Probant in primis philosophi omnes, Aristoteles praesertim secundo caeli idque rationibus quae maxime naturales sunt, terrae faciem habitam, una cum aquae connexo, superficiam unicam, eamque convexam efficere, cuius & universi idem sit centrum”; Fernel, *Cosmotheoria*, sig. Biv. For a similar discussion, see also Finé, *De mundi sphaera sive cosmographia*, sig. Adv.

58 “Quomodo terra cum aqua unum globum perficiat”; Copernicus, *De revolutionibus orbium coelestium*, sig. aiv. On Copernicus’s argument and its departure from earlier views of the water-earth relationship, see Randles, “Classical Models of World Geography,” 69–70.

59 Mizauld, *De mundi sphaera seu cosmographia*, sig. biv; Frisius, *De principiis astronomiae et cosmographiae*, sigs. A3v–A4r; Cuningham, *Cosmographical Glasse*, sig. Eiiiiv; Rauw, *Cosmographia*, 121–22; and Barozzi, *Cosmographia in quatuor libros*, sig. A2r.

water and earth combined together to make one sphere in his description of the elements without any justification for doing so, unlike Copernicus, who had devoted an entire chapter to proving and explaining the configuration.⁶⁰

This different conception of the water-earth relationship was a second thing that separated the works of sixteenth-century authors of cosmographical and geographical texts from their medieval predecessors. The third and final one explored here is the amount of attention sixteenth-century authors placed on the ontological classification of the current water-earth relationship with many more sixteenth-century authors emphasizing that this relationship was miraculous. As we noted above, most medieval authors did not classify the relationship between water and earth at all, and those authors such as Albertus Magnus and Dante who did tended to define the relationship as a natural one. Of the twenty-one sixteenth-century cosmographical and geographical texts explored here, seven explicit ontological classifications of the water-earth relationship appeared with two authors stating the relationship was natural, one defining it in a teleological manner much as Sacrobosco and Lilio had, and four arguing that the relationship was miraculous. Fernel and Gerard Mercator (1512–1594) in his posthumous, *Atlas sive cosmographicae meditationes de fabrica mundi et fabricati figura* (Atlas, or cosmographical meditations on the fabric of the world and the figure of the created; 1595) redacted by his son, Rumold (1545–1599), made the argument that the relationship between the water and the earth was a natural one, though they made the classification in different ways. Fernel gave his classification in his description of the four elements, stating simply that the elements, including water and earth, were located naturally.⁶¹ Mercator, in his preface to the *Atlas* that focused on the creation of the world, argued that God was responsible for the relationship between the water and earth due to his process of creation and that their current relationship should be understood as natural. Mercator explained that on the third day of creation, God had gathered the primordial waters in caverns in the earth and used the winds to drive the water back into its proper boundaries. For Mercator, the celestial bodies God fashioned during the fourth day of creation now worked with the winds to provide natural, secondary causes for the dry land's existence, even if God as the first cause was responsible for setting up this natural order in the first place.⁶²

60 Barozzi just asserted, "Terra autem simul cum aqua machinam unam perfecte sphaericam sive globum unum conformant," in his *Cosmographia in quatuor libros*, sig. A2r.

61 Fernel, *Cosmotheoria*, sig., Biiiiv.

62 Mercator and Mercator, *Atlas sive cosmographicae*, sig. C3r.

Whereas Fernel and Mercator argued explicitly that the contemporary relationship between water and earth was natural, Oronce Finé provided the teleological description of the current water-earth relationship. As he described the terrestrial realm and the location and order of the elements, he argued, “truly water does not circularly envelop the earth – having been pressed together in the middle of the other elements and of the whole universe (as it is heaviest), but the water remains sprinkled in little pieces or in depressions and held by its boundaries, by which parts of the earth are uncovered for the health of living things (as God wills).”⁶³ In this passage Finé made an argument that resonates with that Sacrobosco had given in his *De sphaera* and Lilio in his *Contra Antipodes* in which they stated that dry land existed for the sake of living things. Unlike Sacrobosco, Finé did attribute this arrangement ultimately to God, but despite doing so, he did not explain how God accomplished this particular relationship between water and earth. Whether Finé ultimately understood the relationships between water and earth as a miracle that God enacted against the natures of either water, earth, or both as Lilio had, or whether he understood this relationship much as Mercator would do later as God’s fashioning the dry land by installing secondary causes into the universe during creation is unclear.

Though Finé was not explicit on how God was involved in the existence of the dry land, Münster, Mizauld, André Thevet (1516–1590), a French priest, traveler, and cosmographer, and Rauw all claimed that God was responsible for water’s current failure to flood the earth. Mizauld attributed the water-earth relationship to God working along with nature in a marginal note after he had finished discussing the configuration of the elements in the terrestrial realm, assigning the structure of that realm to the “highest providence of God and nature.”⁶⁴ Thevet addressed the ontological status of the relationship of water and earth in his section on the Ocean’s tides in his *La cosmographie universelle* (1575), giving God the credit for separating the dry land from the primordial water and the creation of the earth and the seas.⁶⁵ Münster and Rauw in particular stated that God intervened into the world to stop water from flooding the earth against the natural order, which

63 “Aqua vero Terram, in medio reliquorum elementorum, atque totius Universi (veluti gravissimum) conglobatam, non circumdat orbiculariter: sed frustulatim, sinuatimve circumsparsa, suisque terminate limitibus, ipsius terrae partes discoopertas, ad viventium salute (Deo ita volente) relinquit”; Finé, *De mundi sphaera sive cosmographia*, sig. Aiv.

64 “Dei & Naturae summa providentia in mundi structura”; Mizauld, *De mundi sphaera seu cosmographia*, sig. bvr.

65 Thevet, *La cosmographie universelle*, 1: sig. avv.

made these elements' relationship miraculous. Münster began the first book of his *Cosmographia* (1544) with a discussion of the relationship between the world's landmasses and its seas. He argued that God had removed the primordial water from the dry land so that people would have a comfortable, fertile living space. He then stated, "therefore, it should be noticed that the sea is not now in its natural and original part."⁶⁶ Rauw also argued something very similar toward the end of the century in his dedication letter as he described the utility of studying cosmography to Landgrave Louis IV of Hesse-Marburg (1537–1604). Arguing that the world contained traces of God, Rauw cited water's relationship to earth as proof arguing, "he gathered the water in particular places which is against its nature." He explained further that "it is as clear as day that the water in the high sea stands much higher than the dry land where people and animals live," explaining that without God's intervention, the whole earth could be flooded with water.⁶⁷ For Mizauld, Thevet, Münster, and Rauw, water failed to flood the earth not due to their natures alone as elements but rather at least in part if not fully to God's relationship to them and to the world as a whole.

Comparing sixteenth-century European cosmographical and geographical texts to those cosmographical and geographical passages in eleventh- through fifteenth-century historical and natural philosophical works shows that the manner in which Europeans conceived of the layout of the world's landmasses and bodies of water, the current water-earth relationship, and that relationship's ontological status changed significantly in the sixteenth century. Unlike their predecessors, sixteenth-century authors of cosmographical and geographical texts argued for the existence of land outside the ecumene as well as the Antipodes, and that there was more earth in the world than Europeans had previously thought. As they did so, they began to redefine the water-earth spatial relationship going so far as to claim that the two elements composed a single globe or sphere and to spend more time classifying whether the contemporary relationship between the two elements was natural or miraculous than their medieval predecessors. Much as we saw in Chapters 2 and 3, these

66 "Darub dan woll zumerken daß das mer jetzt undt in syner natürliche und angeborne statt zum theil nit ist"; Münster, *Cosmographia* (1544), sig. Air.

67 "Da wir nun ferner auch den Globum Terrestrem, die Kugel des Erdbodens ansehen so läst sich der himmlische Werkmeister daselbsten abermals gewaltig spüren da hat er das Wasser an sonderliche Oerter versamlet da es wider seine Natur als zwischen seinen gesetzten Mahlsteinen als wanns mit Wällen und Mauren umgeben mere bleiben muß da doch ganz klar am Tage ist daß das Wasser im hohen Meer viel höher stehet als das Trocken da Menschen und Their wohnen"; Rauw, *Cosmographia*, sig.):(iiii.

differences strongly suggest that sixteenth-century Europeans had come to rethink water vis-à-vis the earth in a manner previous Europeans had not done. Though there is abundant evidence of this reconsideration of water's ontological and spatial relationship to earth in the textual aspects of these sixteenth-century cosmographical and geographical works, the world maps that accompanied these texts also suggest that Europeans continued to grapple with the dry land's location vis-à-vis water and the ontological status of the current water-earth relationship longer than the seemingly rapid acceptance of a combined water-earth surface might lead us to believe.

Depicting Water in the Sixteenth Century

Many of the sixteenth-century cosmographical and geographical texts explored above included world maps along with textual descriptions of the earth. Though building on earlier precedents in European mapmaking, these sixteenth-century world maps often drew on geometric projections derived from Ptolemy's *Geography* until the end of the century when Gerard Mercator's projection became increasingly more common.⁶⁸ From the late 1530s, many of these maps also incorporated sea creatures, too. These maps and their accompanying sea creatures shed further light on the conceptions of the layout between the world's landmasses and its bodies of water found in these sixteenth-century European cosmographical and geographical texts. Their authors' continued location of large amounts of water in the Southern Hemisphere as well as sea creatures in precisely those bodies of water with which European contemporaries had the least experience shows that these authors continued to reconsider the spatial relationship between earth and water even though the textual elements of their works seem to suggest a rapid acceptance of a combined water-earth surface – a reconsideration we have also observed in sixteenth-century exegetical and natural philosophical texts.

Though these sixteenth-century world maps were different from their medieval predecessors in many ways, scholars have noted a great deal of continuity between medieval and Renaissance mapmaking, and an overview of these predecessors will therefore help put the sixteenth-century world maps and their depictions of the world's landmasses and bodies of

68 John Synder, "Map Projections in the Renaissance," in Woodward, ed., *Cartography in the European Renaissance*, 365–81.

water analyzed below in context.⁶⁹ The modern scholar, David Woodward, described these medieval maps thus:

In the millennium that links the ancient and the modern world, from about the fifth to the fifteenth century after Christ, there developed a genre of world maps or map-paintings originating in the classical tradition but adopted by the Christian church. The primary purpose of these *mappaemundi*, as they are called, was to instruct the faithful about the significant events in Christian history rather than to record their precise locations. They rarely had a graticule or expressed scale, and they were often schematic in character and geometric – usually circular or oval – in shape.⁷⁰

For Woodward, these *mappaemundi* did draw on ancient precedents, but they functioned within a specifically Christian culture to help instruct Europeans about Christian history and were therefore not meant to be representations of the earth's surface or a part of it on a plane figure.⁷¹ As these medieval maps did so, they tended to circulate within manuscript books, as “the making of world maps was not an identifiably separate activity in the medieval period,” and they did not necessarily include a graphic depiction of the world, as the word, *mappaemundi*, was also used to refer to verbal or written descriptions of the world.⁷² More recent scholars such as Naomi Reed Kline have argued these maps also functioned as memory aids with most of them being shaped in a circle much like medieval *rotae* – flat, circular wheels that were meant to make the explanation of the world's processes easier to conceptualize and remember.⁷³

Produced in this context, two types of *mappaemundi* in particular were especially common in the medieval period – the tripartite or T-O type and the quadripartite or zonal type, both of which reflect ancient conceptions

69 David Woodward, “Cartography in the Renaissance: Continuity and Change,” in Woodward, ed., *Cartography in the European Renaissance*, 3–24.

70 David Woodward, “Medieval *Mappaemundi*,” in Harley and Woodward, eds., *Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*, 286–370, at 286.

71 For an older definition and assessment of maps that evaluated them for how accurately they represented the earth's surface on a plane figure, see Bagrow and Skelton, *History of Cartography*. For a discussion of how time and space were linked in medieval maps, see Edson, *Mapping Time and Space*.

72 Woodward, “Medieval *Mappaemundi*,” in Harley and Woodward, eds., *Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*, 286–87.

73 Kline, *Maps of Medieval Thought*, 2–48.

of the spatial relationship between the world's landmasses and bodies of water.⁷⁴ Accompanying copies of Isidore of Seville's *Etymologiae*, the T-O type was particularly common with over 660 examples of this type of map surviving from the medieval period (Fig. 1).⁷⁵ T-O maps reflect the ancient Greek notions stemming back to Homer and Hesiod of a the three continents of the ecumene – Europe, Asia, and Africa – surrounded by the circumambient Ocean that breaks into the landmasses to form three bodies of water, the Don and Nile Rivers and the Mediterranean Sea, which defined the continents' boundaries. Zonal maps accompanied copies of Macrobius's *Commentary on the Dream of Scipio* and were also rather common with over 150 examples of this type of map surviving from the medieval period.⁷⁶ These zonal maps drew on the notions of Crates of Mallus and Parmenides to show the five climate zones of the world along with the landmasses lying in each one of the climate zones. These maps tended to depict the three continents of the ecumene in the northern temperate zone and land located in the Southern Hemisphere in the southern temperate zone, separated from the ecumene by a large body of water. A late example of such a map appeared in a 1515 printed edition of Macrobius's text (Fig. 2). We see here the water marked as the "hollow of the Ocean" (*alueus oceani*) separating the three continents of the ecumene from a southern hemispheric landmass in the southern temperate zone, labeled, "the Antipodes, which are unknown to us."

Whereas these two more popular types of medieval maps reflected the ancient conceptions of a circumambient Ocean and Crates of Mallus's notion of landmasses in the ecumene and in the southern temperate zone situated across a large body of water, Klaus A. Vogel has found that some world maps and globes produced toward the end of the fifteenth century reflected the notion of a Southern Hemisphere filled entirely with water due to the eccentric-sphere model. Vogel explored the Fra Mauro map (c.1450) produced and located today in Venice, the Catalan world map today in the Biblioteca Estense in Modena (c.1425–30), and Andreas Walsperger's world map (1448) produced in Constance and held today in the Vatican Library Palatina. Vogel argues that despite the influence of Ptolemy's *Geography* as well as the discoveries of previously unknown landmasses off the coast and

74 I base my classifications of these maps on Woodward's. See Woodward, "Medieval *Map-paemundi*," in Harley and Woodward, eds., *Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*, 297.

75 *Ibid.*, 301.

76 *Ibid.*, 300.



Fig. 1: Diagrammatic T-O map in Isidore of Seville's *Etymologies* (*Etymologiae*, last quarter of eleventh century), British Library Royal 6 C I, fol. 108v. © British Library Board/Robana/Art Resource, New York.

down the west coast of Africa, the creators of these world maps argued for eccentric elemental spheres in the text on their maps, indicating explicitly that the land in the Northern Hemisphere stuck out above the water in the Southern Hemisphere. He even concluded his analysis of these maps by stressing that they show that the notion of eccentric elemental spheres and a resulting Southern Hemisphere submerged under water were not abstract, ivory-tower theories confined only to European scholars but rather were seen as realistic representations of the spatial relationship between earth and water in the world.⁷⁷

Largely due to the influence of Ptolemy's works, those people responsible for making the maps in sixteenth-century cosmographical and geographical texts did focus more on using mathematics to project the earth's surface on

⁷⁷ Vogel, "Sphaera terrae," 307–20.

mi circuli breuitate cōtrahit. Deductio aut laterum longitudine tropici ab utraq; p
 distendit. Deniq; ueteres oēm habitabiē nrām extētā clamidi similem esse dixerun
 itē qā oīs terra i qua & oceanus est ad quēuis cālestem circulum quasi cētron pūc
 obtinet locū: necessārio de oceano adiecit: Qui tñ rāto noīe q̄ sit paruus uidēs. Nar
 licet apud nos athlanticū mare licet magnū uocēt; de cālo tñ dispicientibus non pō
 magnum uideri: cum ad cāelum terra signū sit & punctū: qd̄ diuidi nō possit in pte
 A deo at̄ tērtā breuitas tam diligenter asseritur: ut̄ parui pendendum ambitum fam



Fig. 2: Zonal map in Macrobius's *Commentary on the Dream of Scipio* (*De somno Scipionis*, Paris: Giovanni Rivio, 1515). Courtesy of Beinecke Rare Book and Manuscript Library, Yale University.

a plane figure than their medieval predecessors.⁷⁸ As the modern scholar, Jerry Brotton, has explained, “Unlike the medieval *mappae-mundi*, what was significantly different about the emergence of Ptolemy’s representation of the known world was its conceptualization in terms of geometrical rather

78 Gautier Dalché, “The Reception of Ptolemy’s Geography (from the Fourteenth to Beginning of the Sixteenth Century),” in Woodward, ed., *Cartography in the European Renaissance*, 285–364.

than symbolic principles.”⁷⁹ Focusing on these geometrical principles, sixteenth-century mapmakers including those making the world maps incorporated into cosmographical and geographical texts “emplotted [the content of their maps] across a predetermined geometrical grid of latitude and longitude whose guiding force was the principles of abstract geometry rather than those of Christian symbolism, which had defined the contours of the T-O map.”⁸⁰ We find evidence for Brotton’s claims in the world map accompanying the 1482 Ulm edition of Ptolemy’s *Geography* (Fig. 3). This edition contains an early printed world map based primarily on the coordinates found in Ptolemy’s *Geography* in which we see the ecumene projected across space treated as an isotropic, uniform surface. We also observe here a graphic illustration of Ptolemy’s denial of the circumambient Ocean’s existence, as a land bridge connects the continents of Africa and Asia, marked as “unknown land according to Ptolemy.” Despite developing different guiding principles for their maps drawn especially from Ptolemy’s work as seen here, these sixteenth-century mapmakers continued to produce maps showing a great deal of water in the Southern Hemisphere into the 1560s, suggesting that they did not give up the late medieval notion of eccentric elemental spheres as quickly as their advocacy of a combined water-earth surface might suggest and showing yet again that the spatial relationship between water and earth remained in question especially in the sixteenth century.

The world map in the 1513 Strasbourg edition of Ptolemy’s *Geography* (Fig. 4), the world map in Münster’s 1544 *Cosmographia* (Fig. 5), and Girolamo Ruscelli’s (1518–1566) world map in the 1561 Venetian Italian vernacular edition of Ptolemy’s *Geography* (Fig. 6) circulated widely in the sixteenth century and reveal the large amount of water placed in the Southern Hemisphere on many such maps. Printed in Strasbourg, the world map that appeared in the 1513 edition of Ptolemy’s *Geography* was associated with the work of the cosmographers of St.-Dié such as Martin Waldseemüller and Matthais Ringmann. There were four subsequent editions of Ptolemy’s *Geography* produced in Strasbourg that were based on this edition in 1520, 1522, and 1525, and this edition also formed the basis of two others – one printed in Lyon in 1535 and the other printed in Vienne in 1541.⁸¹ This world map incorporates the continents of Africa, Asia, and what is labeled on some versions of the map as “America” and plots them with rhumb lines

79 Brotton, *Trading Territories*, 32.

80 Ibid.

81 See app. 9.1 in Dalché, “Reception of Ptolemy’s *Geography*,” in Woodward, ed., *Cartography in the European Renaissance*, 361–64.



Fig. 3: Untitled world map in the 1482 Ulm edition of Ptolemy's *Geography* (*Cosmographia*, edited by Nicolaus Germanus, Ulm: Lienhart Holle, 1482). Courtesy of the Newberry Library.

stemming back to the portolan tradition of the medieval period.⁸² Though the landmasses extend to 90 degrees north of the equator, the land only extends just 40 degrees south of the equator with the remaining 40 degrees south of the equator filled entirely with water.

The world map in Sebastian Münster's 1544 *Cosmographia* also shows a similar amount of water located especially in the Southern Hemisphere. This work proved extremely popular with four German editions and one Latin edition produced in Münster's lifetime – five of the total thirty-five editions of the text produced in less than a hundred years.⁸³ The work shows a wider variety of landmasses than that of the Strasbourg Ptolemy, including the three continents of the ecumene, "America seu insula Brasiliis," "Terra Florida," "Terra nova sive de Bacalhos," and "Temistitan," and another landmass in the Southern Hemisphere appearing without a label. In this map, though the land extends above 80 degrees north of the equator, the identified land extends only to 50 degrees south of the equator with the

82 Tony Campbell, "Portolan Charts from the Late Thirteenth Century to 1500," in Harley and Woodward, eds., *Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*, 371–463.

83 Karrow, *Mapmakers of the Sixteenth Century and their Maps*, 425–34, and McLean, *Cosmographia of Sebastian Münster*, 173–88.

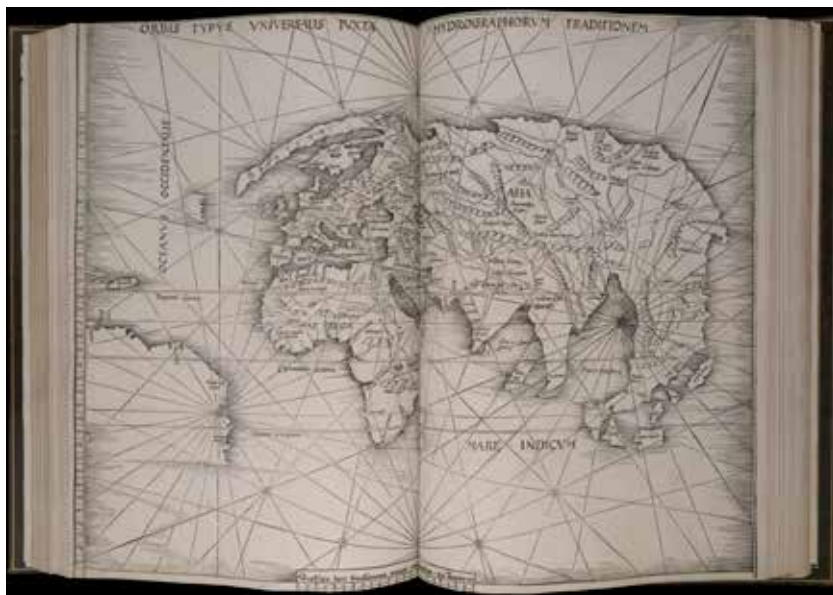


Fig. 4: The world map in the 1513 Strasbourg edition of Ptolemy's *Geography* ("Orbis typus universalis iuxta hydrographorum traditionem," in *Claudii Ptolemei viri Alexandrini mathematicae discipline philosophi doctissimi Geographiae opus*, edited by Martin Waldseemüller, Matthias Ringmann, Jacob Aezler, and Georg Übelin, Strasbourg: Johann Schott, 1513). Courtesy of the Newberry Library.

unidentified landmass south of "America seu insula Brasiliï" in the lower left-hand corner of the map. With the exception of this landmass, the water then extends for a further 30 degrees south throughout Münster's map to be broken only by the two sea creatures located in the Southern Ocean (*Oceanus Australis*).

This placement of large amounts of water in the Southern Hemisphere did not end with the 1513 edition of Ptolemy's *Geography* or Münster's *Cosmographia* of 1544 but continued in Ruscelli's world map of the early 1560s. According to the twentieth-century scholar, Rodney W. Shirley, Ruscelli adapted Giacomo Gastaldi's (1500–1566) projection from his contemporary world map for this world map. Shirley notes that Ruscelli's work was reprinted in subsequent editions of Ptolemy's text in 1562, 1564 (twice), and 1574 and influenced the world map in Giovanni Lorenzo d'Anania's (1545–1609) *L'Universale fabrica del mondo* (The universal fabric of the world; 1573). He also states that the plates were later acquired and used as the basis of two more editions of Ptolemy's *Geography* in the late 1590s.⁸⁴ The work includes

84 Shirley, *Mapping of the World*, 126–27.



Fig. 5: The world map in Sebastian Münster's *Cosmography* ("Ptolemaisch general tafel begreifend der halben vndern welt beschreibung" in *Cosmographia*, Basel, Henricus Petri, 1544). Courtesy of ETH-Bibliothek Zürich, persistent link, <https://doi.org/10.3931/e-rara-8833>.

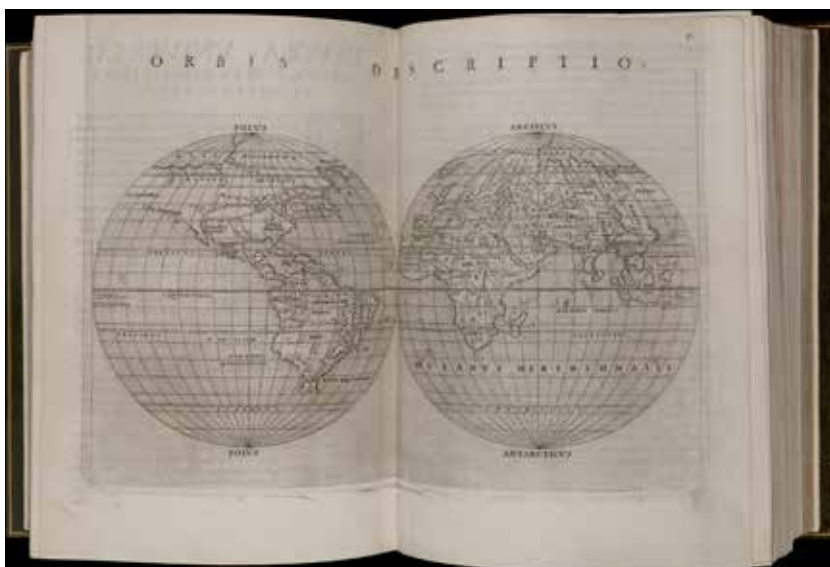


Fig. 6: The world map in the 1561 Viennese Italian vernacular edition of Ptolemy's *Geography* ("Orbis descriptio," in Girolamo Ruscelli, *La geografia di Claudio Tolomeo Alessandrino*, Venice: Vincenzo Valgrisi). Courtesy of the Newberry Library.

double-hemispherical maps, both of which show a great deal of water in the Southern Hemisphere in comparison to the landmasses that appear in the Northern Hemisphere. In both maps, land extends all the way to the northern Arctic pole, while the map on the right containing the landmasses of Africa, Asia, and Europe shows land extending only about 35 degrees south of the equator and the map on the left depicting landmasses called “America,” “Terra Florida,” and “Incognita,” extending 60 degrees south of the equator with the remaining southern portion of both maps filled with water.

Viewing Ruscelli’s map from 1561 in relationship to Münster’s of 1544 and to that contained in the 1513 Strasbourg edition of Ptolemy’s *Geography* shows that into the 1560s, mapmakers still placed a large amount of water in the Southern Hemisphere much like their medieval predecessors in the fifteenth century whose work Vogel has studied, suggesting their continued grappling with the spatial relationship between earth and water. After the 1560s, placing more land in the Southern Hemisphere became much more common. The world map in Abraham Ortelius’s *Theatrum orbis terrarum* of 1570 provides a good example (Fig. 7). Much like Münster’s *Cosmographia*, this work was also extremely popular with twenty-four editions of it appearing in Ortelius’s lifetime and another ten after his death.⁸⁵ Unlike Münster, however, Ortelius filled most of his Southern Hemisphere with a landmass marked, “southern land not yet known” (*Terra australis nondum cognita*). The world map from Rumold and Gerard Mercator’s *Atlas sive cosmographicae meditationes de fabrica mundi et fabricati figura* (1595) also shows a similar landmass in the Southern Hemisphere of both the Western and Eastern Hemispheres, labeled more simply, “Southern Land” (*Terra Australis*) (Fig. 8). According to Shirley, the map is based on Gerard’s world map of 1569, which Rumold condensed into this double hemispherical form for the first time in 1587. The 1587 version of Rumold’s map was then reprinted in the *Atlas* in 1595.⁸⁶ This map would have a long life due to the influence of the *Atlas*. It appeared in a similar format in 1602. The copper plates were then sold to Jodocus Hondius (1563–1612) of Amsterdam in 1604, and he and his sons published twenty-nine further editions of the *Atlas* between 1609 and 1641.⁸⁷

Despite adding as yet unknown land into the Southern Hemisphere in their maps unlike many made prior to the early 1560s, the locations of the sea creatures that appear on the maps of Ortelius, the Mercators, and even Münster provide yet further evidence that sixteenth-century authors of

85 Karrow, *Mapmakers of the Sixteenth Century and their Maps*, 9.

86 Shirley, *Mapping of the World*, 179.

87 Karrow, *Mapmakers of the Sixteenth Century and their Maps*, 405.



Fig. 7: The world map in Abraham Ortelius's *Theater of the World* (*Theatrum orbis terrarum*, Antwerp: Giles Coppens de Diest, 1570). (A) *Typus orbis terrarum* 1, photo: Album/Art Resource, New York. (B) *Typus orbis terrarum* 2, courtesy of Universitätsbibliothek Basel, persistent link, <https://doi.org/10.3931/e-rara-12844>.



Fig. 8: The world map from Rumold and Gerard Mercator's *Atlas* ("Orbis terrae compendiosa descriptio," in *Atlas sive cosmographicae meditationes de fabrica mundi et fabricati figura*, Duisberg, 1595). Courtesy of the Bibliothèque nationale de France.

cosmographical and geographical texts continued to reconsider the spatial relationship between water and earth long after they had started to argue for a combined water-earth surface, as these sea creatures were placed precisely in the waterways with which contemporary Europeans had the least experience. Sea creatures were not commonly found on medieval *mappaemundi*, but they became increasingly more common on sixteenth-century maps especially after the appearance of Olaus Magnus (1490–1557), the eventual titular archbishop of Uppsala's *Carta marina* (Marine map) in 1539, which depicted a large number of sea creatures swimming in the waters surrounding Scandinavia or “the Northern Lands,” as he called them. The modern scholar, Chet Van Duzer, has argued that sea creatures could play a wide variety of roles on sixteenth-century maps. In an increasingly competitive market, sea creatures could help sell maps. They could also provide graphic illustrations of literary texts including sea monsters, indicate possible dangers to sailors and travelers, provide data points for the geography of the marvelous, enliven the image, display an artist's talents, draw attention to the vitality of the various waterways, and illustrate the variety of God's creation. Van Duzer has stressed that what roles sea creatures played on maps and in what proportions varied based on the cartographers and artists involved in their composition.⁸⁸

Though they did not appear frequently on maps until the late 1530s, it had become a common place by the sixteenth century to locate sea creatures along with other beings and animals deemed to be monsters on the margins of the known world, especially in climates Europeans viewed to be extreme.⁸⁹ By the start of the century many authors and artists associated sea creatures and monsters specifically with India, the Indian Ocean, and Africa – places Europeans located close to the torrid zone.⁹⁰ The rare placement of sea creatures on maps early in the century mirror this textual common place, as we see in Martin Waldseemüller's *Universalis cosmographia*, the map that Ringmann's *Cosmographiae introductio* accompanied in 1507 (Fig. 9). Though not containing any graphic depictions of sea creatures, Waldseemüller's map contains six text boxes that describe sea creatures specifically in the Indian Ocean (Fig. 10). Though Waldseemüller was vague about the identity of some of these sea creatures, only stating that “here will be seen a horrible sea monster,” he also located different types of fish, whales, sea

88 Van Duzer, *Sea Monsters on Medieval and Renaissance Maps*, 8–13.

89 See the discussion in Cohen, “Monster Culture (Seven Theses)”; Van Duzer, “*Hic sunt dracones*,” 390–91; and Daston and Park, *Wonders and the Order of Nature 1150–1750*, 173–214.

90 Wittkower, “Marvels of the East,” and Le Goff, “Medieval West and the Indian Ocean.”

dragons, and shellfish, who cry red tears out of which purple dye is made, specifically in the Indian Ocean.

Münster, Ortelius, and the Mercators created their maps after the inclusion of sea creatures on maps became more common with the printing of Olaus's *Carta marina*. What stands out about their sea creatures in comparison to Waldseemüller's sea creature text boxes are the locations in which they are found. On Münster's 1544 map (see Fig. 5), a large fish and porpoise or dolphin are located in the water that fills the Southern Hemisphere in what he has labeled, the "Southern Ocean." Ortelius included three sea creatures on his 1570 map (see Fig. 7), a flying fish in the south Atlantic Ocean, a whale in the south Indian Ocean that breaks into the southern "landmass not yet known," and a porpoise gliding toward a ship in the northern Pacific Ocean. The Mercators' 1595 map contained two of the same sea creatures located in similar places as those on Ortelius's map with one breaking into the Southern Land in an extension of the Indian Ocean and another in the northern Pacific Ocean (see Fig. 8). Rather than place their sea creatures in the relatively familiar waters such as the Mediterranean Sea or the northern Atlantic Ocean or surrounding the landmasses in the Indian Ocean as had been done for over a millennium, Münster, Ortelius, the Mercators and the artists with whom they likely worked placed their sea creatures precisely in the southern portion of the Atlantic and Indian Oceans or the Pacific Ocean – waterways which were just becoming known to Europeans in the course of the sixteenth century.

For what specific purposes these cartographers or the artists responsible for them incorporated these sea creatures would require more research beyond the scope of the present study. What is interesting is that whether they intended to charm people into purchasing their books, take up extra space, indicate dangers and wonders, show the vitality of water and God's creation, and/or display their own artistic talents, they chose to do so specifically in those waterways with which Europeans had the least experience and knowledge and therefore the least amount of information to map. These sea creatures' placement along with the water contained in the Southern Hemisphere on these maps for much of the century strongly suggests that the spatial relationship between water and earth remained in question for Europeans late into the sixteenth century. These maps suggest that water's location vis-à-vis the earth was still unclear for authors of cosmographical and geographical texts even if their endorsing of a combined water-earth sphere in their texts made it seem as though their spatial relationship had been clarified – a questioning not found to such an extent in earlier periods of European history.

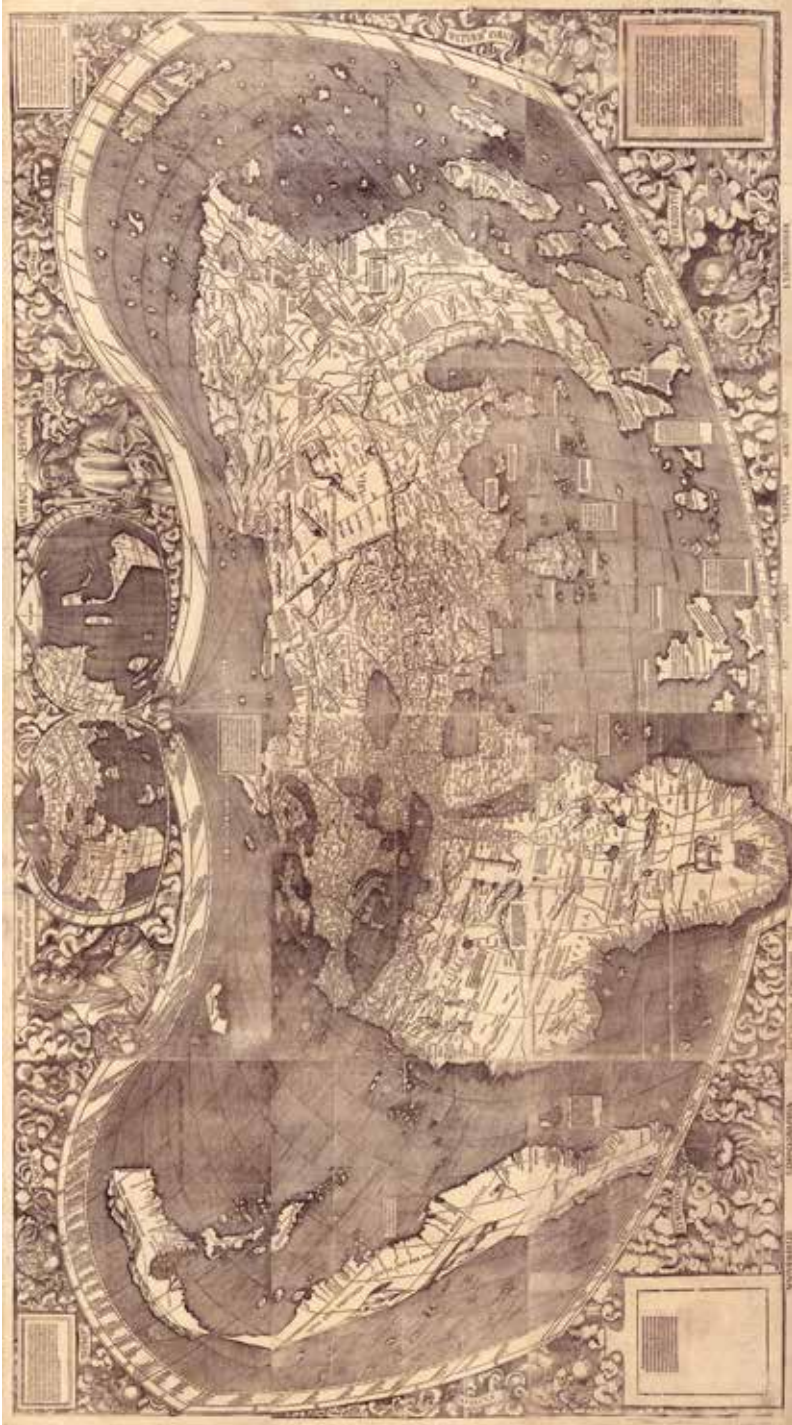


Fig. 9: World map in Martin Waldseemüller's *Universal Cosmography of 1507 (Universalis cosmographia secundum Ptolemaei traditionem et Americi Vesputii aliorumque Illustrationes, St.-Dié)*. Courtesy of the Library of Congress, Geography and Map Division.

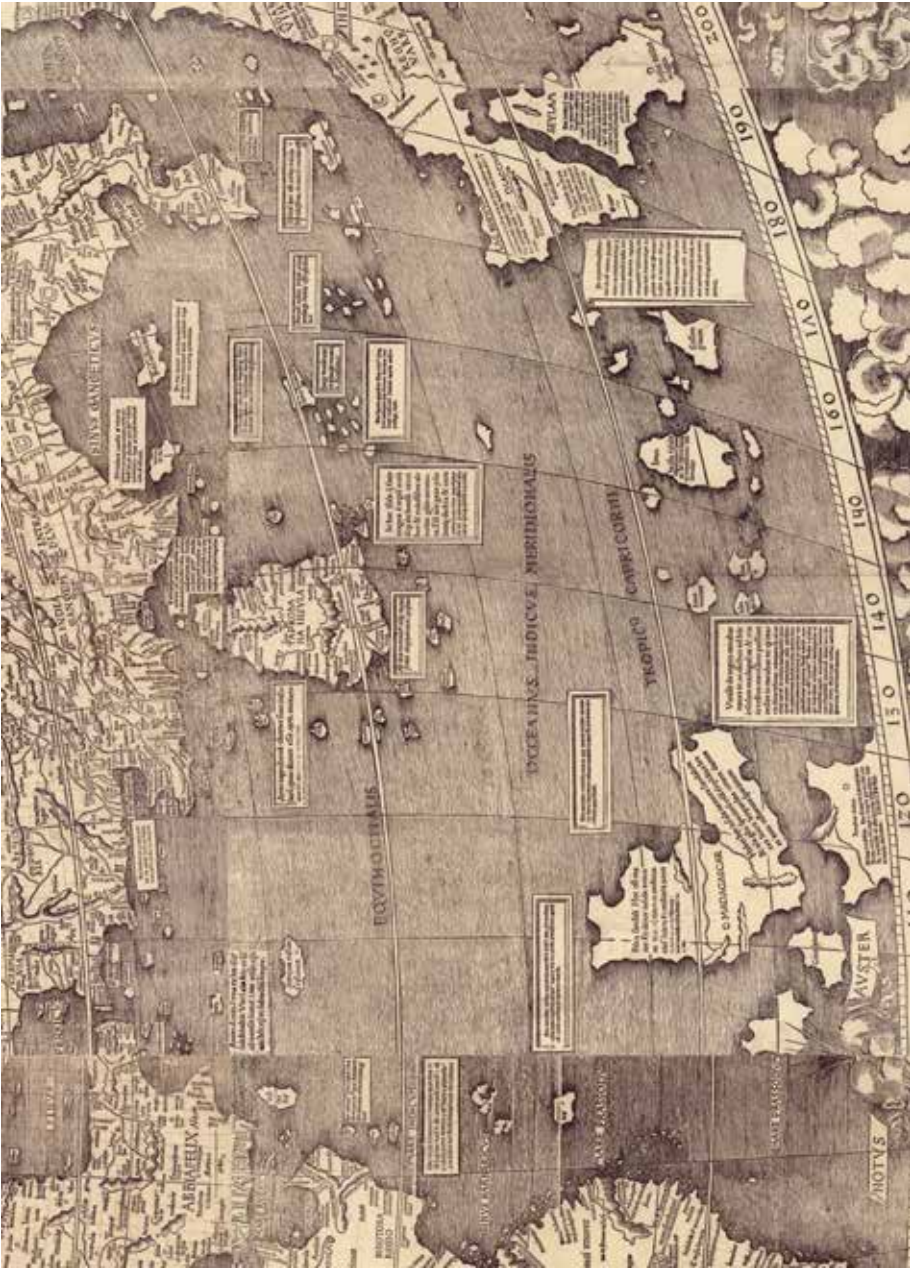


Fig. 10: Detail of the world map in Martin Waldseemüller's *Universal Cosmography* of 1507 (*Universalis cosmographia secundum Ptolemaei traditionem et Americi Vespucii aliorumque lustrationes*, St. Die). Courtesy of the Library of Congress, Geography and Map Division.

Conclusion to Part I

When writing about water in exegetical, natural philosophical, cosmographical, and geographical texts from the patristic period through the sixteenth century, Europeans drew on many different textual traditions to understand and describe its current ontological and spatial relationships to the earth. The Christian scriptures, especially in Genesis 1:9–10, stated that primordial water had entirely covered the earth until the third day of creation when God had ordered it to gather together and the dry land to appear. Aristotelian conceptions of the four elements, their shape, relative weights, and positions also strongly suggested that water should inundate the dry land, even as they were frequently used to deny clear boundaries between water and earth. Despite turning to these foundational texts along with the others explored in Chapter 1 for explanations of the world's past, present, and future phenomena, patristic through early modern Europeans inferred, based on their experience, that something currently kept the water back from the land allowing them, along with plants and animals, to have a dry, safe place in which to live.

Why had Europeans been spared the experience of living like fish, to adapt Lilio's mocking description of the Antipodes? The answer to this question varied depending on when an author composed his text and to some degree also on what kind of text the author was writing. In general, authors writing in the patristic and medieval periods tended to provide natural explanations for the dry land's current existence and the arrangement of the world's landmasses and waterways, pointing to some aspect of the natural order to explain this existence and arrangement. During the sixteenth century, authors of all these types of texts devoted more attention to the relationship between water and earth than their medieval predecessors and expanded the range of ontological classifications of that relationship beyond what these medieval predecessors had done. The expansion of ontological classifications for the contemporary water-earth relationship was especially marked in sixteenth-century exegetical texts, as we saw in Chapter 2. Whereas most patristic and medieval exegetes had argued that the relationship between water and earth was natural, having been established by God through the secondary causes he had fashioned throughout the creation process, sixteenth-century exegetes classified this relationship variously as natural, preternatural, or supernatural. Though we do not find as wide a variance in ontological classifications of this relationship in sixteenth-century natural philosophical, cosmographical, and geographical texts as we did in the period's exegetical ones, we have seen in Chapters 3 and 4 that their authors did more explicitly and thoroughly address both the spatial relationship between water and

earth as well as this relationship's current ontological status in comparison to their medieval predecessors, even if many sixteenth-century authors also ultimately opted to classify the contemporary water-earth relationship as natural, incorporating discussions of the nature of natural philosophy that denied clear separation between water and earth and descriptions and depictions of the spatial relationship between the world's landmasses and bodies of water that did not appear in earlier texts.

Even as these sixteenth-century authors wrote in three different though often overlapping genres, the amount of attention they placed on the dry land's existence and location vis-à-vis water's and their expansion of ontological classifications for the water-earth relationship compared with earlier works raises the question of what in sixteenth-century European culture led these authors to focus especially on the ontological and spatial relationships between water and earth. As we shall see in the next part of this study, the incorporation of newly rediscovered ancient and medieval texts into the traditional bookish methods of European scholarship, the interest in figuring out how God, the world, and human beings connected together in the wake of calls for religious changes, and particularly the information European overseas voyages provided about the location of the world's landmasses and waterways, prompted the authors explored in this section to reconsider water and earth's current relationships in their biblical commentaries as well as in their natural philosophical, geographical, and cosmographical texts.

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Part II

Why Water

5. Water in Newly Rediscovered Ancient and Medieval Texts

Abstract

This chapter explores how Ptolemy's *Geography* and medieval Jewish exegesis helped reshape sixteenth-century European views on water and the relationship between the world's landmasses and waterways. Whereas Ptolemy's *Geography* argued that there was more land and less water in the world than medieval Europeans typically thought, medieval Jewish scholars explained the dry land's existence through God's more direct intervention into the world than their medieval Christian contemporaries. It argues that the method through which sixteenth-century European scholars studied the world in which they lived meant that the books they read shaped the ways in which they conceptualized the arrangement of the world's landmasses and bodies of water, and the ontological status of that relationship.

Keywords: Ptolemy's *Geography*; Jewish exegesis; humanism; Nicholas of Lyra; *Biblia Rabbinica*; Christian Hebraism

Previously there were more troubles, since it was disputed whether the heaven had a spherical shape, as there were those who asserted that the earth's orb swims in the Ocean, just as a ball swims in water, thus: with its top sticking out to such an extent and with all the rest being covered by water; and in many other things they likewise have erred, who spread this art (*artem*) in writing. Now, since by many others, especially by Ptolemy, the thread is stretched out by whose lead anyone is easily able to free themselves from this labyrinth, the way is laid out through which you come quickly to the summit of this art without losses – a way that they ignore, to whom it is proper to ramble frequently in the explication of good authors.
– Erasmus of Rotterdam, dedication letter to the 1533 Basel edition of Ptolemy's *Geography*¹

¹ “Olim plus habebat negotii, quum ambigeretur an coelum esset sphaericae figurae, quum essent qui affirmarent orbem terrae sic innatare Oceano, quemadmodum pila innatat aquae,

In the dedication letter he wrote to a Greek edition of Ptolemy's *Geography* that the Froben press produced in Basel in 1533, Erasmus of Rotterdam credited Ptolemy's work especially with changing the way his contemporaries conceptualized the spatial relationship between water and earth. According to Erasmus, prior to the recovery of Ptolemy's *Geography* in the current period, some Europeans had assumed that the earth floated in water much like a ball with its dry part sticking out in the Northern Hemisphere and with water submerging its Southern Hemisphere. Viewing this notion of the water-earth relationship as erroneous, Erasmus credited Ptolemy for providing Europeans with a way out of such a labyrinth, and he also chastised those predecessors and contemporaries, who spread such teachings in writing through their rambling interpretations of authoritative texts.

Erasmus's description of his contemporaries' working methods and his expressed desire that Ptolemy's *Geography* should influence them reflect the tools through which most educated Europeans developed their understandings of the universe. They also reveal the first explanation for why particularly sixteenth-century Europeans were more focused on the current water-earth spatial and ontological relationships than their predecessors, leading them to reconceptualize and recategorize these relationships as we saw in the first part of this book. Sixteenth-century Europeans with formal education, much like their ancient and medieval predecessors, relied on the reading and interpretation of authoritative texts to learn about the universe. As Grafton et al. have explained, this methodology was built on the assumption that a basically complete and accurate body of knowledge about the universe already existed that people could access through texts, especially through those works composed in the ancient period and through subsequent commentaries on these works.² When some Europeans started to look for and view different texts as authoritative as they did especially after 1350 with the growing influence of the *studia humanitatis*, then the potential was there to change the ways in which Europeans conceived of the universe including the ontological and spatial relationships between water and earth. Viewed as "the most powerful source of knowledge and

prominente tantum vertice, caeteris aqua tectis; atque in aliis item multis errarent, qui scriptis artem prodiderunt. Nunc quum ab aliis compluribus, tum à Ptolemaeo praecipue, porrectum est filum, cuius ductu quivis facile possit sese ex his labyrinthis explicare; strata est via qua sine dispendiis celeriter ad huius artis fastigium pervenias; quam qui negligunt, eos oportet frequenter in evolvendis bonis autoribus hallucinari"; Erasmus of Rotterdam, dedication letter to Theobald Fettich, in Ptolemy, *Klaudiu Ptolemaiu Alexandreos*, fol 3r.

2 Grafton et al., *New Worlds, Ancient Texts*, 13.

guides to behavior in the world,” books had the potential to act “like bombs, armed, powerful, and ready at any moment to explode.”³

Unlike most of their predecessors, sixteenth-century Europeans could encounter the ideas that there was more dry land in the world than water and that God was directly responsible for this arrangement between water and earth through Latin translations of Ptolemy’s *Geography* and Jewish exegeses of the Hebrew Bible – a text and an exegetical tradition that became more widely known and incorporated into European scholarship only toward the end of the fifteenth century. As we saw in Chapter 1, Ptolemy had argued that there was more land in the world than water in his *Geography* and provided directions on how to map landmasses and waterways. This text was translated into Latin for the first time in the early fifteenth century, thereby making it available to a scholarly European audience, but as the modern scholar, Patrick Gautier Dalché, has argued, the geographical and cartographic aspects of this work were not what struck those early readers who now read this work in Latin for the first time. He has shown that most of these early readers were actually interested in the ancient place names contained in Ptolemy’s lists of coordinates and that it was only toward the end of the fifteenth and beginning of the sixteenth centuries that more Europeans focused particularly on the geographic and cartographic aspects of Ptolemy’s work.⁴

Whereas Ptolemy’s *Geography* included the notion that there was more land and less water in the world than medieval Europeans typically thought, medieval Jewish scholars frequently explained the dry land’s existence by invoking God with some claiming that God had established a different natural order on the third day of creation to keep water from flooding the earth, as we saw in Chapter 2. These commentaries circulated more widely among sixteenth-century Christian scholars than their predecessors, and this Jewish exegesis influenced Christians to classify the contemporary relationship between water and earth as miraculous more frequently than they had in prior centuries. Though interest in the Hebrew text of the Hebrew Bible and Jewish exegesis was not unknown among Christians prior to the sixteenth century, this interest affected relatively few Christians prior to that period. A few twelfth-century scholars, especially the Victorines and their students, had turned to local Jewish scholars to learn about the Hebrew text of the Hebrew Bible and to try to establish a plain or literal meaning of that

3 Ibid., 9–10.

4 Gautier Dalché, “The Reception of Ptolemy’s *Geography* (from the Fourteenth to Beginning of the Sixteenth Century),” in Woodward, ed., *Cartography in the European Renaissance*, 285–364.

text.⁵ In his fourteenth-century *Postilla litteralis* (Literal commentary) on the biblical text, Nicholas of Lyra engaged directly with the Hebrew Bible as well as Jewish exegesis, especially the works of Rashi. The modern scholar, Deeana Copeland Klepper, has claimed that Nicholas's appropriation of Jewish exegesis coupled with his anti-Jewish polemic allowed him to make Jewish scholarship and literature palatable and useful for Christians while at the same time divorcing this scholarship from the increasingly suspect contemporary Jewish community, thereby turning his work into such an authority on the Hebrew Bible and post-biblical Jewish exegesis that other Christians likely avoided following his methodology because they thought there was no more work to do on the subject.⁶ As Stephen G. Burnett has shown, it was only in the sixteenth century that the study of Hebrew and rabbinic commentaries emerged as an area of academic study among Christians due largely to the development of what has come to be known as Protestant Christianity.⁷ Daniel Bomberg's (d. c.1549) printing of two editions of the *Biblia Rabbinica* complete with both the Hebrew Bible text and rabbinic commentaries on it at Venice in 1517 and 1525 provided the growing number of Christians interested in the Hebrew Bible and Jewish exegesis with access to these sources to study the Hebrew biblical text and to engage in polemics with other Christians.⁸ This increasing acquaintance with Jewish exegesis among Christians in the sixteenth century exposed more of them to the notion God played a more direct role in the current water-earth relationship than was commonly found in medieval Christian exegesis.

Though the increasing acquaintance with Jewish exegesis and the interest in the geographical and cartographical aspects of Ptolemy's *Geography* account partly for why sixteenth-century Europeans had different conceptions of the water and earth's spatial relationship and focused on the ontological status of that relationship more than their predecessors, we must be careful in drawing too direct a connection between the new availability of these works and their contents and the changing of European conceptions of the locations of water and earth and their relationship's ontological status. As Grafton et al. noted, newly discovered works did not just replace previously known, authoritative texts. Instead, these works added to the

5 Michael A. Singer, "Polemic and Exegesis: The Varieties of Twelfth-Century Hebraism," in Courdert and Shoulson, eds., *Hebraica Veritas?*, 21–32, at 23–28.

6 Klepper, *Insight of Unbelievers*.

7 Burnett, *Christian Hebraism in the Reformation Era*.

8 Stephen G. Burnett, "The Strange Career of the *Biblia Rabbinica* among Christian Hebraists, 1517–1620," in Bruce and McLean, eds., *Shaping the Bible in the Reformation*, 63–83.

broader scholarly conversation, and each, individual reader brought their own tools and methods to decide what to look for within this conversation, choosing the texts and their passages on which they would focus as well as figuring out how to interpret them.⁹ While keeping in mind this significant caution that reading new texts does not automatically mean their readers will have new ideas, we will nevertheless find that Ptolemy's *Geography* and Jewish exegesis did influence how some sixteenth-century Europeans conceptualized and categorized the ontological and spatial relationships between water and earth.

Water in Ptolemy's *Geography*

As we saw in the Chapter 1, Ptolemy's notion of the relative amounts of water and earth in the world clashed with those conceptions found in most other ancient works. Most ancient authors had argued that there was much more water than earth in the world, whether they held to Homer's notion of the Okeanos that encircled the ecumene or Crates of Mallus's conception of two large, impassable ocean bands that separated the ecumene from other landmasses in other parts of the world. As we saw in the first part of this book, these notions of the spatial relationship between the ecumene and its surrounding bodies of water circulated widely in the medieval period. In contrast, Ptolemy had claimed, "The known part of the world has been laid out as having the Ocean *in no wise* flowing around it, but rather [the Ocean] borders only the boundaries of Libye [Africa] and Europe that are drawn in the directions of [the winds] *Iapyx* and *Thraskias*, in agreement with the researches of the more ancient [writers],"¹⁰ thereby denying the existence of both a circumambient Ocean and large ocean bands and indicating that there was more land than water in the world. As the number of printed editions of Ptolemy's *Geography* in Latin, Greek, and various vernaculars multiplied from the late fifteenth century, more and more sixteenth-century Europeans were exposed to Ptolemy's notion that there was less water in the world than Europeans had typically thought.¹¹ The high regard in which sixteenth-century European scholars held Ptolemy's works helps

9 Grafton et al., *New Worlds, Ancient Texts*, 13–58.

10 Ptolemy, *Ptolemy's Geography*, 117. Emphasis added.

11 On printed editions of Ptolemy's *Geography*, see Stevens, *Ptolemy's Geography*, and Dalché, "Reception of Ptolemy's Geography," in Woodward, ed., *Cartography in the European Renaissance*, 361–64.

explain why Europeans particularly in this period reconceptualized the earth-water spatial relationship, as some began to articulate conceptions of the locations of the world's landmasses and bodies of water that resonated with Ptolemy's understanding of the relative amounts of water and earth in the world and his conception of how to map those landmasses and waterways onto a plane figure.

Though the existence of Ptolemy's *Geography* was known from the sixth century and though scholars, who appreciated his works on astronomy and astrology, eagerly anticipated its contents, those scholars whose language skills were restricted to Latin and European vernaculars only encountered this work directly from the early fifteenth century after Greek teachers coming from the Byzantine empire had brought the text with them to Florence and translated it there into Latin. The earliest translations of Ptolemy's *Geography* did not include any maps, but scholars working at the monastery of Santa Maria degli Angeli in Florence produced some maps at a later date based on the place coordinates contained in Ptolemy's text. These early Latin-language readers were not primarily interested in the cartographic aspects of the work, though, as both the lists of coordinates and even the maps seem to have been used as sources on ancient geography to allow these scholars to understand the works of other ancient authors better. The maps were also frequently produced and sold as luxury items and status symbols for the politically powerful and wealthy. Knowledge of the work and its maps did spread beyond the Italian Peninsula, especially through councils the Roman Catholic Curia held such as the Council of Constance (1414–18) and the Council of Florence (1430s). As the text and the maps based on it were disseminated, people living in other parts of the continent such as Pierre d'Ailly and Johannes Regiomontanus (1436–1476), a mathematician and astronomer, became familiar with the work so that there was a real interest in mathematical geography and the creation of maps based on Ptolemy's principles by the beginning of the sixteenth century – an interest that the frequent printing of Ptolemy's text from 1475 both reflected and cultivated.¹²

There were a few European scholars in the medieval period who did incorporate Ptolemy's teachings on the relative amounts of water and earth in the world, allowing it to shape their understandings of the location of water and dry land in the world, though these works were largely ignored in this period. It was only in the sixteenth century when Ptolemy's prestige

12 I am indebted to Dalché, "Reception of Ptolemy's Geography," in Woodward, ed., *Cartography in the European Renaissance*, for the information contained in this paragraph.

had become greater that Europeans looked on this teaching of Ptolemy and his medieval followers with more favor.¹³ Likely due to his comparatively extensive knowledge of Greek- and Arabic-language scholarship, Roger Bacon was the first medieval European scholar to appropriate Ptolemy's notion of the water-earth spatial relationship to explore which parts of the world were inhabitable, explaining, "Ptolemy, in truth, in his book, *On the Arrangement of the Sphere*, determined that nearly six parts of the earth are inhabitable because of water and that water covers all the rest of the remaining part."¹⁴ Bacon here built on Ptolemy to argue that six parts of the world were inhabitable because they were dry land and that water covered only one part of the world, indicating that there was much more earth than water than his contemporaries typically taught. D'Ailly followed this teaching in his early fifteenth-century *Imago mundi* incorporating this passage verbatim into his work without attribution.¹⁵ The influence of both Bacon's work and Ptolemy's notion of the water-earth relationship on d'Ailly can be found in his later text known as the *Compendium cosmographiae* (c.1410–15), which d'Ailly wrote in response to his discovery of Ptolemy's *Geography*. In this text, he once again argued that the land of the ecumene extended over more than 180 degrees from east to west, thereby diminishing the amount of water in the world and increasing the amount of land to be found there.¹⁶

Though Bacon and d'Ailly were early disseminators and readers of Ptolemy's *Geography* who focused their interpretations of his text partly on the water-earth spatial relationship, due to their interest in the question of the earth's inhabitability, Enea Silvio Bartolomeo Piccolomini (1405–1464), elected Pope Pius II in 1458, incorporated Ptolemy's teaching on the water-earth spatial relationship in his *Historia rerum ubique gestarum* (History of achievements everywhere; c.1460) in a manner more typical for Ptolemy's fifteenth-century readers. In Piccolomini's text, Ptolemy's ideas on the water-earth relationship appear in a list of those from ancient authors after Piccolomini had given his own interpretation of the position of the dry land vis-à-vis water. Though he incorporated Ptolemy's opinion on the arrangement between the world's landmasses and bodies of water, Piccolomini's

13 On the relative lack of interests in such theories in the medieval period, see Randles, "Classical Models of World Geography," 28–34.

14 "Ptolemaeus vero in libro de dispositione sphaerae vult quod fere sexta pars terrae est habitabilis propter aquam, et totum residuum est coopertum aqua"; Roger Bacon, *Opus Majus of Roger Bacon*, 1: 290.

15 Pierre d'Ailly, *Ymago Mundi*, 1: 206.

16 Dalché, "The Reception of Ptolemy's Geography," in Woodward, ed., *Cartography in the European Renaissance*, 299–301.

own understanding contradicted Ptolemy's on the subject, which shows both that some fifteenth-century authors did know about Ptolemy's notion of the arrangement of the world's landmasses and its bodies of water and also that his work was viewed as one authority among many. Piccolomini described the locations of water and earth thus: "nearly all agree that the form of the world (*mundus*) is round: and they think the same concerning the earth, which, positioned in the middle of the world due to its weight, drags each thing to itself with its larger part submerged in water."¹⁷ According to Piccolomini, he along with most philosophers held that water submerged the majority of the earth, and he went on to cite those opinions stemming from Homer and Crates of Mallus about the circumambient Ocean and the two impassable ocean bands as proof for this argument.¹⁸ When he turned to Ptolemy's opinion, he suggested that Ptolemy argued for more land in the world than was common, but Piccolomini also tried to reconcile Ptolemy's claims with his own to a certain degree. He stated, "Ptolemy encloses the ecumene (*habitationem nostram*) by unknown land in four parts of the globe, although he affirms that in many places they are bounded by the ocean. It is doubted whether one is able to sail around this island."¹⁹ According to Piccolomini, Ptolemy taught that unknown land rather than water enclosed the ecumene, indicating that Ptolemy held there was more earth in the world than most philosophers. However, Piccolomini was also careful to point out that Ptolemy, too, argued that the Ocean created the boundaries of this land and that Ptolemy did not think people could sail around it in order to reconcile it with his opinion and those of other ancient authorities about a world composed primarily of water.

Whereas Bacon, d'Ailly, and Piccolomini knew of Ptolemy's work and even discussed his teaching on the layout of the earth's landmasses and its bodies of water, sixteenth-century authors of cosmographical and geographical texts asserted that they held Ptolemy's works – both in astronomy and geography – in much reverence, and they also proposed an arrangement of the world's landmasses and bodies of water that resonated to some extent with Ptolemy's understanding of them, suggesting his influence on their conceptions of the water-earth spatial relationship. Whereas fifteenth-century

17 "Mundi formam omnes fere consentiunt rotundam esse: Idemque de terra sentiunt: quae in medio rerum constituta gravia quaeque ad se trahit: aquis maiori ex parte submersa"; Piccolomini, *Historia ubique gestarum*, sig. a2v.

18 *Ibid.*, sigs. a2v–a3r.

19 "Ptholomaeus habitationem nostrum a quatuor orbis partibus terra incognita claudit: quamvis plerisque in locis oceano terminari affirmet. Circum navigari an haec insula queat dubitum est"; *ibid.*, sig. a3r.

authors such as Piccolomini had incorporated Ptolemy's work as one among many ancient authorities, some sixteenth-century authors gave Ptolemy's work the pride of place in their discussions of cosmography and geography. As Dalché has argued, by the end of the fifteenth century, "in both manuscripts and in printed editions of non-Ptolemaic works, Ptolemy's world map served as an illustration of the *oikoumene* (ecumene) – thus indicating that this image was received as the norm."²⁰ We see evidence for the increasing influence of Ptolemy's view of the arrangement between the world's landmasses and bodies of water in the sixteenth century in cosmographical and geographical works produced throughout the century. The full title of Martin Waldseemüller's 1507 world map and the discussion of Ptolemy's work in Matthais Ringmann's *Cosmographiae introductio* that accompanied this map show the prestige of Ptolemy's work early in the century. Waldseemüller's map was entitled, "The Cosmography of the World according to the Ptolemaic Tradition and the Travels of Amerigo Vespucci and Others," thereby attributing this depiction of the world partly to Ptolemy.²¹ In describing the process of creating such a map, Ringmann credited Ptolemy with developing the method to do so and claimed that others such as Vespucci only added to what Ptolemy had done. He explained, "Before anyone is able to have an idea of cosmography, it is necessary to combine it with an idea of materials of the sphere," and he explained that he would draw heavily on Ptolemy's work especially to provide such information, "Since a description of the whole world was related first by Ptolemy and others and afterward it was amplified through others, recently, in truth, by Amerigo Vespucci."²² Sebastian Münster argued something similar about the significance of Ptolemy's work in his dedicatory epistle to the 1540 Basel edition of Ptolemy's *Geography*. Describing the utility of the study of cosmography, Münster claimed, "although there have been many, who have tried, nevertheless no one has achieved more perfect and more excellent knowledge of this inaccessible part of nature than Ptolemy."²³ Writing in

20 Dalché, "Reception of Ptolemy's Geography," in Woodward, ed., *Cartography in the European Renaissance*, 349.

21 "Universalis cosmographia secundum Ptholomaei traditionem et Americi Vespuccii aliorumque lustrationes." See Fig. 9.

22 "Antea quam aliquis Cosmographiae noticiam haberi possit necessum est ut sphaerae materialis cogruitionem habeat. Postquod universi orbis descriptionem primo a Ptolomaeo atque aliis traditam & deinde per alios amplificatam nuper vero ab Americo Vespuccio"; Ringmann, *Cosmographiae introductio*, sig. Aiiiiv.

23 "Et quanquam plurimi fuerint qui id conati sunt, nemo tamen perfectius excellentiusque hanc inaccessam naturae attigit partem quam Ptolemaus"; Sebastian Münster, dedication letter to Philippe von Gundelsheim, Prince-Bishop of Basel, in Ptolemy, *Geographia universalis*, sig. aazv.

1598, Francesco Barozzi also held that Ptolemy's work was crucial for the study of cosmography. He defined cosmography as, "the description of the whole sphere or machine of the world," and he credited Ptolemy in particular with providing such knowledge, "seeing that in it [cosmography] (as we said) there does not exist an entire, perfect text for us, unless the work of Ptolemy, which is called the *Almagest*."²⁴

The prestige these authors attributed to Ptolemy's work is also reflected in their developing conceptions of the arrangement between the earth's landmasses and bodies of water, which resonated in two ways with Ptolemy's notion of this arrangement. First, many sixteenth-century authors also argued that there was more land in the world than water just as Ptolemy had done and as was uncommon among medieval European scholars. As we saw in Chapter 4, both the French physician, Jean Fernel, and Nicolaus Copernicus had argued that there was more earth in the world than water in the 1530s and 1540s with Fernel offering both a mathematical and an experiential proof that there was more earth in the world than water and Copernicus just stating that this arrangement was the case.²⁵ Barozzi made a similar claim as Copernicus at the end of the century during his description of the four elements. After describing the qualities of the four elements, he argued, "The earth of which is situated as the center of the world in the middle of all [the elements], surrounded and nearly covered in many of its parts by water, with the greater of its remaining parts uncovered since there is not such quantity of water that it is able to cover the earth entirely."²⁶ Barozzi, much like Fernel and Copernicus, here reasoned that since water did not cover the entire earth, there must be more earth than water in the world.

The second way in which sixteenth-century Europeans' conceptions of the arrangement between the world's landmasses and its bodies of water resonated with Ptolemy's occurred when many began to argue from the 1520s that water and earth made up one surface and even one sphere in the world. As we saw in Chapter 4, Peter Apian was the first author to make such a claim in his 1524 *Cosmographicus liber*, and Fernel followed him with a similar claim. The notion of a combined water-earth sphere or globe had

24 "Cosmographiam ipsam, seu totius Mundanae Sphaerae, vel Machinae descriptionem. Quoniam in ea (uti diximus) non extat nobis integrum, perfectumque volumen, nisi Ptolemaei iam dictum Almagestum"; Barozzi, *Cosmographia in quatuor libros*, sig. b5v.

25 See the discussion above, pp. 000–00.

26 "Quorum terra est tanquam centrum mundi in medio omnium sita, circumdata & cooperta iuxta multas suas partes ab aqua, relicta maiori eius parte detecta, cum non sit aquae tanta quantitas, qua omnino ea cooperire possit"; Barozzi, *Cosmographia in quatuor libros*, sig. A2r.

appeared as early as 1543 in these cosmographical and geographical texts with the publication of Copernicus's *On the Revolutions of the Heavenly Spheres* (*De revolutionibus orbis coelestium*), and the same notion occurred explicitly in the works of Antoine Mizauld, Gemma Frisius, William Cunningham, Johannes Rauw, and Barozzi.²⁷ This conception of the world as a combined water-earth sphere or surface resonated with mapmaking practices in the period, which many modern scholars have attributed to Ptolemy's call to determine latitude and longitude of a location and then to plot it on a plane surface through a geometrical projection. As Woodward has noted, one of the things that set sixteenth-century mapmaking apart from its medieval predecessors was an abstract, geometric notion of space through which each location on a map was brought into the same measurement grid and treated in the same mathematical way – whether the location was part of a landmass or body of water. In contrast, medieval *mappaemundi* tended to enhance those landmasses that held particular cultural significance such as placing the city of Jerusalem at the center of maps after the Crusades or orienting the maps toward the east where the garden of Eden was thought to be located and tended to diminish the size of the circumambient Ocean, since few events of significance had taken place there. Woodward points out that what happened between the creation of *mappaemundi* and Renaissance maps “is routinely ascribed to the rediscovery of Ptolemy's manual of mapmaking,” though he cautions us not to see this shift as too much of a break, especially since Europeans lacked the methods and tools for careful measurement of a particular place's latitude and longitude for centuries.²⁸ Combining water and earth conceptually into one surface or sphere as many sixteenth-century authors of cosmographical and geographical texts did would have facilitated the mapping based on abstract, geometrical principles in which many of these same authors engaged. They could engage in this type of mapping because their contemporaries were able to measure (though inexactly, to be sure) the latitude and longitude of locations whether in the middle of a landmass or in the middle of an ocean and plot those locations of land and sea on the same map. Dalché has also argued that especially sixteenth-century Europeans were interested in doing so, and he speculated that the experience with the Atlantic Ocean in particular toward the end of the fifteenth century brought Ptolemy's mapmaking techniques more attention because the

27 See the discussion above, pp. 000–00.

28 David Woodward, “Cartography in the Renaissance: Continuity and Change,” in Woodward, ed., *Cartography in the European Renaissance*, 3–24, at 12–13.

long-standing practice of producing portolan charts would not have worked for the Atlantic Ocean due to its size.²⁹ Sixteenth-century European notions of a combined earth-water surface or sphere therefore not only resonated with but also partly enabled their use of mapping techniques stemming from Ptolemy's widely adopted methods.

Though the high prestige of Ptolemy's *Geography* did influence the ways in which sixteenth-century Europeans understood the arrangement of the world's landmasses and bodies of water as we have just seen, these works also suggest that Ptolemy's text was not the sole cause of their authors' interest in the water-earth spatial relationship or their recategorizations of that relationship. As appreciative as these authors were of Ptolemy's scholarship, many of them also expressed the notion that they and their contemporaries knew more about the world, its landmasses, and its waterways than Ptolemy had. Such a notion was included in the world map accompanying the 1503 edition of Gregor Reisch's *Margarita philosophica*, found in his seventh book on astronomy. The map was based on Ptolemy's coordinates and one of the projections in his *Geography*. Building on Ptolemy's work, it shows the ecumene and joins Asia and Africa with a land bridge, thereby making the Indian Ocean an enclosed sea. "Here there is not earth but sea, in which there are islands of large sizes, which were unknown to Ptolemy," is written on this land bridge, which highlights Ptolemy's ignorance of Africa, Asia, and the Indian Ocean, even while presenting his notion of the ecumene.³⁰ This attitude toward Ptolemy's work is also apparent in Waldseemüller's map and Ringmann's accompanying text that we explored above. For as much as both Waldseemüller and Ringmann credited Ptolemy with teaching people the basics of cosmography, they also argued that others had added to Ptolemy's foundation, especially their contemporary, Amerigo Vespucci. Sixteenth-century authors of cosmographical and geographical texts also critiqued Ptolemy's lack of knowledge of the Americas, which they pointed out their contemporaries had recently discovered. Apian included such a subtle critique as he began his description of America. He explained that America was today (*nunc*) known as the fourth part of the world and had been named after Amerigo Vespucci, who had discovered it, but that it

29 Dalché, "Reception of Ptolemy's Geography," in Woodward, ed., *Cartography in the European Renaissance*, 330–32. On these portolan charts, see Tony Campbell, "Portolan Charts from the Late Thirteenth Century to 1500," in Harley and Woodward, eds., *Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*, 371–463.

30 "Hinc non terra sed mare est, in qua magnarum magnitudinis insulae sed Ptolemeo fuerunt incognita"; Reisch, *Margarita philosophica*, between sigs. oviiv and oviir.

had been unknown to Ptolemy and the ancients.³¹ Johannes Schöner in his *Opusculum geographicum* (Little book of geography) also highlighted that his contemporaries knew about lands that Ptolemy had not, entitling his twentieth chapter, “the regions outside of Ptolemy,” and attributing their discovery to Marco Polo, Christopher Columbus (c.1451–1506), Amerigo Vespucci, and Ferdinand Magellan (c.1480–1521).³² Münster in particular contrasted Ptolemy’s knowledge of the world with his contemporaries’, arguing that his contemporaries knew far more than Ptolemy had ever known and that they could use their own knowledge to update Ptolemy’s work. As we saw above, Münster praised Ptolemy for advancing the furthest in the knowledge of cosmography, but he then went on to explain that Ptolemy had to rely on the descriptions of others for knowledge of lands to his east, south, and north because these lands were unknown to him. In contrast, Münster explained, “But yet, since today no corner of the earth has not been penetrated by people, one may easily fill up through new descriptions of regions everything which the Ptolemaic tables lacked before.”³³ For Münster, the knowledge of the world his contemporaries possessed had grown so much beyond what those people living in Ptolemy’s day knew that Münster claimed sixteenth-century people could use their superior knowledge to emend and add to Ptolemy’s work to perfect it.

Münster’s understanding of his contemporaries’ knowledge of the world’s landmasses and waterways in comparison to Ptolemy’s provides a great summation of how Ptolemy’s work influenced sixteenth-century Europeans’ conceptions of the arrangement of the water-earth relationship and its ontological categorization. Though Münster much like other contemporaries highly prized Ptolemy’s work and though Ptolemy’s arguments encouraged some Europeans to accept that there was more land in the world than water and that earth and water combined to make one surface or sphere, they did not view Ptolemy’s text as the final, authoritative word on these subjects. As Grafton et al. have noted, Ptolemy “made it clear that geography was a cumulative and partly descriptive science, not an

31 “America: quae nunc quarta pars terrae dicitur ab Americo Vesputio eiusdem inventore nomen sortita est, Et non immerito: quoniam mari undique clauditur insula appellatur. Ptolemaeo autem et antiquioribus propter nimiam eius distantiam incognita permansit”; Apian, *Cosmographicus liber*, fol. 69r.

32 Schöner, *Opusculum geographicum*, sigs. E4v–E5r.

33 “At cum hodie nullus terrae angulus non sit ab hominibus penetratus, per novas regionum descriptiones facile licuit farcire, quicquid Ptolemaicis antea defuit tabulis”; Sebastian Münster, dedication letter to Philippe von Gundelsheim, Prince-Bishop of Basel, in Ptolemy, *Geographia universalis*, sig. aa2v.

exact one [...] He clearly expected to be superseded over time. The scribes and editors who added new portfolios of modern maps to manuscripts and early editions of the *Geography* worked in Ptolemy's own spirit, as many of them knew."³⁴ The modern scholar, Christine Johnson, has also explained, "the world beyond the limits of Ptolemy's knowledge, German cosmographers insisted, was still susceptible to the principles of Ptolemaic calculation."³⁵ Münster and his contemporaries therefore appropriated Ptolemy's methods and applied them to landmasses and waterways about which Ptolemy had not known, revealing both Ptolemy's strong influence on sixteenth-century European conceptions of water and earth as well as the limits of this influence.

Water in Medieval Jewish Exegesis

As we saw above, sixteenth-century Europeans turned to Ptolemy's *Geography* in increasing numbers as a significant authority on the arrangement between the world's landmasses and bodies of water. Trying to understand how such a spatial arrangement came about led many to the most authoritative text in contemporary Europe – the Bible³⁶ – and the growing awareness of medieval Jewish exegesis among sixteenth-century Christians shaped how many of them interpreted this text. Medieval rabbinic exegetes of Genesis 1:9–10 stressed the role God played in establishing both the ontological and spatial relationships between the water and earth much more than their medieval Christian contemporaries, the vast majority of whom tended to follow Augustine of Hippo's natural explanation for why water did not flood the dry land where it currently existed. Just as more and more Christians became familiar with these rabbinic commentaries throughout the course of the sixteenth century whether through their own Hebrew skills or Latin translations of these works, many more Christians explicitly classified the dry land's current existence as a miracle that God continued to perform into the present day to provide plants, animals, and people with a dry, safe place to live. The growing acquaintance with medieval Jewish exegesis during this century was another reason sixteenth-century European scholars in particular started to rethink and reclassify the contemporary ontological relationship between the substances of water and earth.

34 Grafton et al., *New Worlds, Ancient Texts*, 51.

35 Johnson, *German Discovery of the World*, 62.

36 See the discussion in Shuger, *Renaissance Bible*.

Though a few Christians had studied the Hebrew Bible and rabbinic exegesis in the medieval period, it was only in the sixteenth century that these studies increased among Christians, developing what modern scholars have called, "Christian Hebraism," much further than among their medieval predecessors. Burnett has noted that, "In 1500, Hebrew was an unimportant language to the vast majority of Christian scholars in Europe. They had little to gain by studying it, and they had almost no chance of doing so without Jewish help. A few theological experts or humanist eccentrics such as Pico della Mirandola were willing to learn it, but they were the exceptions that proved the rule."³⁷ A few scholars such as Johann Reuchlin (1455–1522) were interested in Hebraica and Judaica in the early sixteenth century due in large part to the influence of the *studia humanitatis*, but their efforts put them in the minority and were often viewed with a great deal of suspicion.³⁸ It was only with the development of the Protestant Reformation that more Christians gained both the motivation and the means to study Hebrew, the Hebrew Bible, and Jewish exegesis more extensively. This study appealed especially to those who have come to be known as Protestants, as they argued that the biblical texts should be the sole authority for Christian practice and doctrine. Some of these Christians turned to the study of Hebrew and rabbinic commentary to produce more accurate translations and different interpretations of the Christian Old Testament. They also viewed the study of the Hebrew Bible and Jewish exegesis as a useful way to define their understanding of Christianity in a period of confessional development. Many schools and universities in Protestant territories offered courses in Hebrew based on this interest in the reading and interpretation of the Bible in its original languages and on the felt need to dispute with those loyal to the Roman Catholic church.³⁹ There were also some Christians among those who chose to remain associated with the Roman Catholic church who, too, had a personal interest in the study of the Hebrew Bible and Jewish exegesis. Evangelicals' use of these scholarly tools in their polemics against the Roman Catholic Curia and their beliefs and practices also encouraged Catholics to study Hebrew and Jewish exegesis, and schools and universities

37 Burnett, *Christian Hebraism in the Reformation Era*, 11.

38 On the interest among Renaissance scholars in the study of Hebrew and Jewish exegesis, see the introduction to Coudert and Shoulson, eds., *Hebraica Veritas?*, 1–17. On the suspicion Christians had of their co-religionists, who studied Hebrew, the Hebrew Bible, and Jewish exegesis, see Oberman, "Three Sixteenth-Century Attitudes to Judaism: Reuchlin, Erasmus, and Luther."

39 On Protestant Christian Hebraists in particular, see Burnett, *Christian Hebraism in the Reformation Era*, and Sutcliffe, "Hebrew Texts and Protestant Readers."

at Rome, Paris, and Louvain and those associated with the Jesuits offered them training in Hebrew.⁴⁰

Even as many sixteenth-century Christians felt the need to undertake the study of Hebrew and Jewish exegesis and as they institutionalized the means to do so, the number of Hebrew books and Latin translations of Hebrew texts aimed specifically at Christians was growing exponentially.⁴¹ These books provided more sixteenth-century Christians with access to rabbinic commentaries with which they had not previously had easy contact and which stressed God's active intervention into the world to keep water from submerging the earth. Prior to the sixteenth century, Rashi's commentary was the main rabbinic biblical commentary with which medieval Christians were familiar due primarily to Nicholas of Lyra's *Postilla litteralis*.⁴² As we saw in the second chapter, Rashi had simply stated that God gathered together the waters into the Ocean in his explanation of Genesis 1:9–10. Rashi's commentary therefore did not define water's relationship to the earth explicitly, since he did not explain how God had accomplished this gathering. This ambiguity in Rashi's commentary on Genesis 1:9–10 would not have been known to most medieval Christians, though, because Nicholas of Lyra did not incorporate this section of Rashi's commentary into his *Postilla litteralis*. Instead, Nicholas appropriated Augustine's natural explanation of water's relationship to the earth, arguing that prior to the third day of creation, water had hovered over the earth in the form of a cloud and that on the third day God's command had condensed it, allowing the water to gather into the earth's cavities and the dry earth to appear.⁴³

The work of Christian Hebraists and the increasing number of Hebrew texts and translations of Hebrew texts coming off printing presses in early modern Europe provided sixteenth-century Christians with both direct and indirect access to more rabbinic commentaries that stressed God's direct involvement in the water-earth relationship than they had had in the medieval period. The two editions of the *Biblia Rabbinica* the Bomberg

40 On Catholic Christian Hebraists in particular, see Burnett, *Christian Hebraism in the Reformation Era*, 32–36 and 61–91, and Amnon Raz-Krakotzkin, "Censorship, Editing, and the Reshaping of Jewish Identity: The Catholic Church and Hebrew Literature in the Sixteenth Century," in Coudert and Shoulson, eds., *Hebraica Veritas?*, 125–55.

41 On these books and their buyers, see Burnett, *Christian Hebraism in the Reformation Era*, 139–221.

42 On Rashi's influence on medieval and early modern Christian exegesis, see the discussion in Rosenthal, "Rashi and the English Bible," in his *Jewish Themes*, 56–85. On Rashi's influence on Nicholas of Lyra especially, see Klepper, *Insight of Unbelievers*, 82–108.

43 Nicholas of Lyra et al., *Postilla litteralis in vetus et novum testamentum*, 1: sig. ciiiiv.

press produced in 1517 and 1525 as well as Sebastian Münster's 1534–35 *Hebraica Biblia* were the three works that proved especially significant for exposing Christians to these rabbinic commentaries due to these books' wide circulation across much of Europe.⁴⁴ For those, who could read Hebrew, the 1517 edition of the *Biblia Rabbinica* offered both the Hebrew text of the Hebrew Bible and Rashi's commentary on the Book of Genesis.⁴⁵ The 1525 edition additionally offered these Hebrew readers Abraham Ibn Ezra's commentary on Genesis to accompany the Hebrew Bible text and Rashi's commentary.⁴⁶ Münster's *Hebraica Biblia* offered both a Latin translation of the Christian Old Testament based on the Hebrew text and a Latin digest of rabbinic commentaries, therefore opening Christian Hebraist scholarship to those scholars whose Hebrew was not adequate enough to read the *Biblia Rabbinica*.⁴⁷ In addition to these widely circulated books, Burnett has found evidence that some sixteenth-century individual scholarly, institutional, and noble libraries also contained copies of the biblical commentaries of Nahmanides and Gersonides.⁴⁸ As we will see in more detail shortly, the majority of the sixteenth-century authors of commentaries on Genesis, whose works we explored in Chapter 2, either owned at least one of these works or attended an educational institution whose library held at least one of them.

These rabbinic commentaries to which an increasing number of sixteenth-century Christians gained access stressed more than medieval Christians tended to do that God had played a direct role in the dry land's current existence. Whereas Rashi had stated simply that God was responsible for gathering together the primordial waters without explaining how, Ibn Ezra, Nahmanides, and Gersonides had all argued that God went against the original nature of either primordial water or earth to expose the dry land. Though the dry land's original existence was to some extent miraculous, all three also explained that God had fashioned aspects of the natural order

44 Burnett includes a table of those individuals and those educational institutions known to have owned one of the Bomberg *Biblia Rabbinica* in his "Strange Career of the *Biblia Rabbinica* among Christian Hebraists, 1517–1620," in Bruce and McLean, eds., *Shaping the Bible in the Reformation*, 78–83. On the influence of Sebastian Münster's *Hebraica Biblia*, see Rosenthal, "Sebastian Muenster's Knowledge and Use of Jewish Exegesis," in his *Jewish Themes*, 127–45, and Stephen G. Burnett, "Reassessing the 'Basel-Wittenberg Conflict': Dimensions of the Reformation-Era Discussion of Hebrew Scholarship," in Courdert and Shoulson, eds., *Hebraica Veritas?*, 181–201.

45 Burnett, "Strange Career of the *Biblia Rabbinica* among Christian Hebraists, 1517–1620," in Bruce and McLean, eds., *Shaping the Bible in the Reformation*, 65.

46 *Ibid.*, 69.

47 *Ibid.*, 74.

48 Burnett, *Christian Hebraism in the Reformation Era*, 160–88.

to stop water from flooding the earth into the present day, meaning that the dry land's current existence should be considered natural. Ibn Ezra, for instance, had claimed that the earth should naturally be under the water, but that God had used the wind fashioned on the second day of creation to dry the land, which, alongside of the light fashioned on day four, was currently responsible for the dry land's existence.⁴⁹ Nahmanides made a similar claim about earth's natural position under water; he intimated, however, that when God called the separation of primordial water and earth "good," he then established a different nature for the two, which kept water from flooding the land into the contemporary period.⁵⁰ Whereas Ibn Ezra and Nahmanides had argued that the dry land's existence went against the original nature of the earth, Gersonides had claimed that its existence went against the natures of both primordial water and earth, and he credited God for raising the earth above the water against their natures. Though the original fashioning of the dry land was miraculous for Gersonides, his further description of the current water-earth relationship showed that he viewed their contemporary relationship as natural, as he claimed that the motion of celestial bodies currently kept water from submerging the earth.⁵¹ These commentators therefore presented their growing number of sixteenth-century Christian readers with a much more complicated ontological relationship between water and earth than was typical in the works of medieval Christian commentators, who, as we saw in Chapter 2, tended to view this relationship as strictly natural.

The growing acquaintance with medieval Jewish exegesis of Genesis 1:9–10 in the sixteenth century influenced how some Christians viewed the relationship between water and earth. We find evidence for this claim first in that the vast majority of sixteenth-century Christian exegetes who claimed that the current water-earth relationship was miraculous, did so in stark contrast to the medieval Christian exegetical tradition, and were either Christian Hebraists themselves, often owning personal copies of one or both editions of the *Biblia Rabbinica*, or who studied at institutions that held copies of these books and offered courses with teachers who were Christian Hebraists. Johannes Oecolampadius, Peter Martyr Vermigli, Konrad Pellikan, Jean Mercier, Martin Borrhaus, and Huldrych Zwingli all

49 Abraham Ibn Ezra, *Commentary on the Pentateuch: Genesis (Bereshit)*, 30.

50 Nahmanides, *Commentary of Nahmanides on Genesis Chapters 1–6*, 44.

51 Levi ben Gershom [Gersonides], *Wars of the Lord*, 6.1.13. See also the discussion in Staub, *Creation of the World according to Gersonides*, 34–36, and Toutai, *La pensée philosophique et théologique de Gersonide*, 185–87.

argued that water's current failure to flood the earth was miraculous and all owned a personal copy of a Bomberg *Biblia Rabbinica*.⁵² Other additional exegetes who claimed that the dry land's existence was currently miraculous who incorporated their (sometimes second-hand) knowledge of Hebrew and rabbinic exegesis into their own biblical commentaries include Martin Luther, Jean Calvin, Paul Fagius, and Antonio Honcala. Wenzeslaus Linck, Paul von Eitzen, and Nicholas Selnecker, who also classified the current existence of the dry land as miraculous, all studied at Wittenberg where they had Christian Hebraists as teachers and access to both editions of Bomberg's *Biblia Rabbinica*.⁵³ We find a similar classification in the works of Augustin Marlorat and Jerome Zanchi, both of whom studied in Geneva also with Christian Hebraists, and who had access there to both editions of Bomberg's *Biblia Rabbinica*.⁵⁴ Finally, Benedict Pereira also claimed that the water-earth relationship was miraculous, and he was associated with Jesuit education in Rome, an order among whom and a location in which Hebrew studies flourished after the 1560s, when Pereira was in residence there.⁵⁵ There were other sixteenth-century Christian authors of commentaries on Genesis who either had some knowledge of Hebrew or who worked in educational institutions in which they had access to Christian Hebraist books and instruction from Christian Hebraists, who gave God more credit for the current relationship between water and earth than their medieval predecessors had. Cyriacus Spangenberg and David Chytraeus were both associated with Wittenberg, and whereas Spangenberg argued that God's providence kept the water from submerging the earth, Chytraeus claimed that God's Word was responsible for doing so without going into the details of how. Also associated with Wittenberg, Philipp Melancthon and Victor Stringel gave God the credit for fashioning the nature that allowed the dry land to appear. And finally, Wolfgang Musculus, who was trained in Hebrew, claimed that God's mandate on the third day of creation joined with the nature of water to keep it from flooding the earth. Of those remaining sixteenth-century exegetes explored in Chapter 2 who either classified water's failure to submerge the earth as miraculous or who gave God more credit for this relationship than was typical among medieval Christians, there are only two for whom I cannot find a direct link to the personal study

52 Burnett, "Strange Career of the *Biblia Rabbinica* among Christian Hebraists, 1517–1620," in Bruce and McLean, eds., *Shaping the Bible in the Reformation*, 78.

53 *Ibid.*, 79.

54 *Ibid.*

55 Burnett, *Christian Hebraism in the Reformation Era*, 32–36 and 52–55.

of Hebrew or to educational institutions in which Christian Hebraists worked and Hebrew texts were kept – Johann Wild and Christoph Pelargus. Of the two, Pelargus, who claimed that God established the relationship between water and earth without further explanation as to how he did so, likely had some indirect contact with those who studied theology at Wittenberg – an environment, as we have seen, where some Christian Hebraist scholarship took place. Pelargus received his degrees at the University of Frankfurt an der Oder toward the end of the century after it had fallen under the influence of theological ideas and teachers coming from Wittenberg. Wild, a German Franciscan who was a preacher at Mainz, had argued that there are four miracles involved in water's failure to flood the earth, and he is the one author who classified the water-earth relationship as supernatural for whom I have not yet found any connection to Christian Hebraism.

While this strong correlation between Christian Hebraism and the attribution to God of a more active role in the dry land's contemporary existence than was typical in medieval Christian exegesis supports the argument that acquaintance with medieval Jewish exegesis affected how sixteenth-century Christians classified the water-earth relationship, two of these exegetes explicitly claimed that was the case, thereby providing direct evidence for this exegetical tradition's influence on sixteenth-century Christian commentators and their conceptions of the water-earth relationship. In his 1539 *Hexameron Dei opus explicatum* (The six days of God's work explained), Wolfgang Capito cited a rabbinic commentator as a way to clarify the meaning of Genesis 1:9. Genesis 1:9 appears as follows in his text, "Et dixit Deus [congregentur] aquae, quae sub caelo, ad unum locum & appareat arida, Et fuit sic."⁵⁶ The brackets around the Latin word, "congregentur," indicate that Capito would make a comment on this translation based on the original Hebrew, and he did so immediately following the verse. In his clarification, he argued that the Hebrew word used here indicated "in order, to a straight line or rule with precision," and he attributed this interpretation to a Menathem Racca.⁵⁷ We see another example of the appropriation of rabbinic exegesis in Paul Fagius's 1542 *Exegesis sive expositio dictionum Hebraicorum literalis & simplex*. In his commentary on Genesis 1:9–10, Fagius argued that God's command to the water to gather together went against the natures of both water and earth, meaning that the existence of the dry land was miraculous for him. As he did so, he attributed the

56 Capito, *Hexameron Dei opus explicatum*, sig. A2v. NRSV "And God said, 'Let the waters under the sky be gathered together into one place, and let the dry land appear.' And it was so."

57 "Ordine ad regulam, ad amussim, ait Menathem Racca"; *ibid.*

information in his interpretation to Moses, Abraham Ibn Ezra, Nahmanides, and to “Veteres Hebreos” or ancient rabbis.⁵⁸ He explained that Ibn Ezra taught that water had covered the whole earth until it was collected into the Ocean. He attributed the same interpretation of the verse to the ancient rabbis as Capito had to Menathem Racca. As for Moses, Fagius claimed, “therefore, it seems that Moses had seized upon this word [“congregentur”] not without much emphasis, without doubt to portray the infinite power of God’s Word, through which he had collected in one place with precision and to a plumbline that flowing and wandering element [water], occupying the whole surface of the earth. Scripture alludes to this in many places, and particularly in this one.”⁵⁹ Whereas Fagius claimed Moses stressed the power of God’s Word to gather together such a difficult element, he turned to Nahmanides to describe water in its original state, claiming “Nahmanides notes that the waters were gritty and wild.”⁶⁰ Fagius only claimed that water’s current failure to flood the earth was a miracle after he had described the works of all of these Jewish commentators, revealing the influence they had had on his exegesis of these biblical verses.

Though there is much implicit and some explicit evidence to show that their acquaintance with medieval rabbinic commentaries helped lead some sixteenth-century Christians to classify the water-earth relationship as miraculous in an unprecedented fashion, we also must be careful not to attribute their doing so solely to the growing awareness of medieval Jewish exegesis. First, we must note that these sixteenth-century Christians did not classify the dry land’s existence in the same manner as Rashi, Abraham Ibn Ezra, Nahmanides, and Gersonides. Though these medieval Jewish thinkers all argued that God had a more direct role in water’s relationship to the earth than the majority of patristic and medieval Christians did, most of them had also argued that the current relationship between water and earth was natural, based on some aspect of the natural order God had fashioned during creation. We do find this interpretation in a few of the works of sixteenth-century Christian Hebraists or of those who were trained in an institution where there was some instruction in Christian Hebraism. However, the vast majority of sixteenth-century Christian Hebraists or those they taught argued that the dry land’s current existence was

58 Fagius, *Exegesis sive expositio dictionum Hebraicorum literalis & simplex*, sigs. B4v–C1r.

59 “Videtur ergo Moses non sine magna emphasi hoc verbum usurpasse, nimirum ad exprimendam infinitam verbi Dei potentiam, qua fluxum & vagum illud elementum totum superficiem terrae occupans, tanquam ad amussim & perpendicularum, in unum locum coegerit. Hunc scriptura alludit in multis locis, praesertim in istis”; *ibid.*, sig. B4v.

60 “Annotat Nachmanni aquas primum pulverulentas & turbidas fuisse”; *ibid.*, sig. C1r.

a miracle – an interpretation not found in rabbinic Jewish commentaries. Second, there was a limit to how extensively sixteenth-century Christian biblical exegetes were willing to adopt medieval Jewish exegesis in their interpretations of Genesis. For as much as some sixteenth-century Christians viewed the study of Hebrew and medieval rabbinic commentaries as a way to understand the original text of the Bible and to define their understandings of Christianity in relationship to others', many more sensed danger in Hebrew and rabbinic studies taken too far. As the modern scholar, Adam Sutcliffe, has noted for the Reformation period, "Hebrew was also widely perceived as a field of danger. Learning this language effectively almost always required assistance from a Jewish teacher, and led naturally to the study of Jewish traditions of rabbinical exegesis. These contacts carried with them the fear of contamination, and left scholars open to the highly charged accusation of 'judaizing.'"⁶¹ Such charges could lose for the Christianity a particular scholar championed the respect they hoped to gain for it with their scholarship. Charges of Judaizing could also be life-threatening in a time when many political and religious authorities were attempting to instill and enforce religious orthodoxy. Therefore, just as we saw with Ptolemy's *Geography* above, though medieval Jewish exegesis is another significant influence on why particularly sixteenth-century Europeans explored the ontological and spatial relationships of water and earth much more than their predecessors, it, too, fails to explain this exploration fully.

Conclusion

The method through which sixteenth-century European scholars studied the world in which they lived meant that the books they read shaped the ways in which they conceptualized the arrangement of the world's landmasses and bodies of water and the ontological status of that relationship. For them as for their medieval predecessors, they developed their conceptions of the world and its phenomena including water and earth largely through the reading of authoritative texts. Two changes to these authoritative texts occurred in the late fifteenth and sixteenth centuries which helped lead

61 Sutcliffe, "Hebrew Texts and Protestant Readers," 321. For a discussion of the distrust among sixteenth-century Christians of Hebrew and rabbinic studies, see also, Oberman, "Three Sixteenth-Century Attitudes to Judaism: Reuchlin, Erasmus, and Luther"; Burnett, *Christian Hebraism in the Reformation Era*; and the articles in Courdert and Shoulson, eds., *Hebraica Veritas?*

sixteenth-century Europeans to re-examine their understandings of the dry land's current arrangement vis-à-vis water and the ontological status of its existence. The first change occurred with the growing interest in the geographic and cartographic aspects of Ptolemy's *Geography*. As this work began to be seen as a new authority on geography and mapmaking, sixteenth-century Europeans could read in Ptolemy's text that there was more land in the world than water and that each place on the world's surface could be treated in the same manner mathematically, leading in part to the notion of a combined water-earth surface or sphere. The second change was not the introduction of yet another authoritative text but rather a new lens through which to read the most authoritative text of all. As increasing numbers of Christians brought the information they learned from the study of Hebrew and medieval Jewish exegesis to their readings of scripture, many of them also started to reclassify the dry land's existence as miraculous building on the larger role medieval rabbinic commentators had claimed for God in water's relationship to the earth.

Though the introduction of new authoritative texts and different lens through which to read them, coupled with the traditional bookish methods of scholarship, account in part for why sixteenth-century Europeans especially were interested in the water-earth ontological and spatial relationships, these bookish methods and the texts on which these scholars focused them cannot provide the whole story. As we noted above, people do not automatically espouse new ideas just because they read new books. As we also noted, sixteenth-century Europeans typically did not just replace one authoritative text with another. Instead, they joined new authorities and aids for the interpretation of older ones such as Ptolemy's *Geography* and medieval Jewish exegesis with those works and interpretative aids that had been read and used for centuries. In doing so, these new authorities and aids became part of the broad conversation on a wide variety of topics in which each reader had to choose on which excerpts from which texts to focus and how to interpret these chosen passages. Therefore, though their bookish methods certainly led some of the authors we have analyzed to explore those particular passages having to do with the relationship between water and earth in Ptolemy's *Geography* and medieval Jewish exegesis to learn about water and earth's actual locations and their relationship's ontological status, there is a more fundamental question here of why these authors sought information about the dry land's existence and location from these and other texts in the first place. We will find in the next chapter that one of the reasons they did so had to do with their interest in God's connection to the universe's phenomena and the human ability to perceive and understand

this connection through the exploration of these phenomena – an interest the analysis of water's ontological and spatial relationships to the earth allowed them to explore.

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6. Exploring the Created Universe through Water

Abstract

This chapter examines another explanation for why especially sixteenth-century Europeans were interested in the water-earth relationship and the layout of the world's landmasses and waterways, focusing on the shifting conceptions of God and his providence that contemporary religious reformations caused. This chapter argues that these religious reformations helped lead authors to reconsider God's connection to the universe and how people were meant to perceive this connection through the behavior of natural phenomena such as water. They helped because the water-earth ontological and spatial relationships' seeming violation of Europeans' understanding of the nature of these elements. This relationship provided an opportunity to explore just how God was associated with the universe and what people should learn from that association.

Keywords: incarnation; providence; revelation; creation; religious reformations

This also is an illustrious miracle that the waters by their dispersal gave people a place to inhabit. For philosophers concede that water's natural position is what Moses said it was at the beginning so that it should roll over the whole earth. First because water is an element and therefore ought to be circular and since the element of water is heavier than air and lighter than earth, it should cover the earth in its whole circumference. But that the seas, in being driven back into heaps, should concede a place to human beings seems preternatural (*quasi praeter naturam*), and therefore Scripture frequently extolls God's goodness in this particular. Psalm 33:7. "He has gathered the waters just as in a bottle." Jerome 5:22. "Will you not fear me? Will you not be terrified by my presence, who placed the sand as the boundary of the seas?" Job 38:8 "Who has enclosed the

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sea with doors? Have I not surrounded it with gates and bars? I have said to this point you shall proceed; here your swelling waves shall break.” Therefore, let us know that we live on dry land because God removed the waters by his command so that they do not submerge the whole earth.

– John Calvin, *In primum Mosis librum* (1554)¹

As we found in the first part of this book, John Calvin along with many other sixteenth-century commentators on Genesis 1:9–10 considered water’s contemporary relationship to the earth to be miraculous – a classification they also shared with more sixteenth-century authors of natural philosophical, cosmographical, and geographical texts than had been typical in such works prior to this century. Quoted above, Calvin’s explanation of this miracle begins to provide insight into why particularly sixteenth-century authors of these types of texts were more interested in exploring the current water-earth spatial relationship and its ontological status through the bookish methods described in Chapter 5 than their predecessors had been. According to Calvin, water’s behavior vis-à-vis the earth revealed both God’s connection to the world’s phenomena as well as what people should perceive about that connection based on what contemporary philosophers and scripture taught about water’s nature and its current location in relation to earth. Building on what contemporary philosophers taught about the nature of the elements, Calvin argued that water should entirely cover the earth, as Moses explained was the case at the beginning of creation in the earlier verses of Genesis. That some dry land existed at all, Calvin attributed to God’s command alone holding the waters back from the earth, and he cited biblical passages from the Books of Psalms, Jerome, and Job to illustrate and support this argument further. Based on the contrast between what contemporary philosophers taught about water and earth and the behavior of water scripture described and his contemporaries

1 “Hoc quoque illustre est miraculum, quod aquae suo discessu habitandi locum hominibus dederunt. Nam & Philosophi concedent, naturalem esse situm aquae qualem initio fuisse tradit Moses, ut totam terram involvat. Primum quia elementum est, circulare esse oportet & quia elementum est gravius aere, terra, levius, deberet hanc toto circuitu tegere. Quod autem in tumulos redacta maria locum hominibus concedunt, hoc est quasi praeter naturam: atque ideo bonitatem Dei hac in parte Scriptura saepe extollit. Psalm 33 b.7., Collegit aquas velut in utrem. Jerome 5 e. 22 An me non timebitis, anon pavebitis a facie mea? Qui posui arenam terminum maris. Job 38 a. 8, Quis conclusit ostiis mare? Annon ego claustra & vectes circumdedi? Ego dixi Hucusque progredere, hic rumpantur tumentes fluctus tui. Sciamus ergo nos in sicco habitare, quia Deus mandato suo aquas submovit, ne totam terram submergant”; Calvin, *In primum Mosis librum*, 4.

experienced, he labeled the dry land's existence as an illustrious miracle, stating later in his explanation that water's current behavior was also "as though preternatural" (*quasi praeter naturam*). For Calvin, this illustrious miracle revealed some of God's attributes as well as how his contemporaries should respond to them. The first part of Calvin's explanation points to a teleological reason for this illustrious miracle – that God wanted people to have a dry place to live, suggesting that God designed creation including the locations of the world's waterways and landmasses specifically for people's benefit. Later in the passage, Calvin also explained that his holding back the waters from the dry land as seen in many parts of scripture shows God's goodness. He ended his explanation with an exhortation to his readers that they should know (*sciamus*) that they currently lived on dry land because of the miracle of God's command, thereby urging his readers to recognize God's continued connection to this particular phenomenon in the present day due to God's fashioning of it during creation.

As Calvin's explanation of Genesis 1:9–10 suggests, the water-earth relationship served as a site in which to explore God's connection to the world's phenomena and people's perceptions of that connection for many Europeans because water's failure to submerge the earth seemingly contradicted what contemporary natural philosophers and others who wrote about the physical world taught about the natures of water and earth. For Calvin as for a comparatively large number of the sixteenth-century authors whose works we have already explored, the natural characteristics of water and earth as well as other secondary causes God was thought to have implanted into the world during creation just could not explain the dry land's existence, and so they turned to the first cause, God, to explain why people had a dry place to live. Frans Titelmans' natural philosophical textbook of 1530, the *Compendium philosophiae naturalis* provides a good example. Though he claimed that the influence of the planets, especially Saturn, and the earth's natural disposition to float in water like a cork might explain why water did not flood the earth, he ultimately attributed water's restraint to the miracle of God's command to the primordial waters to gather together, since, for him, scripture provided the only sure information on this topic.² Many of these authors also attributed a teleological reason for God's fashioning of the water-earth spatial relationship even against nature, stating that God did so to provide people, plants, and animals with a dry, fertile place to live. As Oronce Finé claimed in his 1542 cosmographical text, *De mundi sphaera sive cosmographia* (The spheres of the world, or cosmography), "truly water

2 Titelmans, *Compendium naturalis philosophiae*, sigs. Lviiiir–v.

does not circularly envelop the earth – having been pressed together in the middle of the other elements and of the whole universe (as it is heaviest), but the water remains sprinkled in little pieces or in depressions and held by its boundaries, by which parts of the earth are uncovered for the health of living things (as God will).³ Some also stated that people should learn something significant about God because of the benefits people derived from water’s restraint just as Jean Mercier had in his 1598 commentary on Genesis 1:9–10, arguing that God’s power and goodness kept the water’s back from the dry land and that people should contemplate this example to learn about these attributes of God.⁴

That the water-earth ontological and spatial relationships provided people with an opportunity to explore how God related to the world and how people could perceive and understand this relationship does not yet explain why particularly sixteenth-century Europeans were more interested in doing so than their medieval and patristic predecessors. After all, Romans 1:20 explained that, “Ever since the creation of the world his eternal power and divine nature, invisible though they are, have been understood and seen through the things he has made,” suggesting that people could turn to the physical world as God’s creation to learn something about God.⁵ There were also many Christian authors from the patristic period, who described nature as a book and frequently set this so-called Book of Nature alongside scripture as sites of God’s revelation. Though each author tended to employ this metaphor in their own way, it most often carried the notion that God revealed certain aspects of himself in the world’s phenomena, even though this revelation was often thought to be more direct in scripture due to human sin.⁶ The focuses on God’s connection to the material world and on how that connection should shape human responses to God and the world were also not unique to the sixteenth century. Recently, scholars such as Sarah Richey and Caroline Walker Bynum have argued that Europeans from the twelfth century tried to access God in and/or through the material world and that

3 “Aqua vero Terram, in medio reliquorum elementorum, atque totius Universi (veluti gravissimum) conglobatam, non circumdat orbiculariter: sed frustulatim, sinuatimve circumsparsa, suisque terminate limitibus, ipsius terrae partes discoopertas, ad viventium salute (Deo ita volente) relinquit”; Finé, *De mundi sphaera sive cosmographia*, sig. Aiv.

4 Mercier, *In Genesin commentarius*, sig. biiiir.

5 NRSV. In the Vulgate, Romans 1:20 reads, “Invisibilia enim ipsius a creatura mundi per ea quae facta sunt intellecta conspiciuntur sempiterna quoque eius virtus et divinitas ut sint inexcusabiles.”

6 Tanzella-Nitti, “Two Books Prior to the Scientific Revolution,” and Vanderjagt and Berkel, eds., *Book of Nature in Antiquity and the Middle Ages*.

these attempts shaped European devotional culture, with Bynum claiming that Europeans after 1300 were particularly interested in doing so.⁷ Scriptural passages that stated God had revealed aspects of himself in the world, the abiding interest in the metaphor of the Book of Nature, and the growing interest from the twelfth century in access to God in the material world that Ritchey and Bynum have explored all suggest that the dry land's existence and location could theoretically have been an ideal topic through which patristic and medieval Christians could have explored God's revelation in the world and the human perception of it; for water's restraint could be interpreted as a violation of what both scripture and the contemporary understandings of the physical world taught. Yet, as we have seen throughout this book, these patristic and medieval authors did not choose to do so, and so therefore, there must have been something about the way particularly sixteenth-century Europeans perceived the nexus of God's revelation in creation and the human perception of that revelation in the world's phenomena that led them to explore this existence and location in more detail than their predecessors.

Calls to reform Christianity became much more widespread in this century and led many Europeans to reconsider basic tenants of their religious practices and beliefs, including God's connection to the world he had created, the human perception of that revelation, and what that connection meant for their devotional practices. Though calls for reforms had occurred throughout Christianity's existence, such discussions were more widespread than ever in the sixteenth century as the topic was taken up in sermons, songs, and in printed works that spread around Europe and beyond.⁸ Bynum has suggested that one of the questions these religious reformers debated was the nature of the material world, itself. She has claimed that fifteenth-century Europeans' increasingly paradoxical understandings of the material world led to a crisis of confidence in Christian materiality in the sixteenth century.⁹ In addition to a heightened interest in how the divine relates to the material world, these religious reformations also raised questions about God's providence, leading many reformers to insist on God's sovereignty over his creation and his ability to intervene into the world's phenomena.¹⁰ These widespread debates and discussions about the nature of the material and how God's providence related to the world's phenomena led sixteenth-century authors

7 Ritchey, *Holy Matter*, and Bynum, *Christian Materiality*.

8 On these calls and their distribution, see Wandel, *Reformation*, and Lambert, *Singing the Resurrection*.

9 Bynum, *Christian Materiality*, 272–73.

10 See the discussion in Walsham, *Providence in Early Modern England*. See also Gorringer, *God's Theatre*.

of exegetical, natural philosophical, cosmographical, and geographical texts to focus on the water-earth ontological and spatial relationships because their seeming violation of what Europeans understood about these two elements' natures provided an opportunity to explore just how God was connected to the universe and what people should learn from that connection in the wake of calls for religious reforms that had brought such questions to the forefront for many of their contemporaries.

God's Connection to the Created Universe through Water

When sixteenth-century authors explored God's connections to the universe in their discussions of the water-earth ontological and spatial relationships, they primarily focused on two aspects of this connection – God's separation of the primordial water and earth to provide people with a safe place to live and to make the earth fertile as well as God's providential control over water's current behavior to restrain it from flooding the dry land. Though there had been discussions from the ancient period about the teleology behind God's exposing of the dry land, the emphasis on God's continued, providential guidance of water into the present day was new in the sixteenth century. These authors' focus on God's continued providential control emphasized that the water with which they and their readers had frequent contact provided evidence of God's creation of and providential control over the world and carried the expectation that people would look at and explore this substance to perceive God's connections to the universe. For these authors, the dry land's existence provided an example for how God continued to relate to the universe's phenomena and to people. In doing so, the locations of water and earth and their relationship's ontological status became more significant topics for sixteenth-century authors than for previous ones, drawing them to redefine these locations and reclassify this relationship through the typical bookish methods of sixteenth-century scholarship.

Appearing in many sixteenth-century texts that discussed the water-earth relationship, the notion that God separated primordial water and earth in order to provide people with a dry, safe, and fertile place to live had both biblical as well as patristic and medieval precedents. Genesis 1:11–12 describes God's additional work on the third day of creation, as he commanded the earth to bring forth plants and fruit trees.¹¹ Many patristic and medieval

11 In the Vulgate, Genesis 1:11–12 reads, "Et ait germinet terra herbam virentem et facientem semen et lignum pomiferum faciens fructum iuxta genus suum cuius semen in semet ipso sit

authors read these verses in connection with the gathering of the primordial waters and the exposing of the dry land in Genesis 1:9–10 as well as in God's granting people dominion over other creatures in Genesis 1:26 to argue that God had gathered the primordial waters together specifically for human benefit, providing them with a fertile habitation.¹² As we saw in Chapter 1, Philo of Alexandria had made such a claim in his first-century-CE *On the Creation of the Cosmos according to Moses*. Arguing that water and earth assumed their present relationship on the third day of creation at God's command, Philo claimed that this command separated the salt water from the sweet or fresh water, allowing the fresh water to run through the earth much like milk runs through breasts in order to nourish the crops human beings needed to survive.¹³ In the fourth century, Basil of Caesarea claimed something similar about the reasons behind the primordial waters' separation from the earth in his discussion of God's calling of the seas' formation, good. He explained that the water-earth relationship since the third day of creation provided the earth with much needed moisture, fresh water for people to drink after it moved through subterranean channels and came forth in rivers and springs, rain, and a passageway between the various islands and other landmasses in the world.¹⁴

Patristic biblical commentators were not the only ones to claim that the exposing of the dry land was done ultimately for human benefit. Such arguments appeared frequently in medieval texts that explored the physical world, too, and therefore, they also provided significant precedents for sixteenth-century Europeans. John of Sacrobosco's influential thirteenth-century text, *On the Sphere*, had claimed that fire, air, and water surround the earth, "except in so far as the dry land stays the sea's tide to protect the life of animate beings."¹⁵ A century earlier, William of Conches had argued in his dialogue on the physical world, the *Dialogue on Natural Philosophy (Dragmaticon philosophiae)* that God's placing of the sun above the middle of the earth to evaporate some of the water enabled life to exist there.¹⁶ Vincent

super terram et factum est ita. Et protulit terra herbam virentem et adferentem semen iuxta genus suum lignumque faciens fructum et habens unumquodque sementem secundum speciem suam et vidit Deus quod esset bonum."

12 In the Vulgate, Genesis 1:26 reads, "Et ait faciamus hominem ad imaginem et similitudinem nostram et praesit piscibus maris et volatilibus caeli et bestiis universaeque terrae omnique reptili quod movetur in terra."

13 Philo of Alexandria, *On the Creation of the Cosmos according to Moses*, 55.

14 Basil, *Exegetic Homilies*, 63–65.

15 John of Sacrobosco, *Sphere of Sacrobosco and its Commentators*, 119.

16 William of Conches, *Dialogue on Natural Philosophy*, 109.

of Beauvais's *Speculum naturale* of the thirteenth century drew frequently on William of Conches' work, and it included a similar claim about how God had given both water and earth their current locations during creation so that plants, animals, and people had a dry place to live.¹⁷ The notion that God established a natural order through which water does not flood the earth so that people, plants, and animals have a dry, fertile place to live continued to appear in fourteenth-century natural philosophical texts as well, as this claim occurred explicitly in both Nicole Oresme's *Le livre du ciel et du monde* and in Albert of Saxony's questions text on Aristotle's *On the Heavens*.¹⁸

Sixteenth-century European authors incorporated many similar themes as they described why the dry land currently existed where it did. Martin Luther's lectures and Benedict Pereira's commentary on Genesis provide good examples of the continuance of this theme in sixteenth-century exegetical texts. After arguing that the dry land's existence is a miracle since water should naturally flood the earth based on its primordial location, Luther explained, "yet the earth as the [universe's] center ought to be enclosed and covered by the sea. But God through his Word repels the sea and fashions it so that the dry land (*planiciem illam*) exists to the extent that it is necessary for habitation and life."¹⁹ Pereira developed these themes even further than Luther, as he described the miracle of water's current restraint, and as he did so, he drew explicitly on Philo of Alexandria's first-century work. Pereira claimed, "Philo said that whatever water was then salty, it would have been noxious to the future fertility of the earth so that its flowing into one place on the third day left the fresh water (*dulci humore*) in the earth. At that time the fresh water joined together the earth just like glue for the utility of plants and animals so that the earth was not scattered in the rain."²⁰ In doing so, Pereira brought Philo's discussion of the separation of the salty and the sweet or fresh water in order to make the earth fertile for plants and animals to a sixteenth-century European audience.

17 Vincent of Beauvais, *Speculum naturale*, 7.5.

18 Oresme, *Le livre du ciel et du monde*, 568–69, and Albert of Saxony et al., *Quaestiones et decisiones physicales insignium virorum*, fol. XLViv.

19 "Terra enim pro suo centro deberet esse inclusa et tecta mari. Sed Deus mare verbo suo repellit et facit planiciem illam extare, quantum ad habitationem et ad vitam opus est"; Luther, *Genesisvorlesung*, 26.

20 "Philo ait, quicquid erat tunc aquae salsum, futurum fertilitati terrae noxiam, unum in locum tertio die confluisse, dulci humore in terra relicto, tum velut glutine ad terrae coagmentationem ne in puluerem dissiparetur, tum ad utilitatem plantarum & animalium"; Pereira, *Commentariorum et disputationum in Genesin*, sig. F6v.

Authors of sixteenth-century natural philosophical, cosmographical, and geographical texts also incorporated notions that the dry land existed for the benefit of living things, though they did so less extensively than contemporary biblical commentators, likely due to the lack of precedent in earlier works on the physical world and the layout of the world's landmasses and bodies of water. Perhaps unsurprisingly, given what we saw with Luther and Pereira's works, the classification of the water's failure to flood the earth as a miracle seems to have led to more scope for such a discussion in those natural philosophical textbooks which categorized this behavior in a similar manner. Titelmans, one author of such a textbook, included the most extensive discussion of the teleology behind this miracle of all the natural philosophical textbooks we explored. He claimed that God on the third day had wanted to create a dwelling place on the dry land that mixed together the elements of water and earth to complete it for future human beings.²¹ Jean Bodin, who, as we saw, explicitly argued that the water's failure to flood the earth was natural even though he did so by collapsing this ontological category with the preternatural and the supernatural, also alluded to this theme specifically when he initially attributed the dry land's existence to the first cause or God. Contradicting Aristotle's teachings on these elements, he argued, "Aristotle is in difficulties here, since he admits that the earth ought to be surrounded by water, but the water is properly back from a certain part of the earth for the safety of birds and reptiles. From this it follows that the first cause freely removes the water and that it is not bound by any natural law, contrary to what Aristotle asserts." Thus, Bodin suggested, without stating, that God ultimately held the waters back for the safety of living things even if Bodin later claimed that people should understand this restraint as natural.²²

Specifying that their works belonged to the genres of cosmography and/or geography in a manner not common in medieval texts on the arrangements of the world's landmasses and bodies of water, sixteenth-century authors of such works also incorporated the notion that the primordial waters were removed from the earth so that people and plants had a safe, fertile place to live. Just as we saw with authors of sixteenth-century natural philosophical texts, it was especially those authors who classified the dry land's current

21 Titelmans, *Compendium naturalis philosophiae*, sig. Mir.

22 "Hic Aristoteles haeret, quia confitetur terram aquis circumfusam esse oportere, sed quadam sui parte reiectam ad volatiliū & reptiliū salutem: ex quo sequitur primam causam libere agere, nec ullis naturae legibus obligari, contra quam Aristoteles contendit"; Bodin, *Universae naturae theatrum*, sig. M4r.

existence as miraculous who dwelled on this theme. Though he touched on it in the 1544 German edition of his *Cosmographia*, explaining that God had drawn back the primordial waters to fashion a fertile, comfortable living space,²³ Sebastian Münster expanded on it in the 1550 Latin edition of the text. He explained in the 1550 Latin edition that, “Scripture shows that the earth from the beginning of its formation was everywhere covered and enclosed by the waters of the seas. Until, at the command of the creator, the water, being drawn back from some parts of the earth’s surface, left behind a dry and suitable place for the dwelling of people and terrestrial animals, and for the plants, from which all living things subsist, a solid foundation was adapted on that dry land, itself.”²⁴ The theme of God’s pulling back the primordial waters for the sake of living things did not end in the middle of the century with Münster’s work, as we also find it in Johannes Rauw’s *Cosmographia* of 1597. Crediting God with holding back the water from flooding the earth, Rauw stressed the fertility of this land God provided for people in particular, citing the animals, the plants that both people and the animals ate, and the means to make bread and wine from these plants to sustain human beings as reasons for why God performed such a miracle.²⁵

Whereas this focus on the teleology behind the separation of the waters and the earth found in sixteenth-century texts resonated with such themes found in patristic and medieval works, their focus on how the water-earth ontological and spatial relationships provided examples of God’s continued providential control over the world’s phenomena was new and offers evidence that exploring this connection was one reason sixteenth-century authors focused on these topics more than their predecessors. As the modern scholar, Alexandra Walsham, has noted, “belief in the ultimate ordering of the universe by a supreme supernatural being or sublime overriding force was, of course, firmly entrenched in traditional Judaeo-Christian thinking. It can also be found in classical Greek and Roman philosophy.”²⁶ However, she has also claimed that sixteenth-century reformers, especially those reformers who have come to be known as Protestants, placed more emphasis on God’s sovereignty and his intervention into the earthly realm due to

23 Münster, *Cosmographia* (1544), sig. Air.

24 “Habent sacra literae, terram ab initio suae formationis undique obductam & inclusam fuisse aquis maris, donec iussu creatoris aqua ab aliqua parte superficiei terrae subducta, sicum & commodum mansionis locum hominibus atque animalibus terrestribus reliquit, plantis quoque unde omni viventia victitarent, firmum in ipsa arida adaptaretur fundamentum”; Münster, *Cosmographia universalis* (1550), sig. air.

25 Rauw, *Cosmographia*, sig.):(iiiiv.

26 Walsham, *Providence in Early Modern England*, 8.

“their expulsion of all intermediaries between God and the individual soul” and to their “uncompromising insistence upon mankind’s utter impotence and depravity and complete dependence upon the mercy of its Maker and Redeemer.”²⁷ According to Walsham, providence had a dual definition for these sixteenth-century reformers that included both God’s foreknowledge of all that would occur as well as God’s direct, active guidance of the world through his power.²⁸ Given this new emphasis on providence, the topics of the water-earth ontological relationship and the way it provided a safe, fertile, and dry place for people to live offered many of the authors whose works we have analyzed topics through which to explore God’s active intervention into the world’s phenomena even into their contemporary day.

Especially authors of sixteenth-century exegetical texts connected the teleology behind the separation of primordial water and earth with God’s providential foreknowledge, though this argument also appeared explicitly in at least one sixteenth-century cosmographical text, too. Nikolas Selnecker, Martin Borrhaus, and Antoine Mizauld all stated that the separation of primordial water from the earth on the third day of creation was testimony of God’s providence. Whereas Mizauld simply declared that there was the highest providence in the structuring of the world into a single water-earth globe, Selnecker claimed that water’s failure to flood the earth was “illustrious testimony” of divine providence, and Borrhaus argued that God’s providence kept the water in a heap through an interpretation of Psalm 103.²⁹ Wolfgang Musculus directly connected God’s providential separation of the primordial water and earth to making the earth fit for people, claiming that God raised up the earth little by little during the first three days of creation to make it habitable.³⁰ David Chystraeus and Ambrosius Catharinus Politus explored how God’s providence had prepared the earth for habitation more extensively. Chystraeus began his discussion with a similar declaration as those found in the works of Mizauld, Selnecker, Borrhaus, and Musculus, declaring that the works of the third day of creation showed “much illustrious evidence of divine providence.” He then added further elucidation of what this divine providence had done on the third day, explaining that it set up the “conservation of the universe and a perpetual order as well as the propagation of distinct species of plants and what is generated, like from

27 Ibid., 9.

28 Ibid., 9–10. See also, Gorringe, *God’s Theatre*, 1–18.

29 Mizauld, *De mundi sphaera seu cosmographia*, sig. bvr; Selnecker, *In Genesim commentarius*, sig. F6v; and Borrhaus, *In Mosem, divinum legislatorem*, sig. a3v.

30 Musculus, *In Mosis Genesim plenissimi commentarii*, 21.

like.”³¹ Politus went into an even more in-depth analysis of the effects of God’s providential foreknowledge on the water-earth relationship. Extolling God’s “wonderful providence” in taking care of people through his separation of primordial water and earth, he distinguished between the universal order of nature and water’s particular nature as an element, arguing that though water went against its own nature in failing to submerge the earth, this restraint fit the universe’s nature, since it was necessary to sustain life on earth.³² For all of these authors, God’s omniscience had led him to prepare the dry land as a safe, fertile place for people during creation.

In addition to discussing how God’s providential foreknowledge designed a commodious habitat for people, plants, and animals wherever the dry land currently existed, sixteenth-century authors also discussed how God actively guided water to keep it from flooding the earth even in the present day through his providence. Once again, most of these discussions occurred in sixteenth-century exegetical texts, but one also appeared explicitly in Mizauld’s work. In a discussion of the air, the heavens, earth and the sea, Mizauld included marginal notes that claimed, “Providence governs all,” and after a description of some of the various aspects of this topic, he summarized, “this is a most perfect demonstration that God through reason and the divine mind governs all things.”³³ We saw another example of God’s continued action in the universe to restrain the water in John Calvin’s commentary on Genesis 1:9–10, as he ended his explanation with an exhortation to his readers to recognize that God removed the primordial waters so that they do not currently flood the dry land. Martin Luther emphasized this present-day connection even more than Calvin in his *Lectures on Genesis*. Focusing on the threat water posed to his contemporaries, Luther intimated that they would all drowned unless God held water back from the earth. As proof for this claim, he urged his contemporaries to view the relative height of the water level and the earth’s elevation in their own day, stating that the water level of the Ocean and seas was actually higher than the earth’s elevation and that only God’s Word kept water from overwhelming the earth. He even compared God’s parting of the Red Sea to how he currently protected people from water, emphasizing God’s current restraint of the

31 “Sunt autem in hac parte operis tertii diei, plurima providentiae divinae testimonia illustria. Conservatio universalis & perpetuus ordo & propagatio specierum distinctarum in singulis plantis & quod ex similibus similia gignuntur”; Chytraeus, *In Genesin erratio*, sig. E3r.

32 Politus, *Enarrationes in quinque priora capita libri Geneseos*, sigs. Bviiiv–Bviiiir.

33 The first marginal note reads, “Providentia omnia gubernari, ac ratione, nec frustra,” and the second reads, “Demonstratio pulcherrima, quod omnia a Deo, Ratione, & mente divina gubernantur, contra Epicureos”; Mizauld, *De mundi sphaera seu cosmographia*, sig. aiiir.

waters through the use of present-tense verbs. Luther concluded, “therefore, it happens through divine virtue, that the waters do not press in on us, and besides, God today causes (*facit*) that miracle everywhere on the boundary of the world for us – the miracle which he caused in the Red Sea for the people of Israel.”³⁴ Toward the end of the century, Augustin Marlorat’s commentary on Genesis not only connected God’s holding back of the primordial waters to water’s current behavior. He also mentioned God’s use of this providential guidance of water to punish his enemies, perhaps alluding to the drowning of the Egyptian army in the Red Sea as well as the flood.³⁵

Sixteenth-century discussions of the water-earth ontological and spatial relationships used these relationships to explore both why God had gathered together the primordial waters to expose the dry land as well as God’s providential foreknowledge and continued guidance of the world’s phenomena. Though these discussions appeared most frequently in exegetical texts likely due to the precedent of such discussions in earlier commentaries on the Book of Genesis, the century’s natural philosophical, cosmographical, and geographical works also contained some discussions of why God had gathered the waters together, and Mizauld even attributed water’s current failure to flood the earth to God’s providence and argued that God’s providence governed all things in a discussion of the earth and the sea. These discussions, especially those focused on God’s providence – a subject that did not frequently feature in patristic and medieval works on the water-earth relationship – all suggest that sixteenth-century Europeans viewed this topic as a way to explore God’s connection to the universe as calls for reforms to Christianity raised many questions about the link between the divine and the material. Calvin’s text, with which we began this chapter, suggests that exploring God’s connection to the universe was not the only thing that drew sixteenth-century authors to classify the ontological relationship between water and earth and to describe the spatial relationship between the world’s landmasses and bodies of water more than their predecessors, however. As Calvin noted, water’s failure to submerge the earth did not just show God’s connection to the world’s phenomena. For Calvin, this connection between God and the world he had created required people to acknowledge that they lived on dry land only because of God’s miraculous restraining of the waters, revealing God’s goodness. His

34 “Ergo virtute divina fit, ne aquae in nos grassentur, et adhuc hodie usque in finem mundi miraculum illud nobiscum Deus facit, quod in rubro mari fecit cum populo Israel”; Luther, *Genesisvorlesung*, 26.

35 Marlorat, *Genesis cum catholica exposition ecclesiastica*, sig. aiiir.

work and, as we shall see, that of many other sixteenth-century authors we have explored therefore suggest that the water-earth ontological and spatial relationships drew sixteenth-century Europeans' interest in another way. These relationships also drew these authors' interest because they were topics through which to explore what people should perceive about God's connection to the world as they learned about the universe's phenomena.

Perceiving God's Connection to the Created Universe through Water

Christians had long acknowledged a connection between God and the world he had created based on biblical and exegetical precedent. However, when Christians spoke or wrote about God's connection to the universe, they often drew on the same biblical precedent to claim that the world's phenomena revealed information about this connection that people should perceive, even if many of these authors expressed doubt that sinful human senses and minds could grasp God's revelation in creation fully, if at all. For many Christians, then, God's revelation in creation went hand-in-hand with the notion of human perception of it.³⁶ Given how frequently Christians made this connection and as we just saw, sixteenth-century authors' interest in examining it through the water-earth relationship, this relationship also provided them with a topic to explore what people should perceive about the teleology behind the dry land's location as well as water's providential restraint. In their works, these sixteenth-century authors emphasized three things that people should learn through the water-earth ontological and spatial relationships. Many argued that water's current failure to flood the earth could teach people about some of God's attributes, that this failure should provide people with lessons for their proper behavior, and that people should know God used his providential control over water to punish his enemies and to save the faithful. This interest in exploring people's perceptions of God's revelation in the world through an especial focus on the water-earth relationship helped lead these sixteenth-century authors to rethink the ontological status of this relationship and the layout of the world's landmasses and bodies of water often through the reading of newly rediscovered and emphasized ancient and medieval texts.

Much like in Jean Mercier's late sixteenth-century commentary on Genesis as we saw above, the notion that water's failure to flood the earth could teach people about some of God's attributes appeared especially frequently

36 Gorringer, *God's Theatre*, 15–33.

in commentaries on Genesis, though we also find a similar theme in this century's cosmographical and geographical texts, too. Much like Mercier, most of these authors of exegetical texts claimed that God's restraining of the waters revealed God's power and goodness to people, though there were also some who pushed this argument further to claim that God's holding back of the waters to provide people with a safe place to live should provide them consolation. Much like Mercier, Luther, Oecolampadius, and Johannes Wild all simply stated that God's restraining of the elements revealed his power to people with Luther stressing the power revealed in the manifest miracle of water's failure to flood the earth, and Oecolampadius and Wild attributing power specifically to God's Word due to its ability to gather the waters together.³⁷ Martin Borrhaus offered a longer commentary on how the dry land's existence showed God's power. Comparing water's current failure to submerge the earth to water's total covering of it during the flood, Borrhaus stated, "From this, we know first that it is the work of the divine power that the waters do not burst on the earth to cover its inhabitants, just as they burst in during the Flood."³⁸ Also claiming that the gathering of the primordial water taught people about God's power, Paul Fagius used water's current behavior as an unstable, flowing substance to emphasize God's ability to gather together such a slippery substance through his Word. Fagius argued, "Therefore it seems that Moses made use of this word not without great emphasis without doubt to demonstrate the infinite power of God's Word, which the flowing and ebbing of that element [water], occupying the whole surface of the earth, it collected as if to a rule and plumbline in one place."³⁹ When their sixteenth-century contemporaries contemplated water's failure to flood the earth, these authors all expected them to learn about God's power from this example.

God's power was not the only attribute water's current restraint from the dry land revealed for these biblical commentators. They also emphasized that God's restraining of the waters providing people with a safe place to live wherever dry land existed showed God's goodness and should even

37 "Ideo autem tum singulariter revelavit eam potentiam manifesto miraculo, ut pauva populo coleretur diligentius"; Luther, *Genesisvorlesung*, 26. See also Oecolampadius, *In Genesim enarratio*, sigs. 13v–14r, and Wild, *In totam Genesim*, sig. B3v.

38 "Unde primo intelligimus potentiae divini esse opus, aquas coerceri ne in terra habitatores erumpant, sicut erupere in diluio"; Borrhaus, *In Mosem, divinum legislatorem*, sig. a3v.

39 "Videtur ergo Moses non sine magna emphasi hoc verbum usurpasse, nimirum ad experimentam infinitam verbi Dei potentiam, qua fluxum & vagum illud elementum totum superficiem terrae occupans, tanquam ad amussim & perpendicularum, in unum locum coegerit"; Fagius, *Exegesis sive expositio dictionum Hebraicorum literalis & simplex*, 16.

provide people with consolation about God's care for them. We saw an example of someone who argued that God's preparation of dry land for plants, animals, and human beings shows God's goodness in the section of Calvin's commentary on Genesis that began this chapter, as he claimed that scripture frequently praised God's goodness in providing this dry land for people. Cyriacus Spangenberg took this theme up most directly in his commentary on Genesis in which he claimed that the separation of water and earth as well as all the other acts of creation should provoke the following reaction from people. "Here this consolation is presented: if God created the whole world, therefore also he created me, and if he conserves all things, he therefore also conserves me. This consolation has a place during affliction."⁴⁰ For Spangenberg, water's failure to flood the earth showed both that God created and continued to govern the world, and he urged his readers in this commentary to find hope and consolation in this realization because it was evidence God had created and continued to care for them.

Though these themes appeared frequently in sixteenth-century exegetical texts, this notion that the contemporary water-earth ontological and spatial relationships could reveal something significant about God's attributes also appeared in several sixteenth-century cosmographical and geographical texts. Antoine Mizauld and Sebastian Münster both claimed that water's failure to submerge the islands sprinkled throughout the world's waterways provided people with evidence of God's power. Describing each part of the world succinctly, Mizauld explained that islands were able to withstand waves without being immersed through the will of God, "the power of which is in the earth, the sea, the heavens, the air, and fire."⁴¹ Münster offered a longer discussion of islands and how their failure to flood shows people God's power over creation in his editions of the *Cosmographia*. After listing the numerous islands people encountered in his own day, Münster in his 1544 German edition of the *Cosmographia* had claimed that these islands' existence showed a great wonder of God.⁴² He added a longer discussion of how these islands reveal God's power in the later Latin edition, arguing:

And surely here we see that wonderful power of God, that so many small islands are everywhere reached in the vastest sea, which sustain the

40 "Hinc consolatio haec producta: si Deus creavit totum mundum, ergo & me: si & omnia conservat, ergo & me. Habet haec consolatio locum in afflictio"; Spangenberg, *In sacri Mosi Pentateuchum tabulae ccvi*, sig. A2r.

41 Mizauld, *De mundi sphaera seu cosmographia*, sig. bvr, and Selnecker, *In Genesin commentarius*, sig. aiiiv.

42 "Und hie wirt ein groß wunder gottes gespört"; Münster, *Cosmographia* (1544), sig. Aiir.

assiduous crashing of storms and nevertheless never move from their place and are not submerged by the inundation of the seas [...] Yet just as the sea through God's power is preserved violently in one place not returning and flooding the whole earth, thus the sea obeys God's command at the limits of the earth not to cross over the established boundary of the shore unless God should allow it.⁴³

Here Münster claimed that two of water's behaviors vis-à-vis the earth provided evidence of God's power. For Münster, the fact that the islands remained stationary even after the constant buffeting of waves provided the first example people could discover for God's power in the water-earth relationship. That the water stayed in its boundaries and did not flood the earth even against its natural inclination provided Münster with a second example of God's power to be found in the current water-earth relationship, as he intimated that water's restraint showed God to be more powerful even than nature, as he made water behave violently to allow the islands' existence. For these writers of cosmographies as for the biblical commentators discussed above, the restraint of a forceful, fluid substance such as water provided them with an opportunity to extol and explore God's power.

In addition to revealing some of God's attributes, water's failure to flood the earth also provided lessons for proper human behavior for some of these sixteenth-century authors. For them, these examples for appropriate human conduct were therefore a second thing the water-earth relationship revealed to those people who studied this particular phenomenon. Most basically, many sixteenth-century authors stated that God's holding back the waters required people to acknowledge God's care for them and to worship him. The Franciscan, Konrad Pellikan, emphasized that all creation should lead people to praise God, but that the dry land's existence and fertility in particular should do so since these both were basic to human life in his 1536 commentary on the Pentateuch. He claimed, "we should learn to praise the Lord God as a result of all creatures, but especially for the dry and fertile earth, which was conceded to us, being appropriate to sustain

43 "Et certe hic videmus mirabilem dei potentiam, quod tot passim parvae insulae in vastissimo mari inveniuntur, quae assiduas procellarum illisiones sustinent, & tamen numquam e loco semoventur, neque maris inundatione submerguntur [...]. Sicut enim mare per dei potentiam violenter in uno loco conservatur ne revertatur & inundet totam terram, ita in limitibus terrae obtemperat mandato dei, ne constitutum littoris terminum transgrediatur, nisi deus dispenset"; Münster, *Cosmographia universalis* (1550), sig. a2r.

human life and for consolation."⁴⁴ Citing Martin Luther, Christoph Pelargus emphasized the human response to having a dry place to live even more than Pellikan, as he stressed that God's care for human beings in this matter should incite them to give thanks (*actionem gratiarum*) to God in his late sixteenth-century commentary on Genesis.⁴⁵ A similar claim appeared in the second dedicatory epistle that accompanied Gerard and Rumold Mercator's 1595 *Atlas sive cosmographicae meditationes de fabrica mundi et fabricati figura* from Jacobus Sinstedius. Sinstedius began the letter with the claim that Gerard Mercator had shared his treatise on creation with him prior to his death – a treatise that began the *Atlas*. Summarizing the general course of creation from the single mass on the first day to the fashioning of the heavens and angels, Sinstedius argued that all creation in general should inflame people to give thanks to God, but he intimated immediately that the current relationship between water and earth provided particular evidence of this need for thanksgiving in his juxtaposition of his call for praise with the following description of what Mercator taught about the layout of the earth's waterways and landmasses:

Surely there is that judgement of perceptive and clever people (*ingenii*), that since the waters were separated from the earth and were enclosed in hollows of the middle of the earth, the center of the weight [of the earth] is not overpowered [by water] evenly due to [the requirement for] equilibrium everywhere; from which he [Mercator] concludes and demonstrates that the other part of the earth below our horizon stands out from the waters to correspond to our Europe, Asia, and Africa.⁴⁶

For all of these authors, God providing people with a safe place to live and even places Europeans had just discovered or even speculated about in the case of Sinstedius showed people that they must praise God for his care for them.

44 "Discamus Dominum Deum laudare ex creaturis omnibus, maxime autem pro arida nobis concessa terra ac foecunda, victui humanae apta & consolabili"; Pellikan, *In Pentateuchum sive quinque libros Mosis*, sig. a2r.

45 Pelargus, *In Prophetarum omnium oceanum sive Genesin sacram mosaicam*, sig. C3r.

46 "Illud certe solertis & sagacis ingenii iudicium est, quod ex aquarum a terra separatione & mediae terrae cavitatibus inclusarum, idque undique ex aequilibrio, ne centrum ponderis in aequalitate gravetur; inde concludit & probat alteram terrae partem infra nostrum horizontem ex aquis eminentem, nostrae Europae, Africae, & Asiae correspondere"; Jacobus Sinstedius, "Epistolae duae," in Mercator and Mercator, *Atlas sive cosmographicae*, the page immediately preceding sig. ar.

For other authors of sixteenth-century exegetical and cosmographical texts, learning about God's control over water as it failed to flood the earth should lead people both to believe and trust in God as well as fear him. In his 1543 commentary on Genesis, Wenzeslaus Linck argued that the manner in which God used his Word to create a commodious living place for human beings should lead them to believe in both God and eternal life, stressing in this discussion both that water did not cover the earth and that the earth did not sink into the water.⁴⁷ Musculus also included a similar claim in his commentary while focusing specifically on the water-earth relationship. Using the separation of the waters and the fertility of the earth as examples which admonish people to recognize God's ingeniousness, he argued, "whereby we must know not to agree the next time the universe seems disagreeable so that we are willing to suffer only in the moment; but it must be born patiently as little by little that thing to be raised is raised up and that thing to be completed is completed."⁴⁸ For Musculus, the perfection of God's exposure of the dry land provided people with hope that even if the world seemed harsh that God would ultimately perfect it. Johannes Rauw argued that God's restraining of the waters from the earth should also teach people to trust in God much as Musculus had in his cosmographical text, but rather than urge people to trust that God would eventually perfect the universe, Rauw argued that the dry land's existence provided people with a reason to believe in both God and eternal life. He claimed, "We should remember not only God's omnipotence but also our happy resurrection to eternal life."⁴⁹ For Linck, Musculus, and Rauw, God's guidance of water to give people a safe, fertile place to live provided them with a reason to believe in God and trust in the coming perfection of the universe and their future eternal life.

Whereas Linck, Musculus, and Rauw learned a lesson of hope from God's control over water, George Fabricius and Jerome Zanchi both focused instead on what God had done with water and showed their contemporaries that water's awesome ability to flood the earth when the restraint God imposed on it was removed should teach them to fear God in their commentaries on Genesis. A German humanist, who studied at Leipzig and traveled extensively in the Italian Peninsula studying Roman artifacts, Fabricius took a

47 Linck, *Annotation in die fünf Bücher Mosis*, sigs. Bir–v.

48 "Quare cognitandum nobis est, non convenire ut mox universa quae videntur incommoda, unica velimus esse sublata momento; sed patienter esse feredum, ut palatim tollantur tollenda, & perficienda perficiantur"; Musculus, *In Mosis Genesim plenissimi commentarii*, 21.

49 "Darhen wir uns nicht allein der Allmacht Gottes sondern auch unser fröhlichen Aufferstehung zum ewigen Leben errinnen sollen"; Rauw, *Cosmographia*, sig. Aiiiir.

more general approach to this lesson as he just briefly described the creation process and argued that it should teach people both to love and fear God, given his damnation of all of creation after the fall.⁵⁰ In contrast, Zanchi wrote about this topic at some length. Zanchi's discussion of how water's restraint should teach people to fear God occurred in his argument that the dry land's existence was a miracle which only God could cause. In making this claim, Zanchi argued against philosophers who explained that heavenly bodies dried up the water from the earth, and he asserted that it was God's Word alone that did so against water's nature.⁵¹ He then connected water's natural propensity to flood the earth without the restraint God imposed on it to how this propensity should inspire fear in people. He explained:

Therefore let us likewise learn to fear God, who in a moment is able to inundate the whole world with water, if he were only to permit water its natural course. This is evident in the first flood, and it is what is said according to Jerome "Will you not fear me? Will you not be terrified by my face?" Therefore, from this example (*hoc igitur loco*) let us learn both to fear God and to love him and to give thanks to him for such a benefit.⁵²

For Zanchi, God's ability to let the waters submerge the earth, which he had chosen to do during the flood to punish the wicked, should lead people to fear God just as his usual restraint of this liquid should lead them to love and give thanks to God.

For at least two authors whose works we have explored, the behavior of the waters provided people with an example of obedience to God that they should follow. Since water abided by God's command and stayed back from most of the earth, this substance could teach people how they should respond to God's Word. Such an argument had appeared prior to the sixteenth century in the *Genesis Rabbah*. As we saw in Chapter 1, the scholars who compiled this text had juxtaposed Genesis 1:9 with Psalm 104:7 to show that water entirely obeyed God's will, unlike people, who would come to be punished for their disobedience with water during the flood.⁵³ We see a similar claim

50 Fabricius, *Commentarius in Genesin*, sigs. B6r–B7r.

51 See the discussion in Chapter 2, pp. 000–00.

52 "Etiam simul discamus timere Deum, qui uno momento, posset totum Mundum Aquis inundare: si tantum permetteret Aquis, suum naturalem cursum. Apparet hoc in diluvio primo. Atque hoc est, quod ait per Iere. An non timebitis me? An non pavebitis a facie mea? Ex hoc igitur loco discamus & timere Deum, & eundem amare, gratiasque ei agere pro tanto beneficio"; Zanchi, *De operibus Dei intra spacium sex dierum creatis opus*, sig. X4r.

53 *Midrash Rabbah: Genesis*, 1: 34.

in the exegetical commentary of the Franciscan, Johann Wild. He stated, “The shame is not average that the insensible elements obey God’s command and people do not obey in whom there were perception and reason from the beginning. We also have other examples and not this one alone of water’s obedience,” and he proceeded to cite further biblical passages from the Books of Job and Jeremiah to emphasize water’s obedience.⁵⁴ Frans Titelmans also included a similar lesson in his natural philosophical textbook. After describing how God caused a miracle in keeping the waters from the earth, he explained, “yet it is not the natural creatures who are disobedient as it is people, for whom it is necessary often either to command or prohibit the same on account of speeding up obedience.” Included in the margin is a note to the reader that urged them to “note how much more steadfastly natural things obey than people.”⁵⁵ For both Wild and Titelmans, water’s current failure to flood the earth provided people with a model for how they should respond to God’s Word, as they should attempt to behave like water by going against their sinful nature to do what God commanded of them.

Whereas many sixteenth-century authors claimed that the water-earth ontological and spatial relationships taught people about God’s attributes as well as lessons about human gratitude for, trust in, fear of, and obedience toward God, there were several authors of biblical commentaries who also claimed that these relationships taught people the various treatments God doled out to both the faithful and the wicked. Such an argument appeared first in Luther’s *Lectures on Genesis* in the 1530s as well as in Martin Borrahus’s 1555 and Jacques Brocard’s 1580 commentaries on Genesis. Luther made this argument in his discussion of God’s continued providential guiding of the water in the present day to keep people safe on the earth. After explaining that God holds the waters back from submerging the earth as they had during the flood, Luther stated, “it shows that the sea is in God’s hands, which he is able both to hold and to let loose in the midst of the ungrateful and the evil.”⁵⁶ Borrahus also focused on God’s use of water to punish the wicked in his commentary. He began this discussion with a summary of

54 “Non mediocris pudor est, imperio Dei insensibilia elementa parere & homines non obedire, quibus sensus & ratio inest ab initio. Caeterum non hic solum obedientis aquae exemplum habemus”; Wild, *In totam Genesim*, sig. B3v.

55 “Non enim inobedientes sunt creaturae naturales ut homo, cui necesse est saepius eadem vel praecipere vel prohibere, propter obedientiae promptitudinem.” The marginal note reads as follows, “Nota firmiorem rerum naturalium quam hominis obedientiam”; Titelmans, *Compendium naturalis philosophiae*, sig. Mir.

56 “Ostendat Deus mare esse in manu sua, quod et tenere possit et in ingratos et malos immittere”; Luther, *Genesisvorlesung*, 26.

the flood's outcome, stating that God had promised that water would not submerge the pious again. He then claimed that God did continue to use his control over water to punish tyrants such as the Assyrians, Babylonians, the Egyptians, and the many others, who were and are on the prowl for victims.⁵⁷ Brocard offered the longest discussion of this theme, explaining how God's gathering of primordial water into one place and his control over it allowed him to use it to punish the impious and to castigate the pious. Brocard argued, "but we must direct attention to how the waters are placed for the impious and the pious," and he then went on to intimate that in addition to punishing the impious, God also used the waters to castigate the pious, though he held them back from submerging and ruining them fully.⁵⁸ Whereas Luther, Borrhaus, and Brocard all argued that people could learn about God's treatment of the faithful and the wicked from the manner in which he did and did not allow water to flood the earth, their work hints at this lesson's wider connection to sixteenth-century European religious culture. Focusing on how God uses water to treat the faithful and the wicked differently, we see the water-earth relationship perhaps playing a polemical role in these texts, as these authors' contemporaries debated proper Christian beliefs and practices, dividing on the basis of their own definitions between the faithful, whom the water could perhaps reprove but never harm, and the wicked, whom God would eventually drown.

Allowing scholars to explore God's connection to the universe and human perception of that connection, the water-earth ontological relationship and the layout of the world's landmasses and bodies of water were of particular interest to the authors of sixteenth-century texts that addressed the dry land's existence because they lived in the midst of redefinition and debate about some of the basic Christian understandings of God, human beings, and the world. In addition to exploring this relationship and layout for what they showed them about the reasons behind God's creation of the world in the first place and his continued providential guiding of it, many also argued that God's keeping the waters from flooding the earth taught them about God's power and goodness, provided models for their appropriate behavior, and even showed how God would reward the faithful and punish the wicked in a period when more and more Europeans made such stark

57 Borrhaus, *In Mosem, divinum legislatorem*, sig. a3v.

58 "Sed illud advertendum est, aquas poni pro impiis & piis: ob quae rem ut hic indicetur, de quibus aquis sit sermo, de impiis scilicet, dicuntur aquae, quae sub caelo, sunt congregari in locum unum, atque impediri, ne demergant, & perdant pios, quos Deus castigatos tantum voluit"; Brocard, *Mystica et prophetica libri Geneseos*, sig. Bbir.

divisions between themselves and their contemporaries. Water and earth therefore proved to be fruitful topics to think through some of the most pressing questions then under debate that calls for religious reform helped to raise.

Conclusion

Though the topics of water and earth allowed the sixteenth-century authors whose works we have explored to delve into questions about God's connection to the universe and the human perception of that connection, the period's unique interest in this connection and its perception still does not fully explain why these authors expanded the ontological categories through which to classify the water-earth relationship and focused more on the layout of landmasses and bodies of water than their predecessors, even as they used typical bookish methods to understand this classification and layout. This interest does point the way toward the final piece of this puzzle, however. Water and earth were not just topics through which sixteenth-century authors could debate and try to answer questions about God, the world, and themselves. They were also a part of the material world with which people interacted on a daily basis. Coming from a Judeo-Christian perspective, these authors understood this material in relationship to God. The aqueous events in Genesis showed them that God controlled water and earth to provide the safe, fertile places in which people currently lived. The material water they drank and that nourished their plants and the earth on which they dwelled and from which they harvested those plants came ultimately from God, making him responsible for the actual, physical locations of water and earth as well as their ontological relationship. In the sixteenth-century, Europeans learned more about this layout than their predecessors, as their contemporaries sailed to sub-Saharan Africa, Asia, and the Americas, discovering previously unknown yet inhabited dry lands and the waterways that connected them all together. These voyages, especially to the Southern Hemisphere, ultimately provided the stimulus to sixteenth-century European authors of exegetical, natural philosophical, cosmographical, and geographical texts to re-examine the ontology of the water-earth relationship as they explored these substances' location. These voyages' revealing that water and earth did not have the spatial relationship previous Europeans had argued they did even encouraged sixteenth-century Europeans to use their bookish, scholarly methods and rediscovered texts to search for different ways of conceiving of the contemporary water-earth

ontological and spatial relationships as well as to explore what seemed to many to be relationships that violated the natural order in order to learn about the connections between God, the world, and human beings.

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7. Sea Voyages and the Water-Earth Relationship

Abstract

This chapter argues that it was fifteenth- and sixteenth-century sea voyages especially to the southern hemisphere that ultimately explain why particularly sixteenth-century Europeans re-evaluated the ontological and spatial relationships between water and earth. Though certainly there were some medieval scholars who argued differently, the most prevalent spatial model of the world's landmasses and waterways in the late middle ages positioned the dry land in the northern hemisphere and placed a large amount of water in the southern hemisphere. As Europeans sailed down the west coast of Africa and to South America, the water that carried them and the texts that circulated about these voyages disproved many of the basic earlier assumptions about the water-earth spatial and ontological relationships.

Key Words: voyages of discovery; encounters; Amerigo Vespucci; Gerard Mercator; southern hemisphere

[That land has been discovered (*invenio*), which ought to be called a new world] contradicts the opinion of our ancient authorities, as most of them claimed that there is no continent south of the equator, but rather a great sea, which they called the Atlantic. And if they affirmed that there was a continent there, they denied that it was habitable land for many reasons. But my last voyage revealed their opinion is false and that the contrary is entirely true, since I discovered a continent in those southern regions that is inhabited by more numerous people and animals than our Europe, or Asia, or Africa.

– Amerigo Vespucci [?], *Mundus novus* (1504)¹

1 “Hec opinionem nostrorum antiquorum excedit, cum illorum maior pars dicat ultra lineam equinoctialem et versus meridiem non esse continentem, sed mare tantum, quod atlanticum vocavere. Et, si qui eorum continentem ibi esse affirmaverunt, eam esse terram habitabilem

Claiming to be the text of a letter from Amerigo Vespucci about his third voyage to the Western Hemisphere, the widely circulated *Mundus novus* reveals the major influence behind sixteenth-century Europeans' reclassification of the water-earth relationship and their reconceptualization of the spatial arrangement between the world's landmasses and bodies of water. Late fifteenth- and sixteenth-century European sea voyages and what these voyages showed and suggested about the locations of earth and water influenced this reclassification and reconceptualization. They also helped lead Europeans in this period to apply their bookish methods to this relationship's ontological status and spatial arrangement and to use it as a topic in which to think through God's connection to the universe and what people should learn from that connection, as we have explored in Chapters 5 and 6. As the *Mundus novus* states, Vespucci's third voyage showed that there was a densely inhabited continent south of the equator, which contradicted earlier notions of the water-earth spatial relationship and of the resulting uninhabitability of the Southern Hemisphere. According to the letter, the experience of this voyage indicated that both those ancient authorities who claimed that the Southern Hemisphere was made up entirely of water and those who claimed that any continent in the Southern Hemisphere was uninhabited were totally wrong. On the contrary, Vespucci's experience revealed that the opposite was entirely true. Water did not fill the entire Southern Hemisphere, and inhabited, dry land – with even more people and animals than Europe, Asia, and Africa – existed there instead. In doing so, this voyage, and the many before and after Vespucci's to sub-Saharan Africa, Asia, and the Americas exposed that earlier Europeans had been wrong about the layout of the earth's landmasses and waterways, leading some sixteenth-century Europeans to seek to understand this new information through the flexible bookish methods their predecessors had long practiced and to explore what this spatial relationship that seemed to contradict both nature and tradition might mean for associations between God, the world, and human beings.

Though it is certainly true that the vast majority of sixteenth-century Europeans, including and perhaps especially European scholars, did not take part personally in overseas voyages, information about these voyages and their encounters with different peoples, landmasses, and waterways circulated widely both by word of mouth and in print from the fifteenth

multis rationibus negaverunt. Sed hanc eorum opinionem esse falsam et veritati omnino contrariam: hec mea ultima navigatione declaravit: cum in partibus illis meridianis continentem invenerim frequentioribus populis et animalibus habitatam quam nostrum Europam seu asiam vel africanam"; Vespucci [?], *Mundus novus*[, 4].

century. These voyages and encounters began even before the spread of printing technology in Europe. Portuguese mariners encountered islands off the west coast of northwest Africa in the Atlantic Ocean from about 1420, beginning to settle them shortly thereafter. The kingdom of Castile, too, was involved with the Canary Islands from the early fifteenth century. With strong papal support, both the kingdoms of Castile and Portugal continued to back the exploration and even settlement of these Atlantic islands politically and financially, and Portuguese-funded expeditions began to explore the west coast of Africa in the late 1430s and 1440s in pursuit of slaves and gold, reaching the westernmost point of Africa in 1458 and entering the Gulf of Guinea in 1462. In 1469, King Afonso V of Portugal (1432–1481) granted Fernão Gomes a monopoly over the Guinea trade, and he explored a further 2,000 miles (3,200 kilometers) of coastline, crossing the equator for the first time in 1473. To calm the political and commercial tensions between the royal families of Castile and Portugal that intermarriage and these overseas encounters had caused, they both signed the Treaty of Alcáçovas in 1479. In exchange for giving up claims to the Castilian throne and the Canary Islands, Afonso V gained Castile's consent to the Portuguese hold over the navigation and trade routes down the west coast of Africa, thereby continuing the Portuguese focus on Africa and pushing Castile to turn to different sea routes if they desired to reach Asia by water, which both the Portuguese and Castilian monarchs pursued at various points during the 1480s and 1490s. With Portuguese support, Bartolomeu Dias (d. 1500) rounded the southern portion of Africa, returning to Portugal in 1488 to report on his trip, and Vasco da Gama (d. 1524) returned to Portugal in 1499 after sailing around the southern portion of Africa, up its east coast, and to the Malabar Coast in the Indian subcontinent. Not to be outdone, Isabella of Castile (1451–1504) sponsored Christopher Columbus's voyage in 1492 that ended up reaching islands in what is now known as the Caribbean Sea, and sailors in the pay of both Castile and Portugal had sighted and explored portions of the northern and eastern coasts of the soon-to-be-named South America by the early 1500s. This era of Portuguese- and Castilian-supported sea travel perhaps reached its culmination when Sebastian del Cano (d. 1526), who had been a part of the Portuguese Ferdinand Magellan's (d. 1521) attempt to circumnavigate the world, returned to Castile in 1522, reporting that such circumnavigation actually was possible.²

2 For a general overview of these voyages, see Love, *Maritime Exploration in the Age of Discovery, 1415–1800*, 1–53. See also, Diffie and Winius, *Foundations of the Portuguese Empire 1415–1580*; Newitt, ed., *First Portuguese Colonial Empire*; and Abulafia, *Discovery of Mankind*, 33–75.

Even though both the Portuguese and Castilian governments tried to control the circulation of information about the voyages and encounters they funded and supported to protect their monopolies over trade routes, this information did circulate widely among European scholars through both maps and narrative accounts of them. The modern scholar, Jerry Brotton, has noted that this scholarly interest in new trade routes and in information about which Europeans had not previously known can be seen in maps beginning in the early fifteenth century, and that these maps were especially focused on those routes linking Europe with Asia since the impact of the discoveries of the Americas took longer to affect Europeans than has typically been realized.³ He also stresses that the wide circulation of both manuscript and printed maps created a culture among many literate Europeans, who shared the conventions associated with the Ptolemaic world picture – images of which had been widely circulated and frequently printed even before 1500 – forming a community among them that reached across geographical space and time.⁴ Something similar occurred with the narratives of overseas voyages. One of the most popular such narratives of the early sixteenth century was the *Mundus novus*, discussed above. It first appeared in print in Florence in 1502–3, and it was reprinted in Latin afterward many times as well as translated into German in 1505 and Flemish in 1506.⁵ The letter was also incorporated into collections of travel writings shortly thereafter. This popularity has led the modern scholar, Alfred Hiatt, to conclude the following. “The evidence of the number and frequency of editions of Vespucci’s texts, when compared to the dissemination of Columbus’s writings, indicates that, however briefly, during the first part of the sixteenth century, Vespucci’s fame displaced that of Columbus.”⁶ Christine Johnson has shown how diplomatic, scholarly, and commercial channels brought Spanish and Portuguese letters and accounts of overseas travel to German readers, inspiring translations of these works into German language compilations such as the *Neue unbekante landte* (New unknown lands), which was published in Nuremberg in 1508, and the Latin *Novus orbis regionum ac insularum veteribus incognitarum* (New world of regions and islands unknown to the ancients) of 1532, which incorporated further

3 Brotton, *Trading Territories*, 26–32.

4 *Ibid.*, 35–39. Brotton points out that of the 222 maps printed prior to 1500, about half were Ptolemaic.

5 Formisano, introduction to his *Letters from a New World: Amerigo Vespucci’s Discovery of America*, pp. xix–xxii.

6 Hiatt, *Terra Incognita*, 192.

European travel narratives in each subsequent addition.⁷ Mary C. Fuller has also argued that even though England's printers did not originally seem interested in printing accounts of the voyages, despite the travels of England-based mariners and fishermen to the Western Hemisphere from the early sixteenth century, Richard Hakluyt produced his *Principal Navigations of the English Nation* (1598–1600) by the end of the century.⁸ These widely circulated maps and narrative accounts provided information about overseas travel to sub-Saharan Africa, Asia, and the Americas, even to those scholars who never left Europe.

Though frequently fantastical and contradictory, these narratives suggested to many European scholars that their predecessors had been wrong about the placement of the world's landmasses and waterways as well as the ontological status of the relationship between the elements of water and earth. These voyages and encounters with people living in the Southern Hemisphere challenged the cosmological model referenced in the *Mundus novus* of a water-filled Southern Hemisphere that had become common among authors of theological, natural philosophical, geographical, and cosmographical texts from the fourteenth century. Many of these authors explicitly stated that these voyages had changed the manner in which they conceived of water and earth both ontologically and spatially, thereby revealing yet again the impact overseas travel had on Europeans' conceptions of the water-earth relationship. These voyages urged European scholars to develop new cosmological models that considered what overseas travel and encounters with people living in the Western and Southern Hemispheres showed about the actual relationship between water and earth, leading them to newly discovered ancient texts, to rereadings of other authoritative texts, and to the reconsideration of the connections between God, people, and the world, as they tried to understand the world God had made.

The Medieval Water-Filled Southern Hemisphere Model

By the fourteenth century, the prevalent model of the universe among Europeans posited that there was more water than earth in the world and that this water filled the Southern Hemisphere, flooding any earth located there. According to this model, the Southern Hemisphere was the repository for the majority of water in the world, and as such, this arrangement allowed

7 Johnson, *German Discovery of the World*, 19–27.

8 See Fuller, *Voyages in Print*, and her, *Remembering the Early Modern Voyage*.

dry land to appear only in the Northern Hemisphere. This model had not always been so common among Europeans, however. Crates of Mallus's and Parmenides' notions of four land masses separated by two large bands of water and the heat of the torrid zone at the equator were influential ideas among ancient and early medieval geographers. There were also several significant medieval authors such as Roger Bacon, Albertus Magnus, Marco Polo, Sir John Mandeville, and Pierre d'Ailly who argued that there was more land than water in the world and that there was inhabited land in the Southern Hemisphere. Despite these voices, the notion of a water-filled Southern Hemisphere predominated until the late fifteenth-century Portuguese- and Castilian-backed voyages encountered people living on dry land in the Southern Hemisphere.⁹ The circulation of the information about the experience of these voyages and the existence of this inhabited land in the Southern Hemisphere gradually led sixteenth-century Europeans to rethink and reclassify the water-earth ontological and spatial relationships as they tried to figure out where all the water they had expected their contemporaries to find in the Southern Hemisphere actually was.

The notion common among medieval Europeans that there was more water than earth in the world can be traced back ultimately to ancient Greece. Arguably, Homer and Hesiod's notion of a flat earth surrounded by the Ocean encouraged such a thought that there was more water than land in the world,¹⁰ and Thales of Miletus built on this concept to affirm that the earth floated in water and that water was the underlying principle out of which all others developed, thereby also implying that water predominated over the earth.¹¹ Such claims about the amount of water relative to the earth became even more suggestive in Plato and Aristotle's works. As we noted in Chapter 1, Plato was the first Greek to describe the spherical earth fully,¹² and as he did so, he also retained Empedocles' notion of the four elements in his *Timaeus* – fire, air, water, and earth – though attributing their combination to their geometric shape.¹³ Plato offered the following description of the transition from one element to another that implied there was more water than earth in the world.

This [water], when it is compacted, we see (as we imagine) becoming earth and stones, and this same thing, when it is dissolved and dispersed,

9 On this model's prevalence in the Middle Ages, see Randles, "Classical Models of World Geography," 22–27.

10 Kirk et al., eds. and trans., *Presocratic Philosophers*, 10.

11 Aristotle, *Complete Works of Aristotle*, 1555–56.

12 Furley, *Cosmic Problems*, 24.

13 Plato, *Plato's Cosmology*, 228.

becoming wind and air; air becoming fire by being inflamed; and, by a reverse process, fire, when condensed and extinguished, returning once more to the form of air, and air coming together again and condensing as mist and cloud; and from these, as they are yet more closely compacted, flowing water; and from water once more earth and stones.¹⁴

Though Plato never stated that he understood this transition in terms of elemental volume, his discussion of “condensing” and “coming together” as well as “dispersing” suggested that there was more water than earth in the world because he stated that the water needed to condense itself in order to turn into earth and disperse itself in order to become wind and air. According to the modern scholar, W.G.L. Randles, Greek commentators misunderstood a similar discussion in Aristotle’s works and began to argue that there actually was ten times more water than earth in the world. They then passed on this notion to the Middle Ages as though it was Aristotle’s official teaching on the subject, guiding Randles to conclude, “this erroneous doctrine, leading to the belief that the volume of the Ocean was ten times that of the earth was [...] to constitute a hinderance to projects of transatlantic navigation.”¹⁵

Before these commentators bequeathed to the Middle Ages the notion of the Ocean’s much larger volume than the earth, many other ancient Greeks and Romans placed the world’s water in two ocean bands that, they argued, separated the world’s four different landmasses. This model of the water-earth spatial relationship became popular enough in the early Middle Ages so that it could have challenged the subsequent notion of a water-filled Southern Hemisphere. As we saw in Chapter 1, this argument reached back to Crates of Mallus, and it became a topic of conversation among ancient geographers such as Strabo and Pomponius Mela. Though the vast majority of their works were devoted to a description of the ecumene because both Strabo and Pomponius Mela argued that people in the ecumene could not cross the ocean bands due to their immense size and the heat of the torrid zone, drawing here on Parmenides, they still both situated the ecumene within Crates of Mallus’s world model.¹⁶ This model continued to be influential even after the fall of the western Roman empire and into the Middle Ages through the works of Macrobius and Martianus Capella. Trying to offer compendia of all scientific knowledge, both Macrobius and

14 Ibid., 179.

15 Randles, “Classical Models of World Geography,” 9–10.

16 Strabo, *Geography*, 1: 113, and Pomponius Mela, *Pomponius Mela’s Description of the World*, 34.

Martianus Capella also argued that there were other landmasses in the world that two ocean bands separated from the ecumene. They disagreed on whether people in the ecumene could travel to these other lands, however. Whereas Macrobius claimed the following about these lands, “by whom it is occupied, we have never been permitted to learn and never shall be, since the torrid zone lying between denies the people of either zone the opportunity of communicating with each other,”¹⁷ Martianus Capella claimed the following, “voyages in all directions prove that a circumambient ocean girds the shores of the globe [...] From the pillars consecrated to Hercules at Cádiz all the way around the Arabian Gulf, the southern Ocean is navigable, as has been attested in many instances.”¹⁸

The popularity of Macrobius and Martianus Capella’s works from the ninth to the twelfth centuries brought this cosmographical model to later Europeans, but Augustine’s influential discussion of the water-earth spatial relationship proved to be more significant to the development of the fourteenth-century water-filled Southern Hemisphere model that predominated in Europe on the eve of overseas voyages.¹⁹ As we saw in Chapters 1 and 4, Augustine had denied the existence of inhabited land in the Southern Hemisphere for theological reasons. As he did so, he posited a hypothetical arrangement between water and earth there. He stated that, “They [those such as Crates of Mallus, who argued for land in the Southern Hemisphere] fail to observe that even if the world is held to be global or rounded in shape, or if some process of reasoning should prove this to be the case, it would still not necessarily follow that the land on the opposite side is not covered by masses of water.”²⁰ In denying the existence of the Antipodes, Augustine here hypothesized that even if there were land located in the Southern Hemisphere, it could be covered entirely with water. Isidore of Seville took what Augustine had hypothesized and made it a statement of actual fact in his *Etymologiae*. Drawing on Augustine, he stated that, “the size of the ocean is said to be beyond compare and its width impassable. Moreover, the philosophers say that there is no land beyond the ocean.”²¹

Even though Augustine and Isidore’s “pronouncements can in no way to be said to have settled the question of the Antipodes,”²² even those medieval authors who held to a different model of the water-earth spatial relationship

17 Macrobius, *Commentary on the Dream of Scipio*, 203.

18 Martianus Capella, *Martianus Capella and the Seven Liberal Arts*, 230–31.

19 On these works’ influence, see Hiatt, *Terra Incognita*, 65–95.

20 Augustine, *City of God*, 5: 49–51.

21 Isidore, *Etymologies of Isidore of Seville*, 168.

22 Hiatt, *Terra Incognita*, 82.

such as Roger Bacon, Pierre d'Ailly, and Albertus Magnus acknowledged that many of their contemporaries held that there was more water than earth in the world and that water filled the Southern Hemisphere. Bacon as well as d'Ailly, who incorporated this passage of Bacon's text verbatim into his *Imago mundi*, stated that water occupied much less space than people typically thought, leading them to claim, "therefore it follows that that the quantity of inhabitable land is great and that covered by water ought to be moderate."²³ Albertus Magnus referenced his contemporaries' belief in a water-filled Southern Hemisphere in his *De natura loci* as he attempted to prove that people could live in the torrid zone. To do so, he explained that he was arguing against both those who cited the scorching heat of the torrid zone as a hinderance to its inhabitation as well as those people, who stated that the Southern Hemisphere is submerged in water.²⁴ Though Bacon, Albertus Magnus, and d'Ailly did have a different notion of the water-earth spatial relationship that clashed with the one Augustine and Isidore had proposed, their very arguments show just how influential the conceptions of a water-predominate world and a water-filled Southern Hemisphere had already become by the thirteenth century when Bacon and Albertus Magnus wrote and remained into the fifteenth century when d'Ailly appropriated Bacon's text for his own purposes.

The predominance of the water-filled Southern Hemisphere model coalesced beginning in the fourteenth century in natural philosophical, theological, and even some cartographical works, providing the model against which sixteenth-century Europeans reacted when overseas voyages revealed the inhabited land in the Southern Hemisphere. Writing in the early to mid-fourteenth century, Jean Buridan's notion of the difference between the earth's centers of magnitude and gravity due to the relative weights of exposed-to-air versus submerged-under-water earth posited that the exposed earth in the Northern Hemisphere stuck out above the water, whereas the waterlogged earth of the Southern Hemisphere remained submerged under the water.²⁵ This argument also appeared in the slightly later works of Nicole Oresme and Albert of Saxony, who had both studied at Paris while Buridan was a teaching master there, with Oresme largely upholding Buridan's claims and Albert of Saxony discussing them only to

23 "Et ideo secundam haec quantitas habitabilis magna est et quod aqua cooperitur modicum debet esset"; Roger Bacon, *Opus Majus of Roger Bacon*, 1: 291, and Pierre d'Ailly, *Ymago Mundi*, 1: 206–15.

24 Albertus Magnus, *De natura loci*, 12–13.

25 Buridan, *Quaestiones super libris quattuor De caelo et mundo*, 159.

refute them.²⁶ Paul of Burgos added his *Additiones* to Nicholas of Lyra's *postilla* on the biblical text decades after Buridan's death, and he, too, claimed that water entirely submerged the Southern Hemisphere. Rather than attribute it exclusively to a principle of nature as Buridan had done in his commentary on Aristotle's works, Paul of Burgos claimed that God worked with nature to gather the water in the Southern Hemisphere and to raise up the land in the Northern Hemisphere so that people would have a dry place to live in his biblical commentary.²⁷ As we saw in Chapter 4, this natural philosophical and exegetical discussion of the water-filled hemisphere influenced the creation of at least some fifteenth-century world maps as the Catalan world map (c.1425–30), Andreas Walsperger's world map (1448), and the Fra Mauro Map (c.1450) all stated explicitly in the text on them that the Northern Hemisphere stuck out above the water located in the Southern Hemisphere.²⁸

Traces of this water-filled Southern Hemisphere continued to linger even after Europeans began to encounter people living on dry land there, showing just how long-standing and tenacious this model was. As we saw in the Chapter 4, though authors of sixteenth-century geographical and cosmographical texts seemed to accept and develop new notions of the layout of the world's landmasses and waterways in the explicit discussions contained in their texts, the maps that frequently accompanied them retained large quantities of water in their Southern Hemispheres, likely due to the influence of this medieval model.²⁹ Writing about eight years after Dias's voyage around the southern tip of Africa and three years after Columbus's first voyage to the Western Hemisphere, Zaccaria Lilio still strongly supported the idea that dry land stuck out of the water in the Northern Hemisphere because water submerged it in the Southern Hemisphere. He stated, "for it comes together among all authors – the Greeks, Latins, and barbarians – that water pours around the earth everywhere except for that part, which that foremost God, who rules this world, reserved for the use of living creatures. Therefore, the earth, of which all is cultivated by us, is a certain, small island."³⁰ Such a notion of a water-filled Southern Hemisphere also appeared in the natural

26 Oresme, *Le livre du ciel et du monde*, 568–69, and Albert of Saxony et al., *Quaestiones et decisiones physicales insignium virorum*, fol. XLVIr.

27 Paul of Burgos et al., *Postilla literalis in vetus et novum testamentum*, sigs. fiiiv–fiiir.

28 Vogel, "Sphaera terrae," 307–20.

29 See above, pp. 000–00.

30 "Nam terram circumfusam undique aquis inter omnes convenit auctores, graecos, latinos, & barbaros: praeter eam partem quam princeps ille Deus qui hunc mundum regit, ad usum animantium reservavit. Est enim terra omnis quae colitur a nobis, parva quaedam insula ut

philosophy portion of Gregor Reisch's 1503 *Margarita philosophica*, as he explained how some dry land existed in the world. Drawing on the work of Albert of Saxony, Reisch did claim that water and earth formed one sphere, but he also built on Buridan's notions of separate centers of magnitude and gravity, arguing that this combined sphere's different centers allowed land to appear in the Northern Hemisphere and flooded any land that might be present in the southern one.³¹ Despite the continued influence of the water-filled Southern Hemisphere model evidence of which we find in Lilio and Reisch's texts, late fifteenth- and sixteenth-century European sea voyages to sub-Saharan Africa, Asia, and the Americas and the encounter there with people living on dried land challenged this model, rendering it ultimately moot and leading Europeans to seek to develop others so that they could grasp how God had actually fashioned the world in which they lived.

Voyaging and Redefining the Universe

Portuguese-funded voyages down the west coast of Africa and information that circulated about them based on mariners' actual experiences were the ones that first suggested that inhabited land existed south of the equator in contrast to the prevalent water-filled Southern Hemisphere model. As we saw above, armed with his monopoly on the Guinea trade from 1469 from King Afonso V of Portugal and likely seeking African peoples with whom he could trade for slaves and gold, Gomes led expeditions south down the west coast of Africa, crossing the equator for the first time in 1473. Portuguese-sanctioned voyages to explore further down the southern portion of the west coast of Africa continued in the 1480s, culminating in Dias's rounding of what is now known as the Cape of Good Hope in 1488. Despite the scholarly and popular focus on the westward direction of his four transatlantic voyages, Columbus, too, also traveled south from the Canary Islands in 1492, likely hoping to find the same or even better access to gold and other precious items as well as people ripe for conquest in the torrid zone that the Portuguese seemed to him to have discovered in equatorial Africa, and he continued this southwest course in his other subsequent transatlantic voyages.³² The notion that land existed in the Southern Hemisphere became more

Cicero autor est circumfuse illo mari quod atlanticum: quod magnum quem ocean appellatis in terris"; Lilio, *Contra Antipodes*, sigs. fiiir–v.

³¹ Reisch, *Margarita philosophica*, sig. oiiir.

³² On the southern direction of Columbus's voyages, see Wey Gómez, *Tropics of Empire*.

widespread with Pedro Álvares Cabral's (d. 1520) and his crew's accidental encounter with the northeast coast of South America in 1500. One of the members of his crew, Pêro Vaz de Caminha (d. 1500), wrote the official report of this encounter, and though he died in Calicut several months later, the report circulated widely.³³ Such voyages to the Southern Hemisphere and their encounters with peoples living on dry land there suggested to many authors of sixteenth-century texts discussing the water-earth relationship that the predominate water-filled Southern Hemisphere model was wrong and that Europeans needed to develop a new conception of the arrangement of water and earth and their relationship's ontological status.

Perhaps unsurprisingly, authors of sixteenth-century geographical and cosmographical texts were the main group, who explicitly stated that European voyages had made a water-filled Southern Hemisphere model of the universe obsolete, thereby revealing how these voyages ultimately pushed sixteenth-century Europeans to rethink the water-earth relationship's ontological status and the arrangement of the world's landmasses and waterways. Whereas some of these authors did so based on their own firsthand experiences, others cited the evidence of European voyages about which they had read in the widely circulated works on the subject to challenge the philosophical explanations for a water-filled Southern Hemisphere directly. The author of the *Mundus novus* letter and André Thevet were two such authors, who based their critique of the water-filled Southern Hemisphere on their own experiences of traveling to South America. As we saw above, the author of the *Mundus novus* claimed that Vespucci's voyage south of the equator had shown that the common opinion that nothing but water filled the Southern Hemisphere was entirely false and that the opposite was actually true, since he had discovered a densely inhabited continent there.³⁴ After calling out the ancients for not placing land in the southern portion of the world due to the amount of water they suspected was there in his *La cosmographie universelle* of 1575, Thevet also drew on his maritime experiences to claim that there was land in the southern portion of the world and that water actually had a border or boundary and served to link together the land in all portions of the earth.³⁵

Though he had not traveled to the Southern Hemisphere himself, Gerard Mercator in his treatise on creation that was printed as part of the *Atlas sive cosmographicae meditationes de fabrica mundi et fabricati figura* of 1595 used

33 Gunn, *First Globalization*, 19–20.

34 Vespucci [?], *Mundus novus* [, 4].

35 Thevet, *La cosmographie universelle*, 1: sig. aviv.

the example of Iberian voyages to the Southern Hemisphere to argue against Buridan's natural philosophical explanation of why dry land only existed in the Northern Hemisphere. Though he did not name Buridan directly, Mercator discussed what the coming together of water and earth into one sphere meant for this sphere's centers of magnitude and gravity at length. For he recognized that contact with water would change the weight of earth, much as Buridan had claimed in the early to mid-fourteenth century. Mercator ultimately argued against Buridan's position, however, claiming that land and water were equally distributed throughout the combined sphere, thereby challenging the water-filled Southern Hemisphere model.³⁶ Mercator used the evidence of both ancients' arguments as well as contemporary voyages to the Southern Hemisphere to do so. He even posited that there was another southern continent that Europeans had not yet discovered in order to balance out the other landmasses in the world – an unknown landmass that was marked “Terra Australis” on the world map in the *Atlas* (see Fig. 8). Having proved that the water-filled Southern Hemisphere model was incorrect, Mercator explained that based on his understanding of the combined water-earth sphere's centers of magnitude and gravity, there had to be an additional continent in the Southern Hemisphere that was just waiting to be discovered when the Antarctic pole was explored – a continent about which the “the ancients both knew and considered” and which “the discovery of a new continent in our age” necessitated. In addition to crediting these voyages with further proof for this Terra Australis's existence, Mercator also especially emphasized the southern location of these continents, again challenging Buridan's earlier explanations of how water submerged any land in the Southern Hemisphere, arguing that Europe, Asia, and Africa required the existence of another continent along with the southern portion of Asia and the new Indies or the Americas in order to balance out the combined water-earth sphere.³⁷

Sebastian Münster was the author who discussed how voyages had shown the water-filled Southern Hemisphere model to be incorrect most extensively

36 Mercator and Mercator, *Atlas sive cosmographicae*, sig. C3r.

37 “Haec omnia importat centri gravitatis & mundi constitutio, quae si a veteribus cognita & examinata fuissent, de nova continentis, quae nostro seculo inventa est, deque meridionalis continentis, quae nec dum explorato polo Antartico subiacet, situ, & magnitudine prope verum iudicassent. Etenim cum terrae veteribus cognitae 180. gradibus longitudinis comprehendantur, hoc est, dimidiam tantum sphaeram occupent, necessarium erat tandem terrarum in altera medietate extare. Et cum Asia, Europa, & Africa pro maxima parta ultra aequinoctialem, versus boream sint sitae, necesse erat tantam continentam sub antartico poli existere, quae cum Asia, & novae Indiae, sive Americae partibus meridianis, reliquis terris aequiponderaret”; *ibid.*, sig. C3v.

in his 1540 dedication letter to the *Geographia universalis*. As we saw at the beginning of Chapter 4, Münster intimated in his letter that for a long period of time, Europeans had thought that the ecumene was the only dry land in the world due to their conception of the masses of water that they thought filled the rest of the world, including the Southern Hemisphere. He concluded, however, that, “they are all wrong who were of that opinion, since islands project everywhere in the sea whether you are sailing to the west or to the east or are traversing the south or north.”³⁸ Münster gave the credit for this information to those contemporaries who had sailed throughout the world in a comparison with Alexander the Great. Crediting Alexander with beginning the exploration of the east, Münster claimed that, “if he is compared to those men, who in our age attempt to plough through unknown seas, they have uncovered in their explorations to the west, innumerable islands, people, and full resources found in the vastest sea, about which to this degree no one whatsoever was correct for 2,000 years or more.”³⁹ He then went on to state that he would base his work in this text on the reports from descriptions that had been built on such journeys,⁴⁰ thereby basing the edition of Ptolemy’s *Geography* that he edited both on ancient wisdom and what the latest voyages taught him and his contemporaries about the layout of the world’s landmasses and waterways. His introduction to the first world map in the text provides the best example of this combination, which is similar to the world map that appeared four years later in his German-language *Cosmographia* of 1544 (see Fig. 5). He described this map in the following manner: “a description of the whole world, making a likeness of the world, in which the investigation of Ptolemy and other ancient cosmographers of Africa and India in its furthest shores and those lands lying between is distinguished from the land having been discovered and explored by geographers of our age.”⁴¹ For Münster as for the author of the *Mundus novus*, Thevet, and Mercator, contemporary voyages, especially

38 “Sed falsi sunt omnes, qui in hac fuere sententia, cum nullibi non in mari emineant insulae, sive ad occidentem ieris sive ad orientem, sive meridiem lustres, sive septentrionem”; Sebastian Münster, dedication letter to Philippe von Gundelsheim, Prince-Bishop of Basel, in Ptolemy, *Geographia universalis*, sig. aa2v.

39 “Si comparetur viris illis, qui nostro aevo maria etiam incomperta sulcare tentarunt & Occidentem sua exploratione aperuerunt innumeras insulas, hominibus, & opibus plenas, in vastissimo mari adinvenientes, de quibus hactenus nemini quicquam constitit a duobus millibus annorum & supra”; *ibid.*

40 *Ibid.*, sigs. aa2v–aa3r.

41 “Orbis universalis descriptio, in qua praeter Ptolemaei aliorum veterum Cosmographorum investigationem, Africae, & item Indiae extrema littora, interiacensque, terra a nostri aevi Geographis deprehensa & explorata, expressa cernuntur”; *ibid.*, N7r.

those to the Southern Hemisphere, showed that water did not cover all the land there, as many of their predecessor had thought.

Even though such arguments that specifically claimed current sea voyages invalidated the notion that water filled the Southern Hemisphere appeared most frequently in geographical and cosmographical texts, they also occurred in at least two commentaries on Genesis 1:9–10. The first such example appears in Jakob Ziegler's 1548 *Commentary on the Conception of the World in Genesis and Exodus (Conceptionum in Genesim mundi et Exodum commentarii)*. After building on the common patristic and medieval explanation for water's failure to flood the earth that stemmed from Augustine to claim that primordial water condensed on the third day of creation at God's command, Ziegler turned to the question of where God had gathered this water together, contrasting what earlier scholars had taught with what contemporary voyages had revealed. He explained, "it was learned [in a prior period] that the earth has a figure divided into two hemispheres – the upper and lower. The upper earth is a flat surface or drum that retains the seat of lakes, rivers, and seas in itself: and the lower earth is drawn around into a swelling that floats in the unlimited sea."⁴² Ziegler's description of this earlier model of the "lower" or Southern Hemisphere does clash with those we have seen in other sixteenth-century works that addressed this model, since he did argue that earlier Europeans taught that there was some land in the Southern Hemisphere. However, he described this land as a protuberance only, and his description stressed the unlimited sea in which the protuberance floated. Much like the author of the *Mundus novus*, Thevet, Mercator, and Münster, Ziegler gave credit to contemporary voyages for changing his contemporaries' understanding of the water-earth spatial relationship. He stated, "But truly, the earth does not have the form that was learned: there is not unlimited sea anywhere, but rather the earth is enclosed [by water]," thereby making it possible to circumnavigate around the world. Ziegler then went on to state that what made this understanding of the water-earth relationship clear were contemporary voyages, as "recent explorations made through the sea and the new land (*terram novam*) have uncovered it."⁴³ These voyages showed that the conception of a predominately water-filled Southern Hemisphere were wrong.

42 "Terram habere figuram disci, & bipartiri in hemisphaerium superum & inferum. Superius planem, uti tympanum, recipere sedem in se lacuum, fluminum, & marium: inferius circumductum in umbonem, innatare infinito mari"; Ziegler, *Conceptionum in Genesim mundi et Exodum commentarii*, sig. D2v.

43 "De vero autem, terra non habet formam disci: nec est alicubi infinitum mare, sed circum terram clausum, undique continenti cohibitum, fretis & euripis, intercisum insulis, quo modoque

Benedict Pereira's 1589 commentary on Genesis 1:9–10 also used the evidence of the people and land Europeans had encountered in the Southern Hemisphere to argue that this hemisphere was not submerged entirely or even predominately in water. Wanting to show that God's power alone was responsible for the dry land's existence and that therefore, this existence was a miracle, Pereira went after the water-filled Southern Hemisphere model that stemmed back to Buridan because this model posited a natural explanation of the dry land's existence.⁴⁴ Instead of just stating that water's failure to flood the earth is a miracle like many other biblical commentators of the period did, Pereira actually used the evidence of Spanish voyages to the Southern Hemisphere and of the people whom they had found living on the land there to contradict this natural explanation. He explained that "the other part of the earth opposite to ours, on which it is said the Antipodes reside, is totally overwhelmed by water so that it is uninhabited, as though water was at first collected and congregated, covering the earth there, is false. In this period, through the voyages of the Spanish, the experience is clear that that land [in the Southern Hemisphere] exists which indigenous peoples inhabited before and which now the Spanish inhabit in various locations."⁴⁵ That this discussion appears in a biblical commentary whose author used it to stress God's power over nature shows just how significant these overseas voyages to the Southern Hemisphere were to changing the way Pereira and his contemporaries conceptualized the ontological and spatial relationships between water and earth.

Whereas these authors used European encounters with inhabited lands in the Southern Hemisphere to challenge earlier cosmological models explicitly, there is much other evidence that these voyages also directly affected how other authors of this century viewed water and earth. We see this in their considerations of how much water there really was in the world, their discussions of the combined water-earth surface or globe, their insistence on the existence of the Antipodes, their speculations about the fourth and

per Europam, Africam & Asiam circumnavigatur hodie, navesque nusquam haesuris & casuris similes timorem nautis faciunt, sed per superum hemisphaerum illic aequè uti in orbe nostro ventis & velis aguntur. Quod recentiores explorationes per mare & terram novam factae aperuerunt"; *ibid.*

44 Pereira, *Commentariorum et disputationum in Genesin*, sigs. F6v–G3v

45 "Alteram partem terrae huic nostrae oppositam, quam habitare dicuntur Antipodes, esse totam aquis obrutam ob idque inhabitabilem, quasi illuc aqua prius omnem terram operiens coacta & congregata sit, falsum esse, hoc tempore navigationibus Hispanorum plane compertum est: illa enim terra & antea fuerat ab indigenis habitata, & nunc variis locis ab Hispanis habitatur"; *ibid.*, sig. G4v.

even a fifth part of the world, and in their specific explanations of how these voyages changed their understandings of earth and/or water.

Copernicus's discussion of the amount of water in the world in his *De revolutionibus orbium coelestium* shows such direct evidence of these voyage's effects on his understanding of the water-earth spatial relationship and his felt need to develop a new understanding of that relationship.⁴⁶ He ultimately argued that there was much more earth and less water in the world than people typically thought. He began this discussion by noting, as Randles indicated, that the Peripatetics had taught that there was ten times more water than earth in the world. Copernicus first critiqued this notion based on geometry. Supposing that the people who had claimed this false proportion must be ignorant of this art, he explained how assuming water has ten times more volume than earth in the world would mean one of two things: either water would entirely submerge the earth or the world would have to be a lot larger than Europeans typically understood it to be.⁴⁷ After making this geometrical proof that there must be less water in the world than people expected, Copernicus then used the evidence of both ancient cosmographers, especially Ptolemy, who had extended the inhabitable land beyond that which was common among many ancients, and the discoveries of contemporary voyages to prove that there was much more land in the world. He stated:

It [the existence of more land and less water in the world than was previously thought] would be even clearer, if the islands that the Spanish and Portuguese rulers have discovered are added and especially America, having been named after its discoverer, who was a commander of ships, which, due to its unknown magnitude thus far, they think another part of the earth (*orbem terrarum*) in addition to the many other islands that were unknown before [...].⁴⁸

Though Copernicus's proof for the relative ratio of earth and water started with geometry, he clinched this proof with the evidence of contemporary sea

46 Thevet also argues for less water in the world than ancients supposed based on his own experiences and those of his contemporaries of finding previously unknown land throughout the world. See his discussion in Thevet, *La cosmographie universelle*, 1: sig. aviv–aviir.

47 Copernicus, *De revolutionibus orbium coelestium*, sigs. aiv–aiir.

48 “Magis id erit clarum, si addantur insulae aetate nostra sub Hispaniarum Lusitanaeque Principibus repertae, & praesertim America ab inventore denominate navium praefecto, quam ob incompertam eius adhuc magnitudinem, alterum orbem terrarum putant, praeter multas alias insulas antea incognitas [...]”; *ibid.*, sig. aiir.

voyages and the vast amount of previously unknown land these explorations had encountered, thereby ultimately allowing him to make his argument for a combined water-earth globe and for a heliocentric universe.

Still other authors of exegetical, geographical, and cosmographical texts discussed the impacts voyages had had on their understandings of the water-earth ontological and spatial relationships as they argued that water and earth combined together to form one surface in the world or one water-earth globe. We find such claims in the biblical commentaries of Ziegler and Nicholas Selnecker as well as in the cosmographical texts of Jean Fernel, Mercator, and Francesco Barozzi. Ziegler stated that water and earth make one surface like a ball before his discussion of how a water-filled Southern Hemisphere was incorrect, partly due to the evidence of contemporary voyages, thereby showing how these voyages also influenced his understanding of the layout of the world's landmasses and waterways.⁴⁹ Selnecker argued that whatever pertains to the elemental sphere of the world was fashioned on the third day of creation in his 1569 biblical commentary. He included among his long list of geographical and chorographical features that the two elements of earth and water comprise one globe, and he intimated that contemporary voyages affected the manner in which he and his contemporaries understood how this one globe was laid out, as he claimed that America is today added to the traditional list of the three continents of Europe, Asia, and Africa.⁵⁰ Concerned more than Ziegler and Selnecker with how God had arranged the world's landmasses and waterways, Fernel, Mercator, and Barozzi also argued for a combined water-earth surface or globe that they also attributed to contemporary voyages. In his 1528 *Cosmotheoria*, Fernel stated that water and earth combined together to form one sphere. Though he attributed this claim to Aristotle's *On the Heavens*, he also stated that "therefore at the same time, it is clear according to the written records of erudite men and from the true testimony of voyages that there are innumerable islands and many sandbanks sprinkled everywhere in the sea."⁵¹ Mercator argued for a single water-earth globe that exists in equilibrium, and he used contemporary voyages as proof for this claim in the manner discussed above.⁵² Finally, Barozzi, writing in 1598 after more than a century of the discussions of the water-earth ontological and spatial relationships and these overseas voyages,

49 Ziegler, *Conceptionum in Genesim mundi et Exodum commentarii*, sig. D2r.

50 Selnecker, *In Genesim commentarius*, sig. F4v.

51 "Quum igitur perspicuum sit tum eruditorum virorum monumentis, tum fidelis navigantium testimonio, mare ipsum innumeris insulis, plurimisque syrtibus passim conspersum esse"; Fernel, *Cosmotheoria*, sig. Biv.

52 Mercator and Mercator, *Atlas sive cosmographicae*, sig. C3r.

also asserted that the elements of water and earth joined together to form a perfect sphere.⁵³ Assuming this water-earth combined sphere to be the actual layout of the world, Barozzi later turned to the question of where people live in this combined water-earth sphere, and he cited the voyages of Vespucci as proof that even the tropics are inhabited.⁵⁴

Whereas these authors attributed their more general conception of the water-earth ontological and spatial relationships to contemporary voyages, they and their contemporaries also credited these voyages with changing the way they thought about specific regions of this water-earth globe. We find evidence for such a claim in the affirmation of the Antipodes' existence – an existence which some authors connected directly to overseas voyages. Whereas the biblical commentators Peter Becker and Jerome Zanchi just stated that there are Antipodes, with Becker declaring his certainty in their existence in his 1546 commentary on Genesis and Zanchi insisting that God fashioned the Antipodes and that those who denied their existence were wrong in his 1591 commentary on the same biblical book,⁵⁵ Selnecker tied his affirmation of the Antipodes' existence to overseas voyages in the continuation of the same discussion in which he intimated that voyages help show water and earth form one globe.⁵⁶ Frisius argued for the existence of Antipodes and attributed this information to the experience of voyages as he discussed what parts of the world are inhabited and what the people who live in these areas are called. Arguing against the ancient notion that the torrid zone is uninhabitable in his 1553 *Principles of Astronomy and Cosmography (De principiis Astronomiae & Cosmographiae)*, Frisius explained, “truly writers in our age assert by reason that that region is not only inhabited but is also temperate, and they are verified by experience [of overseas voyages].”⁵⁷ He then went on to give the geographical definition of the Antipodes, offering the example of America and Scythia, thereby further revealing the effects of these voyages on his understanding of the Antipodes' existence.⁵⁸

We also find evidence that sixteenth-century authors credited overseas voyages with changing the way they thought about specific regions of this

53 Barozzi, *Cosmographia in quatuor libros*, sig. A2r.

54 *Ibid.*, sig. G2r.

55 Becker, *Christiana trium linguarum elementa*, sig. F7v, and Zanchi, *De operibus Dei intra spacium sex dierum creatis opus*, sigs. X4v–X5r.

56 Selnecker, *In Genesin commentarius*, sigs. F5v–F6r.

57 “Verum nostrae aetatis scriptores eam non solum habitabilem, sed temperatam esse & rationibus contedunt, & experientia comperti sunt”; Frisius, *De principiis astronomiae et cosmographiae*, sig. A7r.

58 *Ibid.*, B3r.

water-earth globe in their discussions of the fourth and even a possible fifth part of the world. The earliest such discussion occurred in Matthais Ringmann's 1507 *Cosmographiae introductio*. After describing the traditional three parts of the world that stemmed back to the ancient period, Ringmann argued that there was a fourth part of the world Amerigo Vespucci had found. We see the emphasis he placed on this voyage's role in providing him with a new view of the water-earth spatial relationship, as he argued that this fourth part of the world should be named "America" after its discoverer, Vespucci.⁵⁹ Peter Apian argued something similar in his 1524 work. He explained that America was now known as the fourth part of the world thanks to Vespucci and his 1497 voyage, after whom the location had been named.⁶⁰ Johannes Rauw claimed something similar in his 1597 *Cosmographia*, though he gave Columbus rather than Vespucci the credit for discovering this previously unknown fourth part of the world.⁶¹ Johannes Schöner offered a more extensive discussion of how contemporary voyages had changed and would continue to shape the manner in which he conceptualized the layout of the world's landmasses and bodies of water in his 1533 *Opusculum geographicum*. He explained that "the regions that are outside of Ptolemy's description have not yet been described by certain authorities nor been described with such diligence," and he then argued that the travels of Marco Polo and the voyages of Columbus, Vespucci, and Magellan had brought to light what was known so far about these regions, including the fourth part of the world, America.⁶² Writing later in the century than Schöner, Abraham Ortelius's *Theatrum orbis terrarum* (1570) not only confirmed what he and the other authors discussed here argued about the fourth part of the world, but he also expressed the belief that future voyages would find a fifth large landmass in the southern part of the world. He expressed this hope in the introductory overview of his world map. "This map includes and exhibits the likeness of the whole earth and its surrounding Ocean. The ancients (to whom of course the new part of the world had not yet been made known) divided it into three parts: into Africa, Europe, and Asia, but America, having been discovered, our age added as the fourth part, and we expect a fifth situated below the southern axis."⁶³ That voyages were responsible

59 Ringmann, *Cosmographiae introductio*, sig. Ciiiv.

60 Apian, *Cosmographicus liber*, fol. 69r.

61 Rauw, *Cosmographia*, 1027.

62 "Regiones extra Ptolemaei descriptionem sunt, non adhuc adeo certis autoribus traditae, nec etiam tanta diligentia descriptae"; Schöner, *Opusculum geographicum*, sigs. E4v–E5r.

63 "Haec tabula comprahendit, & exhibit totius terrarum circumambientis Oceani effigiem; quem universum terrarum Orbem Veteres (quibus nouus nempe Orbis nondum innotuerat)

for changing his contemporaries' understanding of the world, Ortelius made clear in his introduction to his map of the new world (*novus orbis*), explaining that this whole hemisphere had been unknown to the ancients and that Columbus's voyage was responsible for discovering it.⁶⁴ Francisco Alvares also showed the influence of overseas voyages on his conception of the world's landmasses and waterways, as he, too, argued for a fifth part of the world with which his contemporaries had little experience but which he named "Magellana" in honor of Ferdinand Magellan.⁶⁵ Whether claiming that there were four or five parts of the world, Ringmann, Apian, Rauw, Schöner, Ortelius, and Alvares all explained that they held their particular conception of the layout of the world's waterways and landmasses thanks to the overseas voyages of their contemporaries.

Still other sixteenth-century authors stated that the manner in which they understood water and its placement relative to earth were related directly to what these contemporary voyages revealed. Antonio Honcala in his 1555 commentary on Genesis revealed the effect these voyages had on his thinking as he described what happened when the waters were gathered together into one place. Explaining that the water of the Ocean touched on many different parts of the earth, he argued, "this corresponds to the most faithful narration of the Spanish, who, crossing the equator to the people below the Antarctic pole, have penetrated through the Ocean."⁶⁶ Based on what Honcala had learned from Spanish overseas voyages, he argued that God's gathering of the waters meant that they touched on all parts of the earth on which many people dwelled, providing a pathway between the various portions of dry land in the world. William Cuninghame also tied his understanding of water to overseas navigations, and he did so explicitly in his 1559 dialogue between teacher and student, *The Cosmographical Glasse*. Describing the shape and layout of the four elements, he argued "the earth, not rounde about as th'other do, but in divers parts, so that the water & th'earth, rather make one unifourme Globe."⁶⁷ The student then pushed the teacher further on the nature of the elements, and though agreeing to

in tres partes divisere: in Africam scilicet, Europam, & Asiam: Sed inventa America, eam pro quarta parte nostra aestas adiecit: quintamque expectat sub Meridionali cardine iacentem"; Ortelius, *Theatrum orbis terrarum*, 1.

64 Ibid., 2.

65 Alvares, *Cosmographia*, sig. Aiiir.

66 "Constat hoc Hispanorum fidissimo relatu, qui transgressi Aequinoctialem ad gentes sub Polo Antartico de gentes perpetua per Oceanum navigatione penetrarunt"; Honcala, *Commentaria in Genesim*, sig. B2r.

67 Cuninghame, *Cosmographical Glasse*, sig. Eiiiv.

describe earth more fully, the teacher explained, "I will speak nothing [here] of water (but referre it until we intreat of Navigation)."⁶⁸ This back-and-forth showed that when it came to Cuningham's notion of water, contemporary voyages strongly influenced it.

Analyzing sixteenth-century European exegetical, natural philosophical, geographical, and cosmographical texts, we find much evidence that overseas voyages, especially those to the Southern Hemisphere, pushed Europeans to reconsider and reclassify the water-earth ontological relationship as well as the locations of the earth's landmasses and bodies of water. Led to expect large quantities of water and little if any land in the Southern Hemisphere due to the predominant late medieval understanding of the water-earth spatial relationship, European voyages to this hemisphere discovered instead innumerable lands and peoples, and reports of these voyages such as the *Mundus novus*, circulated widely, acquainting European scholars with the information that the experience of these voyages strongly suggested that earlier models of the water-earth relationship had been wrong. Some of them used the information these voyages provided to challenge earlier beliefs in a water-filled Southern Hemisphere or of a world composed mostly of water. Still others called on voyages as evidence for their understanding of the world as a combined water-earth globe that included Antipodes and four if not even five different large landmasses, about which some of the ancients had been ignorant. Yet others allowed this information to change what they understood about water's location and how it connected together the world's dry land on which Europeans were encountering so many peoples about whom they had not previously known. Being for the most part scholars rather than sailors, these authors turned to their typical method of consulting a widening variety of ancient texts in order to make sense of the information they received about the reported locations of water and earth and used the example of the water-earth relationship as an ideal topic in which to consider how God, people, and the world connected to one another, striving to redefine the universe in which the voyages suggested Europeans were actually living.

Conclusion to Part 2: Methodology, Ideology, and Experience

Water was a useful substance and topic for sixteenth-century Europeans to explore in light of the contrast between previous European conceptions of its

68 Ibid., sig. Eiiiiir.

ontological and spatial relationships to the earth and what the experience of late fifteenth- through sixteenth-century sea voyages suggested about these relationships. Both the Hebrew and Christian Bibles as well as Aristotle's *libri naturales* – some of the most authoritative texts in sixteenth-century European intellectual culture – suggested that water should entirely flood the earth. Prior to the sixteenth century, the vast majority of authors of exegetical, natural philosophical, geographical, and cosmographical texts were not overly concerned with why the dry land on which they lived existed. They offered natural explanations for this dry land's existence and posited layouts of the world's landmasses and waterways that supported their natural classifications of the water-earth relationship, including especially the concept of an entirely or at least predominately water-filled Southern Hemisphere. The wide circulation of reports about European voyages to the Southern and Western Hemispheres and their encounters with people living on dry land there challenged both these earlier cosmological models and the natural classification of the water-earth relationship. As these mariners reported the discovery of more land and less water than most sixteenth-century European scholars expected, they relied on their bookish methods to reconceptualize the layout of the earth's landmasses and waterways, and many recategorized the relationship between water and earth, seeing it as a miracle in a period when calls for religious reform had led to a rethinking of the connections between God, the universe, and human beings.

This reconsideration of the water-earth relationship common among many sixteenth-century European scholars ultimately shows how the typical methods through which Europeans understood the universe, their underlying assumptions about that universe, and their contemporaries' actual experiences with that universe combined to reshape the intellectual history of Europe. For as much as biblical commentary, natural philosophy, geography, and cosmography each had their own ancient and patristic precedents as well as traditions by the sixteenth century, bookish methods, underlying assumptions about God's creation of the universe, and access to reports of overseas voyages and encounters with previously unknown landmasses and waterways were common to the authors of exegetical, natural philosophical, geographical, and cosmographical texts. As their contemporaries encountered and reported a different spatial relationship between water and earth and as many people began publicly to preach and print that God's connection to the universe and to human beings was not what they had long heard and understood, they all used the bookish methods appropriate to their particular genres to reconsider the world.

Rooted ultimately in the reports of the experience of overseas voyages, these European scholars explored their previous assumptions about God's creation of, and revelation in, the universe and drew on ancient texts to understand and explain the experiences about which they read and the world in which they lived. The results of these shared methods, assumptions, and experiences were different understandings of the universe in which water provided a pathway to dry land and the peoples who inhabited it, some of which and of whom might still remain to be encountered, raising questions about exactly how God had created the world and how he related both to Europeans and to these people about whom Europeans had not previously known – the inhabitants of unexplored and maybe even as yet unknown dry lands with whom water connected them.

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Afterword: The Redefinition of the Universe and the Twenty-First-Century Water Crisis

Abstract

This afterword reflects on the implications of the historical study undertaken in the rest of the book for our current water crisis. Without ignoring the different contexts in which these Europeans wrote and twenty-first-century people live, it proposes that the manner in which sixteenth-century Europeans came to rethink water's status and position vis-à-vis the earth's can provide some insight into how twenty-first-century advocates for a different relationship between people and – at least fresh, if not all – water can perhaps awaken people's interest and active intervention into what is already a growing global problem.

Key Words: blue humanities; climate change; water scarcity; water contamination; natural disasters

Living things depend on water, but water does not depend on living things. It has
a life of its own.

– E.C. Pielou, *Fresh Water* (1998)¹

This great and excellent wisdom [that God created and governs the world],
having been learned through mind, eyes, and hands, as I said, is included in the
comprehensive study of the physical world.

– Philipp Melanchthon, *Initia doctrinae physicae* (1549)²

¹ Pielou, *Fresh Water*, p. x.

² “Haec mente, oculis ac manibus, ut ita dicam, comprehensa tenere, magna & excellens Sapientia, & perfecta Physica esset”; Melanchthon, *Initia doctrinae physicae*, sig. Biir.

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These quotes from Pielou's *Fresh Water* and Melanchthon's *Initia doctrinae physicae* point to some of the major differences in the way the relationship between water, earth, and people as well as water and earth's place in the universe are conceptualized by sixteenth-century Europeans and their late twentieth- and twenty-first-century descendants. For Melanchthon as for many of his contemporaries as we have seen repeatedly throughout this book, water and earth were a part of God's created universe, their ontological and spatial relationships designed ultimately for human needs and human stewardship.³ For Melanchthon, his textbook, which drew on the accumulated wisdom of ancient scholars such as Plato, Aristotle, and Galen, could teach Europeans to study the physical world comprehensively, and in exploring this created universe through Melanchthon's explanation of these ancient texts, his readers could learn about their relationship to its creator. The quote from Pielou's *Fresh Water* suggests a radically different notion of the universe and its relationship to water among her late twentieth-century readers. God is absent from Pielou's conception of the water-human relationship. Instead, she focuses explicitly on the connection between water and living things, stressing water's independence from all living things, even as they remain completely dependent on water. This realization serves as a starting point for her work in which she tries to convince her human readers to change the way they interact with and use water before it is too late. Melanchthon and Pielou therefore started their works with different preconceptions about the universe and the purposes for studying it.

Such differences in how and why Melanchthon's age and our own conceptualize water are significant and should not be overlooked. For example, sixteenth-century Europeans did not separate as clearly between salt and fresh water as twenty-first century authors tend to do. However, there is one thing that is common to both Melanchthon's period and our own when it comes to the conceptualization of water and about which the sixteenth-century Europeans we have studied in this book have much to teach us in the twenty-first century. Just as the experiences of overseas voyages across salt water caused sixteenth-century Europeans to ask more insistently about the water-earth ontological and spatial relationships than their predecessors, the late twentieth- and twenty-first-century experiences of freshwater scarcity and climate change as well as increases in severe weather, floods, and drought are causing modern people to raise questions

3 Though his argument has certainly been much contested, see the discussion of this theme in Western thought in White, "Historical Roots of our Ecological Crisis."

once again about the relationship between water, earth, and human beings, leading some such as Pielou to warn of the limits of the human abilities to direct water where and when they want it to go. We find examples of such experiences as well as predictions about future ones in the outcome report from the High-Level Panel on Water comprised of members from the United Nations Department of Economic and Social Affairs and the World Bank, released 14 March 2018, entitled, *Make Every Drop Count: An Agenda for Water Action*. Starting with the assumption that access to clean water is a fundamental human right and that therefore providing such access universally is the ultimate goal, this report concluded that pressure on freshwater resources is rising and that lack of such resources is one of the greatest threats to economic progress, poverty eradication, and sustainable development around the world. Currently, more than 2 billion people drink contaminated water, and 36 percent of the world's population lives in water-scarce regions in which more than 20 percent of the global GDP (gross domestic product) is located. The Panel's projections suggest that by 2030, there will be a 40 percent shortfall in water availability, which will cause the displacement of 700 million people, and that by 2050 more than half the world's population and about half of its grain supply will be at risk due to water stress, with desertification threatening the livelihoods of 1 billion people in a hundred countries.⁴ Though not all people observe these troubling signs of a water crisis directly or interpret them as such, the Panel also found that the vast majority of the world's natural disasters over the last twenty years have been tied to shifts in the water cycle, since floods, storms, droughts, and heatwaves have caused 90 percent of them.⁵

Despite people's experiences with these challenges and disasters as well as the growing number of studies pointing them out and describing to their readers how they can get involved in shaping water policies from the local to the global levels to try to alleviate them,⁶ most people seemingly remain indifferent to the water crisis.⁷ There has been less work done on people's interactions with seas and oceans than on freshwater sources, likely

4 Though the following is not addressed in this report, these burdens will likely fall disproportionately on the poor and on the global South due to what Rob Nixon has called "slow violence" in his, *Slow Violence and the Environmentalism of the Poor*.

5 High-Level Panel on Water, *Making Every Drop Count*.

6 See, for example, Barlow, *Blue Covenant*; Christian-Smith et al., *Twenty-First Century US Water Policy*; Schneller-McDonald, *Connecting the Dots*; and Pearce, *When the Rivers Run Dry*.

7 There are, of course, some exceptions, that the experience of extreme water scarcity such as in Israel, Australia, and South Africa as well as political considerations such as those in Singapore and the European Union tend to cause.

due to the human biological need for freshwater.⁸ When seas have been discussed and conceptualized, there has been a tendency to view them as either voids and waste spaces or as giant fish coolers.⁹ Many discussions and scholarly works have focused instead on how people have responded to the growing scarcity of freshwater sources such as rivers, lakes, and groundwaters. When it comes to managing these freshwater resources in sustainable ways in response to such experiences, scholars have found a reluctance among politicians to abandon what they have called twentieth-century “hard-path” solutions and decision-making that stress centralized infrastructure such as large dams even though recent studies have shown again and again that such solutions tend to harm rather than help a country’s economy and ecosystems.¹⁰ Fred Pearce, a modern journalist, has gone so far as to argue that politicians often support such projects because they serve as ego-builders, claiming, “it is perhaps no surprise that, despite the democratic idealism of the early days of superdams, autocratic, corrupt, and militaristic governments have come to like them best.”¹¹ There has been perhaps even less success in convincing people in industrialized and affluent countries such as the United Kingdom and the United States to limit their water usage despite their experiences with freshwater scarcity and natural disasters. For example, Veronica Strang found in her ethnographic study of people living along the Stour river in Dorset in the early 2000s that even though most of the people she surveyed were aware of the problems associated with the management of the Stour river’s water and that some even had experienced them first-hand, this knowledge did not change their water-usage practices over the long term, serving only to make them feel guilty about the amount of water they continued to use.¹² Additionally, whereas some policymakers and scholars have argued that privatizing water management in response to the experience of its scarcity would bring efficiencies and more sustainable water management, still others have argued strenuously against this privatization, viewing it as one more way in which to worsen the water crisis perhaps even more than people’s

8 See the discussion in Klein and Mackenthun, eds., *Sea Changes*; Blum, “Prospect of Ocean Studies”; and Gillis, “Blue Humanities.”

9 Brayton, *Shakespeare’s Ocean*, xi.

10 On “hard-path” solutions and their alternatives, see Christian-Smith, et al., *Twenty-First Century US Water Policy*, pp. xvii–xx. On these studies, especially those related to centrally funded dams and their economic and ecological costs, see Pearce, *When the Rivers Run Dry*, 95–127.

11 Pearce, *When the Rivers Run Dry*, 96.

12 Strang, *Meaning of Water*, 236–42.

indifference or politicians' building of expensive and ultimately wasteful large water-management projects.¹³

The manner in which sixteenth-century Europeans came to rethink the universe suggests some ways in which the twenty-first-century advocates for a different relationship between people and at least fresh water, if not all water, can perhaps awaken people's interest and active intervention into what is already a growing global problem.¹⁴ As we saw in this book, though the experiences of sailing across seas and oceans led sixteenth-century Europeans to ask more insistent questions about the ontological status of the water-earth relationship and the actual layout of the world's water and earth, they answered these questions based on the traditional bookish methods of their scholarship and the assumptions about the world they held even before they started to think about water. As Melanchthon notes in his quote that begins this afterword, the tools of human inquiry into the world are the human mind, eyes, and hands. This study of sixteenth-century Europeans' changing conceptions of water suggests that learning about the methods through which twenty-first-century people use these tools to gain knowledge of the water crisis and the preconceptions they have when they do so can combine with the experience of freshwater scarcity and increasing natural disasters tied to changes in the water cycle to encourage more of our contemporaries to redefine the universe. This historical study also suggests that redefining the universe will be a useful first step toward reshaping people's interactions with water, much as many sixteenth-century Europeans began to employ the world's oceans and seas as passageways between all the world's landmasses during the same period as their contemporaries reconceptualized the water-earth relationship.

Before exploring how twenty-first-century people come to learn about water and the preconceptions they bring to it, it is crucial to address one possible misinterpretation of sixteenth-century Europeans' understanding of water's relationship to God and human beings that could suggest people remain passive in the face of the modern water crisis. As we have seen

13 For a study that largely supports the privatization of water management, see Solomon, *Water: The Epic Struggle for Wealth, Power, and Civilization*. For a study that argues strenuously against privatization, see Barlow, *Blue Covenant*. For a study that takes a more middle approach, noting early successes of privatized water management while also being wary of its possible consequences, see Pearce, *When the Rivers Run Dry*, 257–61.

14 Petri S. Juuti, Tapio S. Katko, and Heikki S. Vuorinen make the argument that historical case studies such as the one undertaken in this book can be especially illuminating when it comes to human interactions with water, as people's biological need for water has meant that they have been interacting with it throughout human history. See their "Water Is the Beginning of All: Global Water Services and Challenges," in Juuti et al., eds., *Environmental History of Water*, 3–10.

repeatedly throughout this study, especially sixteenth-century Europeans tended to argue that God alone was responsible for controlling water's relationship to land and to human beings. On the surface, such arguments might make it seem as though the Europeans thought human beings could do nothing to change natural phenomena, leaving them only with the option to implore God through prayer to intervene into the world to cause the required changes. Yet, such a reading fundamentally misses crucial aspects of their understanding of the created universe. As we saw especially in Chapter 6, they closely connected together God, the universe, and human beings, arguing repeatedly and consistently that God revealed himself through the universe's phenomena and that human beings are expected to perceive this revelation through studying these phenomena. The universe as a place of revelation meant for many of these authors that God used the universe's phenomena to communicate with people, even going against the natural order to reward, test, or punish them. For example, in writing about God's control over water, Luther had stated, "it shows that the sea is in God's hands, which he is able both to hold and to let loose in the midst of the ungrateful and the evil."¹⁵ For Luther as for many of his contemporaries, even though God was in control of water, how he exercised that control depended directly on human behavior, and therefore these authors tied both human and water's behavior together, meaning that people had an active role to play in shaping whether salt water would submerge the dry land. The modern scholar, Lydia Barnett, has recently argued that the conviction that human behavior had a transformative effect on the natural environment and that therefore human history and natural history were linked became even more prominent from the late sixteenth into the seventeenth centuries, further underscoring that early modern Europeans advocated for human action in the face of environmental challenges.¹⁶

To encourage such activity in the twenty-first century, this book suggests that it is crucial to explore how modern people learn about water and what preconceptions they bring when they do so. The manner in which people come to learn about water in the twenty-first century varies a great deal based on geographical location and socioeconomic level, and these differences must factor into how we come to understand the method through which people conceptualize water. All human beings share a biological need for fresh water, and so one of the main methods through which people interact with this water

15 "Ostendat Deus mare esse in manu sua, quod et tenere possit et in ingratos et malos immittere"; Luther, *Genesisvorlesung*, 26.

16 Barnett, *After the Flood*.

is through the satisfaction of this biological need. Material circumstances for doing so vary widely, however. In geographical and socioeconomic spaces where piped, clean fresh water is not available, people must either harvest rain and other water sources, purchase water from tankers, or travel, sometimes long distances, to obtain the water they need to meet their daily needs. In places where there is available piped fresh water, there tends to be a material disconnect between people's water usage and its ecological consequences, as the ability to turn a tap on-and-off or repeatedly flush a toilet can make it seem as though there is an unlimited supply of clean water.¹⁷ In addition to this biological need, water has also become a significant aspect of how people spend their recreational time in those places where they have access to more abundant water resources and the economic means for such leisure. Strang has found that people's recreational interactions with water tend to focus on being in close, physical proximity to it as they walk or sit around it, swim in it, fish, and/or travel on its surface.¹⁸ The different material circumstances through which people interact with water based on their geographical location and socioeconomic situations must be kept in mind when trying to convince people to act on the water crisis.

In addition to these varied, more personal interactions with water, there has been a growing body of scholarship on water-human interactions since the 1960s that also provides another way in which people come to know about water and that therefore must be attended to when persuading people to take freshwater scarcity and the natural disasters it causes more seriously. The 1962 publication of Rachel Carson's *Silent Spring* and its focus on the effects of the pollution of waterways through the use of chemical pesticides sparked the modern environmentalist movement.¹⁹ This work helped launch a series of investigations into both the United States' and the world's water supplies that have gained wide attention. In the United States, such investigation was and is ideally a crucial aspect of the Environmental Protection Agency's enforcement of the 1972 Clean Water Act and the 1974 Safe Drinking Water Act. By the 1980s when environmentalism became a more global phenomenon, the United Nations began to fund and inspire such research. In 2000, for example, they commissioned the first assessment of the earth's ecosystems, completed in 2005.²⁰ Even though such scholarship is one crucial way through which people come to know about water and

17 Strang, *Meaning of Water*, 195–204.

18 *Ibid.*, 105–10.

19 Solomon, *Water: The Epic Struggle for Wealth, Power, and Civilization*, 354.

20 *Ibid.*

its growing scarcity in the twenty-first century, the High-Level Panel on Water has recently concluded that the data people have about water and its uses are inadequate, and they have listed “understanding water” as their first recommendation for sustainable water management. The report’s authors state, “Information about water quantity, quality, distribution, access, risks, and use is essential for effective decision-making, whether by businesses managing a production process, rural communities managing a well or basin authorities managing a flood. Yet major gaps in water data and decision making systems exist in many places [...] In addition, where water data does exist, it is often difficult for stakeholders to access.”²¹ They call for changes in the manner in which such data is collected and shared in response to what they see as a major deficiency, incorporating the quote, “you cannot manage what you cannot measure,” to emphasize this point.²² As such scholarship is one crucial way that twenty-first-century people come to know about the water-human relationship, being clear about what the research has shown and where the gaps in this research are will help convey the message about the water crisis.

While people’s biological need for water, the significance of water to recreational activities, and scholarship on water resources are most of the ways in which twenty-first-century people come to learn about water, there is one further area through which people engage with it – through the arts and literature – which is especially true when it comes to the sea. As the modern scholar, John R. Gillis, noted, most people today do not have working, direct knowledge of the sea. Instead, they know it through books and literature, and we should add here film and other media sources. Gillis argues that whereas sixteenth-century Europeans largely viewed the ocean as a giant abyss, especially below its surface, people living in the late eighteenth century rediscovered the sea as a place with a history and geography of its own and began to sublimate it as a place of leisure and aesthetic beauty in their literature and art. Based on this example, Gillis concludes that people come to know the sea through the humanities as much as they do through the sciences.²³ Building on Gillis’s insights, in order to understand how twenty-first-century people learn about water, we will also have to take into consideration the books they read and the art they make and experience as well as films and other media depictions of water to arrive at a full understanding of how people will react to the experiences of the water crisis.

21 High-Level Panel on Water, *Making Every Drop Count*, 16.

22 Ibid.

23 Gillis, “Blue Humanities.”

This focus on how literary works and media creations inform people's understanding of water begins to point toward the other piece that goes into shaping how people conceptualize it that we observed in our analysis of sixteenth-century Europeans' changing notions of the water-earth ontological and spatial relationships. In addition to the experience of the overseas voyages and their bookish methods, these sixteenth-century Europeans also used their preconceptions about God's creation of and providential control over the world to reconceptualize water vis-à-vis the earth. Therefore, we must also explore the preconceptions or the meanings twenty-first-century people associate with water in order to understand fully how they might reconceptualize and engage with it. Strang has spoken most directly about the need to consider the wide variety of meanings people associate with water. She explains:

The meanings themselves – water as the spirit, as life, as social, connective substances, as wealth and power, as generative source and regenerative sea, as nature, id, emotion and unconscious – all of these permeate the interactions that people have with water. Sometimes near the surface and visible, sometimes deeper and out of sight, they seep into every decision made about water use, wash over every aesthetic, religious or acquisitive vision of water, and swirl in powerful undercurrents in every quarrel about ownership, access and control of water resources.²⁴

Her study shows that people in the United Kingdom did not curb their water use in the early 2000s despite all the scholarship and even personal experiences that suggested they should, because their use was consistent with the meanings these people associated with water, and she warns policymakers that in order for water-use policies to be effective, they must cohere with the meanings people associate with that water. Therefore, we must have a clear idea of the preconceptions people bring to water before we can even begin to get them to reconceptualize their relationship to it and to act on the experience of water scarcity.

Comprehensive studies on these preconceptions are in their infancy, but the preliminary works that have been completed do suggest that assumptions about water and its meanings vary widely based on historical and cultural contexts.²⁵ More scholarship must be done on these cultural meanings in

²⁴ Strang, *Meaning of Water*, 245.

²⁵ See the articles in Tvedt and Oestigaard, eds., *Ideas of Water*, for an example of such a preliminary study.

order to bring water policies and people's assumptions about water into line in all areas of the world. Focusing primarily on water-rich and affluent regions of the world, the scholarship that currently exists on the subject suggests that these preconceptions can be broken down into two different groups depending on how an author views people's relationship with water. On the one hand, there are a wide variety of scholars who stress people's responsibility for sustaining water resources, reversing the damage that they have caused the environment especially since the Industrial Revolution, and managing water in a more sustainable and equitable manner. Beginning with such a preconception that people can and ought to work to sustain water and the environment as a whole, these works often assume a fundamental separation between human beings and water as people become the actors intervening into the passive environment. This approach can even instrumentalize water, viewing it strictly in relationship to human needs and desires.²⁶ In contrast, more recent scholars have argued that the notion that people are not a part of the environment and that it remains a passive receptor of human activity is wrongheaded. Instead, they call for preconceptions of the human-water relationship that stress that it is one of interaction where both people and water play active and passive roles. Jeffrey Jerome Cohen and Lowell Duckert have expressed such a notion forcefully in their introduction to *Elemental Ecocriticism: Thinking with Earth, Air, Water, and Fire* (2015). To counter what they label as hubris, they argue that people need a model of inhuman agentism so that they can avoid thinking in such reductive terms.²⁷ Whether these two strands of thought appear in other cultural contexts when people attempt to conceptualize water, further studies will need to investigate. However, since these notions of human beings as either acting on the environment or engaged with it through mutual interaction seem to be so prevalent in the cultural contexts that have been studied to date, advocates for changes in the water-human relationship can begin with such preconceptions as they attempt to align the changes they suggest with the meanings people associate with water.

Doing so has never been more crucial. If something is not done about the growing scarcity of fresh water as the climate gets warmer and leads to more extreme variations in the water cycle, as the population of the world continues to grow at such a fast rate, and as more and more people move to

26 On such approaches to water studies, see the introduction to Chen et al., eds., *Thinking with Water*, 3–22.

27 Jeffrey Jerome Cohen and Lowell Duckert, "Eleven Principles of the Elements," in Cohen and Duckert, eds., *Elemental Ecocriticism*, 1–26, at 5–7.

urban areas thereby creating greater water-management challenges, then a large portion of the world's population and the earth's ecosystems are in grave peril. The shift in sixteenth-century Europeans' conceptions of water that we have traced in this book provides some hope that those of us living in the twenty-first century can also redefine our universe and our place within it in order to act to meet these challenges before it is too late. We, too, can say, with Sebastian Münster in his 1540 edition of Ptolemy, that contemporary experiences have shown our predecessors to have been wrong for a long period of time in how they viewed water and that it is time for a change.²⁸ We can admit that our predecessors' notions of water as an inexhaustible resource that human beings can fully master is wrong and destructive. We can admit along with Pielou that water has a life of its own to which human beings will have to adjust and not the other way around. If we also keep in mind that the methods through which people learn about water and the assumptions they have about it influence their conceptions of it even as their experiences with it do, then we can perhaps reshape the manner in which people engage with water just as sixteenth-century Europeans did, providing future generations with the opportunity to redefine the water-earth relationship in their own way.

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²⁸ Sebastian Münster, dedication letter to Philippe von Gundelsheim, Prince-Bishop of Basel, in Ptolemy, *Geographia universalis*, sigs. aa2v–aa3r.

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Both the Christian Bible and Aristotle's works suggest that water should entirely flood the earth. Though many ancient, medieval, and early modern Europeans relied on these works to understand and explore the relationships between water and earth, sixteenth-century Europeans particularly were especially concerned with why dry land existed. This book investigates why they were so interested in water's failure to submerge the earth when their predecessors had not been. Analyzing biblical commentaries as well as natural philosophical, geographical, and cosmographical texts from these periods, Lindsay Starkey shows that European sea voyages to the southern hemisphere combined with the traditional methods of European scholarship and religious reformations led sixteenth-century Europeans to reinterpret water and earth's ontological and spatial relationships. The manner in which they did so also sheds light on how we can respond to our current water crisis before it is too late.

Lindsay J. Starkey is an Assistant Professor of History at Kent State University at Stark. She specializes in early modern European history, and has published pieces in *Explorations in Renaissance Culture*, *Culture and Cosmos*, *Renaissance and Reformation/Renaissance et Réforme*, and *Preternature*.

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