WIKIPEDIA FLAT EARTH

Flat Earth

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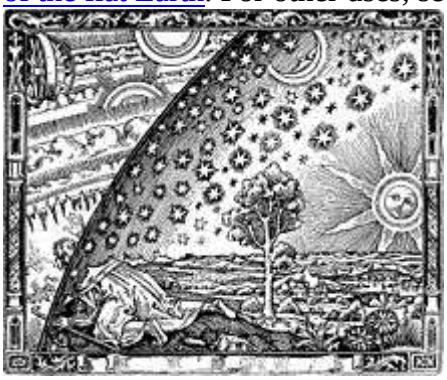
This article is about ancient cosmologies in which the Earth was regarded as flat. For the modern misconception that belief in a flat Earth was responsible for a major source of opposition to Christopher Columbus, see Myth of the flat Earth. For other uses, see Flat Earth (disambiguation).



The Flammarion engraving (1888) depicts a traveler who arrives at the edge of a flat Earth and sticks his head through the firmament.

The **flat Earth** model is an archaic conception of the Earth's shape as a plane or disk. Many ancient cultures subscribed to a flat Earth cosmography, including Greece until the classical period, the Bronze Age and Iron Age civilizations of the Near East until the Hellenistic period, India until the Gupta period (early centuries AD) and China until the 17th century. That paradigm was also typically held in the aboriginal cultures of the Americas, and the notion of a flat Earth domed by the firmament in the shape of an inverted bowl was common in pre-scientific societies.[1]

The idea of a spherical Earth appeared in Greek philosophy with Pythagoras (6th century BC), although most Pre-Socratics retained the flat Earth model. Aristotle provided evidence for the spherical shape of the Earth on empirical grounds by around 330 BC. Knowledge of the spherical Earth gradually began to spread beyond the Hellenistic world from then on.[2][3][4][5]

Modern flat Earth theories, such as those espoused by modern flat Earth societies are considered pseudoscience by academics.

Contents

Historical development

Ancient Near East

Imago Mundi Babylonian map, the oldest known world map, 6th century BC Babylonia

In early Egyptian[6] and Mesopotamian thought the world was portrayed as a flat disk floating in the ocean. A similar model is found in the Homeric account of the 8th century BC in which "Okeanos, the personified body of water surrounding the circular surface of the Earth, is the begetter of all life and possibly of all gods."[7] The

Israelites likely had a similar cosmology, with the earth as a flat disc floating on water beneath an arced firmament separating it from the heavens.[8]

The Pyramid Texts and Coffin Texts reveal that the ancient Egyptians believed Nun (the Ocean) was a circular body surrounding *nbwt* (a term meaning "dry lands" or "Islands"), and therefore believed in a similar Ancient Near Eastern circular earth cosmography surrounded by water.[9][10][11]

Ancient Mediterranean

Poets

Both Homer[12] and Hesiod[13] described a flat disc cosmography on the Shield of Achilles.[14][15] This poetic tradition of an earth-encircling (*gaiaokhos*) sea (Oceanus) and a flat disc also appears in Stasinus of Cyprus,[16] Mimnermus,[17] Aeschylus,[18] and Apollonius Rhodius.[19]

Homer's description of the flat disc cosmography on the shield of Achilles with the encircling ocean is repeated far later in Quintus Smyrnaeus' Posthomerica (4th century AD), which continues the narration of the Trojan War.[20]

Philosophers

Possible rendering of Anaximander's world map[21]

Several pre-Socratic philosophers believed that the world was flat: Thales (c. 550 BC) according to several sources,[22] and Leucippus (c. 440 BC) and Democritus (c. 460 – 370 BC) according to Aristotle.[23][24][25]

Thales thought the earth floated in water like a log.[26] It has been argued, however, that Thales actually believed in a round Earth.[27][28] Anaximander (c. 550 BC) believed the Earth was a short cylinder with a flat, circular top that remained stable because it was the same distance from all things.[29][30] Anaximenes of Miletus believed that "the earth is flat and rides on air; in the same way the sun and the moon and the other heavenly bodies, which are all fiery, ride the air because of their flatness."[31] Xenophanes of Colophon (c. 500 BC) thought that the Earth was flat, with its upper side touching the air, and the lower side extending without limit.[32]

Belief in a flat Earth continued into the 5th century BC. Anaxagoras (c. 450 BC) agreed that the Earth was flat,[33] and his pupil Archelaus believed that the flat Earth was depressed in the middle like a saucer, to allow for the fact that the Sun does not rise and set at the same time for everyone.[34]

Historians

Hecataeus of Miletus believed the earth was flat and surrounded by water.[35] Herodotus in his *Histories* ridiculed the belief that water encircled the world,[36] yet most classicists agree he still believed the earth was flat because of his descriptions of literal "ends" or "edges" of the earth.[37]

Ancient India

Ancient Hindu, Jain, and Buddhist cosmology held that the Earth is a disc consisting of four continents grouped around a central mountain (Mount Meru) like the petals of a flower. An outer ocean surrounds these continents.[38] This view of traditional Buddhist and Jain cosmology depicts the cosmos as a vast, oceanic disk (of the magnitude of a small planetary system), bounded by mountains, in which the continents are set as small islands.[38]

Norse and Germanic

The ancient Norse and Germanic peoples believed in a flat Earth cosmography with the Earth surrounded by an ocean, with the axis mundi, a world tree (Yggdrasil), or pillar (Irminsul) in the centre.[39][40] The Norse believed that in the world-encircling ocean sat a snake called Jormungandr.[41] In the Norse creation account preserved in Gylfaginning (VIII) it is stated that during the creation of the earth, an impassable sea was placed around the earth like a ring:

...And Jafnhárr said: "Of the blood, which ran and welled forth freely out of his wounds, they made the sea, when they had formed and made firm the earth together, and laid the sea in a ring round. about her; and it may well seem a hard thing to most men to cross over it."[42]

The late Norse Konungs skuggsjá, on the other hand, states that:

...If you take a lighted candle and set it in a room, you may expect it to light up the entire interior, unless something should hinder, though the room be quite large. But if you take an apple and hang it close to the flame, so near that it is heated, the apple will darken nearly half the room or even more. However, if you hang the apple near the wall, it will not get hot; the candle will light up the whole house; and the shadow on the wall where the apple hangs will be scarcely half as large as the apple itself. From this you may infer that the earth-circle is round like a ball and not equally near the sun at every point. But where the curved surface lies nearest the sun's path, there will the greatest heat be; and some of the lands that lie continuously under the unbroken rays cannot be inhabited."[43]

Ancient China

Further information: Chinese astronomy

In ancient China, the prevailing belief was that the Earth was flat and square, while the heavens were round,[44] an assumption virtually unquestioned until the introduction of European astronomy in the 17th century.[45][46][47] The English sinologist Cullen emphasizes the point that there was no concept of a round Earth in ancient Chinese astronomy:

Chinese thought on the form of the earth remained almost unchanged from early times until the first contacts with modern science through the medium of Jesuit missionaries in the seventeenth century. While the heavens were variously described as being like an umbrella covering the earth (the Kai Tian theory), or like a sphere surrounding it (the Hun Tian theory), or as being without substance while the heavenly bodies float freely (the Hsüan yeh theory), the earth was at all times flat, although perhaps bulging up slightly.[48]

The model of an egg was often used by Chinese astronomers such as Zhang Heng (78–139 AD) to describe the heavens as spherical:

The heavens are like a hen's egg and as round as a crossbow bullet; the earth is like the yolk of the egg, and lies in the centre.[49]

This analogy with a curved egg led some modern historians, notably Joseph Needham, to conjecture that Chinese astronomers were, after all, aware of the Earth's sphericity. The egg reference, however, was rather meant to clarify the relative position of the flat earth to the heavens:

In a passage of Zhang Heng's cosmogony not translated by Needham, Zhang himself says: "Heaven takes its body from the Yang, so it is round and in motion. Earth takes its body from the Yin, so it is flat and quiescent". The point of the egg analogy is simply to stress that the earth is completely enclosed by heaven, rather than merely covered from above as the Kai Tian describes. Chinese astronomers, many of them brilliant men by any standards, continued to think in flat-earth terms until the seventeenth century; this surprising fact might be the starting-point for a re-examination of the apparent facility with which the idea of a spherical earth found acceptance in fifth-century BC Greece.[50]

Further examples cited by Needham supposed to demonstrate dissenting voices from the ancient Chinese consensus actually refer without exception to the Earth being square, not to it being flat.[51] Accordingly, the 13th-century scholar Li Ye, who argued that the movements of the round heaven would be hindered by a square Earth,[44] did not advocate a spherical Earth, but rather that its edge should be rounded off so as to be circular.[52]

As noted in the book *Huainanzi*,[53] in the 2nd century BC Chinese astronomers effectively inverted Eratosthenes' calculation of the curvature of the Earth to calculate the height of the sun above the earth. By assuming the earth was flat, they arrived at a distance of 100,000 *li* (approximately 200,000 km), which is a value far short of the correct distance of 150 million km.

Declining support for the flat Earth

Further information: Spherical Earth and History of geodesy

Ancient Mediterranean

When a ship is at the horizon, its lower part is obscured due to the curvature of the Earth.

Semi-circular shadow of Earth on the Moon during the phases of a lunar eclipse

In *The Histories*, written in the mid-5th century BC, Herodotus cast doubt on a report of the sun observed shining from the north. He stated that the phenomenon was observed during a circumnavigation of Africa

undertaken by Phoenician explorers employed by Egyptian pharaoh Necho II c. 610–595 BC (*The Histories*, 4.42) who claimed to have had the sun on their right when circumnavigating in a clockwise direction. To modern historians aware of a spherical Earth, these details confirm the truth of the Phoenicians' report.

After the Greek philosophers Pythagoras, in the 6th century BC, and Parmenides, in the 5th, recognized that the Earth is spherical,[54] the spherical view spread rapidly in the Greek world. Around 330 BC, Aristotle maintained on the basis of physical theory and observational evidence that the Earth was spherical, and reported on an estimate on the circumference.[55] The Earth's circumference was first determined around 240 BC by Eratosthenes.[56] By the second century CE, Ptolemy had derived his maps from a globe and developed the system of latitude, longitude, and climes. His Almagest was written in Greek and only translated into Latin in the 11th century from Arabic translations.

The Terrestrial Sphere of Crates of Mallus (c. 150 BC)

In the 2nd century BC, Crates of Mallus devised a terrestrial sphere that divided the Earth into four continents, separated by great rivers or oceans, with people presumed living in each of the four regions.[57] Opposite the oikumene, the inhabited world, were the *antipodes*, considered unreachable both because of an intervening *torrid zone* (equator) and the ocean. This took a strong hold on the medieval mind.

Lucretius (1st. c. BC) opposed the concept of a spherical Earth, because he considered that an infinite universe had no center towards which heavy bodies would tend. Thus, he thought the idea of animals walking around topsy-turvy under the Earth was absurd.[58][59] By the 1st century AD, Pliny the Elder was in a position to claim that everyone agrees on the spherical shape of Earth,[60] though disputes continued regarding the nature of the antipodes, and how it is possible to keep the ocean in a curved shape. Pliny also considered the possibility of an imperfect sphere, "...shaped like a pinecone."[60]

In late antiquity such widely read encyclopedists as Macrobius (5th century) and Martianus Capella (5th century) discussed the circumference of the sphere of the Earth, its central position in the universe, the difference of the seasons in northern and southern hemispheres, and many other geographical details.[61] In his commentary on Cicero's *Dream of Scipio*, Macrobius described the Earth as a globe of insignificant size in comparison to the remainder of the cosmos.[61]

Early Christian Church

During the early Church period, the spherical view continued to be widely held, with some notable exceptions.[62]

Lactantius, Christian writer and advisor to the first Christian Roman Emperor, Constantine, ridiculed the notion of the Antipodes, inhabited by people "whose footsteps are higher than their heads". After presenting some arguments he attributes to advocates for a spherical heaven and Earth, he writes:

But if you inquire from those who defend these marvellous fictions, why all things do not fall into that lower part of the heaven, they reply that such is the nature of things, that heavy bodies are borne to the middle, and that they are all joined together towards the middle, as we see spokes in a wheel; but that the bodies that are light, as mist, smoke, and fire, are borne away from the middle, so as to seek the heaven. I am at a loss what to say respecting those who, when they have once erred, consistently persevere in their folly, and defend one vain thing by another.[63]

The influential theologian and philosopher Saint Augustine, one of the four Great Church Fathers of the Western Church, similarly objected to the "fable" of an inhabited Antipodes:

But as to the fable that there are Antipodes, that is to say, men on the opposite side of the earth, where the sun rises when it sets to us, men who walk with their feet opposite ours that is on no ground credible. And, indeed, it is not affirmed that this has been learned by historical knowledge, but by scientific conjecture, on the ground that the earth is suspended within the concavity of the sky, and that it has as much room on the one side of it as on the other: hence they say that the part that is beneath must also be inhabited. But they do not remark that, although it be supposed or scientifically demonstrated that the world is of a round and spherical form, yet it does not follow that the other side of the earth is bare of water; nor even, though it be bare, does it immediately follow that it is peopled. For Scripture, which proves the truth of its historical statements by the accomplishment of its prophecies, gives no false information; and it is too absurd to say, that some men might have taken ship and traversed the whole wide ocean, and crossed from this side of the world to the other, and that thus even the inhabitants of that distant region are descended from that one first man.[64]

The view generally accepted by scholars of Augustine's work is that he shared the common view of his contemporaries that the Earth is spherical,[65] in line with his endorsement of science in *De Genesi ad litteram*.[66] That view was challenged by noted Augustine scholar Leo Ferrari, who concluded that

he was familiar with the Greek theory of a spherical earth, nevertheless, (following in the footsteps of his fellow North African, Lactantius), he was firmly convinced that the earth was flat, was one of the two biggest bodies in existence and that it lay at the bottom of the universe. Apparently Augustine saw this picture as more useful for scriptural exegesis than the global earth at the centre of an immense universe.[67]

Ferrari's interpretation was questioned by the historian of science, Phillip Nothaft, who considers that in his scriptural commentaries Augustine was not endorsing any particular cosmological model.[68]

Cosmas Indicopleustes' world view – flat earth in a Tabernacle

Diodorus of Tarsus, a leading figure in the School of Antioch and mentor of John Chrysostom, may have argued for a flat Earth; however, Diodorus' opinion on the matter is known only from a later criticism.[69] Chrysostom, one of the four Great Church Fathers of the Eastern Church and Archbishop of Constantinople, explicitly espoused the idea, based on scripture, that the Earth floats miraculously on the water beneath the firmament.[70]

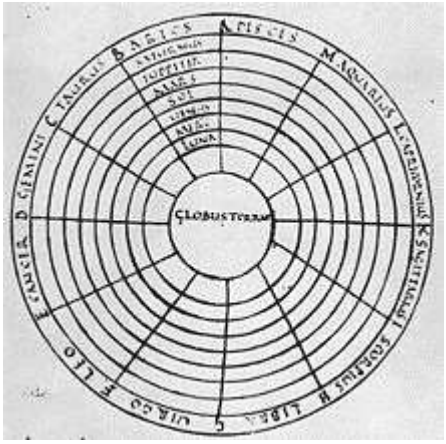
Athanasius the Great, Church Father and Patriarch of Alexandria, expressed a similar view in *Against the Heathen*.[71]

Christian Topography (547) by the Alexandrian monk Cosmas Indicopleustes, who had travelled as far as Sri Lanka and the source of the Blue Nile, is now widely considered the most valuable geographical document of the early medieval age, although it received relatively little attention from contemporaries. In it, the author repeatedly expounds the doctrine that the universe consists of only two places, the Earth below the firmament and heaven above it. Carefully drawing on arguments from scripture, he describes the Earth as a rectangle, 400 day's journey long by 200 wide, surrounded by four oceans and enclosed by four massive walls which support the firmament. The spherical Earth theory is contemptuously dismissed as "pagan".[72][73][74]

Severian, Bishop of Gabala (d. 408), wrote that the Earth is flat and the sun does not pass under it in the night, but "travels through the northern parts as if hidden by a wall".[75] Basil of Caesarea (329–379) argued that the matter was theologically irrelevant.[76]

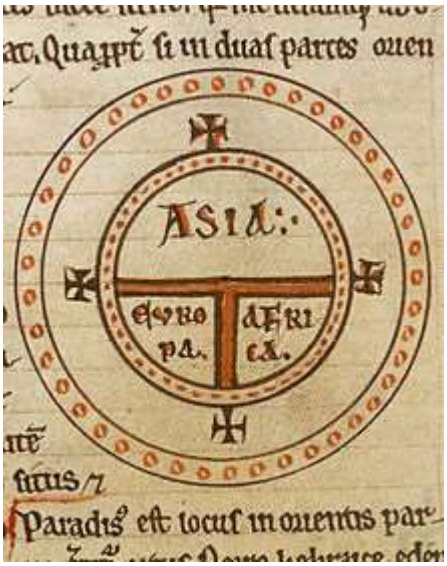
Early Middle Ages

Early medieval Christian writers in the early Middle Ages felt little urge to assume flatness of the earth, though they had fuzzy impressions of the writings of Ptolemy, Aristotle, and relied more on Pliny.[77]



9th-century Macrobian cosmic diagram showing the *sphere of the Earth* at the center (*globus terrae*)

With the end of Roman civilization, Western Europe entered the Middle Ages with great difficulties that affected the continent's intellectual production. Most scientific treatises of classical antiquity (in Greek) were unavailable, leaving only simplified summaries and compilations. Still, many textbooks of the Early Middle Ages supported the sphericity of the Earth. For example: some early medieval manuscripts of Macrobius include maps of the Earth, including the antipodes, zonal maps showing the Ptolemaic climates derived from the concept of a spherical Earth and a diagram showing the Earth (labeled as *globus terrae*, the sphere of the Earth) at the center of the hierarchically ordered planetary spheres.[78] Further examples of such medieval diagrams can be found in medieval manuscripts of the Dream of Scipio. In the Carolingian era, scholars discussed Macrobius's view of the antipodes. One of them, the Irish monk Dungal, asserted that the tropical gap between our habitable region and the other habitable region to the south was smaller than Macrobius had believed.[79]



12th-century T and O map representing the inhabited world as described by Isidore of Seville in his *Etymologiae* (chapter 14, *de terra et partibus*)

Europe's view of the shape of the Earth in Late Antiquity and the Early Middle Ages may be best expressed by the writings of early Christian scholars:

- Boethius (c. 480–524), who also wrote a theological treatise *On the Trinity*, repeated the Macrobian model of the Earth in the center of a spherical cosmos in his influential, and widely translated, *Consolation of Philosophy*.[80]
- Bishop Isidore of Seville (560–636) taught in his widely read encyclopedia, the *Etymologies* diverse views such as that the Earth "resembles a wheel"[81] resembling Anaximander in language and the map that he provided. This was widely interpreted as referring to a flat disc-shaped Earth.[82][83] An illustration from Isidore's *De Natura Rerum* shows the five zones of the earth as adjacent circles. Some have concluded that he thought the Arctic and Antarctic zones were adjacent to each other.[84] He did not admit the possibility of antipodes, which he took to mean people dwelling on the opposite side of the Earth, considering them legendary[85] and noting that there was no evidence for their existence.[86] Isidore's T and O map, which was seen as representing a small part of a spherical Earth, continued to be used by authors through the Middle Ages, e.g. the 9th-century bishop Rabanus Maurus who compared the habitable part of the northern hemisphere (Aristotle's northern temperate clime) with a wheel. At the same time, Isidore's works also gave the views of sphericity, for example, in chapter 28 of *De Natura Rerum*, Isidore claims that the sun orbits the earth and illuminates the other side when it is night on this side. See French translation of *De Natura Rerum*.[87] In his other work *Etymologies*, there are also affirmations that the sphere of the sky has earth in its center and the sky being equally distant on all sides.[88][89] Other researchers have argued these points as well.[77][90][91] "The work remained unsurpassed until the thirteenth century and was regarded as the summit of all knowledge. It became an essential part of European medieval culture. Soon after the invention of typography it appeared many times in print."[92] However, "The Scholastics - later medieval philosophers, theologians, and scientists - were helped by the Arabic translators and commentaries, but they hardly needed to struggle against a flat-earth legacy from the early middle ages (500-1050). Early medieval writers often had fuzzy and imprecise impressions of both Ptolemy and Aristotle and relied more on Pliny, but they felt (with one exception), little urge to assume flatness."[77]

Isidore's portrayal of the five zones of the earth

- The monk Bede (c. 672–735) wrote in his influential treatise on computus, *The Reckoning of Time*, that the Earth was round ('not merely circular like a shield [or] spread out like a wheel, but resembl[ing] more a ball'), explaining the unequal length of daylight from "the roundness of the Earth, for not without reason is it called 'the orb of the world' on the pages of Holy Scripture and of ordinary literature. It is, in fact, set like a sphere in the middle of the whole universe." (*De temporum ratione*, 32). The large number of surviving manuscripts of *The Reckoning of Time*, copied to meet the Carolingian requirement that all priests should study the computus, indicates that many, if not most, priests were exposed to the idea of the sphericity of the Earth.[93] Ælfric of Eynsham paraphrased Bede into Old English, saying "Now the Earth's roundness and the Sun's orbit constitute the obstacle to the day's being equally long in every land."[94]
- St Vergilius of Salzburg (c. 700–784), in the middle of the 8th century, discussed or taught some geographical or cosmographical ideas that St Boniface found sufficiently objectionable that he complained about them to Pope Zachary. The only surviving record of the incident is contained in Zachary's reply, dated 748, where he wrote:

As for the perverse and sinful doctrine which he (Virgil) against God and his own soul has uttered—if it shall be clearly established that he professes belief in another world and other men existing beneath the earth, or in (another) sun and moon there, thou art to hold a council, deprive him of his sacerdotal rank, and expel him from the Church.[95]

> Some authorities have suggested that the sphericity of the Earth was among the aspects of Vergilius's teachings that Boniface and Zachary considered objectionable.[96][97] Others have considered this unlikely, and take the wording of Zachary's response to indicate at most an objection to belief in the existence of humans living in the antipodes.[98][99][100][101][102] In any case, there is no record of any further action having been taken against Vergilius. He was later appointed bishop of Salzburg, and was canonised in the 13th century.[103]

12th-century depiction of a spherical Earth with the four seasons (book *Liber Divinorum Operum* by Hildegard of Bingen)

A possible non-literary but graphic indication that people in the Middle Ages believed that the Earth (or perhaps the world) was a sphere is the use of the *orb* (globus cruciger) in the regalia of many kingdoms and of the Holy Roman Empire. It is attested from the time of the Christian late-Roman emperor Theodosius II (423) throughout the Middle Ages; the *Reichsapfel* was used in 1191 at the coronation of emperor Henry VI. However the word 'orbis' means 'circle' and there is no record of a globe as a representation of the Earth since ancient times in the west till that of Martin Behaim in 1492. Additionally it could well be a representation of the entire 'world' or cosmos.

A recent study of medieval concepts of the sphericity of the Earth noted that "since the eighth century, no cosmographer worthy of note has called into question the sphericity of the Earth."[104] However, the work of these intellectuals may not have had significant influence on public opinion, and it is difficult to tell what the wider population may have thought of the shape of the Earth, if they considered the question at all.

High and Late Middle Ages

Further information: Spherical Earth § Medieval Europe

Picture from a 1550 edition of *On the Sphere of the World*, the most influential astronomy textbook of 13th-century Europe

By the 11th century Europe had learned of Islamic astronomy. The Renaissance of the 12th century from about 1070 started an intellectual revitalization of Europe with strong philosophical and scientific roots, and increased interest in natural philosophy.


Illustration of the spherical Earth in a 14th-century copy of *L'Image du monde* (c. 1246)

Hermannus Contractus (1013–1054) was among the earliest Christian scholars to estimate the circumference of Earth with Eratosthenes' method. Thomas Aquinas (1225–1274), the most important and widely taught theologian of the Middle Ages, believed in a spherical Earth; and he even took for granted his readers also knew the Earth is round.[nb 1] Lectures in the medieval universities commonly advanced evidence in favor of the idea that the Earth was a sphere.[105] Also, "*On the Sphere of the World*", the most influential astronomy textbook of the 13th century and required reading by students in all Western European universities, described the world as a sphere. Thomas Aquinas, in his Summa Theologica, wrote, "The physicist proves the earth to be round by one means, the astronomer by another: for the latter proves this by means of mathematics, e.g. by the shapes of eclipses, or something of the sort; while the former proves it by means of physics, e.g. by the movement of heavy bodies towards the center, and so forth."[106]

The shape of the Earth was not only discussed in scholarly works written in Latin; it was also treated in works written in vernacular languages or dialects and intended for wider audiences. The Norwegian book Konungs Skuggsjá, from around 1250, states clearly that the Earth is round—and that there is night on the opposite side of the Earth when there is daytime in Norway. The author also discusses the existence of antipodes—and he notes that (if they exist) they see the Sun in the north of the middle of the day, and that they experience seasons opposite those of people in the Northern Hemisphere.

However Tattersall shows that in many vernacular works in 12th- and 13th-century French texts the Earth was considered "round like a table" rather than "round like an apple". "In virtually all the examples quoted...from epics and from non-'historical' romances (that is, works of a less learned character) the actual form of words used suggests strongly a circle rather than a sphere, though notes that even in these works the language is ambiguous.[107]

As late as 1674, Robert Hooke could argue "To one who has been conversant only with illiterate persons, or such as understand not the principles of Astronomy and Geometry,...who can scarce imagine the Earth is globous, but...imagine it to be a round plain covered with the Sky as with a Hemisphere", suggesting that the opinion was not uncommon even then.[108]

Portuguese exploration of Africa and Asia, Columbus's voyage to the Americas (1492) and finally Ferdinand Magellan's circumnavigation of the Earth (1519–21) provided the final, practical proofs for the global shape of the Earth.

Islamic world

Further information: Spherical Earth § Medieval Islamic scholars

The Abbasid Caliphate saw a great flowering of astronomy and mathematics in the 9th century CE. in which Muslim scholars translated Ptolemy's work, which become the Almagest, and extended and updated his work based on spherical ideas, and these have generally been respected since. However, after the decline of the Golden Age in the 13th century more traditional views were increasingly heard.[*citation needed*]

The Quran mentions that the world was "laid out". To this a classic Sunni commentary, the Tafsir al-Kabir (al-Razi) written in the late 12th century says "If it is said: Do the words “And the earth We spread out” indicate that it is flat? We would respond: Yes, because the earth, even though it is round, is an enormous sphere, and each little part of this enormous sphere, when it is looked at, appears to be flat. As that is the case, this will dispel what they mentioned of confusion. The evidence for that is the verse in which Allah says (interpretation of the meaning): “And the mountains as pegs” [an-Naba’ 78:7]. He called them awtaad (pegs) even though these mountains may have large flat surfaces. And the same is true in this case."[109]

A later classic Sunni commentary, the Tafsir al-Jalalayn written in the early 16th century says "As for His words sutihat, ‘laid out flat’, this on a literal reading suggests that the earth is flat, which is the opinion of most of the scholars of the [revealed] Law, and not a sphere as astronomers (ahl al-hay’a) have it, even if this [latter] does not contradict any of the pillars of the Law."[110] Other translations render "made flat" as "spread out".[111]

Ming China

As late as 1595, an early Jesuit missionary to China, Matteo Ricci, recorded that the Chinese say: "The earth is flat and square, and the sky is a round canopy; they did not succeed in conceiving the possibility of the antipodes."[52][112] The universal belief in a flat Earth is confirmed by a contemporary Chinese encyclopedia from 1609 illustrating a flat Earth extending over the horizontal diametral plane of a spherical heaven.[52]

In the 17th century, the idea of a spherical Earth spread in China due to the influence of the Jesuits, who held high positions as astronomers at the imperial court.[113]

Myth of the flat Earth

Main article: Myth of the Flat Earth

Beginning in the 19th century, a historical myth arose which held that the predominant cosmological doctrine during the Middle Ages was that the Earth was flat. An early proponent of this myth was the American writer, Washington Irving, who maintained that Christopher Columbus had to overcome the opposition of churchmen to gain sponsorship for his voyage of exploration. Later significant advocates of this view were John William Draper and Andrew Dickson White, who used it as a major element in their advocacy of the thesis[114] that there was a long lasting and essential conflict between science and religion.[115] Subsequent historical research has demonstrated two flaws in this approach. First, studies of medieval science have shown that the preponderance of scholars in the Middle Ages, including those read by Christopher Columbus, maintained that the Earth was spherical.[116] Second, studies of the relations between science and religion over the course of time have demonstrated that the model of an essential conflict is a vast oversimplication, which ignores the positive elements of the relations between them.[117][118]

Modern Flat-Earthers

Flat Earth map drawn by Orlando Ferguson in 1893. The map contains several references to biblical passages as well as various jabs at the "Globe Theory".
Main article: Modern flat Earth societies

In the modern era, belief in a flat Earth has been expressed by isolated individuals and groups, but no scientists of note. English writer Samuel Rowbotham (1816–1885), writing under the pseudonym "Parallax," produced a pamphlet called *Zetetic Astronomy* in 1849 arguing for a flat Earth and published results of many experiments that tested the curvatures of water over a long drainage ditch, followed by another called *The inconsistency of Modern Astronomy and its Opposition to the Scripture*. One of his supporters, John Hampden, lost a bet to Alfred Russel Wallace in the famous Bedford Level Experiment, which attempted to prove it. In 1877 Hampden produced a book called "A New Manual of Biblical Cosmography".[119] Rowbotham also produced studies that purported to show that the effects of ships disappearing below the horizon could be explained by the laws of perspective in relation to the human eye.[120] In 1883 he founded Zetetic Societies in England and New York, to which he shipped a thousand copies of *Zetetic Astronomy*.

William Carpenter, a printer originally from Greenwich, England, was a supporter of Rowbotham and published *Theoretical Astronomy Examined and Exposed – Proving the Earth not a Globe* in eight parts from 1864 under the name *Common Sense*.[121] He later emigrated to Baltimore where he published *A hundred proofs the Earth is not a Globe* in 1885.[122] He said:

- "There are rivers that flow for hundreds of miles towards the level of the sea without falling more than a few feet — notably, the Nile, which, in a thousand miles, falls but a foot. A level expanse of this extent is quite incompatible with the idea of the Earth's convexity. It is, therefore, a reasonable proof that Earth is not a globe."
- "If the Earth were a globe, a small model globe would be the very best — because the truest — thing for the navigator to take to sea with him. But such a thing as that is not known: with such a toy as a guide, the mariner would wreck his ship, of a certainty!, This is a proof that Earth is not a globe."

John Jasper, the black ex-slave preacher said to have preached to more people than any Southern clergyman of his generation, echoed his friend Carpenter's sentiments in his most famous sermon "Der Sun do move and the Earth Am Square", preached over 250 times always by invitation.[123]

In Brockport, New York, in 1887, M.C. Flanders argued the case of a flat Earth for three nights against two scientific gentlemen defending sphericity. Five townsmen chosen as judges voted unanimously for a flat Earth at the end. The case was reported in the *Brockport Democrat*.[124]

"Professor" Joseph W. Holden of Maine, a former justice of the peace, gave numerous lectures in New England and lectured on flat Earth theory at the Columbian Exposition in Chicago. His fame stretched to North Carolina where the Statesville *Semi-weekly Landmark* recorded at his death in 1900: 'We hold to the doctrine that the earth is flat ourselves and we regret exceedingly to learn that one of our members is dead'.[125]

After Rowbotham's death, Lady Elizabeth Blount created the Universal Zetetic Society in 1893 in England and created a journal called *Earth not a Globe Review*, which sold for twopence, as well as one called *Earth*, which

only lasted from 1901 to 1904. She held that the Bible was the unquestionable authority on the natural world and argued that one could not be a Christian and believe the Earth is a globe. Well-known members included E. W. Bullinger of the Trinitarian Bible Society, Edward Haughton, senior moderator in natural science in Trinity College, Dublin and an archbishop. She repeated Rowbotham's experiments, generating some interesting counter-experiments, but interest declined after the First World War.[125] The movement gave rise to several books that argued for a flat, stationary earth, including *Terra Firma* by David Wardlaw Scott.[126]

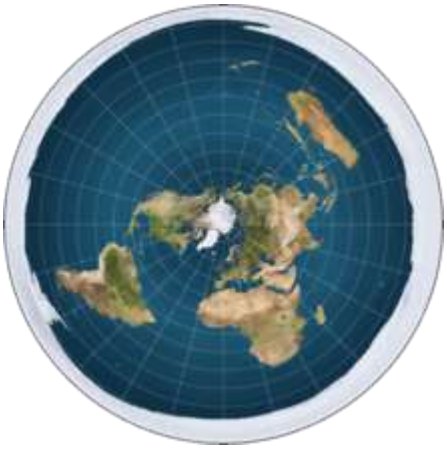
In 1898, during his solo circumnavigation of the world, Joshua Slocum encountered a group of flat-Earthers in Durban. Three Boers, one of them a clergyman, presented Slocum with a pamphlet in which they set out to prove that the world was flat. Paul Kruger, President of the Transvaal Republic, advanced the same view: "You don't mean *round* the world, it is impossible! You mean *in* the world. Impossible!"[127]

Wilbur Glenn Voliva, who in 1906 took over the Christian Catholic Church, a Pentecostal sect that established a utopian community at Zion, Illinois, preached flat Earth doctrine from 1915 onwards and used a photograph of a twelve-mile stretch of the shoreline at Lake Winnebago, Wisconsin taken three feet above the waterline to prove his point. When the airship *Italia* disappeared on an expedition to the North Pole in 1928 he warned the world's press that it had sailed over the edge of the world. He offered a $5,000 award for proving the Earth is not flat, under his own conditions.[128] Teaching a globular Earth was banned in the Zion schools and the message was transmitted on his WCBD radio station.[125]

Mohammed Yusuf, founder of the Nigerian militant Islamist group Boko Haram, stated his belief in a flat Earth.[129]

In January 2016, rapper B.o.B tweeted that "A lot of people are turned off by the phrase 'flat earth' ... but there's no way u can see all the evidence and not know... grow up",[130] and accused NASA of hiding the truth. Astrophysicist Neil deGrasse Tyson replied to B.o.B.'s arguments, commenting that "Being five centuries regressed in your reasoning doesn't mean we all can't still like your music."[131]

Flat Earth Society



Azimuthal equidistant projections of the sphere like this one have also been co-opted as images of the flat Earth model depicting Antarctica as an ice wall[132][133] surrounding a disk-shaped Earth.

In 1956, Samuel Shenton set up the *International Flat Earth Research Society* (IFERS), better known as the Flat Earth Society from Dover, UK, as a direct descendant of the Universal Zetetic Society. This was just before the Soviet Union launched the first artificial satellite, Sputnik; he responded, "Would sailing round the Isle of Wight prove that it were spherical? It is just the same for those satellites."

His primary aim was to reach children before they were convinced about a spherical Earth. Despite plenty of publicity, the space race eroded Shenton's support in Britain until 1967 when he started to become famous due to the Apollo program. His postbag was full but his health suffered as his operation remained essentially a one-man show until he died in 1971.[125]

In 1972 Shenton's role was taken over by Charles K. Johnson, a correspondent from California, USA. He incorporated the IFERS and steadily built up the membership to about 3,000. He spent years examining the studies of flat and round Earth theories and proposed evidence of a conspiracy against flat-Earth: "The idea of a spinning globe is only a conspiracy of error that Moses, Columbus, and FDR all fought..." His article was published in the magazine *Science Digest*, 1980. It goes on to state, "If it is a sphere, the surface of a large body of water must be curved. The Johnsons have checked the surfaces of Lake Tahoe and the Salton Sea without detecting any curvature."[134]

The Society declined in the 1990s following a fire at its headquarters in California and the death of Johnson in 2001.[135] It was revived as a website in 2004 by Daniel Shenton (no relation to Samuel Shenton). He believes that no one has provided proof that the world is not flat.[136]

Cultural references

The term *flat-Earther* is often used in a derogatory sense to mean anyone who holds ridiculously antiquated views. The first use of the term *flat-earther* recorded by the *Oxford English Dictionary* is in 1934 in *Punch*: "Without being a bigoted flat-earther, he [sc. Mercator] perceived the nuisance..of fiddling about with globes..in order to discover the South Seas."[137] The term *flat-earth-man* was recorded in 1908: "Fewer votes than one would have thought possible for any human candidate, were he even a flat-earth-man."[138]

Scientific satire

In a satirical piece published 1996, Albert A. Bartlett uses arithmetic to show that sustainable growth on Earth is impossible in a spherical Earth since its resources are necessarily finite. He explains that only a model of a flat Earth, stretching infinitely in the two horizontal dimensions and also in the vertical downward direction, would be able to accommodate the needs of a permanently growing population.

Referring to Julian Simon's book *The Ultimate Resource*, Bartlett suggests "So, let us think of the 'We're going to grow the limits!' people as the 'New Flat Earth Society.'"[139] The satiric nature of the piece is also made clear by a comparison to Bartlett's other publications, which mainly advocate the necessity of curbing population growth.[140]

See also

- List of topics characterized as pseudoscience
- Biblical cosmology
- Denialism
- Earth's rotation
- Geographical distance
- Hollow Earth
- Scientific mythology
- Skepticism

Notes

1.

1. When Aquinas wrote his Summa, at the very beginning (*Summa Theologica* Ia, q. 1, a. 1; see also *Summa Theologica* IIa Iae, q. 54, a. 2), the idea of a round Earth was the example used when he wanted to show that fields of science are distinguished by their methods rather than their subject matter... "Sciences are distinguished by the different methods they use. For the astronomer and the physicist both may prove the same conclusion - that the earth, for instance, is round: the astronomer proves it by means of mathematics, but the physicist proves it by the nature of matter." *History of Science: Shape of the Earth: Middle Ages: Aquinas*

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1.

• "Their cosmography as far as we know anything about it was practically of one type up til the time of the white man's arrival upon the scene. That of the Borneo Dayaks may furnish us with some idea of it. 'They consider the Earth to be a flat surface, whilst the heavens are a dome, a kind of glass shade which covers the Earth and comes in contact with it at the horizon.'" Lucien Levy-Bruhl, *Primitive Mentality* (repr. Boston: Beacon, 1966) 353; "The usual primitive conception of the world's form ... [is] flat and round below and surmounted above by a solid firmament in the shape of an inverted bowl." H. B. Alexander, *The Mythology of All Races* 10: North American (repr. New York: Cooper Square, 1964) 249.
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• • *Iliad*, 28. 606.
• • *The Shield of Heracles*, 314-316, transl. Hugh G. Evelyn-White, 1914.
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surrounds the flat disc of the earth on which men and women work out their lives". Quoted in *The shield of Achilles and the poetics of ekphrasis*, Andrew Sprague Becker, Rowman & Littlefield, 1995, p.148

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- • *Seven against Thebes*, verse 305; *Prometheus Bound*, 1, 136; 530; 665 (which also describe the 'edges' of the earth).
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- • Xenophanes DK 21B28, quoted in Achilles, *Introduction to Aratus* 4
- • Diogenes Laertius, ii. 8
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- The Myth of the Flat Earth
- The Myth of the Flat Universe
- You say the earth is round? Prove it (from The Straight Dope)
- Flat Earth Fallacy
- Zetetic Astronomy, or Earth Not a Globe by Parallax (Samuel Birley Rowbotham (1816-1884)) at sacred-texts.com
- The Flat Earth Society official website