

Creation, Beginning and Time in the *Summa Theologiae*: Why Creation does not Imply the Beginning of the Universe?

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Abstract

The book of *Genesis* opens with the narrative of the creation of the universe and of the world. Beginning and time are crucial in this account. Applying his method of philosophical inquiry, Aquinas – who was targeted by the condemnations of Étienne Tempier – concluded that creation does not imply the beginning of the universe. In the *Summa Theologiae*, he expounded on this theme and put forward a theory as to why this is so. This article attempts to re-read this mediaeval debate, characterized by two antagonistic cosmogonic views – philosophical and doctrinal – through calculus, notably through the introduction of the limit notion, to which, in fact, Thomas does not adhere, but rather adopted an intermediate position. Grounded in contemporary cosmology, which endorses the beginning of the universe, the Biblical age of the world based on the genealogies contained therein tends to absolute present – a fact and not an act of faith – in terms of the actual age of the universe. Aquinas not only provided a position of ‘modus vivendi’ between philosophy and theology, but addressed a fundamental issue in the philosophy of science of cosmology.

Keywords: Aquinas, *Genesis*, eternity, philosophy, religion, universe, calculus

* The author is grateful for the valuable comments of the late Rev. Professor Peter Serracino Inglott (former Head of Philosophy Department and Rector of the University of Malta), Ivan Christov (Professor of Christian Philosophy, Faculty of Theology, Sofia University ‘St Kliment Ohridski’), Valentin Gutev (Professor of Mathematics, Faculty of Science, University of Malta) and Adriana Neacșu (Professor of Philosophy, Faculty of Social Sciences, University of Craiova). This final version is also thanks to the critical remarks of the two anonymous reviewers.

Introduction

The book of *Genesis*, a narrative of “primaeval history” (Gen 1–11) and “ancestral history” (Gen 12–50) (Bergant 2013, xii), opens with the phrase “In the beginning” (Gen 1:1; cf. Holy Bible). The term, a transliteration of the ancient Greek word γένεσις (genesis), in ancient Hebrew is בְּרֵאשִׁית (Bereshit). Given that the definite article is missing but yet implied, it is translated as “In [the] beginning [of something]” (Blenkinsopp 2011, 30–31). Creation is “creatio continua”, ongoing creation, with phases of un-creation and re-creation. This is one motif of “primaeval history” (Blenkinsopp 2011, 17); the second – related to the problem of evil (see Bianco 1963, Bianco 1968, Blenkinsopp 2011) – is beyond the aim of this research note. This article presents an assertion and aims to:

1. enquire why the mediaeval Dominican theologian and philosopher Thomas Aquinas (fl. 1225–1274)¹ considers that creation does not imply the beginning of the universe in the *Summa Theologiae* (*ST*)²; and
2. apply the mathematical concept of limit notion to the riddle of mediaeval cosmology regarding the eternity or temporality of the world. These cosmogonic views are respectively grounded in philosophy, notably Aristotle, and in the doctrinal teachings of the Scripture.

In this article, use was made of the edition translated by Timothy McDermott. Citations are stated in traditional Thomistic notation.

1. Terminology

Aquinas distinguished between ‘Æternum’ as referring to God (*ST* 1a. 10, 2) and ‘æternum’ as referring to creatures (*ST* 1a. 10, 3). The term can mean either temporal succession without beginning or end – endless time – or a mode of being which is not in time at all. This is an accurate translation of Aquinas. The first meaning belongs to the sphere of creatures, while the other is associated with God. Other useful terminology from the mediaeval lexicon includes the terms translated as ‘eviternal’ and ‘sempiternal’, the former meaning enduring forever, the later referring to infinite duration, that

is, everlasting. If creatures are aeterna in any sense, then it is in the sense of temporal succession without beginning or end. There is a hypothetical character to this claim. To overcome this ambiguity, the world's 'aeternum' can be translated as 'everlasting', whilst the 'Æternum' of God can be treated as eternity; S/He endures eternally. The English word 'everlasting' often means unending, without any implication of not having a temporal beginning. God is prior to the world by priority of duration. His priority is of eternity and not of time (*ST* 1a. 46, 1 ad 8).

2. An issue in Mediaeval Christianity

The controversy over the eternity of the world was one of the significant themes debated during the Christian Middle Ages. The historical context was the rediscovery of, and the subsequent renewed commentaries on, Aristotle (fl. 384–322) notably by the Muslim polymath and jurist Averroes (fl. 1126–1198). Aristotle argued for the eternal duration of the cosmos, a notion which was in conflict with the Scripture. Also, attention is drawn to the notion of participation in mediaeval philosophy, with hints of Neoplatonism and its connection to the Christian doctrine of creation and *Genesis* (see *Liber de causis*).³ The universal incompatibility of Aristotle with Christian doctrine led to the 1277 condemnation by Stephen Tempier, who prohibited the teaching of 219 philosophical and theological theses which were being debated at the time at the Faculty of Arts of the University of Paris. Aquinas was targeted by these condemnations (Hissette 1997).⁴

A publication on the thirteenth-century academic debate on the eternity of the world by Jakob Hans Josef Schneider (1999) has recently been issued in the reputable journal *Archives d'histoire doctrinale et littéraire du Moyen Âge*. Schneider (1999) argues that the crucial issue the mediaeval scholars⁵ – in particular, the eclectic scholar Henry of Ghent (fl. c. 1217–1293), the Franciscan friar Bonaventura (fl. 1221–1274),⁶ Aquinas, the Augustinian friar Giles of Rome (fl. c. 1243 – 1316) and the Dominican friar Boethius of Dacia (fl. c. 13th century) – were addressing was the relationship between philosophy and theology, a debate which gradually led to the

foundation of philosophy as a discipline independent from theology. An anthology of main texts on this controversial theme by these Christian thinkers, including Archbishop of Canterbury John Peckham (fl. c. 1230–1292) and the Franciscan friar William of Ockham (fl. c. 1287–1347), all in response to Aquinas' *De Aeternitate Mundi*, was published in Paris less than two decades ago (Michon 2004).

The cosmological debate centred on two antagonistic philosophical views: whether one can conclude that the world was created through reason only, or that it is impossible to do so as this proposition is an act of faith. It was an attempt by mediaeval scholars to reconcile Aristotelian philosophy with Christian theology – that is, to align reason with biblical revelation – to resolve the assertion that the Universe is eternal and uncreated with the thesis of the absolute beginning of the Universe. In *De Aeternitate Mundi*, Boethius of Dacia argued against the temporal beginning of the world and maintained that creation is not conceivable. The French school maintained that this cannot be the case, as it is logically proven that it is temporary. In *De Aeternitate Mundi*, Aquinas adhered to neither, instead adopting an intermediate position which reconciled these opposing views, by arguing that the creation of the world and the eternity of the world are not mutually exclusive from one another, but neither one can be proven; it is a matter of dogma. A recent study on this theme has been undertaken by Forment (2014), who claims that these three differing positions are grounded in the three varying responses put forward with respect to the issue of reason and faith.

3. Creation of the world in the *Summa Theologiae*

The universe had an absolute beginning, 'creatio ex nihilo' – "In the beginning God created heaven and earth" (Gen 1:1) – or beginning out of chaos – "Now the earth was a formless void, there was darkness over the deep, and a divine wind sweeping over the waters" (Gen 1:2). This could be read as the state of the universe prior to creation (Bandstra 1999, 38–39), the context for his development project, planet earth. There is ambiguity in the Latin word 'initium', as it can mean temporal commencement or non-temporal origin. Two notions of beginning

in the phasing of creation are present: beginning from the beginning and beginning from something else/development of what exists – creation out of nothingness and creation from something else.

As regards the definition given above, nothing except God can be eternal. Recalling *ST*, 1a 19.3, Aquinas restates that “absolutely speaking, it is not necessary that God should will anything except himself” (*ST*, 1a 46.1 resp.). He concludes that “there is no need for God to will anything other than himself” (Davis, 144). It is not necessary for God to will that the world should always exist. Furthermore, “since the necessity of the effect depends on the necessity of the cause” (*ST*, 1a 46.1 resp.), the world exists for as long as God wills it.

An everlasting effect such as the everlastingness of the world need not result from God’s eternally being in action. An effect such as the existence of the world follows as ordered by his will. It is possible from the changeless (*ST*, 1a 46.1 ad 5) and eternal power to will of God to bring the existence of the world about at the time that it is eternally willed by him to be brought about (*ST*, 1a 46.1 ad 10). The “world was made by him” implies that it was preordained eternally by his will (*ST*, 1a 46.1 ad 9).

While remaining himself unchanged, God can produce a new effect. It is possible for a thing to be moved by God, for the new motion follows from God’s will that that motion shall be (*ST*, 1a 46.1 ad 5). The eternity of God’s will is different from the eternity of God. It seems that the ‘aeternitas participata’ is different from the ‘aeternitas divina’ – a kind of intermediary between it and ‘aeternitas mundi’. God is said to be prior to the world by duration, that is, in terms of the mode of his existence, not necessarily in a temporal sense. Here the word ‘primum’ stands for a priority which is not of time but can be eternal; it is used here because eternity is thought of as imaginary time, and does not imply truly existing time: “There are two kinds of time: imaginary and real, the first being external to the material universe, and containing within itself all durations” (Phillips 1959, 120).

A substantive claim is that the world came into being without any change happening in the divine essence, because

“the universe did not come out of God by a sort of natural necessity” but as the product of his willing it to be (Gilson 1955, 373). Since “there is no need for God to will anything but himself” (*ST*, 1a 46.1 resp., p.69), God need not have created an everlasting world. If God ‘freely’ willed the world, it is absolutely impossible to demonstrate that he ‘necessarily’ willed it, whether in time or in eternity. The only basis for holding that it has not always been in existence, according to Aquinas, is that God “made his will manifest to us by revelation upon which faith is founded,” A conclusion cannot be reached by reason alone: “That the world has not always existed cannot be demonstratively proved but is held by faith alone” (*ST*, 1a 46.2 resp. p.79). Since God has made it known to humanity through revelation, believers must believe that the world had a temporal beginning because this is a matter of revelation, but one cannot demonstrate it and, strictly speaking, one does not ‘know’ it. On the contrary, Dodds (2008, 180) notes that in the ‘sed contra’ (*ST*, 1a 46.1 resp.), Aquinas cites the *Gospel of John* (17:5) and *Proverbs* (8:22). Is it a case that these must be taken literally?

4. Eternity of the world in Aquinas’ thought

Nothing apart from God has existed for all eternity. Since God’s will is the cause of things, the necessity of their being is that of God’s willing them. The world exists as long as God wills it. It is not necessary for it to have existed for ever, because its existence is totally dependent on God’s will. Its everlasting existence cannot be demonstratively proved. God’s eternal will and decree to create a temporal world is known from revelation. Apart from revelation and faith, it may be proved that even a beginningless world is a created world, for everlasting matter, if it existed, would not be causeless matter; it would still have been by participation and not by necessity.

A seminal edited publication issued three decades ago addressed the theme of this section with respect to Aquinas’ *De Aeternitate Mundi* through six comprehensive studies. De Grijs argues that this work is a theological rather than a philosophical text (De Grijs 1990, 1–8), a position opposed by Aertsen (1990, 9–19). This edited publication addresses the

responses of his Christian contemporaries on the themes of eternity and infinity, namely Bonaventure (Van Veldhuijsen 1990a), William de la Mare (fl. 1272–1279)⁷ (Hoenen 1990) and Richard of Middleton (fl. 1249–1308)⁸ (Van Veldhuijsen 1990b) as well as the Chancellor of the University of Oxford, Henry of Harclay (fl. 1270–1317)⁹ (Thijssen 1990). Enquiring into the infinite is “in itself a mathematical subject” (Thijssen 1990, 83).

On the basis partly of considerations in logic and physics, and partly in the Christian doctrine of creation, Aquinas seems content to let physics reach its own conclusions in its own ways, even though theology may not always be able to accept them. Yet this issue, at least, is close enough in logical space to the heart of Christian doctrine that theology does not simply veto the conclusion of classical physics, but provides its own reason why it must be false: to posit an external world would be to put a creature where only the uncreated Verbum can be, in the beginning with God (John 1:2) (Marshall 2005, 23).

Citing Chenu (1970, 12), De Carvalho (1996, 53) notes that

... Aquinas wanted to detail the reality, the truth and goodness of a creature as universally understood, against an important tradition that emphasised the precariousness of a creature. His aim was to assure the dignity and the existence of God as well (Van Veldhuijsen 1990a, 30–33). It is on these lines that one can understand Aquinas’ invention of a new word to define the created being ‘aeternitas participata’ (*ST*, 1a 10.2 ad 1).

For Aquinas, creation of the universe is not eternal from the standpoint of faith. A recent study proved that his position remained consistent through his other works – *Scriptum super Sententiis*, *Summa contra Gentiles* and *Summa Theologiae* – although it becomes more profound (Neacșu 2013). From the standpoint of reason, Aristotelian philosophy advocating eternal motion and an eternal world is not conclusive either.

5. An attempt to resolve the controversy by means of the limit notion

Aristotle’s notion of infinity was a philosophical one; he distinguished between potential and actual infinity, accepting the former as a mathematical concept whilst, according to Bostock (1972-1973), refuting the existence of actual infinity. For example, with respect to the arrow paradox of Zeno of Elea (fl. 490–430), Aristotle argued in *Physics* (Greek: *Φυσικὴ*

ἀκρόασις; Latin: *Physica*, or *Naturales Auscultationes*) that “time is not composed of indivisible nows any more than any other magnitude is composed of indivisibles” (Book VI. Part 9, verse 239b5).¹⁰ His notion of infinity lacked the precise formulation which was introduced through the refinements brought by infinitesimal calculus – notably through the work of Isaac Newton (1642–1727) and Gottfried Wilhelm Leibniz (1646–1716) whose responses were based on initial physical and algebraic intuition respectively (Bagni 2005). Another significant arithmetical concept relating to calculus is the limit notion, which, historically, was often related to sequences and series.¹¹ For example, Gregory of St Vincent (1584–1667) referred to Zeno’s paradox of Achilles and the Turtle in his *Opus Geometricum* as a geometric series (Bagni 2005).

Augustin Louis Cauchy (1789–1857), the first mathematician to undertake a rigorous study of calculus (Bagni 2005), defined limit and infinitesimal in the *Cours d’analyse* (Cauchy 1882) thus: “When values of a variable approach indefinitely a fixed value, as close as we want, this is the limit of all those values. For instance, an irrational number is the limit of the different fractions that gave approximate values of it. [...] When values of a variable are [...] lower than any given number, this variable is an infinitesimal or an infinitesimal magnitude. The limit of such variable is zero.” (Bottazzini, Freguglia & Toti Rigatelli 1992, 327-328, Bagni 2005, 459)

Now, regardless of whether the world (Un) is temporal or eternal, it is surely a function of time t , that is, $Un = f(t)$. Applying the limit notion, these two positions may be reformulated thus:

A. Limit as t tends to infinity:

If Un is eternal, $f(t)$ approaches infinity as t approaches infinity, or, using standard notation:

$$\lim_{t \rightarrow \infty} f(t) = \infty$$

where, the = sign is an indicator and not an equal; in the limit, t cannot actually converge to infinity but it approaches infinity, that is, $f(t)$ is limitless, that is eternal.

B. Limit as t tends to a :

If Un is temporal, $f(t)$ approaches y as t approaches a , or, using standard notation:

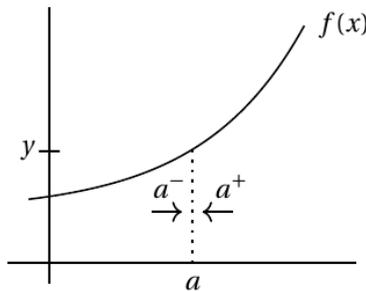
$$\lim_{t \rightarrow a} f(t) = y$$

where:

- i. y in the limit of $f(t)$ does exist, that is, the state of the Universe at creation at time a ; and
- ii. the $=$ sign is an indicator and not an equal; in the limit, t actually converges to a , that is, $f(t)$ is limited, hence it had a beginning.

Contemporary cosmology endorses the premise that the universe had a beginning; the Earth's initial formation is estimated to be between 4.6 and 4.5 billion years old.¹² Geologic timescales include the Hadean Eon, an informal interval which spans from about 4.6 to 4.0 billion years ago; formal geologic time commences with the Archean Eon (4.0 to 2.5 billion years ago) (Britannica 2020), and continues into the contemporary Anthropocene which, applying the argument of Nobel laureate Paul Crutzen (1933–2021), began in the latter part of the eighteenth century (Crutzen 2002). This implies that, the limit of $f(t)$ tends to a finite number a as t tends to 4.6 billion years, which is indeed an incredibly long time. One may indeed argue that positions A and B are related:

If a is the time of creation, even when taking into account that the age of the universe tends to infinity, there is a continuum, that is, when t tends to ∞ , the limit of $f(x)$ as t tends to a^- is equal to the limit of $f(x)$ as t tends to a^+ .



Infinity is a notion and not a number and, conversely, its reciprocal, that is $1/\infty$, is undefined. Yet, one can still approach ∞ by trying to converge to ∞ by attempting a large value of t :

t		$1/t$	
4	4×10^0	$1/4$	2.5×10^{-1}
4,000	4×10^3	$1/4,000$	2.5×10^{-4}
4,000,000	4×10^6	$1/4,000,000$	2.5×10^{-7}
4,000,000,000	4×10^9	$1/4,000,000,000$	2.5×10^{-10}

One notes that as t increases, its reciprocal approaches 0 but it is not equal to 0, that is:

$$\lim_{t \rightarrow \infty} \left(\frac{1}{t} \right) = 0$$

In this context, the limit of a function is a dynamic process leading to potential infinity and the infinitesimal. One may think of billion-year calendars; likewise, million-year calendars, thousand-year calendars, and so on.¹³ These geological timescales are immensely large as compared to when Hominins appeared 6 and 5.3 million years ago, that is during the Miocene epoch, much earlier to the earliest dating in archaeological chronology; “in terms of ... geological timescales, archaeological time is absolute present” (Bianco 2017, 9), or in limit language, the Biblical age of the world based on genealogies contained therein approaches absolute present as the age of Earth approaches Hadean Eon. This is a scientific fact and not an act of faith and thus one may argue that the Aquinas’ notions of the beginning of the world and the eternity of the universe is not mutually exclusive. Thus, Aquinas’s decision to opt for partial cosmological agnosticism is a valid position from the standpoint of science. In this context, one may argue that he did not only put forward a position for the mutual coexistence of philosophy and theology, but that his stance is fundamental in the philosophy of the science of cosmology and central to the foundation of science.

Conclusion

This article exposes the main thrust of Aquinas’s argument, which is based on the assertion that creation exists because of God’s will, and that creation – even if it were without beginning – is only known through revelation, and exists by participation in God. This is a fideistic interpretation of

Aquinas that does not engage with the philosophical reflection which he developed in the *De Aeternitate Mundi* whereby he reflects on the distinction between creation and having a beginning. Does creation really exist only because God wills it? This may be a theological claim, based on revelation, but one has to acknowledge the importance of the debate presented by Aristotle as commented on by Averroes, that implied that the world was without beginning.

The beginning of the universe is a central issue in cosmology. Both mediaeval and contemporary cosmology hold that it had a beginning. For Aquinas and other theists, this is an 'absolute' beginning – the prime mover and first cause is God – whilst a number of theories are postulated by today's science. One way to comprehend the two antagonistic mediaeval cosmogonic views is not through the philosophical notion of infinity but through the mathematical one. Applying the limit notion to the eternity and temporality of the world, it can be argued that Aquinas's position converges with Aristotle's when taking note of the contemporary cosmological assumption that the universe had a beginning in time – albeit on a different timescale from that given in the Scripture. The mathematical notion of ∞ introduced a refined concept of infinity, a function that can approach 0 but is never equal to it. In this context, the author concurs with Thijssen's position, cited above (Thijssen 1990, 83), that Aquinas let science take its course independently of the Christian doctrine contained in the Scripture. In doing so, Aquinas did address a major theme in the philosophy of science of cosmology that was essential for the foundation of science.

NOTES

¹ Aquinas' textual commentaries on Aristotle were drafted at a time when the Latin translations of his works made their way to the West. This Aristotelian corpus led to reexamination of the relation between reason and faith resulting in a new 'modus vivendi' between philosophy and theology until the advent of the science of physics. He disputed both the interpretations of Aristotle by followers of the Islamic scholar Ibn Rushd (fl. 1126–1198), better known as Averroes, and the predisposition of the Franciscans to reject Aristotelianism.

² According to Gilson, Aquinas was “one of the three great metaphysicians who ever existed”, the others being Plato and Aristotle (Gilson 1938, 324).

³ The *Liber de Causis*, a treatise on Neoplatonist metaphysics, influenced mediaeval philosophy along certain paths of thought – in particular, the theory of ultimate causes and the introduction of the metaphysical principles of monotheism – leading to a metaphysical reinterpretation of Neoplatonist philosophy.

⁴ In 1270 and 1277, the Roman Catholic Bishop of Paris and the former Chancellor of the Sorbonne, Etienne Tempier (fl. ?–1279), known as Stephanus of Orleans, condemned his doctrines, which were being disputed at the University of Paris.

⁵ Two leading branches of Scholasticism were Neoplatonism and Aristotelianism. The Franciscan school endorsed the former philosophy, mainly read through Augustine of Hippo (fl. 354–430), whilst the Dominican school supported the latter. Averroes was a staunch proponent of Aristotelianism and vehemently opposed the Neoplatonism of earlier Islamic scholars like Al-Farabi (fl. c. 872–c. 950) and Ibn Sina (fl. 980–1037), known in the West as Alfarabius and Avicenna respectively.

⁶ Bonaventure’s ideas – significantly influenced by Augustine of Hippo – converged with those of Albert the Great and Aquinas on a number of theological and philosophical issues. He concurred with the former in reading theology as an applied science and disagreed with the later that philosophy (reason) is independent of theology (faith). For him, philosophy was the handmaid of theology; it was the ‘*praeparatio evangelica*’. Bonaventure rejected the Aristotelian notion of the eternity of the world and thus differed from Aquinas with respect to the abstract notion of an eternal universe. An authoritative concise scholarly research on the philosophy of Bonaventure and Aquinas, published in two parts, was penned by Callus (1940a; 1940b).

⁷ De la Mare was influenced by Bonaventura and Roger Bacon (fl. c. 1220–1292). In 1277–9, de la Mare wrote the *Correctorium*, or *Reprehensorium*, a work critical of Aquinas. In 1282, this work was prescribed by the Franciscan Order to be read along with Aquinas work. Unlike Aquinas, he argued the ‘*principium individuationis*’ is form and not matter.

⁸ Richard of Middleton was significantly influenced by Bonaventure and Aquinas. Although his philosophy was indebted to Neoplatonism, he concurred with Aquinas when including Aristotelian notions in his philosophy.

⁹ Henry of Harclay was significantly influenced by the Franciscan John Duns Scotus (fl. 1265/66–1308), his philosophy teacher at the Sorbonne. He defended the theory that “the world and movement could have existed from all eternity” and asserted that “God [has] the power to do anything that is known not to include a contradiction or that is not known to include [one]” (Harclay 2008, 753).

Callus, the first member of the Dominican Order to receive a degree from the University of Oxford since the Reformation (Bianco, 2020), had undertaken pioneering research in Aristotelian learning in the thirteenth century at his alma mater (Callus, 1938; Callus, 1943) including the subsequent condemnation of Aquinas at the same university (Callus, 1946).

¹⁰ Although philosophers, such as Alba Papa-Grimaldi, argue that the paradoxes of the Zeno are metaphysical problems (Papa-Grimaldi 1996), scientists – such as Carl Boyer – argue that they are mathematical problems which are resolved through calculus (Boyer 1959), notably the notion of a convergent infinite series (Burton 2010).

¹¹ The historical roots of the limit notion with respect to the development of its representation registers and cognitive development are the subject of a study by Bagni (2005). Citing Tall (1985) and Tall & Vinner (1981), he notes that “the limit process is intuitive from the mathematical point of view, but not from the cognitive one sometimes cognitive images conflict with the formal definition of limit. The limit of a function is often considered as a dynamic process, so it is considered in the sense of potential infinity and infinitesimal” (Bagni 2005, 454).

¹² Indeed, using radiometric dating, scientists discovered rocks in northwestern Canada and in Australia which are about 4.0 and 4.3 billion years old respectively. Rocks from the moon and meteorites that have landed on Earth are dated to between 4.5 and 4.4 billion years ago. This supports the claim that bodies in the solar system may have formed at similar times. (Bodies in the solar system formed later than those in other parts of the universe; the universe is thought to have formed 13.8 billion years ago).

¹³ Based on the genealogies contained in the two versions of *Genesis*, the world was created about 5500 BC and about 4000 BC according to the Greek Old Testament and the Hebrew/Aramaic Masoretic text respectively. According to both versions, the creation of the world is presented as a development project undertaken in seven phases – from Day 0 (the beginning, that is, forming the context of creation) to Day 7 (the final phase, that is, completion of creation). These phases can be further read in terms of environmental monitoring and audit by the Creator (Bianco 2021).

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