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Astrotheology: A proactive contextualization of novelty within space exploration

ABSTRACT

Space exploration is the dawn of a new era for humanity and the need for theological reflection is essential. Astrotheology, as the vehicle of choice, is predominantly reactive in nature. I intend to challenge this reactive function of theology and propose that theology might be called to play a proactive, even prophetic role especially within the science and religion debate. Scripture's specific revelation vis-à-vis the essence of the natural world and the nature of God may provide a proactive contextualisation of novelty for future space exploration. Astrotheology underlines certain attributes in nature, embedded within the fabric of space and time, that could magnify and frame our understanding of empirical observations. We live in a universe where there is a space for contingency and novelty; yet a creation that is lawful; there is also a movement towards entropy, and, finally, certain aspects in creation will remain a mystery.

1. INTRODUCTION

In popular culture, people tend to misuse certain concepts or words that define a specific era. The idea is to merge a common product or word with a powerful concept, in order to strengthen the commodities' market value. From this approach, we have everything from quantum vacuum cleaners to astro-chocolates, none of which has anything to do with the original concept. It would not be surprising if the layman's first encounter with the term "astro-theology" may lead to the same observation. By



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adding the prefix, “astro-” to “theology” might be a good ploy to spice up a stale doctrine, re-energised for the 21st century. Therefore, a first impression of the name “astrotheology” might be: What is next? Historically, theology is notorious for being last in accepting or embracing new technology or thoughts. Therefore, a legitimate question might be: Did theology eventually, after decades of space exploration, come to the party, as a Biblical add on?

The answer is clear, definitely not! This article shows that cosmology was, from the outset, a prominent theme in theological deliberations over Scripture and God’s providential agency in creation. The reason for this is simple. The triune God of Scripture, who revealed Himself through the incarnation of Christ, is the Creator of the entire cosmos. In and through the cosmic Christ (Col. 1), He continuously upholds creation and creates novelty through the agency of the Spirit. In addition, this interaction with creation encourages dialogue between natural science and theology (Pieterse 2017).

The scope of this article necessitates a brief introduction to the term “astrotheology”. The seeds of the term “astrotheology”¹ can be traced to the pre-Christian era of the Parthenon, where the peripatetic philosophers (Leucippus, Democritus, Epicurus, and Lucretius) held that our cosmos is infinitely large, with an infinite number of patterns that could sustain intelligence. Aristotle conversely maintained the centering principle, or geocentrism, which holds that the finite and visible world is all there is, with the Earth at its centre. Christian medieval Europe accepted Aristotle’s proposal that formed the bedrock for theological deliberations over cosmology well beyond Copernicus (Peters 2016:10, 11). The extra-terrestrial life or the plurality of worlds debate intensified in the 17th and 18th centuries, due to the new heliocentric system (Copernicus²), the Earth had become a planet like the others and was no longer the centre of the universe. After Galilei aimed his telescope at the moon in 1609 and found that it resembled our own planet’s topography of mountains and plains, the Earth lost its unique status as potentially the only habitable planet in our solar system (Dunér 2016:451). The dawn of the space race created the potential to settle this age-old speculation about the unique status of earth and life as we know it.

It is important to note that neither the ancient Athenians, nor the medieval scholastics or Copernicans used the term “astrotheology”. Peters (2016:13, 14) traces the expression to an Anglican clergyman, William Derham (1657-1735), in his publication, *Astro-theology, or a demonstration of the being*

1 For a more detailed historical perspective, see Dunér (2016).

2 The publication of *De revolutionibus orbium coelestium* (1543) was not condemned by the Catholic Church initially, although Luther objected to this new model on account of Scriptural interpretation (Gribbin 2003:9, 13).

and attributes of God from a survey of the heavens, published in 1714. His intention was to glorify God by illuminating the expansive nature of the heavens. The scope and motive of contemporary astrotheology seems to have changed. Losch (2016:408) points out that, when Peters (2014) called for an establishment of the field of “astrotheology”, he was certainly thinking less of these ancient attempts. Rather, he was coining the word analogously to the emerging field of *astrobiology* (an expansion of the previous field of *exobiology*³). The need for theological reflection regarding current and future space exploration became essential. The relevance for theology is clear (Losch 2016:409-11). As Peters (2016:2) observed:

The cultural tree is ripe with the new fruits of astro-enthusiasm. Astrobiologists are sending probes to Mars as well as the moons of Saturn and Jupiter, hoping to find the signatures of microbial life. Elon Musk’s Space X plan is to take earthlings to Mars and establish a colony. With the help of the Kepler telescope, discoveries of exoplanets in the Goldilocks zone – not too hot and not too cold – occur monthly. SETI Institute scientists listen twenty-four hours per day for radio signals emitted from extra-solar civilizations. METI scientists are targeting star systems to listen to messages sent from Earth.

We might ask: What is theology’s responsibility in all of this? Certainly, it should echo the exalted expectations of Derham. That may be true, but the answer to this question is more complex. Understanding *astro-* as an amplicative prefix, Pryor (2018:7) views astrotheology as one of many emerging fields that study the wider social implications of space research such as *astrosociology*, *astroethics*, *astroanthropology*, *astroeconomics*, and so on. Peters’ (2014:446) aim is more specific. Astrotheology should function as a multidisciplinary branch of theology that takes up the relationship between God and the creation, especially the creation of the universe over time. Our picture of God’s work over time is informed by the natural sciences, particularly cosmology, astronomy, and evolutionary biology.

Consequently, Peters (2016:4; 2014:446) defines astrotheology as

that branch of theology which provides a critical analysis of the contemporary space sciences combined with an explication of classic doctrines such as creation and Christology for the purpose of constructing a comprehensive and meaningful understanding of our human situation within an astonishingly immense cosmos. I place astrotheology within the larger understanding of theology.

3 The study of extra-terrestrial life forms (Peters 2020).

It becomes clear that theological deliberations over the heavens have concrete earthly motives. Pryor (2018:6) interprets this definition as a form of correlational or critical-correlational theology of culture, wherein understanding our planetary place in the wider cosmos affects the existential questions we might ask and the theological answers we might offer. It assumes a discontinuity: a fundamental change between pre- and post-space science questions regarding meaningful human being. Instead, Pryor (2018:6) is content to link astrotheology to other work done in theology and science; it is, at minimum, a Theology of Space Science.

It is evident from Peters' definition of astrotheology that its purpose is predominantly *reactive* in nature. Although Peters (2019:366) suggests a dialogue between natural science and theology that could yield a better understanding of creation, he concludes with the idea that theologians should assess and interpret the findings of astrophysics and astrobiology and evaluate how these findings might affect theological reflection (Peters 2016:14). His methodology is clear, "the initial movement here is from astrobiology toward enhanced theological understanding" (Peters 2014:444; 2016:3). This attitude is endorsed by Russell (2012:72) who interprets this endeavour as part of a theology of nature, theology reconstructed considering science.

The term "astrobiology"⁴ arose among scientists in the 1990s and loosely provides access to a wide array of approaches to space exploration. This term will stand as a cipher covering astronomy, astrophysics, cosmology, exobiology, and other space sciences (Peters 2014:445). Its goal is inquiring into the *possibilities* and *conditions* whereby life might emerge. Such possibilities and conditions would be abductive inferences that might contribute to establishing the first principles for the emergence of biological systems (Pryor 2018:7). Ironically, astrobiology's emphasis is not primarily shaped to find intelligent life somewhere in the universe, although Peters (2016:3; 2020) argues that it should be given special consideration at this moment. The religious scholar is subsequently called to a *response theology*.

In this article, I intend to challenge this predominant reactive function of theology, especially within the science and religion debate. This unbalanced

4 "In 2015 NASA revised its previous roadmap with an Astrobiology Strategy identifying six major research areas.

- Identifying abiotic sources of organic compounds
- Synthesis and function of macromolecules in the origin of life
- Early life and increasing complexity
- Co-evolution of life and the physical environment
- Identifying, exploring, and characterizing environments for habitability and biosignatures
- Constructing habitable worlds" (Peters 2016:6).

affection with science⁵ is bound by a specific understanding of the sciences, where natural science nearly always gets preference over theological contributions, due to its epistemological foundations. In some environments, a response theology is indeed required, but if we accept a complementary view (Pieterse 2015) to the sciences and the notion of consonance (Pieterse 2017) as a real possibility, theology might be called to play a *proactive*, even prophetic role. Pryor (2018:6) endorses this function. This innovative task of theology is not new, but it should be embraced in an era where the perception is held that cosmology, particle physics, and astronomy are the only custodians of knowledge about creation.

I agree with Pryor (2018:9) that theology could and should play a significant role⁶ in space exploration, especially regarding the contextualisation of data. Currently, innovative technological research in various fields connected to space exploration leads to numerous discoveries, which, in turn, spawn specific theories about creation. These snippets of a big puzzle require a more compressive approach that transcends the limits of physical science. Natural science is exceptional in its ability to answer most of the *how* questions. However, due to its epistemological foundations, it struggles to give appropriate answers to the value-oriented *why* questions. Occasionally, in their efforts to extrapolate empirical data about novel findings, natural scientists venture into this domain where a more inclusive contextualisation is needed. I believe that astrotheology could contribute in a proactive way. This duet between the sciences is complementary in nature and assists the physical sciences in remaining true to their core values.

Thus, the premise of this article is that Scripture's specific revelation *vis-à-vis* the essence of the natural world and the nature of God may provide a proactive contextualisation of novelty encountered in space exploration. Astrotheology is the vehicle best equipped within the broader science-religion dialogue to span the perceived bridge between the sciences on this subject.

5 This prejudice may lead to *scientism*, an ideology that views natural science as the only viable discipline to acquire true knowledge.

6 Peters (2014:446) identifies four areas where astrotheology could add value, namely Christian theologians along with intellectual leaders in each religious tradition need to reflect on the scope of creation and settle the pesky issue of geocentrism; the astrotheologian should set the parameters within which the ongoing debates over Christology (Person of Christ) and soteriology (Work of Christ) are carried on; theologians should analyse and critique astrobiology and related sciences from within, exposing extra-scientific assumptions and interpreting the larger value of the scientific enterprise (Peters 2016:24), and theologians should cooperate with leaders of multiple religious traditions and scientists to prepare the public for the eventuality of extra-terrestrial contact by helping develop astroethics.

This undertaking depends on an important question. Is it possible or even theologically correct to extrapolate from Scripture certain waypoints that could prophetically enlighten current and future physical observation of the broader cosmos? If we view theology as pseudoscience, as certain scholars loyal to the ideology of scientism claim, then the answer is “No”. Then again, if we accept that the Bible’s intention is not to give a detailed analysis of historical or scientific conundrums, but to give clarity on the nature of God and the fabric of His creation,⁷ then the answer is an emphatical “Yes”. I hold the latter view. This approach compels us to ask appropriate questions⁸ to Scripture, as well as fitting questions to natural science. If successful, it could draw the curtain ever so slightly on the nature of nature and the essence of a providential God who lovingly holds the entire cosmos in the palm of His hand. There is a delicate balance between these truths in Scripture, God creates freely, but creation does not necessarily flow from His divine nature. Yet, nature expresses something of God’s character (Jaeger 2018:62). Astrotheology may well, in a limited sense, inform space exploration about the character of the cosmos, as theoretical physics depicts possible scenarios for astronomical observation. A critical question might be: Is this a bridge too far, exceeding the limits of theological endeavour? To the contrary, I (2017) believe that a confessional approach to the essence and place of the cosmic Christ in Colossians 1 necessitates a proactive role for theology, albeit in a minimal way. This prophetic function of theology is not new in the science and religion debate. The futility of the universe (Polkinghorne 2004:144; 1996:162), for example, as predicted by scientific observation, resonates with Christian eschatology, and is contextualised within the current and future encompassing presence of the triune God.

The unveiling of the character of creation is a continuous process within the scientific enterprise, and research highlights the persistent move towards complexity, as well as a relational structure between different elements. However, there are certain underlying attributes in nature, embedded within the fabric of space and time, that could magnify our understanding of these empirical observations. Within the confines of this article, it is only possible to give introductory remarks on four such properties. We live in a universe where there is a space for contingency and novelty; a creation that is lawful; yet there is also a movement towards entropy, and finally, certain aspects in creation will remain a mystery. Although these features are not theologically unique, and are consistent with observed physical phenomena, they conceal an

7 Lennox (2007:29) reminds us that the universe is not a closed system, but a creation, *an artefact of the mind of God*, maintained and upheld by Him. Human beings have an important role as co-creators of God within His agency with the world.

8 This method emanates from a complementary approach-seeking consonance, although an independent view to the sciences utilises the same system.

even deeper spiritual truth. Astrotheology has the capability to contextualise novelty in space exploration within these hidden parameters. This venture emphasises the complementary nature of the sciences for a new age and theology's responsibility to interpret, extrapolate and apply Scripture within creation (Peters 2016:14, 15). At first glance, these aspects seem obvious, but ironically, in the enthusiasm of new discoveries, they are often neglected, ignored, or frankly rejected. What is the character of the universe we inhabit?

2. IN CREATION, THERE IS A SPACE FOR CONTINGENCY AND NOVELTY

The concepts of contingency and novelty are hardly unique when we consider the diversity within creation. Hence, a first reaction might be: What is special about this proposal? The physical sciences continuously describe and analyse a contingent⁹ universe endowed with novelty. What could be new from a theological perspective? Theology, as an interpretation of Scripture, reminds us that these two attributes are what we could expect from a creation providentially created and sustained by God. In addition, these qualities could potentially expand our definitions of life. It is essential that we acknowledge the significance of these realities in our exploration of space and ongoing quest to search for possible traits of life.

Jaeger (2018:62) reiterates Scriptural waypoints (1 Cor. 15:38; Rev. 4:11) that affirm that God created everything through His will as free act. It is within this free act of God that creation finds its contingency and non-necessary character. What does it mean? Scripture supports the notion that there is a fine balance between contingency and necessity in nature.¹⁰

I believe that the Christian God, who is both loving and faithful, has given to its creation the twin gifts of independence and reliability ... the interplay between happenstance and regularity, between chance and necessity (Polkinghorne 1993:n.p.).

9 Russel (Kärkkäinen 2015:128-129) identifies different aspects of a contingent universe, e.g. ontological, empirical, local, and nomological contingency. In descending order, it describes God's creative agency in creating the universe, the creation of empirical features such as natural laws, the dependence of the different aspects to one another, and the vast number of contingent properties reflected in the cosmos.

10 The two primary creation narratives in Genesis 1 and 2 gracefully balance temporal time frames and directives with the mandate to multiply, to subdue, and to be co-creators of God.

Natural laws may govern the physical universe, but there is a myriad of permutations¹¹ of how physical constituents may organise themselves within the boundaries of these laws. This inevitably leads to novelty. Throughout Scripture, the creation narratives speak of a God who creates new things. This creation of novelty is embodied by the incarnation of Christ who not only transforms human beings, but also eschatologically renews creation in every possible sense. This *creatio continua* may take on different appearances that approach the eschaton. For example, Yong (2011:133-72) develops a pneumatological theory of emergence in accordance with Philip Clayton's theory of emergence.

How does the above relate to space exploration? Our pursuit of potential life in the cosmos may be inherently flawed. The dilemma is not our equipment or detecting apparatus, but our expectations of what we hope to find. In the classic story of Dr Seuss, *Horton hears a who!* (1990), Horton, the elephant, found the Who's of Whoville inhabiting a small speck of dust. Tragically, he is the only one that understands and believes that life might exist on a scale of which his peers seemed ignorant. The reason being that everyone else presumed that all life should conform to their limited understanding of existence.

This idea of possible extra-terrestrial life is not unique to our age. Dunér (2016:453-454) and Losch (2016:407-408) documented how 18th-century natural philosophers (e.g. Fontenelle, Huygens, and Kant) and theologians came to defend a physical-theological viewpoint and deduced that the astonishing order and efficacy on earth translates to the existence of life on other planets.¹² However, we are seduced in seeking to define life¹³ from our limited experience thereof. Yet, there is no definitive statement that describes the profusion of life. Despite our incomplete knowledge, scholars often make exuberant claims. Green (2015:339-341) confidently declares:

I will define material intelligent life forms as self-conscious, learning, toolmakers, and symbol-makers, they will most likely be socio-cultural toolmakers with symbolic language, related bodily systems for manipulating tools and generating symbolic representations, long childhoods for teaching and learning, and so on. In short, there

11 See, for example, Pieterse (2012:95-97) who describes the contingent character of the human immune response to potential threats to the human body.

12 See, for example, Derham's *Astro-theology* (2010).

13 Pradeu *et al.* (2016) speculate if viruses could be considered alive, a question raised repeatedly throughout the history of virological research. Then, "of course, this question is directly related to another question, 'What is life?'. Answering this question is notoriously difficult, and it has often been emphasized that conceptions of life have regularly changed in the last decades, making any answer to this question even more delicate."

may only be one way to be an intelligent species. We should expect prophet traditions, mystical traditions, asceticism, avatars, god kings, and the like.

His views might be extreme, but Pryor (2018:8) reiterates the common belief among astrobiologists that there are at least four habitability requirements that need to be considered for understanding how the universe might “harbour life beyond earth”: the availability of a liquid solvent, the existence of a corresponding chemistry, an energy source for metabolism, and a consideration of the breadth at which these other requirements pertain. McKay (2004) casts the net wider with his “Lego principle” which affirms that different life forms are likely to have different patterns. Therefore, at the very least, we might find life elsewhere that mirrors symmetry of life on Earth, with d- instead of l-amino acids, for example. All these prerequisites might be true, as all our models and detection equipment are calibrated to find these specific exoplanetary systems.¹⁴

At this moment, we only seek life or variations thereof, based on our enclosed analysis of certain data currently available on earth. This is expected, as this is the only world we know. Unfortunately, in our exuberance, we could be blinded to the potential abundance of other possibilities¹⁵ of life, albeit peculiar and unexpected. An astrotheological proactive approach might widen our expectations of what we might find. The creator God is not limited only to the type of life, or the conditions for life we experience or envision from earth. His resources are not exhausted in the creation of this universe, or multiverse. Our definitions of life may change dramatically on account of future space exploration. Who would have predicted that biological life on earth is possible on the boundaries¹⁶ of tectonic plates in the deep ocean? The cosmos may hold even more revelations, each of which celebrates the creative Spirit of the triune God.

Our girded expectation of life is entwined with certain assumptions regarding evolution. Peters (2016:25) identifies an over-interpreted variant of Darwinian evolution that frames and guides research programmes in the fields of astrobiology and SETI. What does it mean? He notes that, even

14 For example, the extraordinary Trappist 1 planetary system (Landau 2018).

15 The eccentric Swedish natural philosopher and theologian, Emanuel Swedenborg (1688-1772), reflected on numerous possibilities (Dunér 2016:464-466).

16 Scientists first discovered hydrothermal vents in 1977 while exploring an oceanic spreading ridge near the Galapagos Islands. To their amazement, the scientists also found that the hydrothermal vents were surrounded by large numbers of organisms that had never been seen. These biological communities depend on chemical processes that result from the interaction of seawater and hot magma associated with underwater volcanoes (*National Oceanic and Atmospheric Administration* 2018).

though leading evolutionary biologists decry the presence of a progressive entelechy or directional purpose in evolution, space researchers frequently work on the assumption that life's genesis is almost inevitable where pre-biotic chemistry is present (Russell 2018:81). Even more suspiciously, once life gets going, it will progress toward increased complexity, toward intelligence, and toward science and technology as we know it. They assume that the cosmos is biophilic, that it loves life and that life (our definitions thereof) is plentiful among the stars (Peters 2020). This conjecture is founded on the belief that science will ultimately come to the rescue of the cosmos (Peters 2016:26).

The premise that we live in a contingent universe endowed with novelty should liberate our expectations of life and sharpen our senses towards a providential God whose agency is not locked up in ancient scrolls, but who is actively engaging within the very fabric of space and time He created. We inhabit a universe that is governed by specific laws.

3. A LAW-ABIDING CREATION

The lawful nature of creation was a steady unfolding process that is well documented in the history of science. Gribbin (2003) describes eloquently how the first scientists¹⁷ and most often laymen described empirical processes that were subsequently identified as laws of nature which was consistent in their outcome. The biblical texts do not speak of natural laws in the same way as we currently differentiate between these natural phenomena.¹⁸ However, the creation narratives speak of God who created the natural order in an organised way, obeying specific foundational certainties. Although the ancients had not yet cracked the code of planetary motion, and often worshipped the celestial bodies as gods, the consistency of natural processes fascinated them. The act of creation or the analysis of ancient beliefs is not within the scope of this article, but the fact that creation was constructed in an orderly fashion and functions within certain fixed parameters is important. In a sense, creation mirrored its Creator. Through the ages, theologians¹⁹ utilised the analogy of the *fingerprints of God* to describe God's agency in creation, although each gave his/her own interpretation of what it meant. Yet, the logic was simple, from the fabric of creation, one could extrapolate a divine hand in nature.

17 Although Galileo is often accredited as the first scientist, Gribbin (2003:68) identifies a contemporary physician, William Gilbert (1544-1603), as the first scientist, on account of his methodology of observation.

18 For example, gravity, electro-magnetism, and the strong and weak nuclear forces.

19 Buitendach (2009) instead argues, from an eco-hermeneutical perspective, in favour of a theology of nature as an alternative to traditional natural theology (for example, Paley's analogy of a watch), which historically attempted to deduce proof of God's existence from specific evidence in nature.

Van Niekerk (2003:9), for example, investigated Calvin's assessment of two trajectories, namely creation and redemption, in God's action within the world. Unfortunately, but well understood within the context of his era, Calvin's view of the God-human-and-nature relationship led to a degrading of the natural cosmic realm, because his soteriology was primarily focused on humanity's relationship with God.

Despite these temporal infused theological assumptions, I believe, given God's providential agency as mediated through Scripture, that it is not a coincidence that reality behaves according to certain laws²⁰ which originated from within the Lawgiver. In addition, the universe is structured on a deeper level, according to an embedded mathematical order (Polkinghorne 2007:55). We live in a cosmos that is intelligible (Polkinghorne 2004:12), where human beings have the ability to access quantum theory's account of the subatomic world, and the account that general relativity gives. It is noteworthy that this ability of humanity to systematically unlock the code of the universe is not necessary for its primary survival.

This intelligibility led to surprising new discoveries about the structure of the universe. The mysterious truth of quantum entanglement²¹ and the more recent discovery of the Higgs field²² reminded us, first, that our knowledge about nature is very limited and, secondly, that the universe is even more peculiar than we envisioned. This insight led Polkinghorne (2004:74) to state that our grasp of natural laws might be "no more than what one might call a 'downward-emergent' approximation to some more holistic account of physical reality". His proposal is synonymous with the contemporary conception that reality is entwined. Scripture affirms that God acts universally in creation and that creation is closely connected to its Creator. It is important to be specific (Peters 2014:449). How does God interact with creation?

Throughout the ages, different models²³ were put forward in an attempt to explain God's agency in the world. Although they differ in origin and motive, all are rooted in the acknowledgement that God acts in the world. Scripture

20 The nature of these laws is disputed from a philosophical perspective. The Platonist, for example, argues that natural laws are independent of the universe/multiverse. Conversely, many physicists believe that the laws are more pragmatically regularities found in nature, and not transcendent immutable truths (Davies 2007:267).

21 Quantum entanglement is "a property of a set of subatomic particles whereby a quantum characteristic (such as *spin* or *momentum*) of one particle is directly and immediately correlated with the equivalent characteristic of the others regardless of separation in space" (Merriam-Webster 2021a).

22 Definition of Higgs field: "a physical field that endows elementary particles with mass and that is mediated by the Higgs boson" (Merriam-Webster 2021b).

23 For a detailed analysis of the different proposals, see Conradie (2013).

speaks of a God who acts in a universal way in creation. In Psalm 104 verses 27 to 30, we read:

²⁷They all wait for You. To give them their food in its appointed season.

²⁸You give it to them, they gather it up; You open Your hand, they are filled and satisfied with good [things]. ²⁹You hide Your face, they are dismayed; You take away their breath, they die, and return to their dust.

³⁰You send out Your Spirit, they are created; You renew the face of the ground (Amplified Bible 2021a).

Although the Wisdom literature is symbolic and poetic in nature and originated in a pre-scientific era, it nonetheless expresses the temporal work of a providential God on a cosmic scale. Weiser (1965:670) states: “Life is the breath of God: when He holds his breath, then what is alive becomes dust”. In Colossians 1 verses 16 and 17, Paul writes about Christ who is not only the Creator, but also the One who makes the current processes in nature possible and sustains it. Through His presence, everything fulfils and holds its place in Creation. In his exegesis of the Greek word *κοσμος* (*cosmos*), Peters (2020) concludes that the biblical image of the cosmos may have been smaller than ours, yet the word still refers to the totality of created reality for the Bible just as it does for us at present. In recent years, scholars have published extensively about the interaction between the Spirit of God and the physical laws in the universe (Pieterse 2012; Conradie 2013). Thus, Scripture testifies about an inherent essence in nature, not another natural law, but a universal presence of the Creator. This charisma mysteriously validates and empowers the physical forces we experience as laws of nature. God’s nature and creative power translate to law-abiding universe!

How does the law-abiding character of creation relate to future space exploration? Astrotheology might assist the natural sciences with the realisation that, in the universe, there are probably more underlying “laws” at work (as we have noted with the Higgs field and quantum entanglement), yet to be discovered. Some of these forces might stay hidden, their effects only visible indirectly, in the same way that an extensive gravitational field discloses the possibility of a black hole. In addition, creation is intertwined, not only on a subatomic level, but infused with God’s presence. The God of Scripture is not pantheistic, but triune in nature and agential at work in the physical processes we strive to unlock. His presence may not be obvious from a physical perspective, but it is nonetheless true and constant. A simplistic physical account of the cosmos or the deception of a deistic god could diminish its true splendour and the joy it gives to its Creator. Our universe is not static.

4. MOVEMENT TOWARDS ENTROPY

There is a deep irony in the manner in which some human beings visualise the future. Various futuristic philosophers and cosmologists eagerly adopted the real possibility of a celestial utopia, yet to be discovered. A civilisation morally and technologically more advanced and capable of liberating our world from itself.²⁴ In addition, for some, the triumph of human scientific endeavour is the only salvation to escape from a doomed planet. There is indeed much to celebrate about our ongoing achievements as a species, and more sophisticated societies might well exist. Unfortunately, the reality is that all of us live in a finite universe with the tendency of entropy. Astrotheology has a responsibility to interpret the significance of these well-documented physical phenomena and remind the physical sciences of realistic expectations for future space exploration.

One of the implications of the second law of thermodynamics is that everything in the universe wears out. Gribbin (2003:388) reminds us that the amount of disorder in the Universe, which can be measured mathematically by a quantity Clausius dubbed “entropy”,²⁵ always increases overall. This well-understood law of nature does not condemn humanity to the only intelligent species in the universe, but it restrains any utopian delusions we might have. The significance of this truth is often neglected in our dialogue and conception of possible advanced civilisations inhabiting an exoplanet. In the exuberance to escape our disillusion with humanity’s tragic history of violence and destruction, we often exploit our limited knowledge of evolutionary theory and assume that the movement towards the complexity we encounter on earth is a universal phenomenon that naturally drove other civilisations to a more advanced state of being. Although this assumption might be true, it is not a substantiated fact that should direct a buoyant view of all extra-terrestrial life. Peters (2014:452) advocates vigilance in this respect, and reminds us that such an eschatological vision, although common among space scientists and philosophers²⁶ and their surrounding culture, cannot be justified based on what we know about the working of natural selection in the evolutionary process on Earth, as discussed earlier. In addition, the significance of the transhumanist movement’s emphasis on creating a superhuman intelligence

24 Green (2015) attempts to address these issues from a different perspective, by emphasising our common humanity and the responsibility to bring hope to a broken universe.

25 Merriam-Webster (2021c) defines “entropy” as the degradation of the matter and energy in the universe to an ultimate state of inert uniformity. It is the general trend of the universe toward death and disorder. This is true even for sophisticated systems (for example, Trappist 1 exoplanetary system) that have a natural tendency towards self-organisation. Eventually entropy will prevail.

26 See, for example, Davies’ (1995:49) observation: “We can expect that if we receive a message, it will be from beings who are very advanced indeed in all respects, ranging from technology and social development to an understanding of nature and philosophy”.

and longevity through technological advancements with the help of GRIN (Genetics, robotics, artificial intelligence, and nano technology), should not be disregarded (Peters 2018). It creates a climate that literally believes that the sky is not the limit.

Human beings have indeed reached a new level of complexity and understanding since the Enlightenment and the discovery of quantum mechanics. Yet, there is a persistent problem. In his book, *The great mystery*, McGrath (2018:137-158) devotes an entire chapter on the question: What is wrong with us? Human beings have the capacity to conquer space, yet tragically destroy their own planet and each other. Any history book could confirm this conundrum. Regrettably, future space exploration is not untouched by this dilemma. Science struggles with a moral ambiguity, because science is ethically blind, but it is undertaken and applied by human beings with morally conflicting principles (McGrath 2018:143). Peters (2018:360) highlights this same enigma:

Realism maintains a stubborn awareness that every dramatic technological transformation carries with it human fallenness, the potential for self-destruction right along with the potential for healing. Only God's final act of redeeming grace will relieve us of such self-destruction.

In Scripture, Paul amplifies this mystery even further. Romans 8 verses 19 to 23 reveals that God's entire creation is in bondage and futile, waiting eagerly for an eschatological rejuvenation. In his commentary on the text, Murray (1968:304) concludes that the bondage and brokenness of creation refers to a sense of decay and death prevalent even in a non-rational creation. Hodge (1975:271) reaffirms this state of being and emphasises the eschatological hope that God prepared for the whole of creation. It is not within the scope of this article to elaborate further on a detailed exposition of Christian eschatology, but Scripture affirms what is physically detectable about the nature of the cosmos.

How does the reality of entropy and futility in nature influence future space exploration? Astrotheology has an obligation to expose any form of secular eschatology where salvation is solely dependent on humanity's intellectual application, or astrobiology's prophesy of a cosmic utopia. Peters (2014:453) conveys a stern message:

When space scientists attempt to perform the tasks of religion – to practice theology without a license – it's time to blow the whistle.

Tomorrow SETI might receive that elusive signal, and ET may well be more than a Hollywood blockbuster. Still, entropy and futility remain. Any hope of an all-inclusive eschatological transformation is entrenched in the grace of

the triune God as incarnated in the resurrected Christ. Finally, we inhabit a strange universe.

5. MYSTERY

The sense of unbridled optimism about humanity's ability to solve problems sometimes creates an atmosphere within the space sciences where it is suggested that every mystery in the universe is potentially solvable, given enough time and brain power. In his book about cosmology, *The Goldilocks enigma* (2007), Davies explores the anthropic principle evident in the universe. He concedes that natural science has not yet explained everything there is to know about the cosmos but, given time, all we need is advances in scientific understanding. He maintains that, if one ponders about the mysteries related to physical phenomena, any appeal to gods or miracles is not sufficient (Davies 2007:16, 289). This point of view, naturally sympathetic to the scientific cause, elicits some questions such as, for example: Is it possible for humanity to know everything eventually? Are there physical and temporal barriers that restrict the limits of human knowledge?

It is well documented and understood that, due to the physical properties of space-time, there is indeed a maximum distance or horizon in space beyond which we cannot retrieve knowledge. This theoretical and physical boundary is closely tied to the finite speed of light and the nature of a multi-dimensional universe or multiverse (Davies 2007:52, 54). In addition, there are also epistemological boundaries to consider *vis-à-vis* categories of information the human brain is capable to assess. The philosophical debate on the implications of Kant's analytic²⁷ and synthetic statements is not settled, and it could potentially limit our knowledge about the nature of the universe. Barrow (2007:236-238) concludes that certain truths about the cosmos will be inaccessible to human beings on account of the way in which our brains are able to process information. McGrath (2018:65) elaborates on this point. He challenges the idea that facts alone give rise to intellectual certainty. Facts are not enough; they need to be interpreted and understood. Even scientific data is framed within a specific philosophy of science, and a view of the world in a certain time frame. Therefore,

the proper attitude towards the universe is humility. We should be respectful of its spatial and temporal vastness, in the face of which we seem insignificant (McGrath 2018:196).

27 Barrow (2007:236) clarifies the difference: "An analytic statement requires us to analyse the statement alone to ascertain the truth. Synthetic statements are meaningful statements that are not analytic. They tell us things that can only be checked by looking at the world and are not logically necessary."

Although we long for Cartesian clarity, even natural science must accept that we live in a universe where mystery and unresolved questions are a reality.

It is significant to note that God, in His address to Job in chapters 38-40, gives prominence to this limited ability of humanity to fully comprehend the mysterious nature of creation. Although this passage is poetic in character and composed in a pre-scientific age, the essence still holds true. One commentator observed that God surprises Job with questions,

of which there are many that the natural philosophy (science) of the present day can frame more scientifically but cannot satisfactorily solve (Keil & Delitzsch 1975:312).

In 1 Corinthians 12, Paul famously observes

¹²For now [in this time of imperfection] we see in a mirror dimly [a blurred reflection, a riddle, an enigma], but then [when the time of perfection comes, we will see reality] face to face. Now I know in part [just in fragments], but then I will know fully, just as I have been fully known [by God] (Amplified Bible 2021b).

Kaufmann (2008:134) invites believers to embrace this sense of mystery in creation. He encourages Christianity to acknowledge the reality that we as human beings live our lives within a context of mystery, of not knowing everything. The Christian faith impels us to keep moving forward creatively and with confidence, trusting in the supreme mystery of life, God. This appeal to faith does not belong to a pre-scientific era, as some scholars would believe. To the contrary, the philosophy of natural science exposes various faith-based²⁸ assumptions that sustain scientific enquiry.

Thus, we live in a universe that is intelligible, and we as human beings are providentially blessed to unlock many secrets through mathematical ingenuity. But the essence of the cosmos is mysterious in nature, and specific knowledge will be beyond our comprehension. Astrotheology could help the space sciences internalise this phenomenon. In this process, an epistemological transition might occur that could be beneficial to science in general.

28 Scientist's statement that natural science is the only true method to unlock the mysteries of creation is, in essence, a faith-based premise. It is impossible to verify this assertion through scientific principles.

6. CONCLUSION

This article aimed to address the contemporary belief that theology's contribution to space science is primarily reactive in nature. Therefore, I proposed that astrotheology might assist in a proactive contextualisation of novelty for future space exploration. This premise is rooted in the nature of the providential care of the triune God for His creation, as revealed in Scripture and sensed in nature. I explored the concepts that, in creation, there is a space for contingency and novelty; that creation is lawful; that we observe a movement towards entropy, and that certain aspects in creation will remain a mystery. It became clear that future space exploration could benefit from the contributions made by astrotheology in this regard. The cosmos we intend to inhabit and explore and the tools we utilise are both gracious gifts of a loving Father who is inexplicably agential at work in creation.

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