

Nicholas Campion and Chris Impey, editors, *Imagining Other Worlds: Explorations in Astronomy and Culture. Studies in Cultural Astronomy and Astrology 9*. With a foreword by Martin Rees, Lord Rees of Ludlow, Astronomer Royal.

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This volume collects 25 papers selected from presentations at the Ninth Inspiration of Astronomical Phenomena conference (INSAP IX), “Imagining Other Worlds”. Though pooled under one topic, the subject area is rather broad, containing a range of perspectives and approaches that are noted here. The discussion begins with a contribution by Lord Rees of Ludlow on how human understanding of the cosmos has developed from geocentrism to heliocentricity, and then galactocentricity, cosmocentrism and finally (so far) to the concept of the multiverse, and this is supplemented by a roundtable discussion involving the author in conversation with Ian Morison, Carolin Crawford, Michael Rowan-Robinson and Andrew Fabian, followed by further discussion by Chris Impey. Developments relating to modern astronomy, especially in the fields of cosmology but also including physics, geosciences and other subjects (including the notion of exobiology), have led to a radical re-assessment of the position of humanity in the cosmos, and several of the contributions that follow consider what this means for our self-understanding as human beings, and what ethical questions may arise. The former includes how cosmology has changed perspectives about planet Earth as the original human home of the human lifeworld (discussed by Nicholas Campion, by José G. Funes and by Elizabeth Forbes Wallace), as well as the impact of new understandings of time that were so significant for geology, biology and cosmology in the nineteenth century (Howard Carlton). Ethical issues relate to the forthcoming extension of humanity to other “worlds” in the form of scientific stations on the Moon or Mars, and also to the exploitation of various celestial bodies in the solar planetary system (Campion).

In particular, Nicholas Campion discusses the rapid expansion of unmanned and manned space programs by various nations, and he argues that a universal body of rules

that is valid for anywhere in space which may be colonised by human beings, or where their objects may be deposited, will have to be formulated. Through the voyages of astronauts and probes, questions of values, of action, of purpose and of meaning will travel beyond people on Earth, possibly even to the celestial bodies of other solar systems, and issues of human rights and sustainability will have to be addressed. Industrialisation and pollution, as well as the potential for conflict and militarisation, will be exported to other worlds because of space travel in the twenty-first century and into the future.

Even now, there are large amounts of space debris in orbit and other garbage on the Moon, Mars, Mercury and even on Saturn's moon Titan, in the form of landed or crashed space probes and disused rovers. Ethical issues to be considered include problems arising from future space tourism and terraforming, and also questions of responsibility for human life born in space or on other celestial bodies and, if discovered, simple forms of extra-terrestrial life. How should and how could a future space ethic be conceived? How can we ensure that people, organisations and states commit to it? The exploration and use of near (and possibly eventually, more distant) cosmic space must be not just for the benefit of humans, but also for other life forms and their environments. But what is welfare? Peace, security, opportunities for the human individual and for social development, as well as new perspectives and insights must all be taken into account. In any case, a space ethic and the legal statutes attached to it must consider the involvement of all life in the fabric of the cosmos. Campion argues that astronomy in particular has an important role to play in this, as the subject repeatedly addresses these topics.

The question of humanity's self-understanding becomes even more difficult and speculative when eschatology is brought into the discussion, and José Funes relates this to "weak" and "strong" versions of the anthropic principle – that is, the question of whether and how the cosmic web of relationships is so balanced that human self-awareness became possible in this cosmos. The fact that the cosmos is moving towards a natural end is a challenge to theology (here especially a Christian cosmology), but the author's brief contribution unfortunately is unable to do justice to the subject, which would have been better explored in more detail elsewhere. Instead, questions are raised with no attempt to categorise the problems or offer possible answers.

A number of contributions are concerned with experiences of the heavens and of cosmic events from the topocentric, temporal and existential position of humankind, noting the significance of sensory and bodily perceptions, feelings, memories, places, land- and seascapes, atmospheric phenomena, light and shadow, plants, animals, people and buildings. Daniel Brown in particular refers to self-awareness, interaction with the environment and the sense of being embedded in the cosmos. This kind of exploration can be undertaken through the philosophical method of phenomenology, placing experiences of the sky and the cosmos into the context of stories, enhanced by technical aids such as Stellarium planetarium software (Stellarium 2018) combined with head-mounted displays and Virtual Reality (VR) (Alastair G. Bruce). This is an affordable solution that permits a significant expansion in simulating past, present and future celestial phenomena or cosmic processes. Alastair Bruce in particular discusses the Oculus Rift Planetarium Project (StarsightVR 2018), which is the first step towards this goal; another

fascinating technological approach is “solargraphy”, presented by Tarja Trygg. In this procedure, long-exposure photographs taken with a pinhole camera provide fantastic views of the Sun’s movement in the sky over the landscape during the course of a year. Such artistic and technical expressions considerably expand the ordinary human perception of cosmic phenomena.

Human perception is also the subject of Elizabeth Forbes Wallace’s research. She suggests that the impressive view of Earth landscapes and of the Earth as a whole as seen from the cupola of the observation room of the International Space Station has significantly affected the psyche of many astronauts. A new awareness of planet Earth, its uniqueness, the particularity of life on it, and of the human responsibility for the planet, has prompted a shift in their philosophical and spiritual views about their home planet. Wallace’s study suggests how such emotional experiences, supported by technical aids, can also be presented to an earthly audience.

Lived experience is also the subject of several other contributions, dealing with the perception of the zodiacal light among various cultures in antiquity or medieval times (George Latura), and of how celestial phenomena have been represented in rituals, music, song and dance or works of art by modern indigenous cultures such as those of the Torres Strait Islanders (Duane W. Hamacher *et al.*) and the Ojibwe and D[L]akota (Annette S. Lee).

How astronomical knowledge and the experience of celestial phenomena can be adequately grasped and expressed in various media is explored in relation to various topics, such as sky atlases from the eighteenth century (Jay M. Pasachoff and Kevin J. Kilburn), seventeenth-century architecture (Valerie Shrimplin), nineteenth-century church art (Michael Mendillo and Ethan Pollack), and photography (Marek Kukula and Melanie Vandembrouck, and also Michael Geffert on photographic plates). These contributions also show how astronomy was popularised by 2-D and 3-D illustrations (such as large format projections), special recording techniques, long-term recordings, drawings and photographs, caricatures and the conversion of digital raw data into images and astronomical works of art related to the manufacturing processes from the twentieth and twenty-first centuries. Manifold references to astronomy are highlighted from paintings over the last two centuries (Gary Wells), as well as from photography, video technology, and computer animation and image editing.

Particular figures from the history of astrology are also considered, from diverse foci that include memorials, works of art and modern opera. These contributions relate to Galileo Galilei (by Liana De Girolami Cheney and by Paolo Molaro) and to Johannes Kepler and Albert Einstein (David Morgan, on operas by Philip Glass about all three figures).

There is also a discussion (Clive Davenhall) of the relationship between spiritualism and communication with entities on other planets (especially Mars) and even stars from the mid-nineteenth century through the first half of the twentieth century. Astral projection, interplanetary spiritual journeys, reincarnation on other planets, UFOs and the New Age are discussed here in connection with the astronomical notion of other worlds. In addition, this reviewer has found that such ideas occasionally recur here and there today: they can also be found and are thematised in modern science fiction and films, such as the *Star Trek* franchise.

Imagining Other Worlds, contains a wealth of interesting articles which are more or less easy to read depending on one's previous knowledge. The topics covered are important and valuable, although the quality of the scientific papers differs. It is a pity that the selection and arrangement of the various contributions was not particularly well-conceived, which makes it a challenging read. For example, some contributions would have benefitted from a thorough revision and it would have been helpful to summarise the contributions thematically and, thereby, separate different blocks from each other. It is also regrettable that some topics were not addressed – for example, science fiction. That being said, this volume is definitely recommended for those who want to explore the topic of “other worlds” from the perspective of astronomy and its role in human cultures.

References

- StarsightVR 0.0.17, 2018 [online]. Accessed January 2019, <https://starsightvr.weebly.com/>
Stellarium v.0.18.3., 2018 [online]. Accessed January 2019, <https://stellarium.org/release/2018/12/22/stellarium-0.18.3.html>