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Comment on hgss-2021-21

Andrew Miall (Referee)

Referee comment on "Cyclicity in Earth sciences, quo vadis? Essay on cycle concepts in geological thinking and their historical influence on stratigraphic practices" by Daniel Galvão Carnier Fragoso et al., Hist. Geo Space. Sci. Discuss., https://doi.org/10.5194/hgss-2021-21-RC1, 2022

Cycles in Earth Sciences.

By Daniel Galvao et al.,

Review by Andrew D. Miall

This is an interesting and useful review, with much important information about early developments in the study of repetitive and cyclic stratigraphy.

Care needs to be taken to distinguish between cyclicity and episodicity. Earth processes that are exactly, statistically, cyclic, are rare, and as far as I am aware, are related entirely to the processes of orbital forcing. Developments in this area, led by people like Fritz Hilgen, are significant and important, with outcomes in the areas of cyclostratigraphy and astrochronology. However, the tendency to reduce all stratigraphy to time-series analysis has led, in my opinion,to significant error. I am not at all convinced of the value

of Boulila's study, for example. His classification of Miller's new Jersey sequence stratigraphy in terms of long-term orbital cycles, I find entirely unconvincing (see Miall, 2016, p. 420-421). The search for cyclicity can be self-convincing. Studies such as that of Zeller (1964) and Hiscott (1981) have demonstrated that geologists are all too good at finding cyclicity where none is present. Algeo and Wilkinson (1988) showed that cycles of autogenic origin can appear similar to those generated by orbital forcing. Elsewhere I have strongly criticized the search for global eustasy and global cycle correlation (I discuss all of this in my book "Stratigraphy: A Modern Synthesis". See also Miall, 2004, 2010).

The difference between cyclicity and episodicity is important, Many processes are repetitive, but not on a strictly regular time scale. The Wilson Cycle is a good example. Geologists have long sought for a "pulse of the earth' (see Miall, 2004), and have been led down several rabbit holes as a result.

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