

Interactive comment on “The Eons of Chaos and Hades” by C. Goldblatt et al.

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In this short paper the authors propose the name Chaotian for the period between the origin of the Solar System and the Moon-forming impact, and suggest a series of names for subdivisions of the Hadean, the period of geological time between the formation of the Earth and the start of the Archean. As someone who has always had some difficulty in remembering the name of the period between the Ordovician and the Devonian, and is totally at sea when my colleagues in Grenoble start speaking of the Hauterivian or the Cenomanian, I look upon this suggestion with some unease. The justification for introducing the names is that they would introduce some rigour into the terminology used to describe the early history of our planet. Perhaps so, but for me, to speak of the “period before the Moon-forming event” is far more informative and clear than the use of terms such as the Eochaotian or Nephelean. Similarly, I prefer “early Proterozoic” to Paleoproterozoic and blanch at the idea that the Hadean should

C17

be subdivided into the Hephaestean, Jacobian, Canadian, Procrustean and Acastan.

I accept, grudgingly, that formal names are required for Phanerozoic systems or periods. The limit between the Cretaceous and Tertiary can be identified in outcrop, labelled with a “golden spike”, dated accurately and shown to coincide with a major geological event. The same cannot be done with the subdivisions of the Precambrian, even for the Archean and Proterozoic where the rock record is more or less complete. And for the Hadean, any stratigraphic subdivision must remain nebulous. Flagging a 4.3 Ga zircon in ANU’s Jack Hills collection does not have the same weight as the stratigraphers’ Global Boundary Stratotype and Point.

The manuscript does provide a brief clear account of the early evolution of the Earth and this is useful. As a terminology-challenged petrologist, I do not welcome the introduction of a new set of names, but I recognise that many other geologists like this sort of thing. I therefore recommend that the manuscript be published in Solid Earth, to stimulate discussion about this important part of Earth history.

In this discussion, and during revision of the manuscript, some thought might be given to the following points: Page2, line 2: Does the Moon-forming impact represent the “true birth of Earth”? It was indeed the major event in our Earth’s infancy, but I would argue that the planet was born about the time it reached nearly its present size and the core segregated, some 30-50 m.y. earlier than Thea’s impact with Tellus (the authors will note that I am not totally refractory and do accept some of their new names).

Page 50, line 17: The interpretation that the “amphibolites” of the Nuvvuagittuq region are ~4.3 Ga old is not universally accepted (see, for example, Andreassen and Sharma, 2009). Another possibility is that the Nd isotopic data record the existence of a older enriched source of these rocks, not their crystallization age; just in the way that the Hf isotope compositions of the oldest zircons record the existence of a source that acquired its enriched character about 4.5 Ga ago (Blichert-Toft et al, 2008). The evidence of old rock recorded by the Nuvvuagittuq amphibolites is not very much more

C18

solid than the negative epsilon Nd or the > 4Ga zircons in the Acusta gneiss, or the very existence of the >4 Ga Jack Hills zircons. This example well illustrates the perils of assigning ages, and names, to periods in the earliest part of Earth history.

R. Andreasen & M. Sharma (2009), Comment on "Neodymium-142 Evidence for Hadean Mafic Crust", *Science* 325 (5938) pp. 267-a

Blichert-Toft, J. and Albarède, F., 2008. Hafnium isotopes in Jack Hills zircons and the formation of the Hadean crust. *Earth Planet. Sci. Lett.* 265, 686-702.

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