



Paleoarchean and Cambrian observations of the geodynamo in light of new estimates of core thermal conductivity

John Tarduno (1,2), Richard Bono (1), and Rory Cottrell (1)

(1) University of Rochester, Earth and Environmental Sciences, Rochester, New York, United States (john@earth.rochester.edu), (2) University of Rochester, Physics and Astronomy, Rochester, New York, United States

Recent estimates of core thermal conductivity are larger than prior values by a factor of approximately three. These new estimates suggest that the inner core is a relatively young feature, perhaps as young as 500 million years old, and that the core-mantle heat flux required to drive the early dynamo was greater than previously assumed (Nimmo, 2015). Here, we focus on paleomagnetic studies of two key time intervals important for understanding core evolution in light of the revisions of core conductivity values.

1. Hadean to Paleoarchean (4.4-3.4 Ga). Single silicate crystal paleointensity analyses suggest a relatively strong magnetic field at 3.4-3.45 Ga (Tarduno et al., 2010). Paleointensity data from zircons of the Jack Hills (Western Australia) further suggest the presence of a geodynamo between 3.5 and 3.6 Ga (Tarduno and Cottrell, 2014). We will discuss our efforts to test for the absence/presence of the geodynamo in older Eoarchean and Hadean times.

2. Ediacaran to Early Cambrian (~635-530 Ma). Disparate directions seen in some paleomagnetic studies from this time interval have been interpreted as recording inertial interchange true polar wander (IITPW). Recent single silicate paleomagnetic analyses fail to find evidence for IITPW; instead a reversing field overprinted by secondary magnetizations is defined (Bono and Tarduno, 2015). Preliminary analyses suggest the field may have been unusually weak. We will discuss our on-going tests of the hypothesis that this interval represents the time of onset of inner core growth.

References: Bono, R.K. & Tarduno, J.A., *Geology*, in press (2015); Nimmo, F., *Treatise Geophys.*, in press (2015); Tarduno, J.A., et al., *Science* (2010); Tarduno, J.A. & Cottrell, R.D., *AGU Fall Meeting* (2014).