Geophysical Research Abstracts, Vol. 7, 03364, 2005 SRef-ID: 1607-7962/gra/EGU05-A-03364 © European Geosciences Union 2005



Similarity between the late Archaean and current geodynamo: secular variation and palaeointensity analysis of 2.8-2.7 Ga flood basalts from the Pilbara Craton, Australia

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The character of the magnetic field in the Archaean is an important factor in determining the nature of the early Earth's geodynamo, a time possibly without a solid inner core. The database of accurate Archaean palaeointensity estimates is small and even less is known about Archaean secular variation. We used recent palaeomagnetic studies of the ca. 2775-2715 Ma flood basalt dominated Nullagine and Mount Jope Supersequences of the Pilbara Craton, Australia, for an analysis of palaeosecular variation and for palaeointensity measurements, for which we used the recently developed IZZI protocol.

The dipole moment at 2772 \pm 2 Ma is determined at 28.1 \pm 9.3 ZAm2, and at 2721 \pm 4 Ma at 22.1 \pm 4.2 ZAm2. These values are at the low end, although within error, of the average

dipole moments between 84 and 1 Ma, (55 \pm 30 ZAm2). Analysis of palaeosecular variation suggests that in the late Archaean the geodynamo operated in a similar way as during the last 5 Myr. Together with low but not anomalous palaeointensities and the occurrence of geomagnetic reversals, we must conclude that the Archaean geodynamo worked no different than today. This may imply, but cannot prove, that the growth of the solid inner core commenced before 2775 Myr ago.