Geophysical Research Abstracts, Vol. 7, 02719, 2005
SRef-ID: 1607-7962/gra/EGU05-A-02719

Mid-Archean Plate Velocities

J. A. Tarduno (1), D. G. Bauch (1), R. D. Cottrell (1) and M. K. Watkeys (2)

(1) Department of Earth and Environmental Sciences,University of Rochester, Rochester, N.Y. 14627, U.S.A., (2) Geological Sciences Programme, School of Geological and Computer Sciences, University of KwaZulu-Natal, Durban, 4041 South Africa

Paleomagnetic data from previous paleomagnetic studies of mid-Archean rocks ($\sim$3.0-3.5 Ga) have been interpreted as reflecting a plate tectonic style similar to that of the Cretaceous to recent. Times of rather slow motion are punctuated by very rapid motion (over 14 cm/yr). However, prior results have been based on whole rock samples, which have been subjected to prolonged low grade metamorphic conditions. In some rocks (mafic lavas and sedimentary rocks) this has resulted in a crystallization remanence of unknown age. In others (plutonic rocks) it has the potential to produce a complex history of overprinting. Here we revisit these issues by approaching the paleomagnetic study at a mineral scale. In rock magnetic investigations we find that hornblende carries a multidomain signal and therefore we expect it to record magnetic overprints. In contrast, quartz and microcline yield single domain to pseudosingle domain behavior, suggesting that the magnetic inclusions they contain could preserve primary magnetizations. A new CO_2 laser/SQUID magnetometer experimental approach allows us to obtain directional and paleointensity information from oriented single quartz and feldspar grains. We report data from 3.2 Ga plutons of the Kaapvaal craton (southern Africa) which suggest that prior indications of very high plate velocities may be premature. Accounting for the potential influence of non-dipolar fields, data available to date are compatible with plate velocities of only a few cm/yr.