Geophysical Research Abstracts
Vol. 14, EGU2012-6593, 2012
EGU General Assembly 2012

The inclination test of the geomagnetic field: Insights from numerical dynamo models

M. H. Heimpel and M. E. Evans
Department of Physics, University of Alberta, Edmonton, Canada (mheimpel@ualberta.ca)

The assumption that the time-averaged morphology of the geomagnetic field is that of a geocentric axial dipole (GAD) is fundamental to paleomagnetism. However, there are very few ways to test the GAD hypothesis throughout geological time. One suggestion, the so-called paleoinclination test, relies on the fact that any zonal model of the geomagnetic field has a unique probability density function (pdf) for the angle of inclination. A random-walk model suggests that, at typical plate-tectonic speeds, data spanning several hundred million years are required to make the test viable. For shorter time scales the inclination test may be applied to observational field models [e.g. CALS10k, GUFM1, IGRF]. Here, we pursue this problem by means of computational geodynamo models that exhibit polarity reversals and directional excursions. Thus far, we find that non-reversing periods typically yield pdf's that are consistent with a GAD or exhibit moderate inclination flattening. For dynamos that include reversals and excursions, the unstable periods are characterised by the strength of higher-order spherical harmonics. The octupolar content in particular leads to an excess of low inclination values, in agreement with some [Kent and Smethurst, 1998; Bloxham, 2000], but not all [Veikkolainen et al., 2011], published analyses.