



Further Evidence for Instability in Earth's Fluid Core from Paleomagnetic Intensity Records

Keith Aldridge (1) and David McMillan (2)

(1) York University, Earth & Space Science, Toronto, Canada (keith@yorku.ca), (2) Av-opticom, Toronto, Canada (dgmilot@gmail.com)

A search of composite stacks of relative paleointensity PADM2M, SINT2000 and PISO-1500 has found a signature of luni-solar tidal strain rate (LTSR) over the past 2 Myr. Our search for LTSR in relative paleointensity records is based on a representation of long term fluctuations in geomagnetic intensity as a sequence of growths and decays, which we suggest are due to a tidally-induced parametric instability in Earth's fluid core. Linear stability theory predicts that the external, LTSR that could excite an instability can be estimated from the difference between the observed growth rate of the instability minus the decay rate of the previous instability. Under the assumption that the observed paleointensity is a proxy for the perturbation velocity of an instability, we find that estimates of the LTSR directly from the relative paleointensity record are in agreement with calculated LTSR.

An important consequence of this depiction is the precise temporal location of 6 reversal events over the past 2 Myr. Previously we found that significantly larger fluctuations of LTSR were associated with these reversals. A parametric instability in Earth's core is consistent with both the success in predicting reversals and finding the LTSR in relative paleointensity records. Furthermore, our model predicts that strain rates prior to the onset of a new instability should show only decay of a previous instability and hence be unrelated to the occurrence of a subsequent event. Recently we have found, with very few exceptions, our results show this and hence are consistent with a parametric instability participating in the geodynamo.