CONSTRAINS ON TIDAL DISSIPATION FROM THE ROCK RECORD

H. Pälike and N. J. Shackleton
Godwin Institute, University of Cambridge, Cambridge CB2 3RS, England.
hpal98@esc.cam.ac.uk/Fax: +44-1223-334871

Milankovitch band variations of past climate, inferred from the rock record, have been used to astronomically tune large parts of the Neogene (Shackleton et al. 1999) and are being extended to older times. Laskar (1993) showed that the position of insolation peaks in time depends on the parameters chosen for the dynamical ellipticity and tidal dissipation (the Earth model). Hence it is crucial to study the temporal evolution of these parameters to use astronomical solutions as a template for further time scale calibration (Lourens, 1996). Here we present a method to extract the evolution of the slowdown of the Earth due to tidal dissipation from geological data for most of the last 25Ma (ODP 154, Shackleton et al. 1997), using a new interference pattern method. Results indicate that the best fitting parameters are close to present day values. This is surprising because a varying average ice-volume would suggest a change in dynamical ellipticity and in general a decreased slowdown rate of the Earth is expected due to the effects of mantle convection.

Laskar J et al., Astron. Astrophysics, 270, 522–533 (1993)
Lourens L J et al., Paleoceanography, 11, 391–413 (1996)
Shackleton N J and Crowhurst S, Proc. ODP Sci. Res. 154, 69–82 (1997)
Shackleton N J et al., Phil. Trans. Roy. Soc., 357, 1907–1930 (1999)