ASTRONOMICAL CALIBRATION OF THE LATE EOCENE TIMESCALE

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Recently the astronomically calibrated geological timescale has been extended to the base of the Oligocene (Shackleton et al, 1999). Here we present a new relative age calibration of sediments of late-Middle Eocene (39.5Ma) to Late Eocene age (35Ma) that were obtained from deep-marine sediment cores during ODP Leg 171B from Site 1052.

We analyse elemental ratios of Ca and Fe as a proxy for calcium carbonate content, obtained by using the X-ray Flourescent core-scanner (XRF) in Bremen. Our data match very well with other proxy data (magnetic susceptibility and colour reflectance) but show a significantly higher signal-to-noise ratio and a more consistent hole-to hole agreement. The data obtained hence allow the construction of a more accurate composite depth scale.

The data display a strong orbital signal that shows variability at all major Milankovitch frequencies as well as long term amplitude modulation patterns. We use the eccentricity driven amplitude modulation of precession to put our record onto a relative timescale, assuming that the 400kyr eccentricity cycle has been stable at that time (Laskar, 1999). The exact nature of the orbital signal might be subject to revision pending further calculations, but the consistent relationship between the different orbital frequencies present in the data suggests new ages for Magnetochrons C16, C17, and C18 that will refine the magneto-stratigraphic timescale created by Cande and Kent (1995).

Our astronomical calibration suggests that the relative durations of these magnetochrons has not changed significantly, although the absolute ages might be ~200ky younger than on the Cande and Kent timescale (1995). Our study should allow a better time control for high-resolution studies over the Late Eocene time interval.

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