Paleoceanography and Paleoclimatology

Supporting Information for

Provenance and weathering of clays in the Bay of Bengal during the Miocene: Linkages to tectonics and monsoonal climate

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Introduction

This supporting information file provides relevant information on spectral aliasing following spectral analysis of proxy timeseries (Text S1 and Figures S1).

Text S1. Spectral analysis and aliasing

Spectral analyses of high-resolution ε_{Nd} data obtained between 14 and 13.5 Ma and on unevenly spaced time series was performed using REDFIT (Schulz & Mudelsee, 2002). The high-resolution ε_{Nd} data spanning between 14 and 13.5 Ma

has an average sampling resolution of ~10 kyrs. The primary objective here is to test whether there is significant periodicity in the proxy timeseries with sufficient resolution while avoiding errors due to spectral aliasing (e.g., Pisias and Mix, 1988). The high-resolution ε_{Nd} data spanning between 14 and 13.5 Ma document a significant ~30 kyr cyclicity, with additional contributions of the ~100 kyr eccentricity cycle (Figure. 8). To test whether the observed spectral variance in this section of the record is not caused by spectral aliasing (e.g., Pisias and Mix, 1988), REDFIT spectral analyses were performed on evenly spaced (5 kyrs) proxy timeseries between 14 and 13.5 Ma and unevnely spaced proxy timeseries between 14 and 13.75 Ma (Figure S1). The latter section of the record, in particular, has an average sampling resolution of ~7 kyrs and provides sufficient resolution to resolve Milankovitch band cyclicity in the proxy timeseries. Both evenly and unevenly spaced proxy timeseries document a significant ~30 kyr cyclicity and are consistent with results shown in Figure 8 in the main text. It's therefore conceivable that the ~30 kyr periodicity observed in the high-resolution ε_{Nd} data is likely a heterodyne produced by interaction of the three major orbital cycles rather than one produced by spectral aliasing.

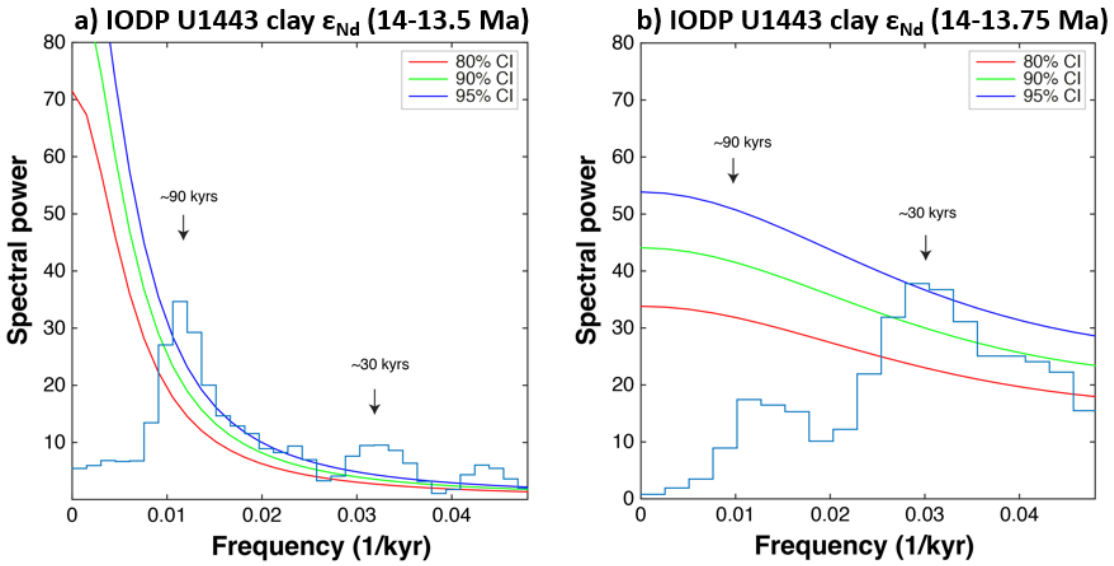

Figure S1. REDFIT spectral analysis of Nd isotope compositions of the U1443 clay samples a) spanning from 14 to 13.5 Ma on an evenly spaced time interval of 5 kyrs, and b) spanning from 14 to 13.75 Ma on an unevenly spaced timeseries. The values of the oversample and segments applied were two and two, respectively.

References

Pisias, N.G. and Mix, A.C., 1988. Aliasing of the geologic record and the search for long-period Milankovitch cycles. *Paleoceanography*, *3*(5), pp.613-619.

Schulz, M. and Mudelsee, M., 2002. REDFIT: estimating red-noise spectra directly from unevenly spaced paleoclimatic time series. *Computers & Geosciences*, *28*(3), pp.421-426.