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ODP Sites 967 and 968 (eastern Mediterranean) revisited and implications for the global oxygen stable isotope chronology of the late Pleistocene

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ODP Sites 967 and 968, located in the Eastern Mediterranean at the Eratosthenes Seamount, are ideally situated to study both regional and global climate signals. Evidently, changes in the titanium to aluminum ratio of the bulk sediment reflect variations in North African aridity, and hence North African monsoon strength: increased levels of titanium are associated with enhanced windblown dust input from the Sahara and increased levels of aluminum with enhanced runoff from the river Nile. In addition, changes in the benthic foraminiferal stable isotope composition reflect primarily changes in global ice volume and deep sea temperature (Lourens et al., 2010; Ziegler et al., 2010).
Here we completed and spliced the Ti/Al and benthic d18O data sets of ODP Site 968 and 967 for the past one million years at approximately 200-400 year resolution. The Ti/Al ratio reflect dominantly precession-controlled African monsoon intensity changes and was used to build an astronomically tuned age model for the composite record. This approach enabled us in first instance to establish an alternative and highly accurate chronology for sapropels in the Eastern Mediterranean, and lead to revisions of existing age models, especially around MIS 11 and 19, when the 405-kyr eccentricity cycle is at a minimum. Color reflectance, typically indicative of sapropels, appears incongruent with insolation forcing during these episodes.
Secondly our Ti/Al-based chronology provides an independent age model for the benthic d18O record, which may shed new light upon the relationship between insolation and global climate (e.g. ice volume) changes. Our research indicates negligible differences between our record and the global benthic stack of Lisiecki and Raymo (LR04) between the present and MIS 11. However, there are significant discrepancies in the timing of terminations and onset of glaciation for several isotope stages prior to MIS 11 of up to 10,000 years. The direct comparison of our stable isotope record to insolation appears to suggest a dominant role of obliquity forcing in ice volume behavior for much further into the Pleistocene than generally assumed.

References

Lourens, L.J., J. Becker, R. Bintanja et al. (2010), Linear and non-linear response of late Neogene glacial cycles to obliquity forcing and implications for the Milankovitch theory. Quaternary Science Reviews 29(1–2), pp.352-365.
Ziegler, M., E. Tuenter & L.J. Lourens. (2010), The precession phase of the boreal summer monsoon as viewed from the eastern Mediterranean (ODP Site 968). Quaternary Science Reviews 29(11–12), pp.1481-1490.