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Climate of the Past Discussions

Interactive comment on "A distal 145 ka sediment record of Nile discharge and East African monsoon variability" *by* W. Ehrmann et al.

Anonymous Referee #1

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I read with interest the manuscript by Ehrmann and co-workers "A Distal 145 ka Sediment Record of Nile Discharge and East African Monsoon Variability" submitted to Climate of the Past Discussion. The authors use clay mineral data to reconstruct the history of the Nile River discharge over the last 145,000 years. The manuscript is well written and presents interesting new results. The chronology of the core could and should be improved. This would allow better evaluation of the relationship between proxy records from core SL110 and orbital and sub-orbital climate variability recorded in time series of orbital insolation and Greenland/North Atlantic. The discussion is very long, I suggest shortening it (where/if possible) and using sub-sections to make it easier to follow. Once strengthened by a more robust age model, I believe the conclusions

drawn by this study could be of interest to the readership of Climate of the Past.

Chronology

I do not think that establishing the age model for an eastern Mediterranean core, such as SL110, by correlating the G. ruber δ18O from this core to the LR04 benthic δ18O stack (Lisiecki & Raymo, 2005 – Paleoceanography) is appropriate. First, G. ruber is a surface-dwelling foraminifer while the LR04 stack is based on a compilation of benthic (bottom water dwelling) foraminifer δ18O records. Second, and most importantly, differently from the LR04 stack, the G. ruber δ18O record for core SL110 reflects surface hydrographic (temperature, monsoon-related freshwater, excess evaporation) conditions in a marginal basin (superimposed upon and partly controlled by a global ice volume signal). The LR04 stack also reflects global ice volume conditions but it is also strongly influenced by global deep ocean temperature variability.

There is, in my opinion, an alternative and better-suited approach to construct an age model for core SL110. It does not require generating new data but it does require using a tuning target other than the LR04 benthic δ18O stack. The authors could correlate the SL110 G. ruber δ18O to the LC21 G. ruber or to Soreq Cave δ18O (see Grant et al., 2012 – Nature). Likewise core SL110, core LC21 is also from the eastern Mediterranean. The LC21 chronology was constructed by using 14C dating for the last $\sim$40 kyr and by correlating its G. ruber δ18O to Soreq Cave speleothem δ18O. Hennekam (2015 – PhD thesis Utrecht University) also used a similar approach for constructing the chronology of core MS21 that is located close to core SL110 presented in this study. I therefore encourage the authors to revise their age model by using the LC21 and/or Soreq Cave δ18O records as tuning target.

I think the records in Figures 2 and 3 should be shown versus age rather than versus depth. This would make clear where the hiatus sits in core SL110 and the virtual lack of sediments recording sapropel S5 in this core.

Other Points

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Line 32-33, page 3: during periods of precession minima/insolation maxima (i.e. periods of sapropel deposition) the “freshwater surplus” in the eastern Mediterranean was not only controlled by the Nile River run-off but also by other river/wadi systems in Northern Africa. This could be made clearer here.

Lines 23-25, page 7: information on where the data will be made available could be moved to the acknowledgements.

Lines 13-17, page 9: sedimentation rates should be shown in Figure 3. This would help the reader follow the discussion. Also, to substantiate the connection between sedimentation rates, silt/clay ratios, and sea level it would be good to show a sea level curve in one of the figures. If the authors follow my recommendation to use the LC21/Soreq chronology for core SLSL110, then the sea level curve presented by Grant et al. (2012 – Nature) could be used.

Lines 6-10, page 12: the enhanced productivity during sapropel deposition was unlikely taking place at the sea surface but in the subsurface (e.g., Rohling & Gieskes, 1989 – Paleoceanography; Sachs & Repeta, 1999 – Science; Grelaud et al., 2012 – Paleoceanography). This statement should be revised.

Lines 33-34, page 16: the authors should be expand on the concept of a lack of vegetation feedback over Northern Africa during glacial times.

Interactive comment on Clim. Past Discuss., 11, 4273, 2015.