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Biogeosciences Discussions

Interactive comment on "Diagenetic control of nitrogen isotope ratios in Holocene sapropels and recent sediments from the Eastern Mediterranean Sea" *by* J. Möbius et al.

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Review of Mobius et al. – Biogeosciences, April 2010 General comments: Mobius et al present evidence from bulk nitrogen isotope analyses, %C and %N analyses, Ba/Al, and an amino acid-based diagenetic indicator to conclude that eastern Mediterranean sapropels in the late Quaternary were likely the result of high preservation of organic matter and d15N values under anoxic bottom water, and extensive nitrogen fixation in surface waters. These same conclusions were reached in a prior study by Sachs & Repeta (1999) Science Vol. 286: 2485-2488. Mobius et al confirm those results by introducing a measure of diagenetic alteration of organic material based on rela-

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tive abundances of a suite of protein amino acids. They provide data from sediment traps and several cores in the EMS to support their conclusions. They find that high d15N values are well correlated with low amino-acid-based preservation index values in sinking particles and sediments, providing support for the notion that diagenesis is the primary cause of high d15N values in EMS non-sapropel sediments. The manuscript is a welcome addition to the eastern Mediterranean sapropel literature and should put to rest some of the questions surrounding the interpretation of nitrogen isotopes in EMS sediments. At the same time it will likely raise objections from some who will take issue with the suggestion that sedimentary Ba/Al ratios in EMS sediments are substantially overprinted by diagenesis. Nevertheless, the suggestions seems reasonable. Overall the paper is well written and the figures and tables are clear and concise. The conclusions are supported by the data and I recommend publication in Biogeosciences with minor revisions.

Specific comments: There are several instances throughout the manuscript where the authors appear to take credit for findings and conclusions made previously. (Or at least by not adequately citing the prior work the appearance is given that they are doing so.) Two of those instances are listed below, but it is incumbent on the authors to carefully go through their manuscript to ensure that proper credit is given to conclusions that were made by others. -p. 1144, Line 9-11: The 'speculation' that N-fixation has been a primary source of N to the E Med for millennia was first some eleven years ago by Sachs & Repeta (1999) and should be cited as such. (I.e., these authors are merely agreeing with that prior study.) -p. 1149, Lines 5-11: The conclusions that (1) N2 fixation was an important N source to the EMS, and (2) diagenesis under oxic bottom water cause non-sapropel sediment d15N values to be high in the EMS were exactly the two main conclusions of Sachs & Repeta (1999). Proper citation would appear warranted.

Additional comments: -p. 1135, Lines 21-24: This sentence is a non-sequitur and requires clarification. Some of those studies appear not to have been done in the

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EMS. -p. 1141, Line 17: “Fixed N” refers to essentially all non-N2 in the ocean, so this should be changed to something like “N derived from biological nitrogen fixation”. -I seem to recall Mark Altabet and Roger Francois previously showing (in the 1990’s) that the diagenetic enrichment of 15N occurs in surface sediments, not in the water column.

Interactive comment on Biogeosciences Discuss., 7, 1131, 2010.