

Interactive comment on “Lipid biomarkers in Holocene and glacial sediments from ancient Lake Ohrid (Macedonia, Albania)” by J. Holtvoeth et al.

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Received and published: 27 July 2010

Manuscript: bg-2010-155 Title: Lipid biomarkers in Holocene and glacial sediments from ancient Lake Ohrid (Macedonia, Albania) Authors: Holtvoeth et al.

General comments:

This paper presents paleo-environmental data on two cores located at opposite locales in Lake Ohrid, and consequentially representing different sedimentation influences and thus paleo-record information. Lake Ohrid is a UNESCO world heritage site located closely to the Mediterranean Sea, acting as a sentinel for regional, long-term climate change records. As such, the study is of great regional importance and contributes to enhancing an already existing wealth of paleo-environmental data on this lake. These

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are the first biomarker based results on this system, and as such make an important contribution to the exiting literature. The data presented here are not only novel but also complementary to existing datasets, thanks to the unique capability of biomarker-based paleo-environmental approaches used in this study. The paper is well written and detailed and the pertinent literature was well covered. The authors have ample experience and expertise in this field and demonstrate using a relatively reduced set of samples, the great potential of the biomarker approach to better understand Lake Ohrid's paleo-environmental setting. While this is an excellent paper, I do have a few comments that I believe could contribute to enhance the quality of the paper. These are detailed below:

Specific comments:

- 1) Biomarker distributions are described in great detail, and significant interpretations were obtained from differences therein. However, the entire study was based on only a handful of samples. While some molecular distribution differences are quite significant, others are much more subtle, and you must wonder how much of these differences are real vs. naturally occurring variability among closely located samples. On page 4613 for example, it is stressed that %TOC is lower for Co1202 compared to Lz1120, however, is this difference statistically significant for such a low number of samples? Similar examples are evident later in the text but are only observationally based. This brings a bit of uncertainty to the overall conclusions of the paper.
- 2) Page 4614, 1st two lines: Unclear what the authors are suggesting here. Could it not just be simply more degraded or humified OM?
- 3) Page 4615, 1st paragraph: Are these FA variations significant – see point #1.
- 4) Page 4616, lines 15-25: Do the different microbial/bacterial biomarkers correlate? This is not clear! Is there a cross correlation between i/a-C15 FAs, C18:1 FAs, microbial HFAs, and hopanoids in this study? They all seem to be interpreted separately; but do they tell the same story combined? This is not entirely clear! There is only a mention that branched FAs and hopanoic acids do not correlate.
- 5) Page 4617: The n-C22 alkanol has also been observed highly enriched in samples

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containing epiphytic algae (Hernandez et al., 2001; Org. Geo.). Have the authors considered such potential sources in this case? The whole section regarding the use of the C22 alkanol is a bit vague! 6) Page 4618, section 3.2.6 and page 4626, lines 15-30: I think the Paq portion of this study could have been expanded into discussions regarding changes of coastal marsh environments as reflected in the paleo-record. These could go hand-in-hand with hydrological changes. I did not see Paq values reported for the specific samples (only ranges). 7) Page 4624: I liked this section very much! The biomarker application to assess specifically the presence from soil OM was performed very elegantly! Nice job! 8) Page 4628, lines 10-30: I found this section quite confusing, and am sure it could be more properly reworded to make the point. Also, the lack of correlation between branched FAs and hopanoic acids could be due to differences in lability? 9) Page 4629: Regarding the potential formation of an oxic-anoxic interface, did you observe or check on other potential biomarkers such as tetrahymanol? 10) Page 4629: The story resulting from the finding of coprostanol in Holocene sediments and its consequences seem fascinating! However, it was detected a low levels in only one sample. How certain are you about this result?

Interactive comment on Biogeosciences Discuss., 7, 4607, 2010.

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