

Interactive comment on “ Late Quaternary palaeoenvironmental reconstruction from Lakes Ohrid and Prespa (Macedonia/Albania border) using stable isotopes” by M. J. Leng et al.

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The authors would like to thank the anonymous reviewer for their helpful and constructive reviews. Given here, where appropriate, is a point by point reply to the comments which have been made.

1. Hypothesis. One of the problems in developing a hypothesis for undertaking this research is the lack of long, well dated, palaeolimnological reconstructions from the Mediterranean region, especially those based on isotopes. So this paper was aimed at showing the first isotope-based environmental reconstruction from Lakes Ohrid &

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Prespa which broadly match with the sixteen records which are so well synthesised by Roberts et al. (2008). Our hypothesis evolves around the expectation that the large scale, low frequency changes should be similar to those described by Roberts (i.e. a wet early Holocene, progressive aridification in the middle Holocene and the late Holocene complicated by human activity), but that there should be smaller scale differences linked with the fact that the 2 lakes are situated on the border of the Mediterranean and continental climate. This explanation has been added into the Introduction.

2. Why use isotopes? A sentence has been added into the Introduction on what information will be provided by the oxygen and carbon isotopes of carbonates and the carbon isotopes of organic matter. The explanation is relatively brief as the full explanation of the rationale behind the analysis is provided later in the text.

3. Details of age models. We have not included further details as the full explanation of the age models of the cores are available elsewhere and referenced in the text. Please see below for a full reference listing: Core Co1204: Wagner, B., Vogel, H., Zanchetta, G., and Sulpizio, R.: Environmental changes on the Balkans recorded in sediments from lakes Prespa and Ohrid, *Biogeosciences Discuss.* 7, 3365-3392, 2010. Core Co1202: Vogel, H., Zanchetta, G., Sulpizio, R., Wagner, B., and Nowaczyk, N.: A tephrostratigraphic record for the last glacial interglacial cycle from Lake Ohrid, Albania and Macedonia. *J. Quat. Sci.*, 25, 320–338, 2010. Core Lz1120: Wagner, B., Sulpizio, R., Zanchetta, G., Wulf, S., Wessels, M., and Daut, G.: The last 40 ka tephrostratigraphic record of Lake Ohrid, Albania and Macedonia: a very distal archive for ash dispersal from Italian volcanoes, *J. Volcanol. Geotherm. Res.*, 177, 71–80, 2008. A comparison/overview of the tephrostratigraphy and correlation of different cores: Sulpizio, R., Zanchetta, G., D’Orazio, M., Vogel, H. and Wagner, B.: Tephrostratigraphy and tephrochronology of the lakes Ohrid and Prespa, Balkans, *Biogeosciences Discuss.*, 7, 3931-3967, 2010 For determination of the hard water / reservoir effect, in addition to Vogel et al. 2010 (see above): Wagner, B., Reicherter, K., Daut, G., Wessels, M., Matzinger, A., Schwalb, A., Spirkovski, Z., and Sanxhaku, M.: The potential of Lake

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Ohrid for long-term palaeoenvironmental reconstructions, *Palaeogeogr. Palaeoclimatol. Palaeoecol.*, 259, 341-356, 2008.

4. Discussion of the comparisons of the LG-Holocene transition between the cores. The critical late glacial – Holocene transition occurs in Co1204 (Prespa) & Co1202 (Ohrid), although is absent from Lz1120 (Ohrid) due to a hiatus. However, carbonate oxygen and carbon isotope data are only available pre 10ka from Co1202 (from c. 15ka). In Co1204 and in Lz1120 from around 9-10ka the sediments change in composition from very low or negligible carbonate content to much higher carbonate content, so carbonate isotope data are only available from the Holocene. So we only have one record of the transition from the LG-Holocene in Co1202 but there are problems with the dating which make it difficult to speculate or relate the changes we see to other records in the region. In summary, the lack of the carbonate isotope data and the concerns about LG hiatuses (discussed in papers from 3 above) prevents us from speculating further at this point about this comparison between the records we examine here and other records from the region. Obviously this a key question for further work.

5. The technical corrections have mostly been dealt with, although there are a few exceptions: P3820. Line 13. IGG and NIGL are defined in the addresses of the authors and this is referred back too. P3822. Line 15/16. We haven't tallied the failed samples because the information is not required. Once published the data will be archived and the data will be available from the lead author. P3823. See point 3 above. P3824. Infill changed to enter. P3825. St. Naum locality information added to text. We didn't move the slim interpretation found in this section to the discussion because we feel it begins to set the context. P3826. Rephrased and corrected. We have considered the suggestion of expanding the figures but given the limitations on the dating (especially in the late Holocene), and that the data is available, we have decided to retain the current figures. P3827. Changes are accepted, except high – low to maximum – minimum as this changes the meaning. "till" have been changed to "until". P3828.

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Repetition is mean for clarity here. P3828. Changes accepted. P3829. Isotope is used as a noun here. P3830. The reference to the spike has been removed, other changes accepted. P3831. Changes accepted. P3832. Changes accepted. P3833. Changes accepted. P3834. Changes accepted. P3835. Changes accepted. P3836. Changes accepted. P3837. Changes accepted. P3837. Some changes accepted. P3838. Some changes accepted. P3831. We would expect the broad climate variation seen in other Mediterranean records to impact Ohrid and Prespa because of the influence of the Mediterranean climate over this region. There are some variations but we are prevented from discussion due to the limitations of the current dating. Other changes accepted. P3832. We would not like to speculate on the possibility of O-fractionation being driven by eutrophication. The most likely explanation of the data is greater freshwater via precipitation over the catchment. Other changes accepted. P3834. Reworded. P3835. Changes accepted. P3839. Some changes accepted. We haven't elaborated on the interpretation due to the reasons outlined above (resolution, dating etc.).

Table 1 and Figure 2 captions amended.

Figures 3 – 5. Negative ages are a function of the age model and published elsewhere.

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