

Interactive comment on “Annual proxy data from Lago Grande di Monticchio (southern Italy) contributing to chronological constraints and abrupt climatic oscillations between 76 and 112 ka” by C. Martin-Puertas et al.

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We would like to thank Referee 1 for the very constructive comments provided on our manuscript “Clim. Past Discuss.10, 2595-2626, 2014 Annual proxy data from Lago Grande di Monticchio (southern Italy) contributing to chronological constraints and abrupt climatic oscillations between 76 and 112 ka”.

We are pleased to accept all the suggestions, as they will improve our manuscript.

Regarding the major modifications and specific comments that the referee suggests:

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1) Introduction has been rewritten. The revised introduction focuses on the study interval (76 to 112 ka) and provides information about the millennial-scale abrupt climate changes during early last glaciation and how this climate variability was recorded in the Greenland ice cores, as well as in other marine and terrestrial climate archives across the North Atlantic region and Western Europe. We have also showed the lack of knowledge of these abrupt climate changes in comparison to those occurring during the full glacial conditions, basically because of limited age control during the early last glaciation. We show detailed information about the most precise and highest resolved palaeoclimate archives recording the study time interval, so far (the NorthGRIP ice core record and the NALPS speleothem) and their main limitations of the chronologies. Thus, we have emphasised the importance of our record to the state-of-the-art, since it is the only independently dated, continuous, high-resolution palaeoclimate archive in the central Mediterranean region through the early phase of the Last Glacial Period.

2) Age uncertainties: we provide a better description of the age uncertainties associated with the duration of the climate oscillations in the revised version of the manuscript. We have calculated error ranges along the study interval based on the comparison between two independent varve counts, the MON-07 which was partly published by Allen et al. 1999 and by Brauer et al. 2007, and the MON-2014 (this study). The correlation between both counts was established using 132 tephra layers as correlation markers. The detailed comparison between the MON-07 and the MON-2014 varve counts allows providing a better constrained and more precise error estimate for the study interval. And we applied this relative error as uncertainty range for the durations of the climate oscillations.

Additionally we have provided two new figures following the referee's recommendations. Figure 6 zooms the climate oscillations described in the Monticchio records in order to see clearly how the transitions were reflected by the pollen, varve thickness and geochemical (Ti) proxies. We have also indicated the resolution of the pollen samples. Figure 8 shows a direct comparison of the timing and duration of the stadi-

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als as displayed by the different chronologies discussed in the text (GICC05modelext, AICC2012, NALPS and MON-2014).

3) We have increased the vertical size of the Figure 3c (Figure 4 in the revised version) and Figure 5 (Figure 7 in the revised version) in order to allow an easier visualization of both the millennial-scale climate oscillations and the sub-millennial scale climate variability.

4) Discussion about different proxy response. According to the referee's suggestions, we have included previous publications that provide information about synchronicity/lead/lags during the Younger Dryas (Lane et al., 2013 and Rach et al., 2014). These studies show that regional differences in the abrupt climate response occurred in the range of decades. In the text, we mention that tracing possible leads and lags in the climate response of the different proxy records is not possible because of the discrepancies (several millennia) among the ice core chronologies and among those and the NALPS and the MON-2014 timescales during the study time interval is higher than decades. We agree Referee1 that the differences observed between the different records may originate from different proxy response and we suggest this as a key issue for further investigations in the last paragraph of the conclusions. Regarding the minor and technical corrections, we have accepted all of them, including the new title proposed by Referee1.

Interactive comment on Clim. Past Discuss., 10, 2595, 2014.