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Climate of the Past Discussions

Interactive comment on "Abrupt climate changes of the last deglaciation detected in a western Mediterranean forest record" *by* W. J. Fletcher et al.

W. J. Fletcher et al.

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Reply to the Editor

We thank the editor for the opportunity to improve our manuscript "Abrupt climate changes of the last deglaciation detected in a western Mediterranean forest record". We have taken time to respond thoroughly to all the issues raised by the editor and the referees. In brief, the main revisions which were necessary to answer fully the various issues are:

1» A pollen diagram has been added to show the basis of the TMF curve and to permit comparison with other major taxa in the record (Figure 4).

2» Two pollen-based climatic indices are presented and discussed to support the climatic interpretation of the TMF curve. These indices are based on the present-day distribution of select vegetation types along precipitation and temperature gradients, which are displayed in an figure accompanying the description of the vegetation in section 2 (Figure 2).

3» Climatic implications of the pollen record are considered in more detail for two key intervals: (i) the Bölling-Allerød trend is discussed (as suggested by Referee 1), and (ii) a comparison for the Younger Dryas with the varve record of Meerfelder Maar is presented, accompanied by a figure (Figure 6), in order to evaluate further the proposed hydrological pattern.

4» The text has been carefully modified for precision and clarity, particularly in key areas mentioned by the editor and referees, i.e. (i) chronological basis, (ii) description and evaluation of the MAT technique and results, (iii) description and justification of the proposed atmospheric mechanism, and (iv) possible chronological implications arising from the identification of abrupt Lateglacial climate transitions (reservoir ages).

5» References have been thoroughly updated to take into account 2009 material.

In response to specific comments from the Editor:

Comment 1- *chronological framework is always a corner stone for any paleoclimatological study, and even more for those related to rapid events. Please spend time to discuss the chronology, and this even if it's already partly published. Be careful with your assertions. I agree with reviewer 2: in the present state, your consideration on reservoir ages doesn't seem to me enough supported.*

We have expanded the chronology section (section 3.1) so as to make clear the basis for age determination and to highlight uncertainties in the chronology. We have also modified the section on reservoir ages (see also responses to the individual reviewers on this point) to make our aims clearer. In fact, our intention with this section of the

CPD

5, S337–S340, 2010

paper is simply to examine in detail the chronology of the Lateglacial events as detected in the record, and consider some of the possible implications of the apparent age of abrupt events; in other words to evaluate in a very open way the chronology of events in the sequence. We agree that chronology is very important and consider that this section of the paper addresses some interesting chronological questions arising from the study.

2 - *dissimilarities between TMF and MAT should be further discussed. I would like to see more about MAT, advantages,limitations, biases (as example why does reconstruction show a constant inf limit?), I'd like to know more on rationale behind the choice of TMF. What are other spectra?*

We have made a strong effort to address these issues. On the one hand, we have expanded the description and discussion of the MAT, both in the methodology section and in the results section, adding information on the locations of the analogues and evaluating changes in dissimilarity (analogue distances) over the record. In this way, the limitations and biases are made evident. On the other hand, we have also added more information about the pollen record, in particular adding information about other key vegetation components (evergreen Quercus, deciduous Quercus, semi-desert and montane vegetation) in the form of two novel pollen indices. This additional information helps make clear the significance of the TMF curve and reinforces the climatic interpretation.

3- *Additionally I like you to answer to H. Grobe about the data.*

We have added this sentence allowing the reader to easily find the archived raw pollen data: 8220;All pollen data for marine core MD95-2043 are permanently archived and accessible at Pangaea doi:10.1594/PANGAEA.711649.

Please also take into consideration our detailed responses to the two anonymous referees.

CPD

5, S337–S340, 2010

Interactive comment on Clim. Past Discuss., 5, 203, 2009.