Climate of the Past Discussions

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Reply on RC2

Mary Robles et al.

Author comment on "Climate changes during the Late Glacial in southern Europe: new insights based on pollen and brGDGTs of Lake Matese in Italy" by Mary Robles et al., Clim. Past Discuss., https://doi.org/10.5194/cp-2022-54-AC2, 2022

Responses to the comments of Reviewer 2

General comments

"Climate changes during the Lateglacial in South Europe: new insights based on pollen and brGDGTs of Lake Matese in Italy" by Mary Robles and colleagues is a nicely crafted paper that uses multiproxy techniques to reconstruct palaeoclimate climate conditions in southern Italy during the Late Glacial period. These records are compared and contrasted with other regional reconstructions. The discussion is rich and the figures are of good quality. I fully support the manuscript's publication in Climate of the Past.

Response: We thank Reviewer 2 for the interesting comments. Our responses and changes are presented below.

Some minor suggestions

Lines 81-83: The chironomid-based synthesis of Heiri et al. (2014) suggests that temperature variations during the Lateglacial tend to be more pronounced in Western Europe (British Isles, Norway) than in Southwestern Europe, Central and Southeastern regions. Why?

Response: We added a sentence in the introduction section line 85: "**These regional differences would be attributed to the changing position of the North Atlantic sea-ice and the Polar Frontal Jet Stream (Renssen and Isarin, 2001).**"

Line 87: "cooler" is vague. How much cooler?

Response: The differences in terms of temperature values depend on the proxies considered or on the climate models justifying the citation of the different papers. We added line 90: "Studies suggest that (1) the OD was cooler than the YD in Southern and

Central Europe in comparison with Northern Europe (**~1-3 °C**; Heiri et al., 2014; Moreno et al., 2014)".

Line 89: Idem with "warmer". It would be good to put some numbers on these statements.

Response: See the response below. We added line 91 "the Allerød period was warmer than the Bølling in Southwestern Europe and the Mediterranean area **(~1°C**; Moreno et al., 2014)".

Lines 125-126: "…for reconstruction environmental parameters."

Response: The sentence has been modified by "… for **reconstructing** environmental parameters".

Line 369: 4.2 Age-depth model: There is no discussion on why there is such a marked offset between the radiocarbon and tephra chronologies. Given the disparity, this point needs to be addressed.

Response: We thank the reviewer for his comments. **Because most of the ^{14}C are rejected in our study, the age model is in our study a very important point which need to be discussed;** therefore the discussion of the age-depth model is presented in the discussion section. However, we agree with the reviewer and added a sentence in the results section to do the link with the discussion section line 393: "**The organic matter extracted from sediment was essentially composed of rootlets, that explains the rejuvenation of the ^{14}C ages."**

Figure 7: No error envelopes?

Response: The analytic reproducibility has been calculated and it is presented in the Material and methods section line 337: "The analytic reproducibility corresponds to **±** 0.040 for CBT, **±**0.0167 for MBT, **±**0.0206 for MBT'_{5me}". The values are low for the different ratio presented in this paper.

Lines 511-512: "…hypothesized that the dated organic matter may have originated from penetrating roots of plants growing during sedimentary Unit 5's deposition (Fig. 4)." If there is evidence of bioturbation, could this not affect the different proxy reconstructions?

Response: This is, in fact, essentially of fine rootlets and there is no evidence of bioturbation. We changed the text in the results section line 357: "This part is mostly composed by roots and **fine rootlets"** and line 393:" **The organic matter extracted from sediment was essentially composed of rootlets, that explains the rejuvenation of the ^{14}C ages" and in the discussion section line 516: "**it is hypothesized that the dated organic matter may have **partly** originated from penetrating **rootlets** of plants growing during sedimentary Unit 5's deposition (Fig. 4)".

Line 694-695: "In Italy (Fig. 9), climate reconstructions do not show latitudinaldifferences in terms of temperature." Is it possible to make this statement given the different proxy reconstructions used at different latitudes? The authors could consider converting the different series in figure 9 into z-scores to test amplitudes and rates of change on a common scale.

Response: We thank the reviewer for his relevant comments. Unfortunately, we do not have the raw data for most proxy records (we digitalized them) and thus it is not possible to test amplitudes and rates of change on a common scale.