

## ***Interactive comment on “Climate changes in interior semi-arid Spain from the last interglacial to the late Holocene” by Dongyang Wei et al.***

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This manuscript contains some excellent material (e.g. Appendix 1, correcting estimates of moisture for [CO<sub>2</sub>]) and much less good material (e.g. pollen-based reconstructions, numerical methods, component selection, SI Table 2, no data for the fossil sequence, no pollen diagram showing major taxa, no information about how the sequence has been constructed from the several pollen diagrams published from the sites, no age-depth model). I am surprised that the statistical significance of the reconstructions was not assessed using the Telford Birks (2011, QQR) randomisation procedure. Such an assessment would provide a critical test of how potentially robust the reconstructions are. Overall I recommend major revisions to some parts plus extending the manuscript to be more complete. It is potentially a very valuable study, it

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simply needs to be presented more fully so that readers can evaluate the reconstructions, the discussion, the chronology, etc. for themselves.

Some specific comments:

Line 41: “long-term” rather than ‘longterm’

Line 49: “ice-sheet volume” rather than ‘ice sheet volume’

Line 63: Two of these papers (González-Sampériz et al. 2013; Aranbarri et al. 2014) present parts of the entire pollen sequence from Villarquimado (V). It would be a great help to the readers of this manuscript to have a more detailed complete pollen diagram than Figure 2 that only shows four groups of taxa.

Line 66: Valero-Garcés et al. needs a year. Again it would be useful to see the age-depth model for V so that one can judge ‘the quality of the age model’.

Lines 102-113: I assume that all the data not already in public databases such as EMPD, EPD, and Pangaea will soon be publicly available (e.g. some of the EMB-SeCBIO data that are not in the EPD).

Line 139: Were these GAMs constructed using pollen percentages? If so, what taxa were included in the calculation sum?

Line 148: It would have been useful to present 2–4 of these GAMs.

Line 156: Were spores of pteridophytes and lycophytes included in the pollen sum?

Line 218: Citation needed for the statement about WA-PLs being ‘relatively robust to spatial autocorrelation’ (e.g. Telford Birks 2005 or 2008 QSR).

Line 226: ter Braak et al. 1993 is missing in the reference list.

Lines 221-227: I am confused here. Van der Voet’s method tests the equality of predictions (reconstructions) from two models. As shown by Juggins Birks (2012 DPER vol 5, chapter 14), this randomisation t-test provides additional information to help dis-

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criminate “hidden” over-fitting from real systematic model improvement, whereas the selection of WA-PLS components on the basis of RMSEP can lead to the selection of an inappropriate model and lead to a correspondingly over-optimistic impression of the prediction error. Why use the Van der Voet t-test to select the number of components and then use the lowest RMSEP as a basis for selecting WA-PLS components? The Van der Voet test is less prone to lead to over-fitting (see Juggins Birks 2012).

Line 239: Is there a word missing after ‘effects’?

Lines 258-261: The CCA (Table 1 lower half) does not show that the three climatic variables have an independent contribution to explaining variation in pollen abundances as you do not appear to have conditional (partial) CCAs with MI as the predictor variable and MTCO and GDD0 as covariables. Also it should be “Axes” not ‘Aexs’. See Juggins (2013 QSR) for a detailed discussion of the major problems of identifying independent predictor variables.

Lines 263-264: Three and four components are quite high – does the Van der Voet test show that these components are significant?

Line 269: But Polypodiales are not really aquatic. Of the taxa you list in S1 Table 2, *Thelypteris palustris* is the only mire plant. None are aquatics.

Line 480: Is there a word missing after ‘regarding’?

Lines 542-554: A corrected list of authors of this paper was published as a correction in VHA.

Line 623: “Quaternary” not ‘quaternary’

Lines 823-828: Maps a and b are very small and b is impossible to read.

Figure 4: It is a missed opportunity not to have used bootstrapping (available in rioja) to estimate sample-specific errors for these three reconstructions.

Table 2: I am confused. These do not seem to me to be the results of the Van der

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Voet randomisation t-test. Also here it says that Poaceae and Polypodiales (not correct spelling) were omitted but on line 159 you say 196 taxa were used. What were actually used – 194 or 196 taxa?

SI Table 2: I am not sure that this is needed when much more relevant basic data are not given, e.g. the fossil pollen counts for the V sequence, modern pollen data not in the EPB, EMPD, or Pangaea (e.g. some of the data in Marinova et al. 2017). A quick perusal of SI Table 2 indicates some errors, “some of the taxa included in Asteroideae have very distinct pollen (Ambrosia, Xanthium) “ same for Carduoideae, Caryophyllaceae (Spergula, Paronychia, Illecebrum, Agrostemma) “ Succisa is not in the Caryophyllaceae “ Fabaceae and Fabaceae (herbs) is an unsatisfactory division “ Tuberaria pollen is like Helianthemum “ Hepatica and Pulsatilla pollen are like Anemone pollen “ Hypericaceae pollen are the same as Guttiferae = Clusiaceae “ Hippuris (in Plantaginaceae) is an aquatic whose pollen is totally different from Plantago pollen “ Cryptomeria is a tree, not a fern (Pteridaceae), many of the Pteridaceae have distinct spores (e.g. Adiantum, Cryptogramma) “ same for Rosaceae (Fragaria has Potentilla-type pollen) “ some of the taxa in your Scrophulariaceae are now in the Orobanchaceae (Euphrasia, Pedicularis, Rhinanthus). This is an allocation of pollen types to higher plant taxonomy names, not to similar pollen types that have been given different names by different analysts. It is a record of how you have amalgamated the 249 taxa but there are errors in it.

SI Table 4: It seems a bit excessive to give estimated ages to one decimal place!

SI Table 5: References are missing.

References: Need checking against the citations in the text.

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