

Interactive comment on “Mid-Holocene climate reconstruction for eastern South America” by L. F. Prado et al.

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The authors really appreciate the comments and suggestions made by E. Piovano. We reply his comments below, with the same topics scheme he has used.

a) Abstract. Agreed. We have modified the abstract and included the following sentences highlighting the main results at the end of the abstract: “Lower values of summer insolation during this period induced an ineffective land-sea contrast and weakened the South American Monsoon-like System (SAMS) circulation. Nevertheless, wetter climate than that of today during Mid-Holocene is observed on coastal areas. This is likely to be related with changes in the regional air-sea interaction which shall be investigated through future modelling studies.”

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b) Section 2. We have mentioned in the first version of the manuscript the SACZ among the five regions of summer precipitation, the SALLJ and the transient systems. All of these features generate precipitation in the center-south of South America (see 2nd paragraph of section 2). The denomination “South American Monsoon System” was used after Vera et al. (2006) and Marengo et al. (2012). However, the inclusion of the particle “-like” seems to be appropriate and we have adopted it, as suggested.

c) Proxy data. Agreed. The replacement of “elements” by “indicators” in “can be obtained from some natural elements” has been made, as suggested.

d.1) Chronologies and calibration. In our manuscript, we used the original chronologies as published in the considered papers (this information was added to the manuscript, section 3.2). We decided to proceed like this, since not all the information necessary for calibration of the 120 records used in our compilation is available in the 84 consulted papers. Moreover, the focus of our manuscript is to compare the MH spatial distribution of precipitation with the LH distribution of the same climatic parameter. The first order forcing controlling climate change on this time-scale is changes in insolation due to changes in the Earth’s orbital parameters, whereas millennial-scale changes are of secondary importance. Changes in insolation due to changes in the Earth’s orbital parameters are known to occur gradually. To avoid picking up anomalous signals from the compiled records that would not appropriately represent the MH, we decided to: (i) expand the MH time-slice to the interval from 7,000 to 5,000 cal yr BP (see Section 3.2); and (ii) use the mean climatic signal considering all samples that chronologically fit within this interval. Because we are aware that using calibrated ages is the standard, we attributed a higher score to the records that had calibrated chronologies (see Section 3.3).

d.2) Westerlies. In Garreaud et al. (2009), page 186, section 3.2., first paragraph, the authors state that the westerlies peak between 45° and 55°S during austral summer, and during winter over South America the jet axis is at about 30°S. This corroborates the criterion we used to define the southern limit of our domain. It is clear in figures

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2a and 2b of the paper mentioned above that the westerlies limit in 40°S at the surface, and in figures 2c and 2d that the jet mean position is in 40°S in high-levels. We have added to the manuscript the information that our selected sites are not under the influence of the westerlies (section 3.2).

e.1) Wrong figure number. Agreed. The number of the figure has been revised.

e.2) More information - Table 2. Table 2 only summarizes the compiled records. Much more information such as the temporal length of the records, proxy types, number of datings, number of samples, sampling methods, etc. will be provided in the worksheet that will be published at www.pangaea.de as soon as the present manuscript is accepted. Then, to make this important part of the manuscript clear, we have added as footnote in Table 2 all the information that will be available through Pangaea: Footnote-Table 2:"The data published in this paper will be available through Pangaea (<http://www.pangaea.de>) as soon as the manuscript is accepted for publication. The available information on Pangaea website will include: Publication details; Core details (name, location, latitude, longitude, elevation, coring device, core length); Sample details (analytical method, samples treatment, sample interval, number of samples); Dating details (number of datings within MH, calibration); Climatic information (period, description, and evidences of changes observed); Values of Q index."

e.3) Compilation of the palaeodata. Agreed. The expression "there were synthesized" has been replaced by "we drew". We did not apply any model to the data, or even modified the climatic information given by the authors. Our task only consisted of organizing and reproducing the interpretation of the records given in each paper. The index Q was not used to infer past scenarios, but to evaluate the reliability of the age models. The qualitative climatic information extracted from the data is discussed in each paper analyzed, and it was only transcribed by us.

e.4) Discussion. This issue has already been addressed in Prado et al. (subm., see below). We have objectively compared our compilation of records with seven

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PMIP3/CMIP5 models outputs. Besides some differences among the models outputs, they generally fit with the records. In the present manuscript, we have mentioned the research of Cruz et al. (2009) (section 4.1), and we have discussed that the MH scenario described in our compilation fits to the atmospheric circulation features presented by them. Here we intended to provide a multiproxy compilation that could be readily used in model validation, and this is the reason why it does not include any numerical comparison.

References

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