

Clim. Past Discuss., referee comment RC1
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Comment on cp-2022-57

Anonymous Referee #1

Referee comment on "Using data and models to infer climate and environmental changes during the Little Ice Age in tropical West Africa" by Anne-Marie Lézine et al., Clim. Past Discuss., <https://doi.org/10.5194/cp-2022-57-RC1>, 2022

The manuscript presented by Lézine et al deal with the climate changes experienced in tropical West Africa during the last millennia. The manuscript first makes use of a number of paleo-records in the study area to define two new indices able to quantify the hydrological and vegetation context. The goodness of these paleo records is first evaluated by computing two multi-proxy indices which are validated against instrumental data for the period 1840-present with good results. Then, the authors make use of modelled data (from 850 to 1850) to characterise the precipitation in pre-instrumental period, subsequently discussing the relation between the modelled climate and the observed variability of the paleo-records, offering an interesting discussion and relevant results.

The paper is well written and in general it is clear. Personally, I find this work quite interesting, as it deals with a region still poorly characterised because of the sparsity of instrumental or even proxy records. Therefore, I recommend its publication in Climate of the Past.

I however have some concerns (general comments) that, if addressed, will probably improve the clarity of the manuscript:

The most important is related with the methodology used to homogenize the paleo data in section 2.1. As far as I understand, the method used is based on rescaling each individual paleo record (table 1) to a common 6-level scale. However, the details of this conversion are not explained in the manuscript making it impossible to know how this index is ultimately computed (this is essential at the time of evaluating the goodness of the original data or even to allow reproducibility). In my opinion, the authors should describe a little more the way this rescaling has been performed.

Another question is related to the reason why the authors have limited their study period

to 850-1850. I'm not familiarised with the past1000 experiment data but ending in 1850 most probably indicates that the past1000 experiment was conceived to model the pre-industrial era. However, if possible, it will be extremely interesting that the modelled precipitation series were extended to present time. This would allow to compare the model results with the instrumental ASWI (figure 2 of the manuscript) and, providing the result is good, it would add a lot of confidence to the results. Anyway, I would like to stress that I find figure 2 very interesting as, beyond some indirect evidence, the humid period described by the ASWI between 1840-1890 had not be confirmed by independent data up to now.

Apart of these questions, there are some minor aspects that could help to clarify the text (specific comments):

Lines 31-32. The west African monsoon is not only driven by land-sea contrast, but it is also a consequence of the migration of the ITCZ (see for example Gagdil et al. <https://doi.org/10.1007/s12040-017-0916-x>).

Line 50. I consider that this manuscript is not a "review" but a "research".

Table 1: Maybe expressing the latitude and longitude in sexagesimal form will be clearer.

Line 97: In my view, the validation performed is not indicating that the methodology is "realistic" but instead, it is testing the similarities between the paleo-data and the instrumental ASWI.

Figure 1. The blue arrows are a little difficult to see where the underlying colour is also blue.

Line 180. I believe that the way the past1000 index is constructed should be more explained.

Figure 4. I'm sure that presenting such amount of series in a single figure is not easy, but it is quite difficult to interpret some of the y-axis scales in this figure. For example (not the only case) in figure 4A "Jikaryia" the axis is scaled by not consecutive values (3, 1.5, 2, 0.5). Please clarify.

Line 326. Please indicate the methodology used to compute statistical significance.

Line 352. The local term "Heug" could be unknown by readers not familiarised with the climate of this region. Please explain.