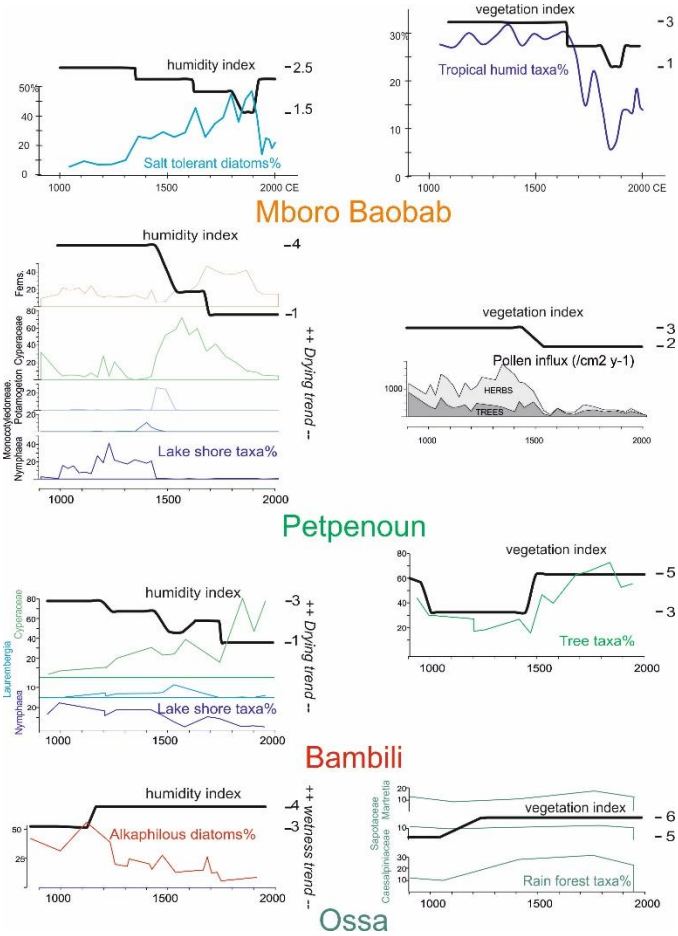
In this manuscript, Lezine and colleagues present a synthesis of palaeorecords representative of the WAM covering the period between 850 – 1850 CE. They compare these data with recent simulations over the same period. The paper is interesting, well-written, and summarises the region's state-of-the-art quite nicely. As such, I recommend its publication in Climate of the Past, providing some clarifications of some technical elements supporting the study (see below). Most data seem to be represented with some indices. How these are constructed is rarely described, making reading and interpreting the figures quite difficult. The authors mention a 6 levels scale, but many plots display decimal values (e.g. 2.5 for GeoB9501 in fig. 4). Overall, the manuscript would greatly benefit if all the technical details of this study were better described.

We thank the reviewer 2 for his positive appreciation of our article. His remarks help to clarify and improve the manuscript. We answer them point by point.

(1) The major question concerns the methodological aspect (the elaboration of indices of paleoenvironmental change). We have answered in detail a similar question from reviewer 1. We reproduce our answers here.

"This paper is based on a *qualitative* description of regional environmental and climate conditions. As is now shown in the supplementary figure (see below), the index synthesizes data from different proxies types (e.g. pollen percentages or influxes, diatom percentages…) from which the main features indicative of aridity are extracted based on a step-scale.
The supplementary figure shows that we relied on proxy such as salt-tolerant diatoms concentration (at Mboro site) which allows identifying the development of aridity based on the salinity levels of lake waters. We also relied on several pollen taxa (such as at Petpenoun), where the development of aridity is deduced with the transition from plants typical of open water (Nymphaea) to plants typical of lake edge (ferns).
The purpose of these step-scale indexes is to homogenise the information provided by the heterogeneous and complex original data sets. The step-scale is built to capture the major transitions to allow distinguish the signal from the noise.
The figure illustrates the method with an example from each of the major vegetation zones considered in the paper: the sahel (Mboro Baobab), the savanna zone (Petpenoun), the mountain forest (Bambili) and the lowland evergreen forest (Ossa). The index is drawn manually from original data."



(2) Decimal values were used to identify minor changes in the paleoenvironment. (added in the text)

Specific comments

L76: Is this the mean resolution of 100 years? Or the highest time between two consecutive samples should be 100 years?

It is the maximum time interval between two consecutive samples

L78-81: I understand this part perfectly, but I do not like the use of the term 'degraded', which is biased towards human perception. Plants or animal species that live in 'degraded' (as defined here) environments would probably not call it that way. A more objective description, from most arid to humid conditions, seems more appropriate.

The sentence has been modified accordingly:

"in order to evaluate the relative amplitude of the environmental/climate change, we build a 6-point scale ranging from 0, corresponding to the most arid environment (e.g., drying of lakes, salinization of water, increase of dust transport, opening of the vegetation cover) or the driest climate, up to 6, which

refers to the most humid environment (e.g., high lake level, fresh water, dense vegetation cover) or the wettest climate. Decimal values were added to identify minor changes in the paleoenvironment ».

L97-113: I think a description of how the ASWI is calculated is warranted. Not in detail, because it has been published elsewhere, but with sufficient information to avoid checking the Gallego et al. 2015 ref.

The sentence has been modified accordingly:

« The ASWI is based on JAS wind direction data (i.e. the persistence of the low-level south-westerly winds) from historical measurements available since 1839 in a region over the Atlantic, close to West Africa (29°W–17°W, 7°N–13°N) . The ASWI is strongly correlated with the observed Sahel precipitation since 1900 and is, therefore, presented as a good indicator of its variability. »

L140: Why a reference to ENSO here? It doesn't seem to be contributing to the rest of the study.

We think it is always good to discuss the model skills regarding ENSO as this mode has a strong contribution to Sahel rainfall variability. Having a reasonable representation of this feature would hence give more confidence in the robustness of our results.

L141: Define the acronym AMV

We rephrased as bellow :

The spatial pattern of the Atlantic Multidecadal Variability (AMV; Deser et al, 2010) teleconnection in the Pacific is consistent with observations but the tropical Atlantic variability is relatively weaker.

Fig. 3: This may be a problem with the preprint, but the axes and colour scale labels are difficult to read. This comment also applies to most figures.

The fonts have been made bigger

L173-175: Replace 'slightly' with a measure in distance or degrees. The northward expansion seems to be several degrees south of where it should theoretically go. Then discuss why this is acceptable.

We rephrased as bellow :

"However, the northward shift of maximum rainfall over the Sahel during the rainy season is underestimated by the model by about 4° (the model's maximum in August is at ~7ºN and the observed one at 11ºN). As a result, the climatological rain belt over West Africa is slightly more constrained to tropical regions compared to observations and with a dryer Sahel on average. "

L180: An index is calculated or derived, not performed. What does this index measures? What do you do to the first and last 9 samples when computing the moving average since they do not meet the criterion of 10 samples for the moving average? Are you reducing the length of the record? (No wrong answers here, but the methodology needs more clarity).

Following the reviewer's recommendation, we replace "performed" with "calculated". We also specify that the endpoints of the low-pass-filtered index are truncated to keep the full 850-1849 time range. This is taking only the elements that fill the centred 10-year moving window at the endpoints to calculate the mean. Please note the following changes in the manuscript:

"Seasonal precipitation anomalies from July to September (JAS), relative to the piControl climatology, are area-weighted and averaged across the Sahel region (red box in Fig. 3A), then filtered with a 10-year centred moving mean with truncated endpoints (i.e., only averaging existing elements within the 10-year window)."

L179-189: A better description of how the index is calculated and what it means is warranted here.

The text has been modified accordingly:

“Then, to characterize the simulated Sahel rainfall multidecadal variability over the past millennium and contrast to the reconstructed environmental series, an index is performed as the 10-year low-pass-filtered Sahel precipitation anomalies in the rainy season from past1000 simulations. Seasonal precipitation anomalies from July to September (JAS), relatives to the piControl climatology, are area-weighted and averaged across the Sahel region (red box in Fig. 3A), then filtered with a 10-year centred moving mean with truncated endpoints (i.e., only averaging existing elements within the 10-year window). An ensemble-mean index is also performed to highlight the forced component of the Sahel multidecadal variability in response to natural forcings that are common to the three past1000 members, such as the effect of large volcanic eruptions, in contrast to the internal variability.”

Fig. 4: What do the blue shades indicate? And how were they determined? Also, what are the numbers of the y-axes? ASWI values?

The figure caption has been improved and this sentence has been added:

« The shaded bands indicate the transition period between the medieval climate anomaly and the Little Ice Age (1250-1450CE light shading) and the LIA (1450-1850 dark shading) »

Results hydrological records: I am struggling to find commonalities within the groups of hydrological records, except for the Sahel region, where a general trend toward drier conditions seems to be consistently reconstructed. Perhaps the authors could run some statistical analyses to extract the trends shared by the records and limit the impact of the ‘local’ signals.

We totally agree with this observation. Vincens et al (1999) already noted the importance of the local hydrogeological context in the response of lakes and wetlands to climate change, which explains the complexity of the records in the equatorial lowlands. Nevertheless, figure 6 shows that, despite a great hydrological variability, the equatorial region was overall "wet" during the LIA, in contrast to the previous period.

Results pollen records: How are pollen records summarised to one single curve? They seem to be plotted against – broadly speaking – the same scale as the hydrological records. Did the authors convert every pollen sample, a high-dimension type of data, to one single value by hand? More details are definitely needed here.

See above response to reviewer 1

In addition, hydrological and pollen records from the same site are, more often than not, quite different.

The lowland equatorial forest is not significantly sensitive to discrete variations in hydrology in a context of prevalent humidity compared to the wooded grasslands and woodlands of the Savannah zone and the Sahel.

The text has been revised as follows:

« The equatorial lowlands are characterized by contrasting hydrological situations (Fig. 4E) reflecting the diversity of local hydrogeological settings » (3.1)

“The forest cover remained roughly unchanged in the central forest massif (Mopo Baï, Bamba Yanga, Goulalougo, Fig. 4I). In the western regions by contrast (Ngamakala, Kitina, Lac Ossa, Nguène and Kamaléte), the forest gradually developed since 1250-1350CE in spite of the discrete hydrological fluctuations. (3.2)”

Fig 6: The signal obtained from the data seems consistent, despite my comments above. Maybe this suggests that their representation in Fig. 4 could be somehow improved.

Another figure similar to Fig. 6 but for the MCA would be pretty important here to see if the changes captured by the data represent the effect of MCA to LIA transition or if it is something else.

This is not the purpose of our article. A synthesis on MCA throughout Africa has already been published by LÜNING, S. et al. Hydroclimate in Africa during the medieval climate anomaly. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 2018, vol. 495, p. 309-322.

Fig. 7A: How are these ‘regional’ curves derived? [I found the explanation later on lines 406-407. It would still be good to add it to the caption]

The regional curves are the mean of the curves for each site in the two regions considered