

***Interactive comment on “Past environmental and climatic changes during the last 7200 cal yrs BP in Adamawa Plateau (Northern-Cameroun) based on fossil diatoms and sedimentary  $^{13}\text{C}$  isotopic records from Lake Mbalang” by V. F. Nguetsop et al.***

**Anonymous Referee #1**

Received and published: 15 February 2011

I congratulate Dr. Nguetsop for developing another much-needed paleoecological record from Cameroon. The methodology used in this study of Lake Mbalang appears to be sound, the straight-forward radiocarbon age model and relatively fine sampling intervals are good, the multi-proxy combination of spicules, phytoliths, sedimentology,  $^{13}\text{C}$ , and diatoms is potentially informative, and the diatom taxonomy also appears to be sound. The paper takes into account a diversity of other records and acknowledges the complexity of climate dynamics in the region, as well as the possible airborne trans-

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port of certain diatoms to the study site.

I do have difficulty with some of the interpretations of these data, as follows:

The presence of sands in the lowermost meter of the core, along with abundant phyloliths and spicules, suggests to me that the lake experienced a significant low stand (or a series of them) ca. 7400-6000 calendar years ago. The abundance of benthic *Stauroneis* (which, by the way, is not included in the diatom figure 4 - please add it) also seems to support this conclusion, as does the *A. distans* which the author(s) earlier found in shallow waters near wetland vegetation. And yet the paper concludes that this was a wet period (page 326); my own reading of the data suggests that this may be incorrect.

The references stable stratification are not well enough supported by ecological evidence or citations. The presence of *A. distans* alone does not clearly indicate stratification. It is common in temperate zone lakes that may be mildly stratified in summer but that also turn over twice year (is that what the unexplained mention of "Big Moose" is referring to on page 315?), and the authors say that they mainly found it in shallow waters near vegetation, where no major stratification would occur. I recommend omitting the references to stratification - they're unreliable and they tend to confuse the ecological interpretations.

The interpretations of lake levels, mixing, and rainfall regimes sometimes seem to be confused. For example, page 316, both high and low lake levels are proposed in the same paragraph. On pages 319, 320, and 322 a more intense monsoon is linked to a more stable and stratified water column, but I would expect stronger monsoon winds to cause more mixing and/or more intense monsoonal rains to do so as well. Perhaps this simply requires a clearer explanation of what is meant by "monsoon," "monsoon flux," etc. in comparison to the rain belt and convection zone, etc. For instance, exactly how could a "stronger monsoonal flow" cause "stable and stratified" conditions (p. 320) rather than the opposite?

On page 320, cooler conditions are linked to more stable stratification, but cooling is normally more likely to cause mixing because of the reduction of thermal differences between epi- and hypo-limnion.

On page 321, high lake levels are attributed to "precipitation lower than today in the context of low evaporation," though I see no convincing evidence given for reduced evaporation then (other than supposed cooling, which is also not firmly demonstrated for that location) or any reason why high lake levels would not be due to increased rainfall instead.

I'm not sure, but I'm guessing that the references to temperature/cooling are based on the *Olea* and *Podocarpus* pollen data. However, these might not be very useful for explaining what happened at Mbalang because they could indicate far-distant changes as well as local ones. More importantly, they don't precisely distinguish cooling from wetting - I therefore recommend removing most or all of the references to temperature from the paper.

If wetland vegetation could have influenced the  $^{13}\text{C}$  record, then can it be trusted as an indicator of forest vs. savanna (as in Figure 7)? If not, then why include it at all?

The presence of wind-blown diatoms is very interesting and could be used to greater effect in this paper. The author is wise to recognize that *Stephanodiscus* and some *Aulacoseira* are probably blown in from the Sahara (perhaps *Cyclotella ocellata* as well?). This means that the Mbalang record nicely documents the end of the Sahara wet period (drying of the Saharan lakes would have mobilized the diatom-rich dust), which would allow the authors to address the conclusions of DeMenocal et al who proposed an abrupt end of the so-called "African Humid Period" on the basis of a marine core. More attention could be profitably given to this aspect of the study.

In general, the discussion and climatic interpretations are rather disorderly and sometimes repetitive (page 327 in particular needs a lot of work). Please clarify and simplify, summarizing things in clear chronological order. Mentioning Lake Ossa so often in the

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midst of the discussions of Mbalang data also makes it difficult to keep track of which lake is being discussed. Why is Ossa more important to focus on than other lakes that might be closer or more directly relevant? And how did low rainfall cause high lake levels at Ossa (page 326)?

The reconstructions of lake levels, "monsoon flux" (which needs to be defined and explained) and NE trade winds in figure 7 seem questionable and need more explanation. Exactly what is the evidence for those fine-scale ups and downs, and how are different kinds of wind distinguished with such apparent precision?

Figure 8 should perhaps become figure 1 or 2.

On a note to the paleo community: I would think that at least one of the five co-authors should have been able to help the first author to fix most or all of these problems before submission. With this case in particular, I wonder why the more senior/established co-authors are included on the paper at all. I vote to exclude co-authors from the list if they don't specify how they have contributed significantly (especially if they waste everyone else's time by shirking their editing duties, as I suspect some of these people may have).

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Interactive comment on Clim. Past Discuss., 7, 305, 2011.

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