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Climate of the Past Discussions

Interactive comment on "Pollen-based temperature and precipitation inferences for the montane forest of Mt. Kilimanjaro during the last Glacial and the Holocene" *by* L. Schüler et al.

Anonymous Referee #2

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The paper proposed for publication at Climate of the Past "Pollen-based temperature and precipitation inferences for the montane forest of Mt. Kilimanjaro during the last Glacial and the Holocene" by Schüler et al., is an attempt to quantify past climate from a pollen sequence from Mt Kilimanjaro. The method uses a modern data set of 14 samples between 1900 and 3200m asl. The pollen sequence is extracted from a 165 cm long sedimentary sequence (from 7.6ka to 0.9ka) with an interruption of about 30 000 years between 36 to 6ka.

At this stage, the paper cannot be accepted for publication for several reasons:

(1) The climate data: how long are the records? Do they correspond to a season, a

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month, a year? When (which year) these data have been collected? Are they really representative of an annual value? That is particularly important for rainfall values which can greatly fluctuate from year to year (see figure2: the dispersion of data could reflect the incompleteness of the record). All this has to be clearly stated since the subsequent climate reconstruction is based on this dataset.

(2) Idem for the pollen samples: you have used pollen traps (instead of soil samples). So, you have to precise how long was the period represented by a sample.

(3) Pollen data are not shown: both modern and fossil. Diagrams have to be presented

(4) The subset of data used for statistical analyses: you avoid all data with percentages less than 20%. This excludes all the types corresponding to plants with low pollen productivity and enthomophilous pollen dispersion. Requieres discussion. See Gajewski et al., 2002; Watrin et al. 2007.

(5) the incomplete inventory of the climate gradient (page 2010): why did you not use the modern pollen data set from the African Pollen Database (Gajewski et al., 2002; data available at this adress: http://apd.sedoo.fr ; http://fpd.sedoo.fr)

(6) Climat reconstruction: you refer to Mumbi et al., : however, forests from the eastern Arc mountains are mostly of Guineo-Congolian type (tropical and subtropical moist broadleaf forests) and not Afromontane with no Podocarpus for instance. You cannot compare both records directly. Idem for Lake Challa where Moernaut et al 2010 depict more or less continuous wet conditions throughout the last glacial. They consider that the easternmost part of equatorial Africa was mainly submitted to the indian ocean influence and strongly differed from the rest of equatorial Africa, the Burundi highlands for instance.

(7) The main critiscim about your climate reconstruction is that you do not take into account CO2 fluctuations through time and their impact on montane biome distribution. Wu et al 2007 and before them, Jolly and Haxeltine 1997 (Jolly D, Haxeltine A

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(1997) Science 276:786–788) have demonstrated that CO2 concentrations lower than today have been responsible for treeline shifts in equatorial Africa during the last glacial period.

(8) Your pollen record does not cover the entire Holocene but only the last 6ka. Idem for the last glacial period. Early or late “Pre-LGM” does not mean much. Page 216,line 26 : you do not record the period from the LGM onwards !!!! Page 217, line 24 you do not depict general climate trends during the past 45 ka!!!. Etc etc.... the LGM is not only missing . About 30ka are missing from 36 to 6ka.

Reference to be added Gajewski, K., Lézine, A.-M., Vincens, A., Delestan, A., Sawada, M. 2002. Modern climate–vegetation–pollen relations in Africa and adjacent areas. Quaternary Science Reviews 21, 14-15, 1611-1631.

Vincens, A., Chalié, F., Bonnefille, R., Guiot, J., Tiercelin, J.-J. 1993. Pollen-Derived Rainfall and Temperature Estimates from Lake Tanganyika and Their Implication for Late Pleistocene Water Levels. Quaternary Research 40, 3, 343-350. Vincens, A., Lézine, A.-M., Buchet, G., Lewden, D., Le Thomas, A. and contributors. 2007. African Pollen Database inventory of tree and shrub pollen types. Review of Palaeobotany and Palynology 145, 1-2, 135-141

Watrin, J., Lézine, A.-M., Gajewski, K., Vincens, A. 2007. Pollen–plant–climate relationships in sub-Saharan Africa. Journal of Biogeography 34, 3, 489-499 DOI: 10.1111/j.1365-2699.2006.01626.x

Wu, H., Guiot, J.,Brewer, S., Guo, Z. 2007. Climatic changes in Eurasia and Africa at the last glacial maximum and mid-Holocene: reconstruction from pollen data using inverse vegetation modelling. Clim Dyn, 29, 211–229. DOI 10.1007/s00382-007-0231-3

Wu, H., Guiot, J.,Brewer, S., Guo, Z., Peng, C. 2007. Dominant factors controlling glacial and interglacial variations in the treeline elevation in tropical Africa. PNAS 104

no. 23 9720–9724, doi: 10.1073/pnas.0610109104

Interactive comment on Clim. Past Discuss., 10, 195, 2014.