REPLY TO CLIST ET AL.:

Human activity is the most probable trigger of the late Holocene rainforest crisis in Western Central Africa

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Clist et al. (1) challenge our conclusions (2), criticizing our archaeological synthesis to maintain that the late Holocene rainforest crisis (LHRC) in Western Central Africa (WCA) was not triggered by human activity.

Clist et al. (1) claim that the archaeological ^{14}C dates we used were not critically evaluated, as we were more concerned with the quantity of dates rather than their quality. However, a careful reading of our article (2) and its associated *SI Appendix* unambiguously documents that we cautiously weighted the radiometric dates by applying a binning in space and time to correct for investigator bias and oversampling at different sites, following refs. 3–5; this was done before combining and rigorously testing the dates.

Clist et al. (1) emphasize that the initial regional increase in human occupation in the study region lags the inception of the local LHRC at Lake Barombi by 200 y. Instead, chronological uncertainties—of ∼160 y (95% confidence range) for the Lake Barombi LHRC (2) and of ∼100–200 y for the population dynamics proxy used (5)—indicate that this apparent time lag is statistically insignificant, particularly as the compared sites straddle the Equator. Here seasonal interhemispheric shifts in atmospheric CO_2 cause additional uncertainties in ^{14}C calibration (6). Conversely, the studies (7, 8) cited by Clist et al. (1) ignore the chronological uncertainties of ^{14}C dates and compile, without rigorous statistical tests, regional data with limited chronological control and sedimentary hiatuses, which precludes any correlation and attribution to a single event.

The signal in the Lake Barombi sediments—the best-dated sedimentary record so far in WCA—is local and strongly amplified due to the high sensitivity of this small basin to vegetation changes. The timing of the LHRC may differ from site to site, also implying chronological leads or lags with the regional trends of human occupation.

The local return to nearly "full" C_3 vegetation after the Lake Barombi LHRC (at ∼2,000 cal y BP) may either reflect a regeneration of the rainforest or a replacement of C_4 crops by C_3 crops, which is compatible with the pronounced coeval increase in oil palm (a C_3 plant) use and human occupation in the region (2, 9), contradicting the claim of Clist et al. (1).

Contrary to the study (10) cited by Clist et al. (1) to suggest that charcoal is absent at Lake Barombi, our pollen analysis on core B14 includes quantifiable amounts of charcoal (see https://doi.pangaea.de/10.1594/PANGAEA.884675), which indicate an up to fourfold increase in charcoal at the inception of the LHRC, together with an increase in sedimentation rate.

Finally, Clist et al. (1) provide no viable alternative explanation for the observed environmental change in the Lake Barombi region at the time of the LHRC,

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particularly in the absence of any significant hydrological change, as we clearly demonstrate. The first widespread and intensive forest clearances at ~2,500 cal y BP in East Africa were associated with the arrival of iron-using early farming communities (11). Similarly, our observations are compatible with the hypothesis that the LHRC in the Lake Barombi region was driven by human activity.

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