Combining orbital tuning and direct dating approaches to age-depth model development for Chew Bahir, Ethiopia

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The directly dated RRMarch2021 age model (Roberts et al., Quaternary Science Reviews, 2021) for the ~290 m long composite core from Chew Bahir, southern Ethiopia, has provided a valuable chronology for long-term climate changes in northeastern Africa. However, the age model has limitations on shorter time scales (less than 1–2 precession cycles), especially in the time range <20 kyr BP and between ~155–428 kyr BP. To address those constraints we developed a partially orbitally tuned age model. A comparison with the ODP Site 967 record of the wetness index from the eastern Mediterranean, 3,200 km away but connected to the Ethiopian plateau via the River Nile, suggests that the partially orbitally tuned age model offers some advantages compared to the exclusively directly dated age model, with the limitation of the reduced significance of (cross)spectral analysis results of tuned age models in cause-effect studies. The availability of this more detailed age model is a prerequisite for further detailed spatiotemporal correlations of climate variability and its potential impact on the exchange of different populations of Homo sapiens in the region.