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Including new equatorial African data in global Holocene magnetic field models

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Global paleomagnetic field reconstructions of the Holocene are a useful tool to study the past evolution of the geomagnetic field at the Earth's surface and the core-mantle boundary, or to estimate shielding against galactic cosmic rays. This protection is currently weak over the South Atlantic anomaly, a feature stretching between South America and Africa. Knowledge of the long-term evolution of this anomaly and whether there are preferred longitudinal ranges of weak fields is required for a better understanding of the geodynamo process and to estimate past magnetic shielding, e.g., for any studies involving the production of cosmogenic isotopes.
The distribution of archeo- and paleomagnetic data available for global field reconstructions is highly inhomogeneous. It is strongly biased towards Europe and particularly sparse for Africa and South America. New data from these regions are necessary to confirm or improve field descriptions in Holocene spherical harmonic magnetic field models particularly for the evolution of this presently anomalous region.
We present new inclination and relative intensity records from two neighbouring lakes in southern Ethiopia: Chew Bahir and Lake Chamo. Measurements were taken on three sediment cores from Chew Bahir, in which the complete Holocene is preserved in the topmost 4 m, and one 17 m long composite profile from Lake Chamo, which spans approximately the last 7 ka. Our age models are constrained by 10 AMS radiocarbon ages through the Holocene.
We investigate the influence of these new records on magnetic field models CALS3k.4 and CALS10k.1b by augmenting previously modeled data with our new data and performing the modeling with otherwise unchanged parameters. Model predictions particularly for the equatorial African region and surroundings are compared and differences discussed.