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Tephra connections between records of past climate and early modern human evolution in Africa

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Abstract

The role played by changing climates and environments in the behaviours and dispersal of modern humans since their first appearance in Africa 300-200 thousand years before present (ka BP) is much debated. Recent theories are shaped by marine and terrestrial records of abrupt and extreme climate variability and on-going landscape changes, alongside archaeological evidence for increasing adaptability through time. Archaeological sequences and tropical climate records, on such long timescales, are often difficult to date directly and to correlate precisely, meaning that testing for relationships between modern human behaviours and their changing environments is extremely challenging.

A 280 metre sediment core from the Chew Bahir palaeolake in the southern Ethiopia Rift provides a continuous terrestrial archive reaching back ~600 ka BP, from which past climate and local environmental conditions have been reconstructed spanning the entire interval of modern human evolution. Layers of volcanic ash (tephra) within the Chew Bahir record provide key age-estimates within the site's age-model and also allow precise and direct correlations to some of the most important early modern human archaeological sites in Ethiopia, including the Kibish Formation. Using these tephra isochrons, the Chew Bahir palaeoclimate record provides critical insight into both the contemporary regional climate and local environmental conditions within which our ancestors were living in eastern Africa.