Seismic records of late Pleistocene aridity in Lake Tanganyika, tropical East Africa

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Abstract

New intermediate-resolution, normal-incidence seismic reflection profiles from Lake Tanganyika's central basin capture dramatic evidence of base-level change during two intervals of the late Pleistocene. Four seismically-defined stratigraphic sequences (A–D) tied to radiocarbon-dated sediment cores provide a chronology for fluctuating environmental conditions along the Kalya Platform. Stacked, oblique clinoforms in Sequence C are interpreted as prograding siliciclastic deltas deposited during a major regression that shifted the paleo-lake shore ~21 km towards the west prior to ~106 ka. The topset-to-foreset transitions in these deltas suggest lake level was reduced by ~435 m during the period of deposition. Mounded reflections in the overlying sequence are interpreted as the backstepping remnants of the delta system, deposited during the termination of the lowstand and the onset of transgressive conditions in the basin. The youngest depositional sequence reflects the onset of profundal sedimentation during the lake level highstand. High amplitude reflections and deeply incised channels suggest a short-lived desiccation event that reduced lake level by ~260 m, interpreted as a product of Last Glacial Maximum (32–14 ka) aridity. Paleobathymetric maps constructed for the two interpreted regressions reveal that despite the positive lake-floor topography created by the Kavala Island Ridge Accommodation Zone, Lake Tanganyika remained a large, mostly connected water body throughout the late Pleistocene. The results of this analysis further imply that Lake Tanganyika is the most drought resistant water body in the East African tropics, and may have acted as a refuge for local and migrating fauna during periods of prolonged aridity.

Keywords

Lake TanganyikaLowstandPaleolimnologyRift-valley lakeSeismic stratigraphyTropical paleoclimate