Geophysical Research Abstracts, Vol. 7, 06662, 2005
SRef-ID: 1607-7962/gra/EGU05-A-06662

Two glacial-interglacial cycles of lake-level change in equatorial East Africa documented by high-resolution seismic sequence stratigraphy from Lake Challa (Kenya)

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A high-resolution (3.5 kHz) reflection seismic survey of Lake Challa (Kenya-Tanzania), a 97-m deep volcanic crater lake on the lower East slope of Mt. Kilimanjaro, revealed at least 215 meters of acoustically stratified lake deposits, relatively unaffected by volcanic or tectonic activity. Analysis of seismic facies and onlapping features, in conjuncton with ^{14}C-dating and sedimentology of a 3-meter surface core, indicates that the 15 major stratigraphic units (and their sub-units) recognised in the seismic sequence represent distinct phases of lacustrine sedimentation associated with late-Quaternary lake-level fluctuations. At least the uppermost units, which represent late-Glacial and Holocene sedimentation, seem to be mainly composed of fine-grained authigenic and aeolian detrital mineral inputs, intercalated only at the periphery by occasional mass-flow deposits from local collapse of the inner crater wall. Extrapolation of available radiometric ages on the uppermost units together with the inferred sequence of late-Quaternary lake-level change suggests that the acoustically visible lacustrine infill of Lake Challa covers the two last glacial/interglacial cycles. Isopach mapping of each stratigraphic (sub-)unit over the dense seismic grid (mean interval 150 meter) reveals repeating patterns of sediment distribution across the lake floor, tracing quantifiable lake-level fluctuations during the Holocene, the late-Glacial period, the Last Glacial Maximum, and the penultimate glaciation. With this contribu-

tion, we want to illustrate the capabilities of integrated, high-resolution geophysical site surveying for paleoclimate research.