

Russell, J. M., Johnson, T. C., 2002. Cyclic variability in moisture balance in central equatorial Africa during the past 5,000 years. EOS Trans. AGU. PP61B-11.

Paleohydrologic variations in Africa are recorded by the chain of large East African rift lakes, whose climatic sensitivity and high sedimentation rates make them ideal for high-resolution reconstruction of past continental moisture balance. Among these lakes, Lake Edward, Uganda-Congo is ideally configured to record past variations in the African monsoon, situated on the equator at the eastern edge of the Congo basin. Analyses of the stable isotopic and chemical composition of authigenic calcite in three cores from Lake Edward covering the past 5,000 years show large, coherent shifts that reflect past variations in hydrologic balance. These chemical and isotopic stratigraphies exhibit both a long-term trend, suggesting increasingly arid conditions from 5 kyr BP culminating at 2 kyr BP, and high-amplitude sub-millennial variability. This short-term variability documents arid intervals centered at 4.6, 4.0, 3.4, 2.7, 2.0, 1.4, and 0.8 kyrs BP, the latter correlating with the Grand Solar Maximum and the European Medieval Warm Period.

The controls on past African moisture balance appear complex, potentially driven by solar forcing and/or related to Indian and Atlantic Ocean SSTs and high latitude events. The geochemical events in Lake Edward are not consistently correlated with solar forcing or with northern or subtropical Atlantic cold events. Spectral analysis of the Lake Edward data shows several weakly significant < 200 year periodicities, as well as a highly significant period at 725 yrs. This 725-year period has been previously recognized in marine records from the Arabian and South China seas, suggesting teleconnections between East Africa rainfall and the Indian Ocean/Asian monsoon operate on long time-scales.