

Multiphase Quaternary highstands at Lake Ngami, Kalahari, northern Botswana

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Abstract

Large lake basins, now almost entirely devoid of water in the Kalahari's semi arid environment, can be clearly identified from Landsat imagery of northern Botswana. These basins are delineated by a series of beach ridges marking the former shorelines of an inundated area that, at its largest extent, encompassed 60,000 km². In the last 30 yr over 150 radiocarbon ages have been produced from three component basins that make up the Palaeo-Makgadikgadi system (consisting of the Ngami, Mababe and Makgadikgadi basins). The paucity of well preserved organic material in the region has led to these ¹⁴C ages being derived from inorganic carbonates whose open system behaviour and polygenetic origin frequently result in unreliable dates from uncertain contexts and then only within the temporal limits of the radiocarbon method. The application of Optically Stimulated Luminescence (OSL) dating to beach ridge sediments from Lake Ngami [Shaw, P.A., Bateman, M.D., Thomas, D.S.G., Davies, F., 2003. Holocene fluctuations of Lake Ngami, Middle Kalahari: chronology and responses to climatic change. *Quaternary International* 111 (1), 23–35] improved chronological resolution, but was limited by the use of hand dug pits. The new application of OSL to samples derived from deep coring of beach ridges has allowed access to a much longer, three dimensional, geomorphic record than previously available. Seventyfour ages new OSL ages from shorelines are presented allowing, for the first time, the opportunity to unravel the complex history of lake stages in the Ngami basin. Multiple lake highstands are identified in the period ~0.3 ka to ~140 ka, with several causes of these events, including tropical and local climates and upstream channel avulsion, identified. To unravel the full paleoclimatic significance of these events it will be necessary to identify the timing of high stands in the other terminal basins within the Okavango system.

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