Hydrogeology in the Chobe Enclave of Northern Botswana

Contact persons

Torsten Vennemann, Edson Ramudzuli, Elsa Bernauer

Context

The ubiquitous carbonate deposits in largely siliceous, sandy sedimentary basins of the Chobe Enclave of Northern Botswana are still a matter of debate [1, 2]. These deposits commonly occur as carbonate platform "islands" of variable sizes, occasionally interbedded with diatomite. They are thought to be of palustrine origin as they are commonly surrounded by ephemeral rivers that may terminate in seasonal lakes flooding with variable frequencies such as Lake Linyanti. Optically stimulated luminescence dating of these continental deposits suggests that they are erosional relicts formed in response to regional paleo-hydrological changes related to Late Cretaceous to Early Pleistocene uplift and large-scale block faulting within the Kalahari Basin. The Kalahari basin of central southern Africa is semi-arid but contains a unique large structural depression as a result of a southwestern extension of the Eastern African Rift with the development of a complex endorheic fluvial system that has established several alluvial fan deposits within the Chobe enclave and Lake Linyanti, and which may have preserved information of complex climatic changes within the region over the Quaternary. This past inland delta is still seasonally flooded by the Kwando/Chobe drainage system and, before the Pliocene or Early-Mid Pleistocene, by the Upper Zambezi that now drains towards the eastern coast off southern Africa.

Aims and Methods

To help constrain the origin of the formation of these carbonate platforms, the mineralogical and geochemical composition including the C and O stable isotope ($\delta^{13}C_{VPDB}$, $\delta^{18}O_{VSMOW}$) and clumped isotope compositions (δ^{47} and Δ_{47}) of the pedogenic carbonates and the platform carbonates will be studied in detail. This in parallel to an ongoing study on the hydrochemistry of the present ground and surface waters in order to help understand the water supply within these complex drainage systems and hence the critical water resources. Samples will be collected and pre-treated within the field in collaboration with the staff of the VanThuyne-Ridge Research Center in Botswana, the bulk of the analyses will be done in the laboratories of the Faculty of Geosciences and Environment of the University of Lausanne.

References

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