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The Lower Molopo River super site (SW Kalahari) and its relevance for the analysis of supra-regional Late Quaternary climate and land-use changes in Southern Africa

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The semi-arid to semi-humid Kalahari of southern Africa is a region with enormous climatic fluctuations due to recent and former shifting of tropical and subtropical atmospheric circulation patterns and changing climatic factors. Although it is clear that large, rapid temperature changes have occurred during the Late Quaternary, we have only limited, and often imprecise, knowledge of how the major moisture-bearing atmospheric circulation systems have reacted to these changes. During the Last Glacial Maximum (LGM) a transition zone existed at approximately 24˚S that was characterized by the overlap of alternating tropical summer rain in the north (ITCZ) and subtropical winter rain (Westerlies) in the south. As part of this transition zone, the study area of the Lower Molopo River valley (20-21˚E and 26˚45'-28˚40'S) offers ideal conditions for terrestrial research on Late Quaternary paleoclimate and environmental changes. Here dunes, pans, slopes and river terraces coexist as major geomorphological types in an ideal way, including different fluvial sediment facies interbedded with slope and eolian sediments, as well as the confluence of the Molopo and Orange River systems. Such geoarchives are typically modified by climatic fluctuations and changes. To assess the paleoclimatic information in time and space, physico-chemical parameters of the sediment archives must be determined to clearly characterize single sediment types and their spatial interrelation. Particularly the interpretation of stratigraphical interbeddings of different sediment facies delivers types, directions or intensities of alternating processes. The sedimentological analysis is systematically combined with OSL- and ^{14}C-dating techniques. The results of our analysis on dune development and fluvial activity comprehensively clarify the chronology of significant shifts in Late Quaternary river regimes, rainfall inputs and atmospheric circulation patterns (Hürkamp et al. 2011) and will be intensified by further geoarchive prospection. As such, the project delivers a very valuable input to the interdisciplinary analysis of past and future global change in the highly sensitive environments of Southern Africa.

Hürkamp, K., Völkel, J., Heine, K., Bens, O., Leopold, M. & J. Winkelbauer (2011): Late Quaternary Environmental Changes from Aeolian and Fluvial Geoarchives in the Southwestern Kalahari, South Africa: Implications for Past African Climate Dynamics. - South African Journal of Geology, 114 (2).