



Reconstruction of the Palaeo-environment of the Alluvial Deposits in the Eastern Free State, South Africa

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Small alluvial fan systems have formed off the hillslopes of the remnant Karoo koppies at Heelbo in the Eastern Free State, South Africa. The landform geometry is a result of complex relationships between climate, lithology, structure and vegetation. This research area, which includes a large mammal mass death site, potentially contains a wealth of palaeo-environmental and specifically palaeoclimatic information.

Palaeo-environmental information and proxy records on past climates in southern Africa has traditionally been obtained from a variety of techniques including stable isotope analysis of speleothems, pollen, faunal analyses at archeological sites, animal remains and crater-lake sediments (see references below). However, little information exists in the scientific literature on the use of palaeosols for defining the depositional palaeoenvironments in southern Africa.

The aim of this research is to attempt to address the lack of palaeo-environmental information by extracting palaeoclimatic information from the sedimentary processes and the palaeosols at the Heelbo farm that have been extensively exposed through gullying. The sedimentary fans in the area have experienced climatically controlled histories of erosion, sedimentation and pedogenesis. Extreme sedimentation is assumed to have occurred during relatively arid climatic intervals, when decreased vegetation cover provided little surface protection. In contrast pedogenesis occurs during humid intervals when vegetation cover is restored, the land stabilizes and the uppermost gravely sands weather to form soils.

A combined approach of both radiocarbon- and luminescence -dating may provide a detailed chronology of these successive hillslope events in order to relate hillslope instability to climatic forcing factors. Preliminary results indicate that at least 3 depositional events are recorded within the large mammal mass death site, which have been confirmed by the radiocarbon dates of $3,610 \pm 110$ in the top section and $4,610 \pm 30$ at the bottom section.

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