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Late Quaternary slope environments and associated climatic implications in the upper Sehonghong valley, eastern Lesotho

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There has been considerable research attention on apparent periglacial, glacial and sedimentary phenomena in the high Drakensberg environment, however relatively little is known about the Quaternary environmental history of this area. This paper examines evidence for Late Quaternary slope dynamics in a high alpine valley of eastern Lesotho, with particular attention given to palaeo-environmental signatures offered by deep colluvial mantles along the flanks of the Sehonghong River and pronival ramparts along the upper southerly-facing slopes of the adjoining Thabana-Ntlenyana.

Possibly the best opportunity to reconstruct the high Drakensberg palaeoenvironment is from sedimentary records exposed along fluvially incised sections. The upper Sehonghong River (3000 to 3200 m a.s.l.) flows in a westerly direction and is flanked by north- and south-facing slopes reaching 3465 m a.s.l. Sediment is exposed on both the north- and south-facing slopes along the river and sedimentary exposures were mapped and sampled for clast fabric, clast shape, organic matter content, granulometry and 14C age determination. Whilst the south-facing deposits are relatively uniform in nature, the north-facing deposits consist of alternating units of gravel and organic sediment, dated to $\sim$ 43 085 cal yrs BP, reflecting environmental changes during the Late Pleistocene. A pronival rampart was also mapped and clast size, shape and fabric determined for various micro-topographic settings. A palaeosol beneath the micro-rampart was also Radiocarbon dated and yielded an age of $\sim$ AD 300-1000.

Sedimentary sequences and colluvial mantles in the upper Sehonghong region indicate phases of warmer/wetter and colder/drier conditions in the high Drakensberg prior to the LGM. In addition, the sedimentary evidence suggests that, despite the high altitude (>3400 m a.s.l.), south-facing slopes in the upper Sehonghong region were not glaciated during the LGM, most likely due to the open nature of the valley allowing for greater insolation and negating the long-term accumulation of snow/ice. Micro-ramparts developed on high SE-facing slopes; during a relatively cold, yet moist period at $\sim$AD 300-1000. We propose that such climatic regimes were conducive to ice wedging along scarp faces and boulder movement through snowcreep and snowpush on high (>3400 m a.s.l.) southeast-facing slopes, whilst enhanced solifluction and melt-induced mass flow transported boulders towards lower slope positions.