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Mass wasting deposits in the upper Sehonghong valley, eastern Lesotho: Late Pleistocene climate implications

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Despite considerable research attention on apparent periglacial, glacial and sedimentary phenomena in the Maluti-Drakensberg alpine environment, knowledge on the Quaternary environmental history of this important watershed and climate-divide is still rather rudimentary. The dearth of Quaternary environmental indicators (proxy data) in the high Drakensberg is partly owing to the harsh climate (e.g. high wind speeds and high seasonal precipitation), which offers a poor preservation of past biological remains (e.g. bones, dung, middens, pollen). Possibly the best opportunity to reconstruct high Drakensberg palaeoenvironments is from sedimentary sequences exposed along fluvially-incised valley fills.

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. Despite uniform regional environmental conditions (geology, topography, climate, vegetation), there is a notable absence of similar north-facing deposits in adjacent upper valley catchments to the north and south of Sehonghong Valley. The upper Sehonghong Valley thus presents somewhat 'unique' evidence for palaeo-slope mass movement in this alpine region. Thick colluvial deposits are most prominent on the south-facing slopes along the Sehonghong River and occur at altitudes between 3100 m a.s.l. and 3150 m a.s.l. The colluvial mantles are approximately 7 m in thickness, however reach up to 13 m in some areas. Although the north-facing lower valley side-slopes are generally absent of deposits, the notable exception is the thick stratified deposit located a few kilometres upstream. 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 36 600 $\pm$ 1400 14C yrs BP, and reflecting environmental changes during the Late Pleistocene.

Mass wasting deposits support enhanced periglacial activity during the Late Pleistocene, particularly on south-facing slopes, and also where conditions were conducive to enhanced sediment transport on the adjacent north-facing slope of the Sehonghong River. Recent published work has suggested evidence for marginal glaciation in the high Drakensberg within 10 km of the Sehonghong Valley, suggesting that whilst particular environmental settings host deposits classified as glacial moraine, adjacent valleys are occupied by deep ($\sim$8 m) valley deposits flanking south-facing slopes. We demonstrate that the variable nature of adjacent valley slope deposits at similar altitudes is a product of a past climate that was within the glacial/periglacial equilibrium zone, and influenced by specific topographic and associated micro-climatic thresholds.