

Evidence of Quaternary glaciation in Southern Africa: moraines on the Bastervoetpad of the eastern cape Drakensberg, South Africa

Colin A. Lewis, Peter M. Illgner (Rhodes University, Grahamstown, RSA)

Three ridges of unconsolidated debris exist on the "2000 m' bench at the foot of the east facing escarpment of the Drakensberg on the farm of Mount Enterprise in the Eastern Cape. The escarpment in that area reaches altitudes around 2300 m and is composed essentially of basalts. Lahar and sandstone deposits exist at the base of the escarpment, where it abuts against the '2000 m' bench. A gravel road, named the Bastervoetpad, descends the escarpment and runs along the inner side of the ridge that is closest to the back wall, providing exposures into that ridge. After completing a hairpin bend, the road is aligned along the front of the outermost ridge. Roadside exposures display up to 7 m of unconsolidated sediments in that ridge. The inner ridge, at altitudes from 2059 to 2040m is about 300m long and is aligned approximately north-south. A depression exists between the ridge (which is up to 3 m high) and the base of the back wall. Road side exposures show that the ridge is composed of basalt clasts that are mainly matrix supported. Clasts were sampled at three sites along the inner ridge and, at all sites, some of the clasts were striated. The highest percentage of striated clasts (36%) existed where there was little matrix and some clasts were clast supported. The angle of elevation from the crest of the inner ridge to the top of the escarpment is 31 °, while the angle to the base of the cliffs that form the upper part of the headwall is 23 °. Assuming that a crystalline mass (snow/ice) existed between the base of the headwall cliffs and the inner ridge, the depth of that mass would have exceeded 23 m. If the crystalline mass extended to within 30 m of the top of the headwall, it would have been up to 34 m thick. Shakesby states 'The change from snow to glacier ice can take place at a depth of as little as 15 m but more typically it is 20-30 m'. The existence of abraded and striated clasts in the inner ridge, plus the fact that much of the debris is matrix-supported plus the 'fresh' morphology of the ridge, indicates that it is a glacial moraine that probably dates to the Last Glacial Stage (the Rhodian). The two outer ridges also appear to be glacial moraines and a roadside cutting beside the Bastervoetpad exposes what appear to be an upper and a lower till. This is the first indisputable evidence of Quaternary glaciation in southern Africa, although the ridge at Killmore (which is also in the Eastern Cape Drakensberg) may well also be of glacial origin. Protalus ramparts exist close to the escarpment and immediately south of what appears to have been the glaciated area.