Project 740030

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During the summers of 1975 and 1976, the writer did bedrock mapping on Somerset Island and Boothia Peninsula (Kerr and de Vries, 1976, 1977; Reinson et al., 1976; Miall and Kerr, 1977). In the course of that work, he made observations on many mounds and other small topographic features. Nearly all those observed appear to be simple erosional remnants, felsenmeer-mantled bedrock highs controlled by the interplay of periglacial weathering and erosional processes on bedrock. Three small mounds (Fig. 15.1), on which additional controls are suggested, are described here.

On northwestern Somerset Island, a small buckle occurs in the Proterozoic Hunting Formation (Fig. 15.2), and is attributed to frost heaving. The formation is thick bedded dolomite about 1000 m (3280 ft) thick that strikes northwest and dips uniformly northeast at 15 degrees. The formation is tilted regionally but not internally folded, indicating that the buckle did not form by regional tectonic deformation. It apparently formed by frost heaving. According to J. Veillette, (pers. comm., 1977), tilted beds present good conditions for infiltration of water down bedding planes, and buildup of ground ice to cause buckling of the overlying beds. Using the UTM co-ordinate system, this buckle is located in Zone 15X at 422250mE, 8181750mN. Using the co-ordinate system outlined by Norris (1972), it is located at +4.3X; -5.6Y on Airphoto A16194-211.

A small tor-like bedrock knob on eastern Somerset Island (Fig. 15.1, Loc. 2) is located at UTM Zone 15X, 534950mE; 8132200mN, and an Airphoto A16331-79 is at +7.4X; -1.75Y. It outcrops on the top of a moderate-size hill that is several hundred feet across and 50 or so feet high. From another bedrock outcrop nearby at lower elevation on the side of the same hill, the regional bedding was determined as striking north and dipping west at 5 degrees. The bedding in the knob in question, however, dips steeply to the west at 60 degrees (Fig. 15.3). A dislocation or displacement of some type therefore occurs between the two outcrops. This knob (Fig. 15.3) is in a region of gently dipping to horizontal Silurian limestone of the Read Bay Formation, and both outcrops are parts of that formation. A few near-vertical normal faults cross this region, but generally they do not produce steep dips. Moreover, it seems unlikely that there is a fault between the outcrops, because most faults in this region are long features, and therefore readily traceable and mappable on aerial photographs. No such lineament intersects the hill on which the knob occurs. It seems most reasonable, therefore, to conclude that the dislocation that produced the steep dip of the knob (Fig. 15.3) was due to either a glacial shove phenomenon or possibly to frost heaving. Glacial shoving may have buckled up the bedrock, perhaps in some way selectively buckling it up on the mound because it projects upward and the nearly horizontal beds at the top could be caught up by ice. The author can think of no other likely explanations.

On southern Somerset Island (Fig. 15.1, Loc. 3), another unusual carbonate bedrock mound exists (Fig. 15.4). This is a bedrock outcrop which, in its upper part, dips 45 degrees to

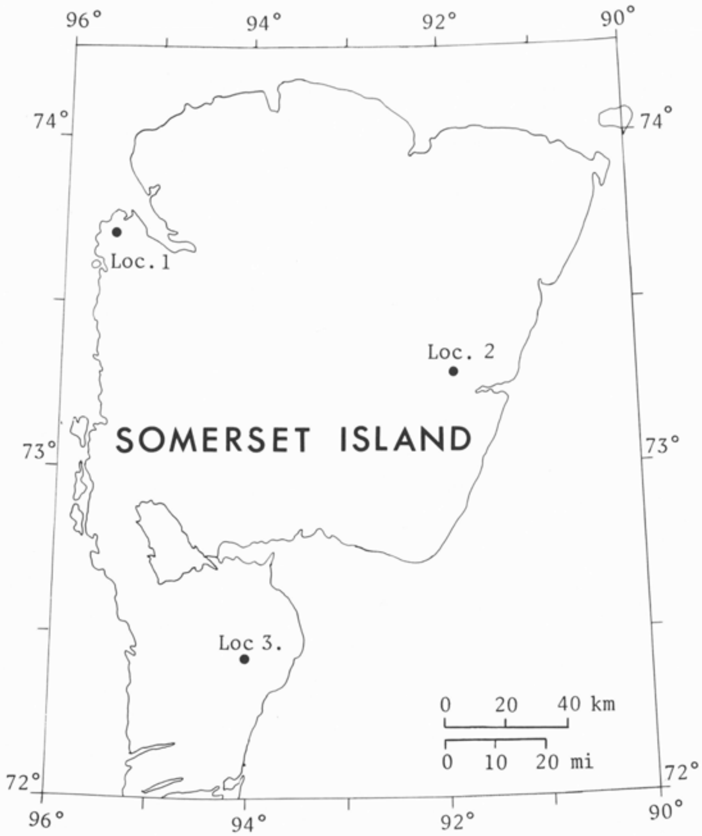

Figure 15.1. Index map of Somerset Island showing the locations mentioned in text.

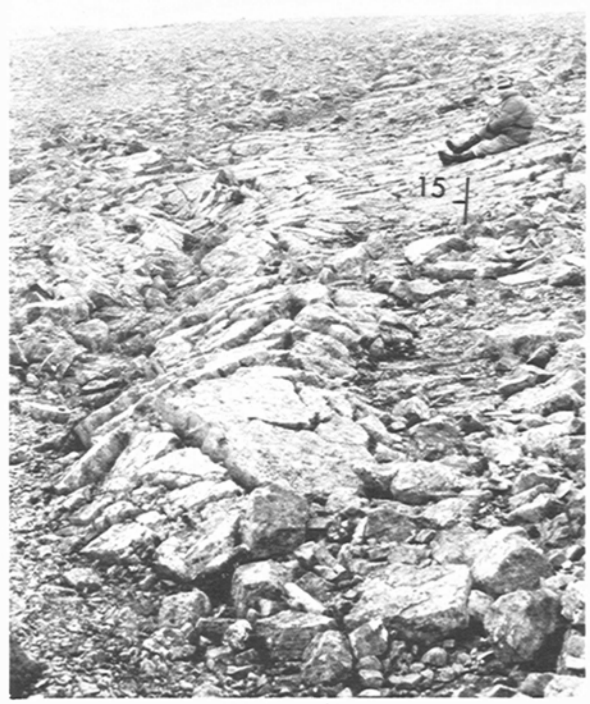

Figure 15.2. Frost-heaved outcrop of the Hunting Formation. View to the southeast along strike. Dip to the left (NE) at 15 degrees. Person provides scale. GSC Photo 199292.

From: Report of Activities, Part C; Geol. Surv. Can., Paper 77-1C (1977)

Figure 15.3.

Outcropping of the Read Bay Formation on eastern Somerset Island that may be glacially deformed bedding. View is to the north. The outcrop dips to the left (W) at 68 degrees. The regional dip in this region is 5°W. GSC Photo 199294.

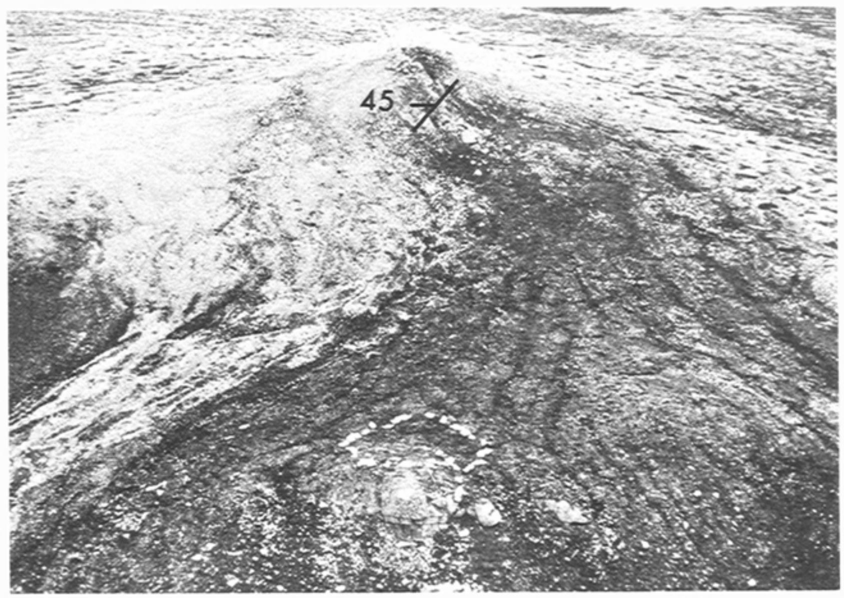

Figure 15.4.

Outcropping of the Lang River Formation on southern Somerset Island. View is to the north. Tent ring in the foreground is 4 m (12 ft) in diameter. GSC Photo 199293. Located at UTM Zone 15x; 463900ME; 8037250mN.

the northwest. A prominent dislocation occurs between the top and lower part of this bedrock mound, for the lower part dips 24 degrees northwest. Interpretation of this exposure is uncertain. It may be due to faulting or to glacial or frost-heaving action. In this region faults are common and there are steep dips in places, although in most places the bedrock is nearly horizontal. Because of the thick alluvial cover in the vicinity, faults are not readily traceable, and a fault could well intersect the mound in question.

In both cases of possible glacial shove cited above (Figs. 15.3, 15.4), it is not possible to trace bedding planes continuously into completely exposed well-understood bedding, so the interpretation of both is rather tenuous. The writer suggests that the dislocation on eastern Somerset Island probably resulted from glacial shove with the ice moving westward. The knob on southern Somerset Island may be due to glacial shove, but could be due to faulting.

In eastern Somerset Island where the suggested glacially shoved knob occurs, Netterville et al. (1976) indicated a terrain of hummocky carbonate bedrock (their area la), containing numerous bedrock basin lakes interspersed with weathered bedrock cored knobs mantled by rubble. Dyke (1976) interpreted this hummocky terrain as the product of glacial erosion, rather than primarily subaerial weathering. Hence, the knobs are not true tors, which are bedrock features that are a residual of differential weathering and mass movement. The present explanation of the bedding distortion (Fig. 15.3) as due to glacial ice would support Dyke's interpretation of the hummocky bedrock terrain as the product of glacial erosion.

One and possibly two knobs (Figs. 15.3, 15.4), in which deformed bedrock outcrops, suggest deformation by glacial ice. This implies that an ice sheet covered part or all of Somerset Island, as is also evident from the apparently ubiquitous distribution of erratics (Craig, 1964; Netterville et al., 1976; Dyke, 1976). In both cases, the shove is toward the west. This conflicts with evidence from striae on southern Somerset Island, which show an eastward flow (A.S. Dyke, pers. comm., 1977). The hypothesis can be tested by searching for more such knobs and recording the direction of displacement. The writer concurs with Dyke (1976) that the larger mounds on Somerset Island, which are rubble mantled and not obviously of stack type, are bedrock cored and due mainly to erosional processes, primarily glacial.

Acknowledgments

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