ROCK WEATHERING FORMS ABOVE CORY GLACIER, ELLESMERE ISLAND, DISTRICT OF FRANKLIN

W. Blake, Jr.
Terrain Sciences Division

Introduction

Early in the 1977 field season, while travelling by helicopter between Makinson Inlet and Coburg Island, a brief stop was made on the plateau to the west of Cory Glacier, southeastern Ellesmere Island (Fig. 1 and 2). W.C. Morgan had noted the presence of tors and deep rock weathering during a landing there earlier in the summer. A revisit was considered imperative because such features had not been reported previously from southern Ellesmere Island. The Cory Glacier area had been reconnoitred by the writer in 1968 and 1970 (Blake, 1975, 1977a), but on those occasions operations with a Piper Super-Cub aircraft restricted landings to the area of raised beaches west of the glacier snout, and the plateau had never been visited.

Relatively little could be accomplished in the time available on July 10th except to gain a general impression of a type of landscape that was most unusual in the author's experience. The purpose of this note is to record the location of this interesting site, to provide some illustrations of the type of features occurring there, and to discuss their implications.

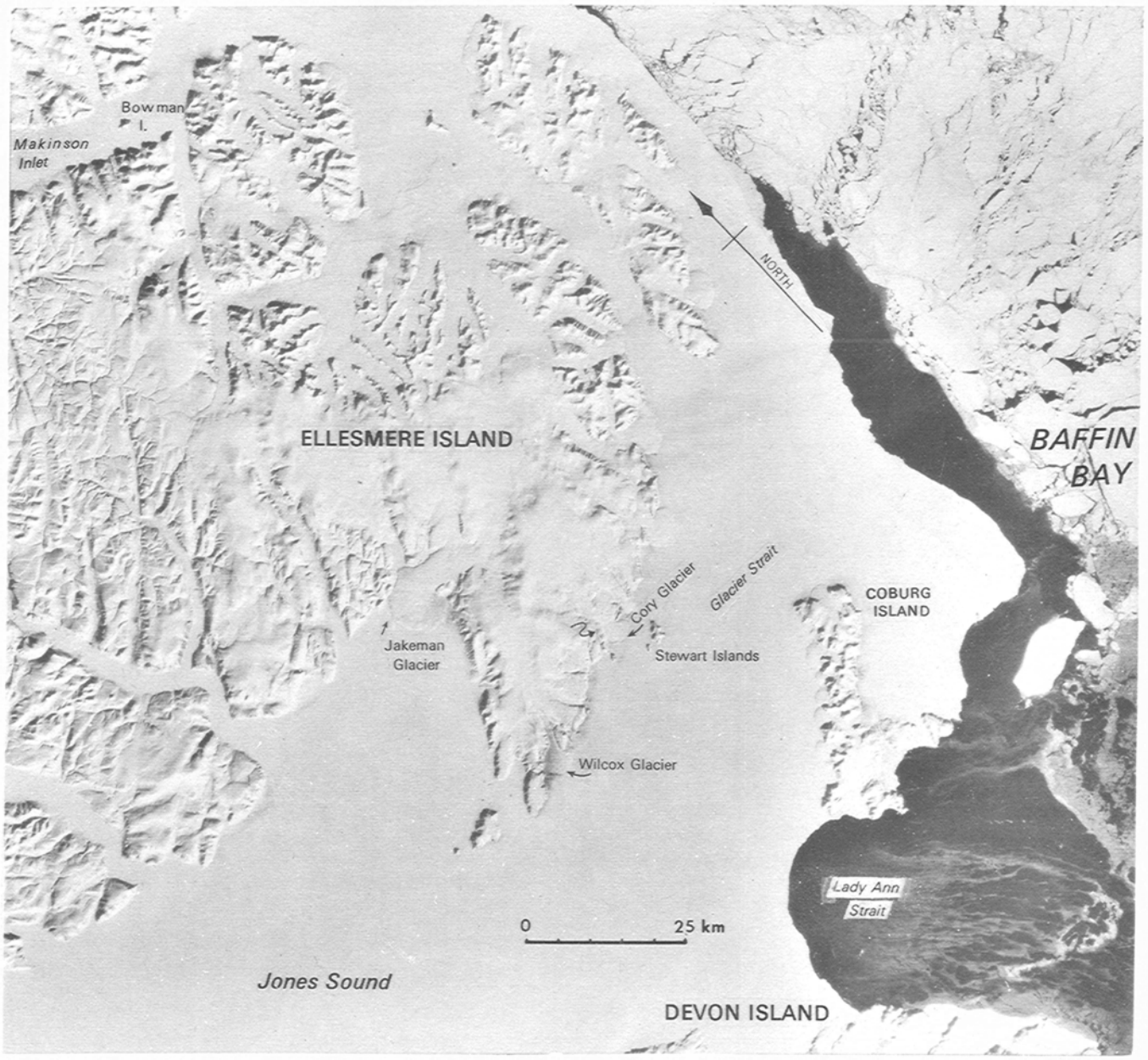

Figure 1. LANDSAT image of southeastern Ellesmere Island showing the location of sites referred to in the text, the extent of present day glaciers, and the development of the North Water on April 26, 1975. The site described in the text is indicated by the arrow to the west of Cory Glacier (image E-11007-17232, spectral band 7).

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Site Description

The landing site adjacent to the tors was some 415 m a.s.l., according to a determination by stereotope plotter, and the ridge on which the tors are developed rises approximately 60 m above the general level of the plateau surface. The ridge overlooks an unnamed subsidiary tongue of Cory Glacier (Fig. 2). The tors are more than 300 m above the glaciers on either side, although the surface of the ice cap rises above the plateau within a distance of 5 km to the north and west. The tors are developed in a massive, coarse grained, foliated biotite granite.

Figures 3 to 5 illustrate the type of landscape that has developed along this ridge of the plateau. It is obvious that much material has been removed along joints, and many whole blocks have disintegrated. The outcrops are well rounded, deeply weathered, and aprons of grus are ubiquitous. Figure 6 shows a typical large weathering pit. The largest pits attain 15 cm in depth and are more than 30 cm in diameter, dimensions that are similar to those of the largest pits recorded by Sugden and Watts (1977) in gneissic granite on Broughton Island, some 1100 km to the southeast along the coast of Baffin Bay. The generally rounded nature of the rock surfaces and the development of weathering pits is reminiscent, also, of the examples given as being representative of weathering zone 1 (the oldest) in the Maktak-Quajon-Narpaing Fiord areas of Baffin Island (close to Broughton Island) by Pheasant and Andrews (1972) and Boyer and Pheasant (1974).

Chronology

As reported earlier (Blake, 1977a) the snout of Cory Glacier is now somewhat more extensive than it was 6490 ± 140 years ago (GSC-1170), when organic material was accumulating in a lagoon close to sea level. This deposit is now 10 m a.s.l., and the highest raised beaches attain elevations of more than 50 m. In addition, thick fragments of **Mya truncata** shells, which had washed out of the till where the moraine ridges on the west side of Cory Glacier are breached by the river (Fig. 2) are >37 000 years old (GSC-1223). This age determination shows that some time in the more distant past (probably prior to mid-Wisconsin time), Cory Glacier was also far less extensive than it is today, for the shells have been picked up by the glacier when it advanced. Yet the lateral moraines on either side of Cory

Figure 2. Vertical aerial photograph showing the location of the ridge (black arrow) to the west of Cory Glacier on which the tors and weathering pits shown in Figures 3 to 6 are developed. Photograph A16682-171 taken from an altitude of ca. 9100 m, July 16, 1959. National Air Photographic Library, Department of Energy, Mines and Resources, Ottawa.

Figure 5. More detailed view of weathered granite along the ridge above Cory Glacier. The hammer handle is 33 cm in length. July 10, 1977 (GSC-173341).

Glacier, east of the ridge on which the tors have developed, rise up to 45 m above the present ice surface, indicating that the glacier also has been thicker, probably most recently in post-Hypsithermal time (cf. Koerner, 1977).

Discussion

The type of landscape present above Cory Glacier, characterized by deeply weathered bedrock, stands in marked contrast to exposures in Makinson Inlet and farther north along the east coast of Ellesmere Island where intense action by glaciers has polished and sculptured granite bedrock at similar elevations (Blake, 1977b, 1978). Unless the rates of weathering in southeastern Ellesmere Island are vastly different from those reported, for example, by Dyke (1978) on granitic gneiss from southwestern Cumberland Peninsula, Baffin Island, it seems extremely unlikely that actively eroding ice flowed across this ridge in late Wisconsin time. In fact, it may well be that such an event has not occurred for a much longer period of time; in this connection the reader is referred to Dyke (1976) for a discussion of the development of tors on Somerset Island.

During the last glaciation, or perhaps during several glaciations, ice draining towards the sea was channelled through the valleys on either side of the ridge. The ridge itself may have had only a carapace of relatively thin, cold-based ice, which presumably would not have affected the underlying bedrock surface other than to inhibit further weathering. Despite the fact that Paleozoic rocks outcrop within 13 km to the west-southwest and 24 km to the northwest (Christie, 1962) and that a few dark grey carbonate boulders were noted during a traverse across the moraines on the west side of Cory Glacier in 1968 (although crystalline rocks predominated), no carbonate erratics were noticed among the tors during the course of this brief visit. One fragment of charnockite was discovered, as was a piece of garnet gneiss; these rocks are foreign to the granite, but they may have travelled only a short distance to reach the ridge. The same is true on the summit plateau of the larger of the Stewart Islands, visited briefly on the return trip from Coburg Island. No limestone or dolomite boulders were observed in the vicinity of the landing site, at an elevation of more than 300 m and approximately 4.5 km to the southeast of the snout of Cory Glacier.

Blake (1970, 1975) noted that data relating to the tilt of Holocene shorelines around Jones Sound were in agreement with Pelletier's (1966) hypothesis, based on an analysis of bathymetric information, that a large outlet glacier had drained eastward to Baffin Bay via Lady Ann Strait (Fig. 1). The information presented here with regards to deep weathering on the plateau above Cory Glacier is an indication that, in the Jones Sound region, only Lady Ann Strait was a major drainageway for ice derived from Devon Island and southern Ellesmere Island, as well as from the Innuitian Ice Sheet farther west. The deepest parts of this strait, in the triangle between Wilcox Glacier (Ellesmere Island), Coburg Island, and northeastern Devon Island, attain depths of more than 180 m (Fig. 1). By contrast, a portion of Glacier Strait between the Stewart Islands and Coburg Island is less than 60 m deep; hence this area would have been dry land when sea level was lower during the maximum of any glaciation. Perhaps glaciers such as Cory Glacier, Wilcox Glacier, and those on the northwest side of Coburg Island merely enlarged their expanded-foot lobes, and perhaps the deeper parts of Glacier Strait – i.e., to the northeast and southwest – sustained ice shelves. In any event it seems certain that considerable time has elapsed since actively flowing ice built up in Glacier Strait, or on the highlands to the northwest, to a thickness that was sufficient to inundate ridges such as that west of Cory Glacier where the tors are found.

Acknowledgments

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Figure 3. General view northward along the granite ridge on which tors are developed west and south of Cory Glacier (visible in middle right distance). Note the disintegrated bedrock and grus aprons in the foreground. On the tor in the background, material has been removed along joints to a depth of at least 4 m. July 10, 1977 (GSC-173351).

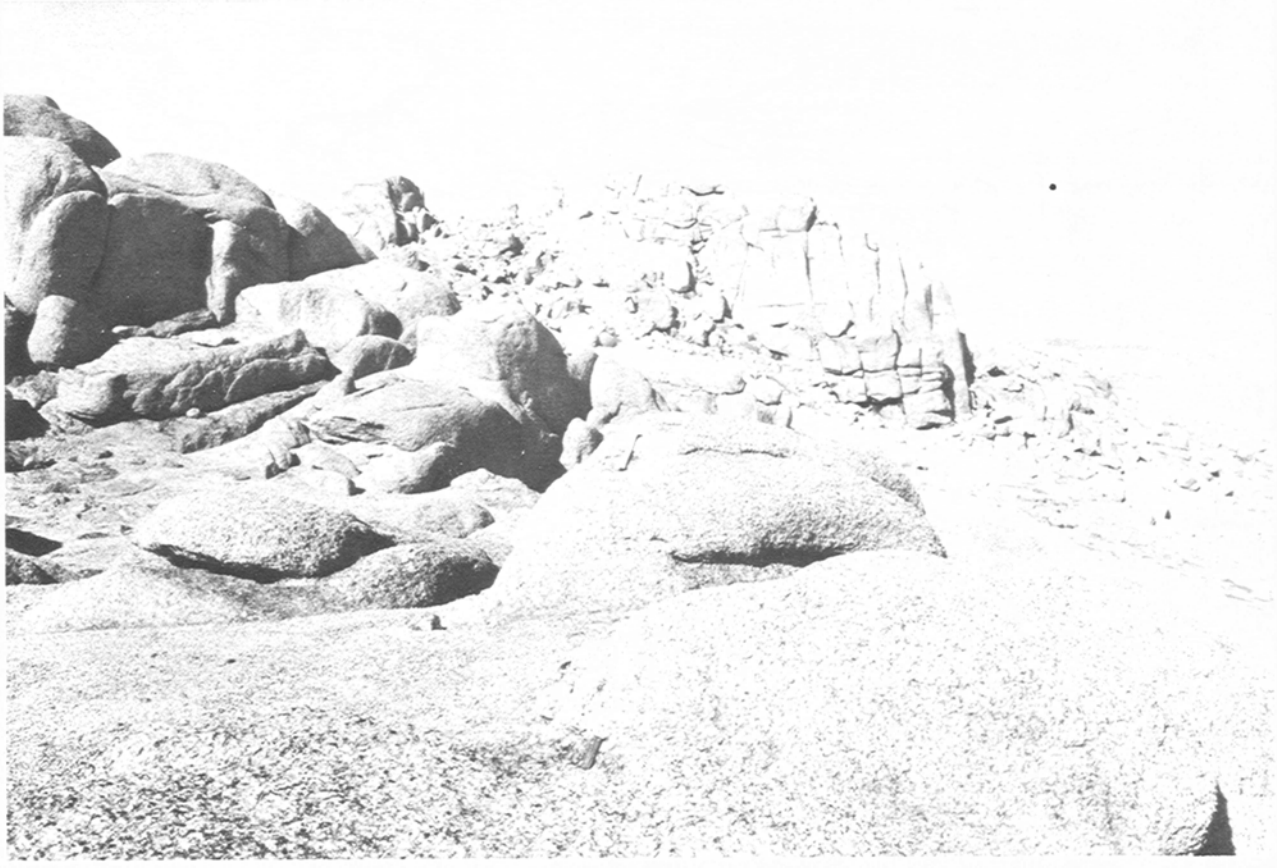

Figure 4. View north at another section of the deeply weathered granite ridge shown in Figure 2. Note the rounded form of the outcrops in the foreground and the surrounding aprons of grus. July 10, 1977 (GSC-173343).

Figure 6. Detail of a weathering pit in the coarse grained granite of the tors. This pit is over 12 cm deep and more than 25 cm in diameter. July 10, 1977 (GSC-173345).

Regional and Economic Geology Division. Mrs. G. Mizerovsky assisted by determining elevations in a stereotope plotting instrument. Comments and suggestions which have helped to clarify various points in the manuscript have been provided by A. MacS. Stalker and R.J. Richardson.

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