BAOSBHEINN

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OS Grid Reference: NG855676

Highlights

Baosbheinn is important for a protalus rampart of exceptional size, in part formed by large rockslides. It is important in demonstrating slope-process activity during the Loch Lomond Stadial.

Introduction

Baosbheinn (NG 855676) is the site of the largest and most impressive protalus rampart in Great Britain (Sissons, 1976c). The rampart is located on the north-west end of the Baosbheinn ridge at an altitude of approximately 450 m OD beneath the cliffs of Creag an Fhithich. Its morphology and characteristics were originally described bySissons (1976c) and further details were provided by Ballantyne (1986a). A number of protalus ramparts have been described in recent years (see Ballantyne and Kirkbride, 1986), but none of them rivals the Baosbheinn rampart in size. This has led Ballantyne (1986a, 1987d) to suggest that both landsliding and deformation by internal ice may have been involved in the production of this remarkable geomorphological feature.

Description

The protalus rampart consists of two distinct ridges (Figures6.9 and 6.10): a massive, openwork, upper ridge (AB) composed of Torridonian sandstone boulders and a lower, vegetated ridge (CD) with few boulders. The arcuate upper ridge is separated from the base of the mountain by a depression approximately 70 m wide and up to 6 m deep, and contains two minor, enclosed hollows. This ridge is over 450 m long and its distal slope is, at maximum, 55 m high. The second, lower ridge was examined in detail byBallantyne (1986a), who demonstrated that it is composed of a diamicton which, on sedimentological grounds (clast size, angularity, roundness, form, hardness and granulometry), is similar to the material comprising certain parts of the Wester Ross Moraine, but quite different to the upper boulder ridge. A third ridge (EF) is also present (Figure6.9).

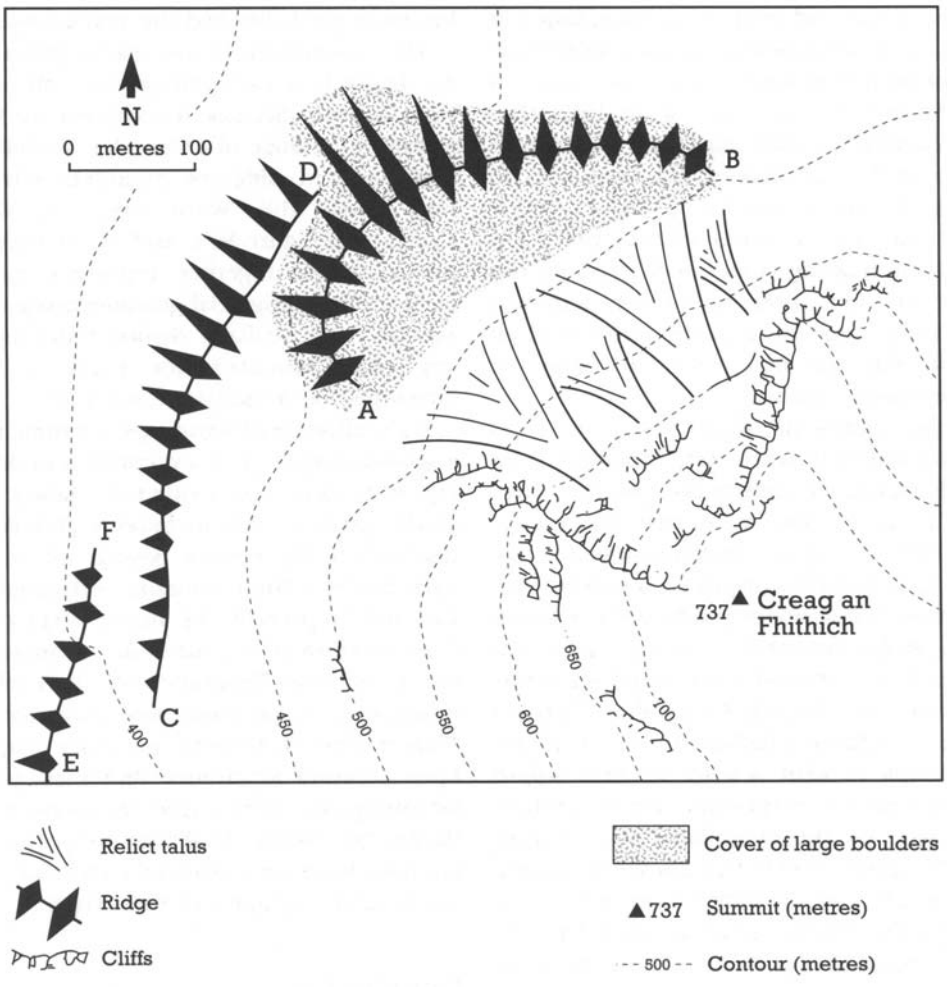

Figure 6.9: The Baosbheinn protalus rampart and associated landforms, showing the upper boulder ridge (AB) and lower ridges (CD and EF) (from Ballantyne, 1986a).

Figure 6.10: Protalus rampart on the north-west flank of Baosbheinn. The view also shows the rock avalanche scar, the two lower Wester Ross Readvance moraine ridges and a Loch Lomond Readvance moraine intersecting the latter at the base of the mountain. (Cambridge University Collection: copyright reserved.)

Interpretation

Sissons (1976c) interpreted both the main ridges (AB and CD) as part of a protalus rampart complex, the lower ridge forming during an early part of the Loch Lomond Stadial and the upper ridge subsequent to it, after a change in climate as the stadial progressed.Ballantyne (1986a), although agreeing with Sissons as to the age of the upper ridge, argued convincingly that both the lower ridge and ridge EF are lateral moraines formed during the Wester Ross Readvance at some time prior to 13,000 BP. No climatic inferences can therefore be based on the contrast in the nature of the two ridges.

Interpretation of the upper ridge as a "conventional' protalus rampart formed by individual rockfall events was also questioned by Ballantyne (1986a). He pointed out that not only is the rampart particularly large by British and even world standards (seeWashburn, 1979; Ballantyne and Kirkbride, 1986), but its formation also implies rock-wall retreat of the overlooking cliffs of an order of magnitude greater than could be inferred from other similar landforms formed during the Loch Lomond Stadial (Ballantyne and Kirkbride, 1987). He also observed that the cliffs upslope take the form of a major rockslide scar, and suggested that the rampart formed in response to one or more rockslides from the backing cliffs across a former snowbed. The occurrence of small enclosed depressions also suggested to Ballantyne the presence of buried snow, firn or ice at the time of formation of the rampart and this, in turn, raised the possibility that there had been some forward movement of the debris due to deformation of buried ice. The feature may, therefore, be regarded as a protalus or valley-wall rock glacier and has affinities with similar features onBeinn Shiantaidh on Jura (Dawson, 1977) and Coire Beanaidh in the Cairngorms (Sissons, 1979f; Chattopadhyay, 1984). Many

protalus rock glaciers in the Scottish Highlands occur at sites of rock-slope failures (Ballantyne, 1987d; Maclean, 1991).

In recent years protalus ramparts have been described from a number of localities in Scotland (Sissons, 1977a, 1979f; Rose, 1980d; Sutherland *et al*., 1982, 1984; Ballantyne and Kirkbride, 1986), as well as more widely in the United Kingdom (Sissons, 1980a; Colhoun, 1981; Gray, 1982a; Gray and Coxon, 1991). Of the known protalus ramparts, however, none is as spectacularly developed as that at Baosbheinn. The countrywide distribution of protalus ramparts, all of which are thought to have formed during the Loch Lomond Stadial, shows a pattern of decling altitude from the eastern Grampian Highlands to the western Highlands and Islands (Ballantyne, 1984; Ballantyne and Kirkbride, 1986) that is remarkably similar to the variation in equilibrium line altitudes for Loch Lomond Readvance glaciers (Sissons, 1980b). This similarity is considered to be of significance in palaeoclimatic terms, according with a pronounced eastwards and northwards decline in precipitation in Scotland during the Loch Lomond Stadial (Ballantyne and Kirkbride, 1986). The Baosbheinn rampart is thus part of a wider sequence of landforms of significance in the understanding of the environment of the Loch Lomond Stadial.

Conclusions

Baosbheinn demonstrates an exceptional example of a protalus rampart, a ridge formed at the base of a snowbank through the accumulation of rock debris which fell from cliffs above. Its large size appears to reflect the incorporation of material from a lateral moraine and the supply of debris from large rockslides. Baosbheinn is important in illustrating the nature of slope processes, between about 11,000 and 10,000 years ago, during the Loch Lomond Stadial. It forms part of a network of related sites, the distribution of which shows the interplay of debris supply and climatic factors during this intensely cold phase.

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