Loch Skene

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Highlights

Loch Skene demonstrates an excellent assemblage of moraines formed by a Loch Lomond Readvance glacier in the Southern Uplands. These landforms provide evidence for different processes of glacier deposition and illustrate clearly the pattern of ice wastage. The evidence from Loch Skene is also important for wider palaeoclimatic reconstructions for the Loch Lomond Stadial.

Introduction

The Loch Skene site [NT 168 162] covers an area of *c.* 5.75 km^2 on the north-west side of Moffat Dale, a classic, fault-guided, glacial trough in the Southern Uplands. It is important for an assemblage of glacial landforms, including fine examples of a corrie and hanging valley which were occupied by part of the largest glacier system in the Southern Uplands during the Loch Lomond Stadial. The locality is therefore significant for glacier and palaeoclimatic reconstructions, and good examples of end and hummocky moraines also provide a valuable means of interpreting the recession of the glacier. The Loch Skene landforms have a long history of research (Chambers, 1855a, 1855b; Geikie, 1863a, 1901; Young, 1864; Brown, 1868; Eckford and Manson, 1927; Price, 1963b, 1983; Sissons, 1967a; May, 1981), and aspects of vegetational history recorded in the peat deposits on the corrie floor have also been examined (Lewis, 1905; Erdtman, 1928).

Description

Rammer Cleugh is notable for an assemblage of The hills around Loch Skene rise to an altitude of landforms produced by meltwater rivers flowing 822 m OD at White Coomb. The steep headwalls of a corrie enclose the valley at the head of the loch and a second, shallower corrie, drained by the Midlaw Burn, forms a tributary basin to the south-west. The glacial deposits at Loch Skene have long been recognized as being significant. Chambers (1855a, 1855b) briefly noted the presence of a moraine-dammed lake associated with local glaciers. Later Geikie (1863a) and Young (1864) described the area in more detail, the latter including a geomorphological map compiled by Geikie. Both Geikie and Young recorded clear end, lateral and hummocky moraines associated with glaciers flowing down from an ice-field on the adjacent plateau slopes. They noted the arcuate alignments of many of the moraines across the valley at the southern end of Loch Skene and in the valley of the Midlaw Burn. In the intervening area the hummocky moraine was irregular in its form. A particularly prominent lateral moraine called 'The Causey' marked the position where the ice flow diverged into the head of the Winterhope Valley.

Subsequent accounts of the Loch Skene area appeared in Brown (1868), Geikie (1901), Eckford and Manson (1927), Price (1963b, 1983) and Sissons (1967a). The ground has also been re-mapped by May (1981) who confirmed the observations of Geikie and Young. May (1981) provided a detailed map of the area showing the form and distribution of the moraines (Figure 17.8). He also described their main characteristics, elaborating on the earlier accounts. Sections in the ridges along the Tail Burn revealed locally derived till comprising angular and subangular clasts in a gravelly matrix.

In a brief reference, Sissons (1977a) recorded the presence of fluting on the hummocky moraine at Loch Skene, implying that active ice overrode 'dead'-ice topography.

As part of a wider study of the Holocene vegetational history of Scotland, Lewis (1905) examined the peat deposits in the Tweedsmuir area, including Loch Skene, and identified layers of birch tree remains and two 'arctic beds', layers in the peat where the plant macrofossils had predominantly northern affinities. However, from pollen analysis and a re-examination of the peat deposits on the north-east side of Loch Skene, Erdtman (1928) questioned some of Lewis'

interpretations, particularly the occurrence of a second 'arctic bed' (see Loch Dungeon).

Interpretation

As first recognized by Chambers (1855a, 1855b) and followed by later authors (for example, Geikie, 1894), the Loch Skene moraines relate to an episode of local glaciation following the last ice-sheet and now recognized to have occurred during the Loch Lomond Stadial (Sissons, 1967a; May, 1981; Price, 1983). Similar moraines occur in adjacent valleys (Young, 1864; Price, 1963b, 1983; Sissons, 1967a; May, 1981;) indicating the extent of the former glaciers associated with the ice-field that developed in the White Coomb area. The moraines at Loch Skene mark successive stages in ice wastage as the glacier retreated back into the corries at the head of Loch Skene and the Midlaw Burn.

Loch Skene is important in several respects. First, in a historical context the work of Geikie and Young provides a good example of early, large-scale geomorphological mapping and description. Their basic field observations demonstrated the value of this type of approach and provided a good contemporary record which has stood the test of time.

Second, Loch Skene provides an ideal area for the study of the formation of hummocky moraine, the origin of which is controversial (see Coire a'Cheud-chnoic). Three main hypotheses exist: it is a form of stagnant-ice topography formed by rapid wastage of ice with a thick cover of supraglacial debris (Sissons, 1967a; Thompson, 1972); it is a product of controlled or uncontrolled deposition by actively retreating glaciers (Eyles, 1983; Day, 1983; Horsfield, 1983; Benn, 1990, 1991; Bennett, 1990, 1991; Bennett and Glasser, 1991); or it is a subglacial deposit formed by deformation of pre-existing till (Hodgson, 1982, 1987; Ballantyne, 1989a; Benn, 1991). All three types probably exist (see the Cuillin). Loch Skene provides a particularly good opportunity to investigate the genesis of different forms of hummocky moraine and their relationships since features of all three models exist in the area: chaotic assemblages of mounds, arcuate alignments of mounds and ridges which have the form of recessional moraines, and overridden and fluted mounds. The results of such work and comparative studies with other sites (see the Cuillin, Coire a'Cheud-chnoic and the Cairngorms) will facilitate the recognition of styles of deglaciation from the landform assemblages and sediment facies (see Eyles, 1979, 1983; Sharp, 1985; Evans, 1989; Benn, 1990, 1991; Benn *et al.*, 1992; Bennett, 1991). In some cases they will also provide field evidence for the characteristics of deformable glacier beds and information on sediment transfer patterns during the Loch Lomond Readvance (see Coire a'Cheud-chnoic).

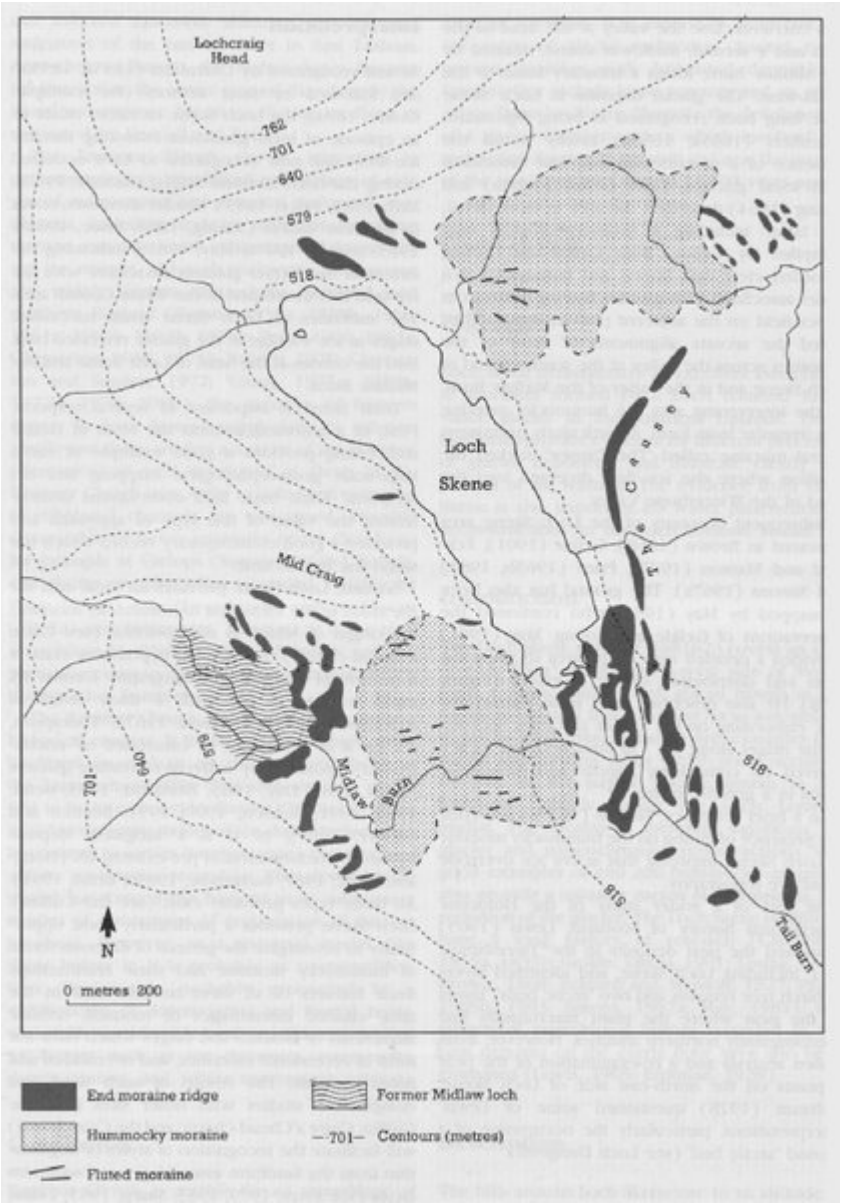
Third, Loch Skene is important for palaeo-climatic reconstructions. The end moraines provide a clear geomorphological record of the pattern of glacier wastage during the Loch Lomond Stadial. At present little is known of climatic variations during the stadial, but comparative studies of the moraines at Loch Skene and other sites (e.g. Tauchers, the Cairngorms, Lochnagar, Cnoc a'Mhoraire and the Cuillin) should provide important information on glacier–climate relationships and the effects of other variables, such as topography, in controlling the mass balance and fluctuations of Loch Lomond Readvance glaciers.

Fourth, glacier development was of very restricted extent in the Southern Uplands during the Loch Lomond Stadial (Sissons, 1979d, 1980b; Cornish, 1981; Price, 1983), and the Loch Skene glacier is therefore significant in forming part of the largest ice mass in the area. This ice mass provides an important geographical link between those in the Highlands, Lake District and Wales (Sissons, 1979d, 1979e) and is a significant element in interpreting the wider national pattern of Loch Lomond Stadial glaciers and underlying climatic conditions (Sissons, 1979d, 1979e). Significant contrasts in glacier development between these areas are explicable in terms of regional precipitation differences associated with variations in the position of the Polar Front and Atlantic depression tracks (Sissons, 1979d, 1979e, 1980b). Such variations can also account for the marked contrast in the degree of glacierization during the Loch Lomond Stadial compared with earlier in the Late Devensian when the Southern Uplands formed a major centre of ice-sheet accumulation (Sissons, 1979d; Sutherland, 1984a). The evidence from Loch Skene therefore contributes significantly towards the establishment of wider palaeoclimatic reconstructions.

Conclusion

Loch Skene is important for an assemblage of landforms in the Southern Uplands representing the resurgence of glacier ice which occurred during the Loch Lomond Stadial, approximately 11,000–10,000 years ago. Principally, these landforms comprise an excellent range of moraine types which illustrate clearly the different processes of glacier deposition. The detailed form of the moraines also shows the pattern of ice decay in the corrie, which is significant for interpreting the glacier behaviour and its possible climatic controls. As part of a wider network of sites representing the pattern of glacier growth and retreat during the Loch Lomond Stadial, Loch Skene also contributes important geomorphological evidence for palaeoclimatic reconstructions.

References



(Figure 17.8) Loch Lomond Readvance moraines at Loch Skene (from May, 1981).