Helvellyn

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Introduction

The principal interest of the Helvellyn massif is twofold: its corries and associated aretes, tarns and moraines on its eastern slopes and its extensive area of upland plateau, with patterned-ground sites. Lake District corries are of interest to geomorphologists because of their value as landforms produced by glacial processes and their use in climatic reconstruction of conditions in the Loch Lomond Stadial (Sissons, 1980). Evans and Cox (1995) list 158 Lake District corries and an important subset of these is found in the Helvellyn Range (Evans, 1997) (Figure 5.67). Sissons (1980) mapped evidence for glaciers during the Loch Lomond Stadial and his reconstruction for the Helvellyn corries is shown in (Figure 5.68).

Patterned ground of the type generally associated with former periglacial conditions can be found on many high flat summits of the Lake District, such as Grasmoor, Helvellyn and Skiddaw. The Helvellyn patterned-ground sites differ from others in this review in that they are developed on Borrowdale Volcanic Group lithologies. Patterned ground, forming under contemporary conditions, was reported from the Lake District by Hollingworth (1934) and active periglacial phenomena consisting of small sorted stripes, nets or polygons and isolated sorted circles are described by Warburton (1985). They generally occur above 610 m, where vegetation is sparse, and on all the main lithologies.

Description

The eastern slopes of Helvellyn are developed into a series of nine corries from Keppel Cove to Cock Cove (Evans, 1997) (26 to 33 and 53 and 54 on (Figure 5.67). In general, the corries face north-east and are cut in volcanic tuff, felsite or basalt with bands of rhyolite and dolerite. The three largest and best-formed corries are Brown Cove (27 on (Figure 5.67)), Red Tarn (28) and Nethermost Cove (30). In the terminology used by Evans, the first two are 'classic' because they contain lakes and Red Tarn itself has a water area of 9.8 ha and a depth of 25.6 m ((Figure 5.70)a). Nethermost Cove, although without a lake, is a deep, broad corrie with a headwall 280 m high. The corries are separated by the well-known aretes or ridges of Swirral Edge and Striding Edge. Evidence for recent glaciation in the corries of Helvellyn is abundant and some of this has been used to reconstruct the limits of the Loch Lomond Stadial glaciers by Sissons (1980). The limits of these glaciers are shown in (Figure 5.68) and a reconstruction of the former limits of the Grisedale glacier in (Figure 5.69).

Generalized descriptions of a range of periglacial phenomena, both active and relict, present on the Helvellyn summit plateau and slopes are given by Hay (1936, 1937). He is not specific with regard to locations but describes the phenomena as:

1. stone stripes
2. stone polygons; on Raise in the Helvellyn Range
3. disintegrated vegetation due to wind
4. solifluction terraces ((Figure 5.70)b)
5. frost-degraded turf patterns
6. gliding blocks
7. soliflucted scree ((Figure 5.70)c)
8. summit blockfields and vertical stones ((Figure 5.70)d).

Warburton (1985) describes nine patterned-ground sites on the Helvellyn plateau. These range from three on Raise in the north to several near the summit of Helvellyn itself. All are underlain by Borrowdale Volcanic lavas and ashes. For the nine sites, slope angles vary from 9 to 20° and aspects generally are westerly. Silt and clay content of fine-grained stripes is 3–7% and a clear distinction between fine and coarse stripes is evident.

Interpretation

The conies in the Helvellyn Range result from the presence of north- and east-facing slopes protected from sunlight, with sufficient altitude, an initial steep slope developed on strong, resistant rocks and flat summits that acted as snow-blowing areas. Evans (1997) suggests that the palaeoglaciation level in the Helvellyn Range was 700 to 800 m but that factors other than altitude played a significant part in where corries developed. The development of corries represents glaciation of a restricted character, but which presumably was repeated many times during the Quaternary Period. It is likely that at the beginning and end of major glacial events corries were occupied by ice. It also is likely that discrete glacial events of a short-lived character, such as the Loch Lomond Stadial, contributed significantly to the development of these conies.

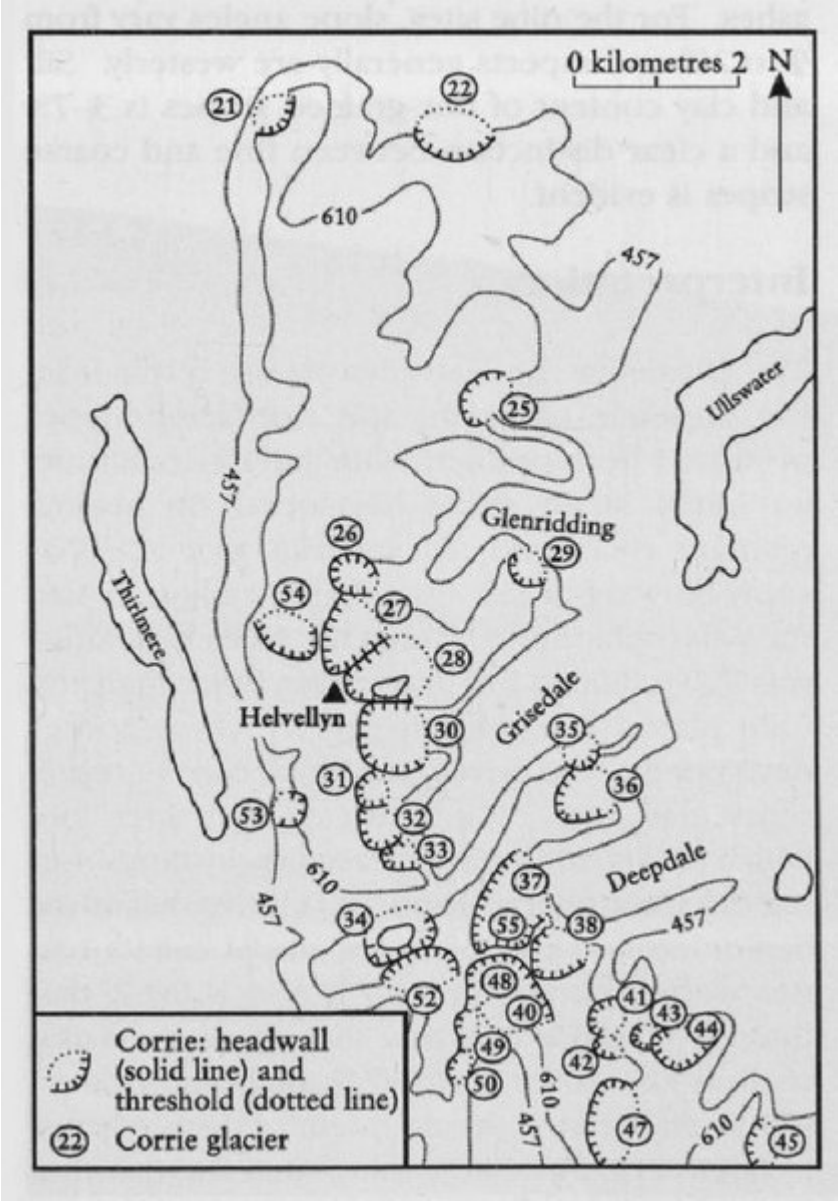
Caine (1972) demonstrated that the distribution of patterned ground in the Lake District shows a strong preference for Skiddaw Slate lithologies, presumably because they are more frost susceptible than the Borrowdale Volcanics. Warburton (1997) shows a tendency for sites at higher elevations to have deeper sorting; perhaps because at higher altitudes there will be more frost days and therefore greater frost-heave potential. However, the simple relationship also is affected by the presence of frost-susceptible material at the site. Widths and depths of patterned ground on Helvellyn are in general greater than at sites on Skiddaw Slates and this may be a reflection of higher altitude (Warburton, 1997).

Conclusions

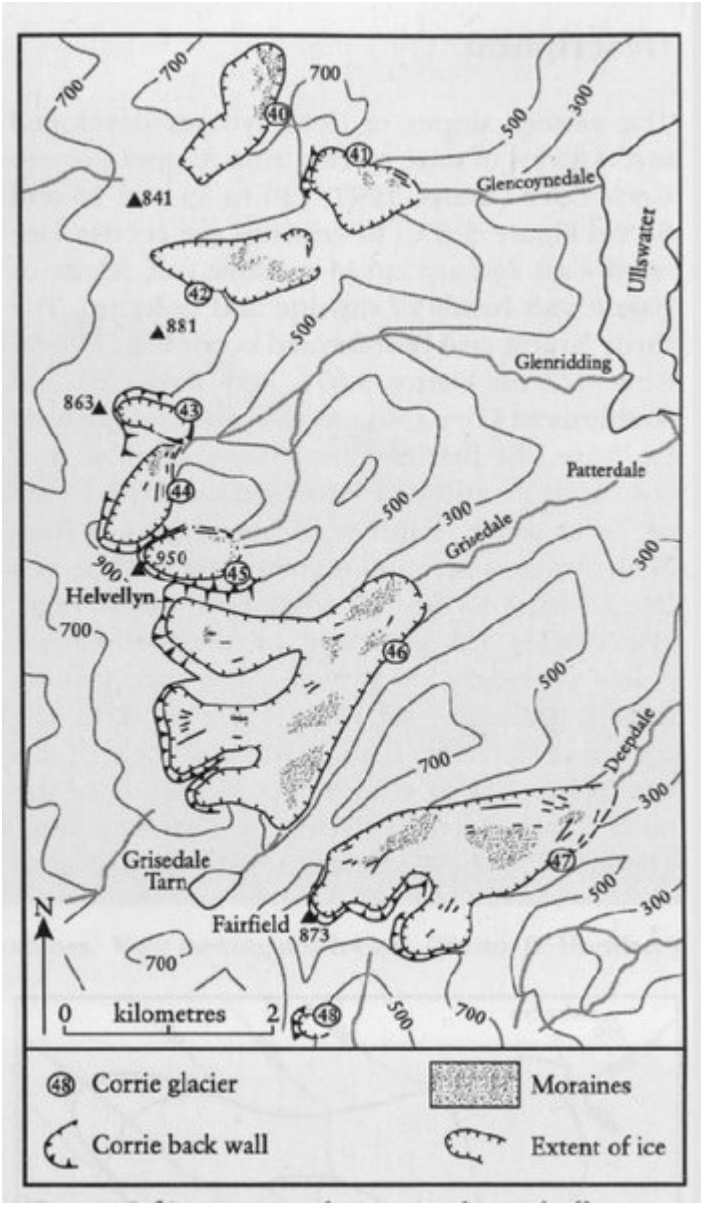
Unambiguous glacial phenomena such as corries and aretes are extremely well displayed in the Helvellyn Range. They are the result of long periods of glaciation of a restricted character with ice confined to comes and upland valley heads. Depositional features in and around the corries allow the extent of Loch Lomond Stadial glaciation to be established. This has led to important conclusions regarding conditions during this short period of climatic deterioration.

Patterned ground is a feature of upland summit areas in Britain. It appears to develop even under the contemporary mild frost climate and does not require what generally are regarded as 'true' periglacial climates. The existence of patterning seems to be related to frost susceptible lithologies and periods of ground freezing in the winter. These produce frost heave and a separation of coarse- and fine-grained materials is achieved. The process is then self-organizing.

References



(Figure 5.67) Corries of the Helvellyn and Fairfield Ranges (after Evans, 1997).



(Figure 5.68) Former glaciers in the Helvellyn area (after Sissons, 1980).

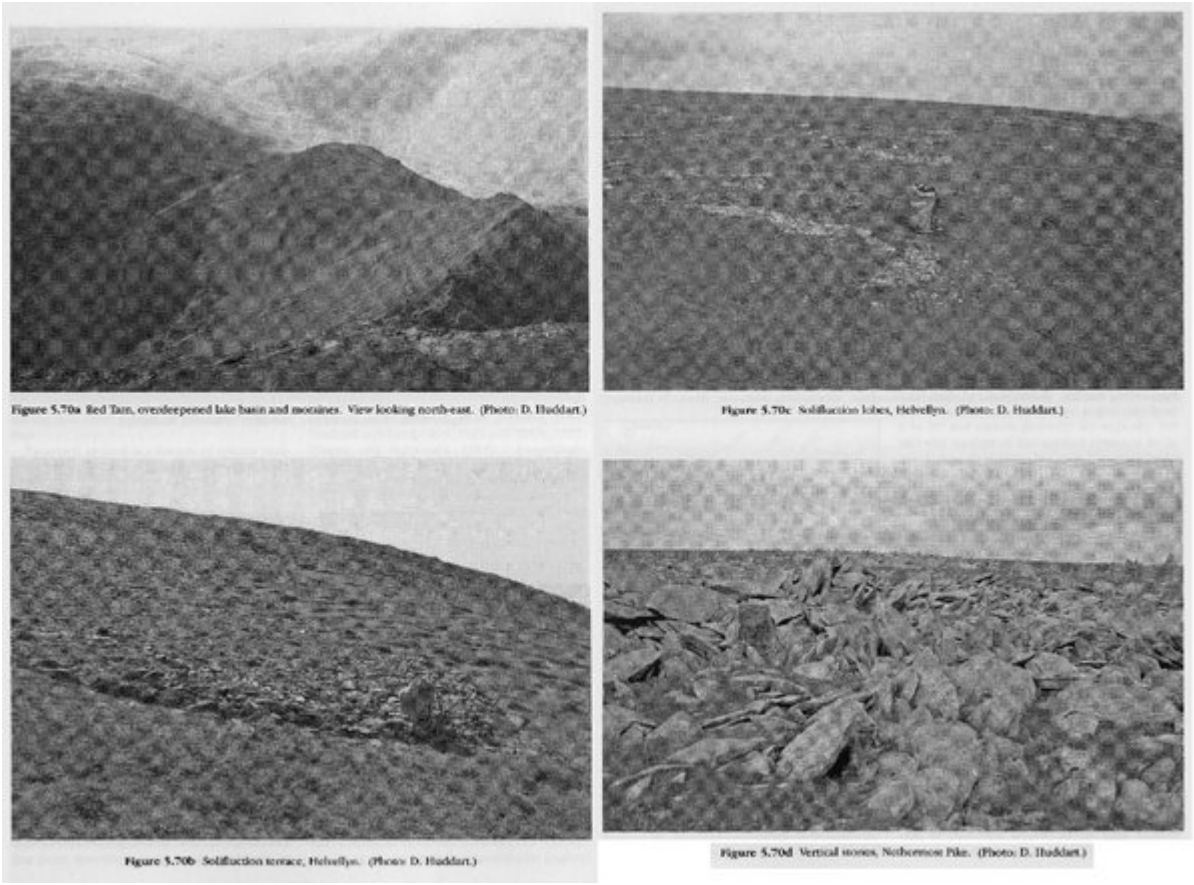


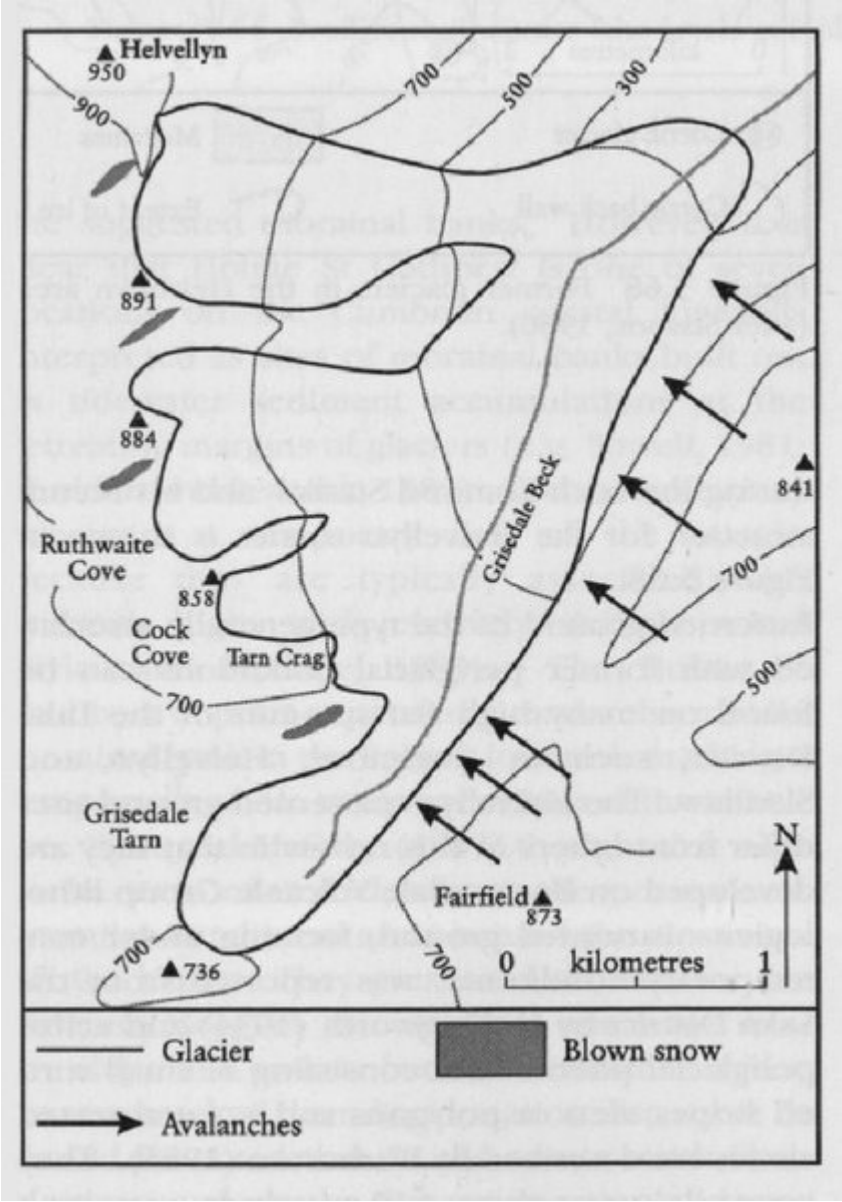
Figure 5.70a Red Tarn, overdeepened lake basin and moraines. View looking north-east. (Photo: D. Huddart.)

Figure 5.70c Solifluction lobes, Helvellyn. (Photo: D. Huddart.)

Figure 5.70b Solifluction terrace, Helvellyn. (Photo: D. Huddart.)

Figure 5.70d Vertical stones, Nethermost Pike. (Photo: D. Huddart.)

(Figure 5.70) a. Red Tarn, overdeepened lake basin and moraines. View looking north-east. (Photo: D. Huddart.) b. Solifluction terrace, Helvellyn. (Photo: D. Huddart.) c. Solifluction lobes, Helvellyn. (Photo: D. Huddart.) dd Vertical stones, Nethermost Pike. (Photo: D. Huddart.)



(Figure 5.69) Map of the reconstructed Grisedale glacier (from Evans, 1997).