
STOB DEARG AND CAM GHLEANN

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OS Grid Reference: NN224547 and NN246521

Introduction

This site is the most easterly of the five GCR sites representing the Glencoe volcano. Relationships here between the volcanic rocks and the original land surface of Dalradian metasedimentary rocks contrast strongly with those in the west of the volcano, indicating important spatial differences in the early volcanic activity. Sedimentary rocks underlying the volcanic sequence at this site yielded the remains of Early Devonian plants during the initial survey, and spores obtained more recently have suggested a more precise biostratigraphical age.

The site comprises two areas: one NW of the River Etive consisting of the 1022 m-high peak of Stob Dearg (at the NE end of the Buachaille Etive Mor ridge) (Figure 9.13); and another SE of the River Etive, around Cam Ghleann.

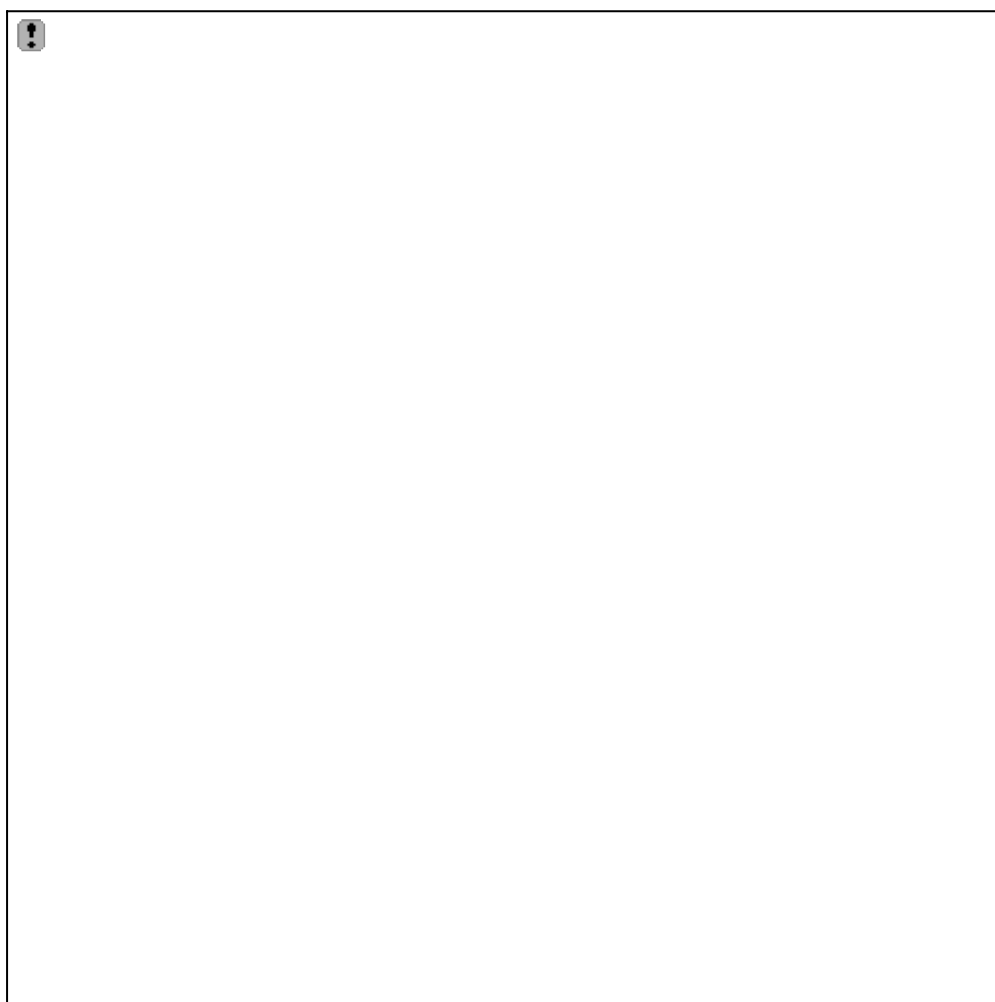


Figure 9.13: The NE face of Stob Dearg, Buachaille Etive Mor, Glen Coe. The lower, scree-covered slopes are of Dalradian metasedimentary 'basement'. The bulk of the mountain consists of rhyolite units (Group 2), with the summit area composed of a mass of intrusive rhyolite. The prominent slab in the lower left centre is the 'Waterslide slab' where fossil plant remains were collected. (Photo: D. Stephenson.)

Description

This GCR site is dominated by Group 2 rocks (see 'The Glencoe volcano— an introduction to the GCR sites', above), which lie directly on top of Dalradian metasedimentary rocks. The marked absence of Group 1 rocks at this site was commented on by Clough *et al.* (1909), Bailey (1960) and Moore (1995).

The Dalradian metasedimentary rocks are quartzites, quartzo-feldspathic psammities and semipelites, comprising the Eilde Flags and the Eilde Quartzite (Clough *et al.*, 1909). These are commonly brecciated and fragmented.

Clough *et al.* (1909) and Bailey (1960) provided a detailed description of a complex sequence of psammite breccias, conglomerates and well-bedded quartzose sandstones, red laminated sandstones, and shales sandwiched between the metasedimentary rocks and the overlying Group 2 rhyolites near the foot of Stob Dearg (Table 9.4). From a dark shale bed beneath a well-known landmark (the Waterslide slab), remains of plants were collected in 1902 by Peach, Kynaston, and Tait of the Geological Survey, which were subsequently identified by Kidston and Lang (1924) as *Psilophyton* and *Pachytheca*. This provided an Early Devonian age for the sedimentary rocks beneath the volcanic succession. Spore assemblages collected more recently suggest a late early to early late Lochkovian age (Wellman, 1994). Although Hardie (1968) and Roberts (1974) believed that the outcrop from which these plant remains were taken is a detached block disturbed during explosive volcanic activity, they concluded that the block has moved only a short distance from its original location.

Group 2 is especially well developed at this site (Clough *et al.*, 1909; Roberts, 1974; Moore, 1995). Using the more detailed subdivisions of Moore (1995), the following Group 2 units are recognized.

Stob Dearg area *Cam Ghleann area* Upper Glencoe Upper Glencoe

Ignimbrite (top) Ignimbrite (top)

Lower Glencoe Lower Glencoe

Ignimbrite Ignimbrite

Upper Etive Rhyolite Upper Etive Rhyolite

Middle Etive Rhyolite (missing) Lower Etive Rhyolite Lower Etive Rhyolite

In addition, Bailey (1960), Roberts (1974) and Moore (1995) report a mass of intrusive rhyolite which forms the summit region of Stob Dearg (Figures 9.13 and 9.14).

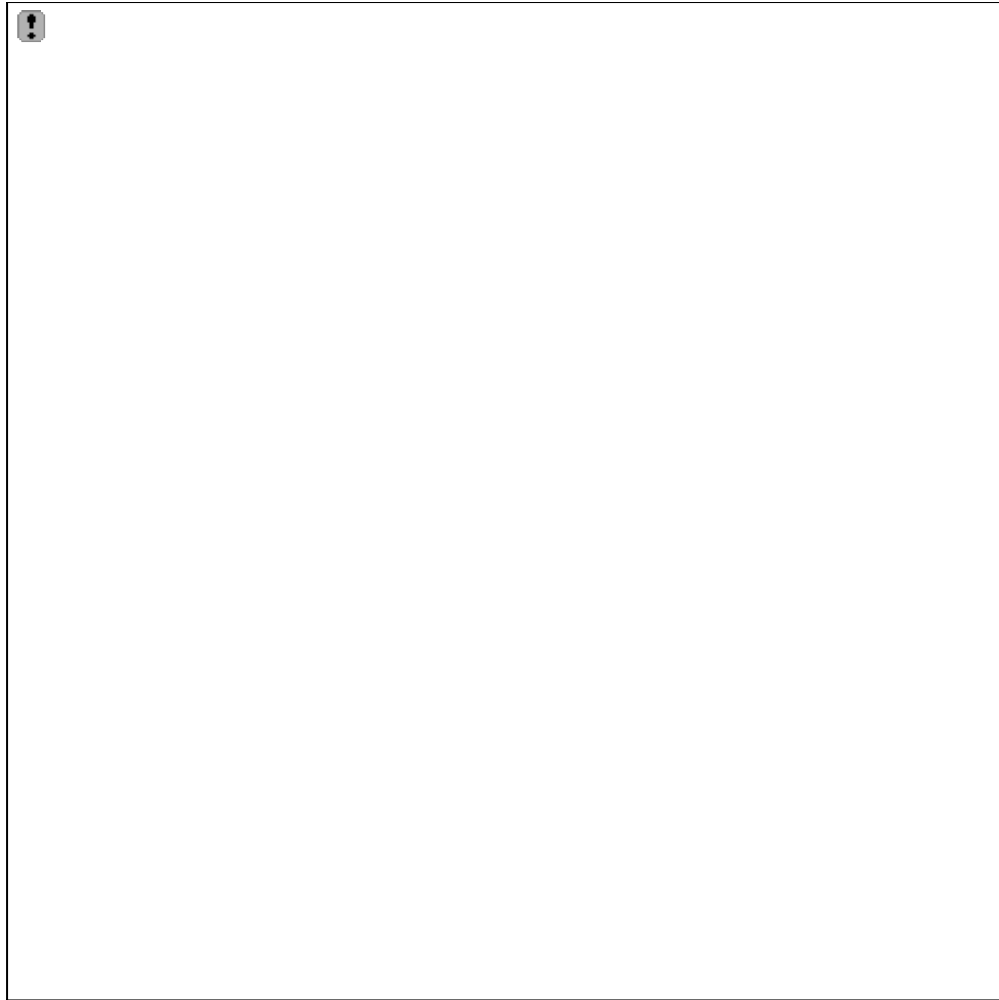


Figure 9.14: Buachaille Etive Beag, Glen Coe from the NE, looking towards Stob nan Cabar from Stob Mhic Mhartuin. (Photo: D.W. McGarvie.)

Other important lithologies present in the site are as follows (oldest first).

- Phreatomagmatic tuffs that constitute the first eruptive phase of each of the Etive rhyolite eruptions are particularly well developed at this site (note the absence of the Middle Etive Rhyolite and its underlying phreatomagmatic tuff at Cam Ghleann).
- Andesitic (mixed magma) flows and sills that intrude the Glencoe ignimbrites.
- A localized breccia wedge (psammite, quartzite, and semipelite clasts) at Cam Ghleann, which overlies the Lower Glencoe Ignimbrite.
- Group 3 sedimentary rocks (alluvium deposits only at this site).
- Group 4 andesites (Cam Ghleann only).

Interpretation

The quartzites, psammites, and semipelites exposed at this site are from a lower part of the Dalradian succession than the less resistant phyllitic lithologies (Leven Schist) dominant in the west of the volcano (Clough *et al.*, 1909). The overlying sedimentary rocks have been interpreted by Moore (1995) as a locally developed alluvial fan (the Kingshouse Fan), which crops out throughout this GCR site, but is best developed at Stob Dearg. Clasts have been derived from both talus and fluvial sources and the evidence of both clasts and sedimentary structures suggests an input into the area from the east (Taubeneck, 1967; Moore, 1995). Taubeneck also believed that the eastern parts of the pre-caldera land surface were elevated some 600 m higher than the western parts.

The absence of the Group 1 Basal Sill Complex suggests that the more-resistant rocks (plus more rugged topography) of the eastern parts of the putative volcano hindered formation of a sedimentary basin. It is possible that lavas similar to the basalt and andesite sheets of the sill complex were erupted in the east but, as Moore (1995) pointed out, the erosional unconformity seen in the west indicates removal of an unknown thickness of sheets, and the more rugged topography in the eastern part of the volcano would have hastened their erosion. However, it is equally possible that no early basaltic to andesitic volcanism took place in the east of the volcano.

The dominance of Group 2 rocks, and their extreme development at this site (i.e. substantial thicknesses of individual units and well-developed tuff layers), strongly suggests that they are proximal deposits. Roberts (1974) noted the great thickness of Group 2 rhyolites here, and Moore (1995) suggested that many of the vents for the Group 2 eruptions were located in the central and eastern parts of the volcano, and that they were controlled by the rectilinear system of graben and cross-graben faults (Moore and Kokelaar, 1997, 1998). This was a significant departure from the model of Roberts (1974), who argued that the major rhyolite (ignimbrite) eruptions at Glen Coe were generated at ring fractures. Moore's evidence is convincing, and highlights the need for a re-evaluation of the role and importance of both the ring fracture and the ring intrusion.

Conclusions

The 'basement' of the down-faulted inner block in the east of the Glencoe volcano is a lower part of the Dalradian succession than in the west and comprises more resistant lithologies. Overlying this is an irregular succession of sedimentary rocks varying from shales to coarse conglomerates deposited in an alluvial fan. Fossil remains found in the shales indicate an Early Devonian (Lochkovian) age. A marked downslope to the west seems probable, as is indicated by sedimentary structures and by the provenance of boulders in the conglomerates. The absence of a sill complex within the basal sedimentary succession in the eastern part of the volcano reflects either complete removal by erosion, or a restriction of this early (Group 1) volcanism to the west of the volcano.

Rhyolites that represent the first major eruptive events of the Glencoe volcano (collectively termed Group 2) are extremely well developed at this site, and thickness variations indicate that feeder vents are nearby. Two eruptive cycles are recognized; all eruptive units comprising the largely effusive first cycle (the Etive Rhyolites) are exposed on Stob Dearg, while the two major units of the pyroclastic second cycle (the Glencoe Ignimbrites) crop out throughout the site. In addition, an intrusive mass of rhyolite occupies the upper third of Stob Dearg, while andesitic sills locally intrude the rhyolitic rocks. Overlying alluvial breccias (Group 3), indicate a re-establishment of a river system following the major eruptions, and at Cam Ghleann the succeeding andesites of Group 4 occur.

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