

# NUNATAKS AND THE SURFACE ALTITUDE OF THE LAST ICE SHEET IN SOUTHERN SNOWDONIA, WALES

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## Introduction

It has long been suggested that the last ice sheet (c. 22–18,000 yrs BP) in Wales had its central axis southeast of the north Snowdonia mountains in the Arenig Region (Figure 1). Greenly (1919) noted that the Rhinog mountains were abraded by westward moving ice coming from the vicinity of the Arenigs. Moreover, Arenig erratics have been reported from the borderlands to the east (MacKintosh, 1873, 1874; Reade, 1885, 1897; Strahan, 1886; Kendall, 1892; Harrison, 1898). There is therefore clear evidence for an ice-shed in this region and it is still widely accepted (Rowlands, 1979; McCarroll and Ballantyne, 2000). However, there has been continued debate as to whether or not this ice sheet pushed through the north Snowdonia mountains (Whittow and Ball, 1970; Addison, 1978, 1983, 1990), or was diverted around an independent ice sheet in this area (Gemmell *et al.*, 1986; McCarroll and Ballantyne, 2000).

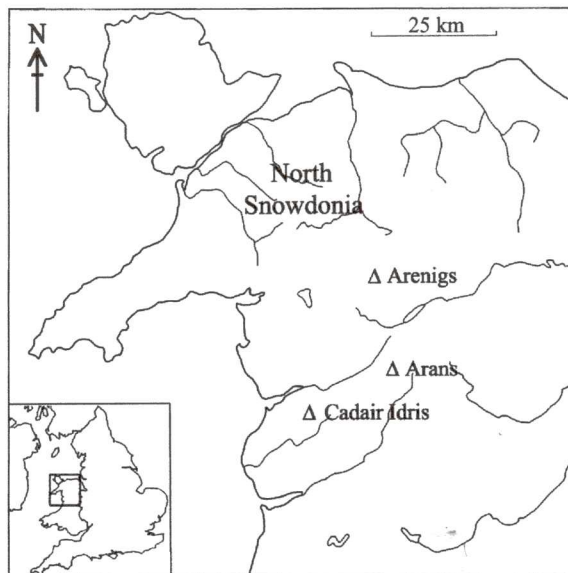


Figure 1. Location map showing the field areas in southern Snowdonia.

The work of McCarroll and Ballantyne (2000) would appear to close this debate since they have convincingly argued the case for an independent north Snowdonia ice sheet. They used periglacial trimline data and the presence of gibbsite, an end product of prolonged weathering (sub-aerial exposure since the pre-Devensian), at the base of soils to support the presence of nunataks above the last ice sheet in this area. Using this data, and evidence of flow directions close to the trimline, they were able to reconstruct the height of the last ice sheet and provide evidence of ice dispersal from an independent ice sheet.

In the study presented here, attention is paid to the evidence in southern Snowdonia and attempts are made to reconstruct the height of the last ice sheet in this area based on periglacial contrasts and evidence of nunataks. The work presents preliminary findings and discusses the implications for ice-sheet reconstruction in Wales.

### **Study area**

Southern Snowdonia can be defined as the area to the southeast of Mount Snowdon in the southern part of the Snowdonia National Park (Figure 1). The region contains fewer and lower mountains than in the north and much of its area is an elevated tableland (>400m). The highest mountain peaks are composed of Ordovician volcanic rocks and the surrounding tablelands of Ordovician slates and shales.

### **The evidence**

Evidence of periglacial-glacial contrasts and the presence of nunataks protruding above the south Snowdonia ice sheet is provided on the three highest mountains of the area: Aran Fawddwy (SH 863224), Arenig Fawr (SH 827369), and Cadair Idris (SH 712131).

### ***The Arans***

The south summit of Aran Fawddwy (905m) is capped by a small tor and the whole summit area displays evidence of frost shattering. The northern approaches of this peak also display clear boulder fields. Small tors are also evident to the south of Aran Benllyn and the whole ridge between this peak and Aran Fawddwy displays well-developed periglacial features, especially frost-shattered bedrock and blockfields. There is no evidence of glacial smoothing compared with the lower slopes where roche moutonnée and striated bedrock abound. The transition between glacial and periglacial terrain, based on field observations and aerial photographs lies between the 750 and 800m contour (Figure 2A).

