

The volcanic Rocks of the Sólheimajökull Area, southern Iceland

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ABSTRACT

A succession of six volcanic units has been identified and mapped in the area adjacent to Sólheimajökull. Most of these units are thought to be the products of essentially single eruptive episodes which at least in their initial stages were sub-glacial. Hence palagonite tuffs and breccias dominate the succession. The volcanic units are separated by major erosion surfaces characterised by conglomerates (tillites) on ice striated pavements, together with local preservation of sub-aerially deposited tuffs and limited evidence of sub-aerial weathering. Chemical analyses of a selected suite of rocks from this volcanic succession show a trend towards increased alkalinity with time.

INTRODUCTION

This paper describes the results of field mapping and subsequent petrographic and geochemical studies of the volcanic rocks exposed in close vicinity to Sólheimajökull. This work was done by the geology team members of a multidiscipline Earth Sciences Expedition from the University of Sheffield which spent some four weeks in the area in the summer of 1973. The full expedition report, which also includes the results of botanical, geomorphological and sedimentological studies, is available on request.

GENERAL GEOLOGICAL LOCATION

The Sólheimajökull area lies near the southern end of the eastern limb of the main active volcanic belt which trends NE-SW across Iceland and out into the Atlantic via Vestmannaeyjar. The large ice cap of Mýrdalsjökull and its outlet glacier Sólheimajökull covers an area previously mapped (Kjartansson 1962) as Upper Pleistocene Palagonite

or "Moberg" Formation. However, late Tertiary-Pleistocene "Old Grey Basalts" were indicated to outcrop just to the west on the southern side of Eyjafjallajökull ice cap and somewhat younger "New Grey Basalts" in the col area (Fimmvörðuháls) between the two main ice caps. Hence the area studied lies between, and slightly to the south of, the Postglacial active volcanic systems of Eyjafjöll (Eyjafjallajökull) and Katla as outlined by Jakobsson (1979).

THE VOLCANIC STRATIGRAPHY

The rocks in the area are largely distinctive yellow-brown palagonite tuffs and breccias with intercalated, irregularly shaped, dark grey basalt lobes. No lava flows were recognised which could be used as mappable horizons of enable correlations across the flood plain of the glacier. The recognition and correlation of major erosion levels over the area is therefore important in any attempt to work out the detailed stratigraphy of the volcanic rocks in the area.

The erosion levels were usually characterised by conglomerates, interpreted as tillites or at least fluvio-glacial deposits, but sometimes by limited sub-aerial weathering as evidenced by haematite formation or by small pockets of sub-aerially deposited black tuffs, occasionally with distinct lapilli.

Six volcanic units separated from each other by major erosion levels have been recognised and mapped (Fig. 1). Details of these units, from oldest to youngest, are as follows:

Unit A: This volcanic unit outcrops in a small area at the foot of Jökulhaus North adjacent to the northern edge of the glacier snout. The exposure consists of both yellow brown palagonite breccia and large irregular lobes of more coherent lava.