Recent Mapping of Gljúfurárjökull and Gljúfurárdalur

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INTRODUCTION

Gljúfurárjökull is a small valley-head glacier lying in the uppermost section of a hanging valley above the major glacial trough of Skíðadalur in the Tröllaskagi peninsula of Northern Iceland (Lat. 65°43'N, Long. 18°39'W). Observations have been made of the glacier by several workers over the past forty years (*Eythórsson* 1956, 1963; *Rist* 1977) and in recent years it has been visited by a number of parties from the United Kingdom as part of the North Iceland Glacier Inventory. Although rates of retreat have been worked out by *Eythórsson* (1963) and several minor surveys have been carried out by the British groups it was not until 1977 that an accurate survey was made of the extent of the glacier by the British Schools Exploring Society (B.S.E.S.). This survey provided the basis for the work of the 1979 Exeter University North Iceland Expedition and the principal results obtained in 1979 are presented below.

SURVEY METHODS

The 1979 survey programme was greatly facilitated by the availability of the B.S.E.S. map, which was based on a rigorously executed surveying programme using a combination of 3rd order triangulation, plane table and tacheometric methods. The existence of a network of identifiable ground stations established by the 1977 party and earlier expeditions, and surveyed accurately by the 1977 party, enabled triangulation work to be kept to a minimum. The 1979 survey was conducted almost entirely using a Wild RDS self-reducing tacheometer in conjunction with a 4m Tristaff. The precision of the altitudinal aspects of the survey was checked during the fieldwork when it became clear that the altitudes of particular stations as determined independently from two or more other stations showed only very small differences (*Caseldine* 1981). The datum for the altitudinal determinations was that used by the B.S.E.S. survey in 1977. This datum is not related precisely to mean sea level, its altitude having been determined with reference to photogrammetrically-surveyed contours on the AMS Series C762 Sheet 5824 III 1:50.000 topographic map. The planimetric accuracy could be checked only during the plotting of the survey data, when it was apparent that positions of stations determined by tacheometry from two other stations corresponded very closely, often within the practical limits of draughtmanship.

Taking the maximal observed discrepancies as a guide to accuracy, it is believed that altitudes (relative to the local datum) are accurate to within 0.5 m, and locations to within 5 m. Table 1 lists stations established and/or used during the 1979 survey.

i) *Glacier Survey* — The margins of the snout of the glacier were surveyed from L1, G and V[1]. The glacier margin was surveyedd at intervals of about 15—20 m although difficulties were encountered where the ice margin was obscured by snow. In such cases the marginal position was estimated from the surface configuration of the snowbeds and as these melted the actual positions were checked. Because of