Variations in meltwater characteristics at Kaldalónsjökull, Iceland, 1979

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ABSTRACT

During the summer of 1979, variations in the glacial meltwater discharge and sediment load of the River Mórilla at Kaldalón, Vestfirdir were measured. The following paper reports the results obtained between 6 and 20th July, 1979 and compares them with observations of the meteorological and ice ablation conditions on Kaldalónsjökull over the same period.

INTRODUCTION

The aims of this project were firstly to establish the order of magnitude of the variations in discharge and sediment load of the River Mórilla, a glacial meltwater stream issuing from the rapidly retreating glacier of Kaldalónsjökull. A secondary aim was to assess, as far as was possible, the effects of glacier retreat upon sediment transport rates.

The present glacier in Kaldalón is confined to the valley head although it is fed by approximately 40 km^2 of ice draining from the Drangajökull Ice Cap. Since 10800 BP and in spite of several fluctuations, substantial glacier retreat has occurred at all the outlet glaciers of Drangajökull (*John and Alexander*, 1975) and this has been recorded systematically since 1931 by *Eythorsson* (1960), *John and Sugden*, (1962), *Lewis* (1964) and *John and Alexander* (1975). Such records show that Kaldalónsjökull has retreated some 1.1 km in 48 years (Fig. 1). Fig. 1 also shows the present location of the glacier snout as surveyed by autoset level in July 1979. At this time the small rock bar noted first by *Lewis* (1964) and subsequently by *John and Alexander* (1975) had emerged substantially, separating the glacier into two ice streams and threatening eventual ice starvation of the lower snout.

METHODS

Two recording sites were established close to the glacier snout in July 1979 (Fig. 1). The first was a meteorological station sited at c. 305 m above sea-level on the rock bar above the lower snout. At this station a continuous thermohydrograph trace recorded air temperature and humidity. Wind measurements were taken daily at 1200 hrs. using a hand held anemometer and precipitation, collected by a c. 13 cm (5") rain gauge, was monitored at the same time. Ablation measurements were taken from one line of graduated ablation poles inserted into the ice surface above the rock bar at 20 m vertical intervals up to 420 m above sea-level.

The second site was a river discharge station established at 30 m above sea-level on the outwash surface close to the glacier snout (Fig. 1). Using an OTT current meter, a cross-section and velocity profile was derived and stage-discharge curve plotted. River stage was subsequently recorded at 0600, 1200 and 1800 hours each day. Suspended sediment concentration was sampled following the method of *Hjulström* (1939) and *Østrem* (1975). A 1-liter plastic bottle, bunged and fitted with 1 cm