

Fluctuations of Gljúfurárjökull, Northern Iceland 1983-1987

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ABSTRACT

Detailed survey of the marginal position of Gljúfurárjökull, Northern Iceland between 1983 and 1986 has shown a considerable slowing and probable cessation of the advance recorded since the mid-1970's. This is confirmed by independent observations in 1987. During the same period there has also been a reduction in the velocity of ice movement in the snout area, from 25.3 ma^{-1} between 1979 and 1981 to an average value of 23.2 ma^{-1} for the more recent period.

GLACIER SURVEY AND MEASUREMENTS

Visits to Gljúfurárjökull in 1986 by the author as part of the Exeter University North Iceland Expedition and in 1987 by Hans Stötter of the University of Munich (pers. comm.) have provided continuing evidence of the status and position of the glacier in its snout area. These complement regular observations begun in 1979 (Caseldine and Cullingford, 1981; Caseldine, 1983, 1985a). The marginal area of the snout of Gljúfurárjökull in 1986 is shown in Fig. 1 based on accurate survey using a Wild T1000 electronic theodolite and Distomat D14L distance measurer, and using fixed stations established during earlier surveys. Survey was extended over the glacier ice approximately 600 m onto the glacier so that all ice contours represent the 1986 ice surface.

Measurements using this survey demonstrate that Gljúfurárjökull advanced 22.5 m between 1983 and 1986, an average rate of 7.5 ma^{-1} . Earlier in the decade higher average annual rates of advance were

observed (21-22 ma^{-1} between 1979-1981, and 12.5 ma^{-1} between 1981-1983) and it thus appears that this continued reduction in the annual average represents a cessation of advance and probably even a slight retreat in 1986. In 1987 Stötter observed three closely-spaced, parallel moraine ridges on the western margin of the glacier. One of these appeared to be in process of formation and the other two he tentatively assigned to frontal positions in 1985 and 1986 (pers. comm.). Such an interpretation would imply retreat from 1985 but should perhaps be considered with caution as Gljúfurárjökull had been advancing over ground last covered in the 1950's on which could be found occasional remnants of earlier ridges which had not become vegetated. Measurement of the distance from the crest of the proximal ridge to a fixed point near the snout showed a marginal position in 1987 ridge ca. 5 m inside that identified in 1986. Although not the result of accurate survey this observation confirms the conclusion made earlier that retreat had indeed begun by 1987 at the latest. Caseldine (1985b), based on the work of Björnsson (1971) at Baegisárjökull, has argued that there is a close link between summer temperatures and glacier response for Gljúfurárjökull with an approximate 10 year lag between temperature deterioration and glacial advance. Observations of the temperature records from Akureyri point to a similar lag time between amelioration and retreat. Mean temperatures for the summer months (May to September) increased in the late 1970's and early 1980's at Akureyri generally rising above 8 °C.