

Holocene glacier fluctuations of the Eiríksjökull ice cap, west central Iceland

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Abstract – Holocene fluctuations of four outlet glaciers of the Eiríksjökull ice cap, namely Stallurinn, Brækur, Ögmundarjökull and Klofajökull west central Iceland show an interesting spatial and temporal pattern. No evidence of recent glacier erosion was found in front of the most advanced stages of Brækur and Ögmundarjökull, which according to lichenometry, are from around 1880 AD and 1923 AD, respectively. The outermost limit of Stallurinn, where lichens were absent, is inferred to date from around 1880 AD. This indicates a lack of extensive glaciation in front of these glaciers prior to the Little Ice Age (LIA) or that the earlier advances of the glaciers did not exceed the LIA limit. The Klofajökull outlet exhibits a different pattern of fluctuation and sedimentation. This outlet glacier has formed a bulk depositional feature in its proglacier area. The oldest part of the landform can be considered older than the Settlement of Iceland (ca. 900 AD) depicted from geomorphic evidence. This landform is identified as a rock glacier deposition. Lichenometric evidence suggests that the Klofajökull outlet re-advanced during the late 19th century. Simple calculations of Equilibrium Line Altitude (ELA) fluctuations suggest that during the LIA maximum the temperature was 1.5°C lower compared with present. Ice thickness calculations indicate that the maximum thickness of the ice cap is at present approximately 220 m.

INTRODUCTION

Glacier fluctuations in Iceland have a global significance because of the island's location adjacent to the boundaries of the warm North Atlantic Drift and the cold Polar Front. Major differences in the position of the Polar Front are known to have characterised the Greenland/Iceland/Norwegian Sea throughout the Holocene (Kroc, *et al.*, 1993). Since there is a strong relationship between the Polar Front latitudinal position, climatic change and variation in mass balance of glaciers, the knowledge of the pattern and timing of glacier fluctuations in Iceland would greatly improve the understanding of climatic change.

This paper describes the recent glacier fluctua-

tions of the Eiríksjökull ice cap through a study of glacier geomorphology. Four geographically diverse outlets were studied: Stallurinn, Brækur, Klofajökull and Ögmundarjökull (Figure 1). All of these outlets have a series of moraines and other glacial landforms in their proglacier areas representing a record of glacier fluctuations. Studies of glacier fluctuations of ice caps in wetter and warmer locations near the coast have revealed an interesting pattern of glacier fluctuations over the latter part of the Holocene (cf. Dugmore, 1989). The location of the Eiríksjökull ice cap in the west central highlands of Iceland, characterised by a dryer and colder climate, gives an ample opportunity to study the contrasts, if any, between ice caps in two climatically distinct areas of Iceland.