

Book Review

HYDROLOGY OF ICE CAPS IN VOLCANIC REGIONS

by

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Glaciers and ice caps (collectively named "glaciers" in this review) are a prominent feature of the landscape of Iceland, covering almost 11% of the country's surface. While most people, content with viewing these from a distance, may consider them to be simply static masses of snow, others have realized that there are important scientific questions to be answered about the dynamics of glaciers and about their effects upon the environment. In the last couple of million years, glaciation was much more extensive than now, and it played a role in creating many of the geological and geographical features of Iceland. At the present time the glaciers influence the climate of parts of the island as well as the flow of the major rivers, which in turn affects the nation's agricultural, energy and communications situation. Some of the glaciers also represent a hazard to the population, mostly through the effects of subglacial volcanic activity.

The results of observations on Icelandic glaciers are somewhat scattered, and no comprehensive treatise describing them is yet available. What has been missing in particular from our knowledge of the glaciers is the "third dimension", namely their internal structure and the subglacial landscape. Seismic sounding efforts on Vatnajökull in the early 1950's have not been followed up subsequently, and only a single deep drilling has been carried out, in 1972.

New possibilities in the study of glaciers in Iceland were opened up in 1976 with a successful attempt at radio-echo sounding, by a joint U.K.-Icelandic expedition to Vatnajökull. As has been the case in many other fields of research, Icelandic

scientists were quick to develop further the ideas and equipment brought from abroad: an improved sounder was built at the Science Institute of the University of Iceland and tested in the following summer. Since then, two large areas in Vatnajökull have been surveyed in detail, as well as essentially all of Hofsjökull, mostly by continuous measurements at 1-km line spacing. The radio wavelength used is (in ice) about 40 m, and random errors in ice-thickness determinations are generally less than 20 m. The survey equipment and processing capabilities has been steadily upgraded, and the very strenuous work of each field season has been rewarded by exciting discoveries.

Helgi Björnsson has been the key person in these developments, which followed logically from his previous research interests in fields such as glacial hydrology, jökulhlaups, and subglacial volcanism. He has been ably assisted by technical staff of the University and by members of the Iceland Glaciological Society.

Helgi has now summarized the results of these surveys up through 1987 in a book accompanied by a collection of 21 very detailed and accurately surveyed maps. One is an index map of Vatnajökull in scale 1:500 000, the others are in 1:200 000 scale. Ten of these are multicolor maps of glacier surface elevations (which incorporate many improvements upon previous topographic maps), glacier thicknesses, bedrock surfaces, and ice/water divides. The other ten (black and white) maps show data sources, ice flowlines and water potential contours.

The book consists of eight chapters. The first