

presented at the symposium are the basis for this volume. Although glaciology is a field of inquiry in which major scientific advances have been made only since the International Geophysical Year of 1957–58, the papers demonstrate that glaciologists employ highly sophisticated techniques in their field and laboratory investigations.

The papers are grouped into nine categories: glaciochemistry, deep soundings, thermodynamics, dynamics, glacial meteorology, mass budgets, fringe regions, ice shelves, and sea ice. Reference to only a few of these sections will be made in this review.

The geochemistry of glacier ice is a relatively new aspect of glaciology that was stimulated by the retrieval of long ice cores from Camp Century in Greenland. Because seasonal variations in the physical characteristics of glacier ice diminish with depth, glaciologists sought other means of dating the deep ice layers. These include studies of insoluble aerosols, ionic content, and stable and unstable isotopes.

The vertical dimension of an ice cap can be attacked by direct penetration with a core drill, by the use of a thermal probe, by traditional seismic soundings, or by radio echo exploration. Core drilling provides the most information because actual samples are returned to the surface for laboratory study. Thermal probes are in their early stages of development and may have value as an inexpensive means of making remote measurements of *in situ* temperature and stress conditions deep in the ice. The record of radio echos from an ice sheet shows the base of the ice, the ice surface, and internal reflecting horizons of unknown origin. The airborne radio echo sounding technique has made thousands of kilometers of ice thickness profiles available for analysis and study, but one constraint on the interpretation of these data is the poor quality of navigational control of the flight lines.

Papers on the thermodynamic behavior of ice sheets are concerned with the meaning of vertical temperature profiles in terms of the past climatic history of the ice sheets. The general idea is that past changes in the surface temperature of an ice sheet will be reflected in the temperature profile. Problems arise in isolating this effect, however, because other parameters such as the accumulation rate, strain rate, ice velocity, surface slope, ice thickness, and the geothermal heat flux all have some effect on the temperature profile.

Work with theoretical models indicates that there is considerable merit in continuing this line of investigation.

A paper in the section on dynamics deals with glacial modeling in an attempt to study the interplay between glaciers and climate. This approach involves a consideration of how changes in accumulation will be reflected in the behavior of a glacier.

The papers on ice shelves include movement studies and other aspects of ice shelf regimes with special attention to the question of bottom melting or freezing. This question is not yet resolved.

The international aspects of Antarctic glaciology are clearly in evidence by the fact that almost all of the member nations of the Scientific Committee for Antarctic Research (SCAR) are represented by authors of papers in this volume. While there is no general theme to this collection of papers, it is still a useful volume for scientists who are working in one or more aspects of Antarctic glaciology.

JAMES H. ZUMBERGE

*School of Earth Sciences,
University of Arizona, Tucson*

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