PREFACE

In recent years, glaciology has emerged from its status as a backwater in physical geography to become one of the most important subjects in the pursuit of understanding of the climate. We now realize that ice sheets play an important and fundamental role in regulating the climate, and that, together with the oceans and the atmosphere, the cryosphere exerts a controlling influence on its long-term evolution.

Studies of palaeoclimate reveal sudden changes caused or mediated by the presence of former ice sheets, such as Dansgaard–Oeschger events and Heinrich events, and there is ample evidence of major disruptive events involving ice sheets and their interaction with subglacial water, for example the Lake Missoula floods in eastern Washington State.

Increasingly, satellite and ground measurements reveal that the present day ice sheets of Greenland and Antarctica are also undergoing rapid changes in places. We now have evidence of pulsatile flow in subglacial lakes beneath Antarctica, rapid acceleration of Jakobshavn Isbræ in Greenland and the dramatic thinning of Pine Island Glacier in West Antarctica, potential herald of the collapse of the West Antarctic ice sheet.

These past and present dynamic events require careful measurements, but their understanding is limited by the difficulty of obtaining such measurements. For example, much of the dynamic behaviour of ice sheets is associated with the presence of water at the bed, and its effect on the basal sliding law, but there is very little direct knowledge of what this sliding law might be. Theoretical studies help to fill this gap, and indeed glaciology is one of the few subjects where theory, experiment and field work all play equally important roles in the advancement of the subject. This issue of the *Annals* takes as its theme the interplay between theory and measurements in the study of dynamical behaviour in glaciology, and the papers reflect this theme in their concerns with ice streams, grounding line migration, glacier surges, subglacial hydrology and basal sliding. In our study of the past and future of the climate, glaciology will play an increasingly important role, and theoretical studies will continue to inform the interpretation of data, just as they have done in the past.

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