Applied Geophysics in Periglacial Environments

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Book Reviews

Applied Geophysics in Periglacial Environments. Edited by Christian Hauck, and Cristof Kneisel. New York: Cambridge University Press, 2008. 256 pp. $140.00 (hardback). ISBN 0-521-88966-9.

The last four decades have seen a great expansion in the use of geophysical surveys to define subsurface conditions in mountain and polar environments. This reflects a happy conjunction of the scientific interest in permafrost and frozen ground, the potential hazards associated with changing environments, the increased power and portability of field equipment, and the availability of software to assist data collection and signal processing. This volume is intended as a guide to field researchers who are considering the use of non-invasive geophysical techniques in periglacial regions. It brings together the first-hand experiences of an international group of workers and illustrates geophysical procedures in a wide range of field contexts.

Applied Geophysics in Periglacial Environments consists of two sets of contributed papers. Part I contains four chapters which review the four main survey techniques: electrical conductivity; electromagnetic surveys; seismic refraction, and ground-penetrating radar. The authors bring to each review much experience of the methods as applied recently in mountain and polar environments. Each chapter is a useful review of the assumptions and limitations of the technique and of specific concerns when they are used in less than ideal conditions. They also conclude with a checklist of suggested field operations. Perhaps more important, each chapter includes an evaluation of the advantages and disadvantages of each technique and their applicability to the research questions asked by periglacial geomorphologists.

Part II of the volume illustrates these four procedures with 12 case studies: each is a short chapter which summarizes a specific study. The topics and geographic locations treated are as widespread as periglacial geomorphology itself, ranging from rock glacier structure and active layer thickness through talus stratigraphy to arctic glacier ice and seasonal snow surveys. The field sites studied are equally widespread: from Bylot Island and Svalbard to many mid- and low-latitude mountain sites. None of these case studies presents a particular procedure as a panacea; all emphasize the need for careful interpretation of field sites and conditions as well as the geophysical survey records. The need for validation data from direct observations, e.g. of snow and ice thickness or of permafrost depth in boreholes, or from other indicators of subsurface conditions, such as ground surface temperatures under the winter snow cover (BTS), is emphasized in all these chapters. Together, they offer a useful set of illustrations of the procedures treated in Part I of the volume.

The book also includes a 12 page appendix which summarizes the geophysical properties of different natural materials likely to be met in studies of periglacial environments.

Each chapter contains monochrome figures, some of which are reproduced as color plates, and a list of references. Cross referencing between chapters in the two main parts of the book is generally good, certainly better than is usually found in compiled volumes of this sort. The result is an attractive, if expensive, volume which is up to the usual standard of CUP. The English is occasionally odd (which is not surprising given that it is the first language of only 2 of 27 authors) but is always comprehensible.

Although the volume will be a useful resource, I was left with the question ''For whom is it intended?'' The comprehensive summaries of procedures in Part I are current and useful but will not replace standard texts on geophysical survey methods, which are usually in the reference list of each chapter. Similarly, the case studies of Part II are good illustrations but are only brief summaries of more detailed reports already available in the published literature, and which are also in the references of each chapter. So, the value of *Applied Geophysics in Periglacial Environments* lies in its compilation of materials and as a source book that will lead readers to survey techniques that have been used in cold environments. In this, it is current and wide ranging and the authors and editors have done a fine job of providing a single source.

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