

for the two dozen essential ground control stations. The Cansos, flown in stages from Canada, managed to include in their itinerary full photo-coverage of the Falkland Islands.

FIDACE was eclipsed by the contemporary and more spectacular Commonwealth Trans-Antarctic Expedition. Despite foul weather and other hazards it afforded no headline-grabbing disasters or disputes, but did a solid, sensible job on which current maps and charts of the area to a great extent depend for their accuracy. (Just how much FIDACE results have been used has been the subject of recent correspondence in *Geographical Journal*, November 1985 and March 1986.) As this book shows, it was a major expedition in its own right, with plenty of adventure and adversity and a refreshingly professional approach to its work. The story here told by Peter Mott, who led and organized it, is an excellent one, earning an honoured place in the literature of pioneering polar expeditions. Published by the author, *Wings over ice* includes plenty of maps and superb photographs of this most photogenic sector of Antarctica. The book is obtainable directly from Upton Bridge Cottage, Langport Road, Long Sutton, Somerset TA10 9NQ. (Bernard Stonehouse, Scott Polar Research Institute, Lensfield Road, Cambridge CB2 1ER.)

### PERMAFROST

THE PERMAFROST ENVIRONMENT. Harris, S. A. 1986. London, Croom Helm. 276p, illustrated, hard cover. ISBN 0-7099-3713X. £22.95.

Areas affected by permafrost cover almost one quarter of the earth's land surface. They contain resources, particularly oil, gas and minerals, which are being exploited actively. While teaching a course on the use of permafrost Stuart Harris became aware of the lack of a suitable modern text in English aimed at advanced undergraduates and interested professionals. In particular, there was a need for an account of the nature and processes of the environment and the engineering implications. This book is the result and a very fine one too. The first three chapters, comprising one third of the book, deal with the history of permafrost research, permafrost identification, nature and processes, and the distribution and stability of permafrost. These chapters are a delight, comprehensive, concise and packed full of insights. They represent the best account of the subject available and should be priority reading on any student reading list. Particularly interesting is the stress laid on the importance of freezing upwards from the permafrost table, the effect of water accumulation on top of the permafrost table, the critical importance of the water content in influencing freezing rates, the differing behaviour of different types of ground water and the accounts of ice segregation, sorting, cracking and frost comminution. The latter discussion includes references to studies in Hudson's Bay in 1743! There are maps showing the susceptibility of permafrost; it is sobering to realise that a rise of only 2°C mean annual temperature would start degradation of 40% of permafrost areas. In view of fears of global warming due to increasing CO<sub>2</sub> in the atmosphere, such estimates assume considerable importance.

Two thirds of the book are devoted to the engineering implication of permafrost. Thus there are chapters, sometimes routine, on foundations, roads and railworks, airfields, oil and gas, mining, water and electricity, agriculture and forestry. These chapters contain clear maps of the distribution of activity within each sphere and a considerable level of detail. The reader will learn where to place explosive charges in a quarry in ice-rich permafrost, how to allow for burial of 0.5 m<sup>3</sup> per person per year in disposing of 'honey-bags' (the contents of bucket toilets) and that the number of red blood corpuscles in sheep per mm<sup>3</sup> increases with altitude. The effect of these chapters is to explain clearly

the practical implications of engineering in permafrost. Throughout all chapters there are abundant references to a wide range of literature ideal for further study. The book covers mainly the Arctic with brief reference to low-latitude alpine permafrost areas. The Antarctic does not feature. One very minor criticism might be noted by geographers—introductory comments about the location and reasons for economic development are often discussed in simplistic terms. But these are minor and do not detract from overall value. The book, especially the first part, is the best available concise account of permafrost. It deserves to be widely read, and would be if only the price was more appropriate to the targeted readers. (David Sugden, Department of Geography, University of Aberdeen, St Mary's, High Street, Old Aberdeen AB9 2UF, Scotland.)

### THE ANTARCTIC CIRCUMPOLAR CURRENT: A SOVIET VIEW

STRUCTURE AND VARIABILITY OF THE ANTARCTIC CIRCUMPOLAR CURRENT. Sarukhanyan, E' I. 1986. Rotterdam, Balkema. (Russian Translation Series 44). 108p, illustrated, hard cover. ISBN 90-6191-467-1. £19.00.

This useful little book is a translation of a Russian work of 1980 vintage, and gives a coherent review of the results of two interlocking research programmes of the 1975–79 period. These were the Soviet POLEX-South and the US-led International Southern Ocean Studies (ISOS); both programmes were aimed at improving our understanding of the synoptic properties of the Antarctic Circumpolar Current, and their aims and methods were so similar that the two projects developed a formal and fruitful system of collaboration. The results of the field studies, which involved the use of drifting buoys and current meter moorings as well as oceanographic station work, have given us a new insight into the complexity of the world's most important current system. The current varies immensely in time and space; it appears to be divided into filaments; it is greatly affected by bottom topography; and a large part of its energy is located in eddy motion. Concisely but adequately surveying these results, this book is a timely one—but only just, for the level of research activity in the Southern Ocean is now growing very fast, and a much higher level of insight will be reached within the next 2–3 years.

The book has no index, and minor mistakes mainly due to imperfect translation. Most irritating is the use of acronyms in which the Russian initial letters are retained; thus FGGE (the First GARP Global Experiment, with GARP itself an acronym for Global Atmospheric Research Programme) becomes the unrecognisable PGEP, or at times, FIGAP. A mysterious electronics company called Magnavoks is mentioned, and Canadians will be interested to learn that their ship *Hudson*, which laid current meters in the Drake Passage in 1970, is described throughout as American. But these are small blemishes in a useful book. (Peter Wadhams, Scott Polar Research Institute, Lensfield Road, Cambridge CB2 1ER)

### THE ICEBERG'S STORY

VOYAGE OF THE ICEBERG. Brown, R. 1986. London, Bodley Head. 166p. £9.95.

This is the story of the iceberg that sank the *Titanic*; or rather, the story of a typical iceberg that calves from the west coast of Greenland and ends its life in the North Atlantic. Richard Brown tells an exciting tale in a fascinating way. The history of the berg, and of the adventures which it may have undergone during its long drift, is interleaved with the history of the *Titanic* herself, her design, building, launch, fitting out, and the terrible complacency that underlay her first and last voyage. The fateful meeting of iceberg and