

research in Arctic and sub-Arctic seas is still most intense, with the need for a US research icebreaker and more international experiments being planned for the future.

The Arctic Ocean issue of *Oceanus* makes good reading, but then so does any other issue of this informative journal. Indeed, as a polar scientist I found earlier numbers more compulsive reading, for example 28(1) on marine archaeology, and 28(2) on the oceans and national security. I presume, however, that if I practiced marine archaeology for a living, I might be fascinated by the recent volume on the Arctic, and can therefore most highly recommend it and a subscription to the journal as a whole. (Vernon A. Squire, Scott Polar Research Institute, Lensfield Road, Cambridge CB2 1ER.)

NORTH AMERICAN SEALERS

THE WAR AGAINST THE SEALS: A HISTORY OF THE NORTH AMERICAN SEAL FISHERY. Busch, B. C. 1985. Kingston and Montreal, McGill-Queen's University Press. 374 p, illustrated, hard cover. ISBN 0-7735-0578-4. \$29.95.

Briton Cooper Busch wrote this book for the best possible reason. He scoured the libraries for a history of the North American sealing industry, found there was no such thing, so wrote his own. A historian with little personal knowledge of seals, he relied on biologist colleagues for his zoology. They served him well; there is little to fault in his account of the animals themselves. The history is lucid, leading us in time from the late 18th century almost to the present, and covering everywhere from Arctic to sub-Antarctic where American sealers worked. Much of the text concerns the hunt for Bering Sea fur seals and Newfoundland harp seals, which together provided the backbone of the industry, but South American, South African and Southern Ocean stocks too are brought into the picture. Busch writes well of the sealers, their ships and their islands; no less important in his story are catch statistics, details of pelt processing, industrial disputes, markets, and the dealers and entrepreneurs who ultimately determined how many seals would die each year for the industry. A most readable story, marred for me only by a plethora of footnotes requiring frequent excursions to the back pages; if a fact is worth putting in, surely it is worth the trouble of building into the main text. This an essential book for libraries and students concerned with the sealing industry. (Bernard Stonehouse, Scott Polar Research Institute, Lensfield Road, Cambridge CB2 1ER.)

AERIAL SURVEY OF GRAHAM LAND

WINGS OVER ICE: AN ACCOUNT OF THE FALKLAND ISLANDS DEPENDENCIES AERIAL SURVEY EXPEDITION. Mott, P. G. 1986. Long Sutton, Mott. Illustrated, hard cover.

Here is the long-awaited account of FIDACE, the aerial survey expedition that systematically photographed much of Antarctic Peninsula and adjacent islands some 30 years ago, in the summers of 1955-56 and 1956-57. FIDACE was organized by Hunting Aerosurveys Ltd on behalf of the British Colonial Office; it was both the first commercially-run Antarctic survey expedition, and the first fully-controlled aerial survey of a sector of Antarctica. Its terms of reference were to take vertical photographs between 62° and 68°S, provide a ground control framework for the preparation of accurate maps, and run airborne magnetic profiles in specified areas for geological investigations.

To this end the survey's two amphibian Canso aircraft flew some 130,000 nautical miles, covered 35,000 sq miles of territory, and took about 17,000 photographs. The survey was organized from a base on Deception Island, with ship and helicopter support

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 CO₂ 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 m³ 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 mm³ increases with altitude. The effect of these chapters is to explain clearly