

draws on the author's own experience with BP's work in the Beaufort Sea and summarises the results of many hitherto proprietary studies. It also contains a description of measurement techniques and their application.

Chapter 6 deals with the theoretical analysis of ice failure. Here the reader becomes aware of the gap which still exists between the mathematical analysis of elastic buckling, creep buckling and fracture, and the real behaviour of ice on a large scale. Our lack of knowledge of the ways in which cracks nucleate and propagate is one of the major obstacles. The final chapter, on calculation of design loads, makes use of the earlier material to give advice on the immediate practical problem faced by the ice engineer, that of estimating the maximum load exerted by ice at a given site on a given structural design. Continuous static and dynamic loading are considered, as well as the discontinuous impact forces of isolated multi-year floes and icebergs on a structure.

Everyone concerned with ice problems will find this book of value. The design engineer may start with the last chapter and work his way backwards in order to understand the theoretical and observational underpinnings to the design load calculations recommended. The ice physicist or oceanographer will start with the first two chapters but will read on in fascination at the ways in which the methods of physics and engineering complement one another in the attack on an immensely important practical problem.

The continuation of low oil prices has caused a lull in the development of Arctic resources, but there is no doubt that the Beaufort, Labrador and Barents seas will once again become a main focus for oil exploration. This book will be of the greatest value to everyone involved in that frontier. (Peter Wadhams, Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER.)

ALASKAN HISTORY IN MAPS

ALASKA EXPLORATION MAP SERIES. Marshall, Philip S. (compiler and editor). 1987. Fairbanks, University of Alaska Press (Produced by the Arctic Environmental Information and Data Center). 4 maps folding. US\$25.00 plus US\$2.00 p and p.

In a series of four maps, compiler Philip Marshall shows the routes of sixty expeditions in and around Alaska, from Vitus Bering's maritime voyage of 1728 to the transpolar dirigible flight by Roald Amundsen and Umberto Nobile in 1926. The maps, scaled at one inch to 69 statute miles, summarize two centuries of Euro-American efforts to delineate the coastline, discover a Northwest Passage, chart the rivers and mountain ranges, locate minerals, collect specimens and artifacts, establish communication lines, and Christianize the native inhabitants. The selection of expeditions has been guided by their historical and geographical significance and by the availability of adequate documentation. The result is not an

'exhaustive' representation of Alaskan exploration but a generalized picture intended mainly for secondary school history students.

The large (2 x 3 ft) maps fold into a paper envelope (9 x 12 ins). Coloured symbols showing the tracks of expeditions are generally clear, although more arrows indicating direction of travel would be useful. Additional information, sometimes anecdotal and trivial, is provided in approximately 100 boxes, and a number of portraits and small sketches are scattered about. The style resembles that of National Geographic maps, but the execution is not as good. The map envelope contains notes and corrections, and nearly 100 bibliographic sources are listed on the backs of the maps.

With the space available on these large maps latitude and longitude could easily have been indicated, and the areas blanketed by boxes might have been used more effectively by showing some of the major environmental features that have influenced the course of exploration, such as topography, natural vegetation (in particular the tree line separating arctic tundra from subarctic forest), and the seasonal limits of sea ice. The lack of physical information to provide a context for the understanding of the geography of exploration is especially curious, as the maps were produced by a centre of environmental information. Despite this shortcoming the map series constitutes a convenient guide to the Alaska's exploration. (W. Gillies Ross, Scott Polar Research Institute, University of Cambridge, Cambridge CB2 1ER.)

BEAUFORT SEA GEOLOGY AND GEOPHYSICS

MARINE SCIENCE ATLAS OF THE BEAUFORT SEA; GEOLOGY AND GEOPHYSICS. Pelletier, B.R. (editor). Ottawa, Energy, Mines and Resources Canada, Geological Survey of Canada Miscellaneous Report 40. 43 p, illustrated, soft cover. ISBN 0-660-53107-0. Can \$30.00 in Canada, \$36.00 in other countries.

This handsome atlas is an outgrowth of the Beaufort Sea Project, begun in 1974-75 by the Canadian government and a segment of the Canadian petroleum industry as a study of the coastal and offshore area of northwestern Canada that has the hydrocarbon potential perhaps equal to that of Prudhoe Bay to the west. More than 40 research projects were conducted on the physical, biological, and human aspects of potential development of oil and gas in this area. More than 60 investigators contributed to this atlas, which contains only topics on geology and geophysics.

The format is large folio 14 x 20 ins (35.6 x 50.8 cm), in which each of 38 fold-out plates shows information on the tectonics, seismicity, magnetic setting, gravity anomalies, geothermal gradients, geology, and permafrost zones. All those are in color, and several plates include black- and-white photographs of representative land and geologic features. Each plate includes explana-

tory text in English and French. The area covered by the plates is roughly 68° to 71°N, 128° to 140°W. The atlas is plastic-spiral bound, which allows each page to lie flat.

Early geologic events represented in the atlas are as old as the beginning of the Paleozoic, although the beginning of the Tertiary Period, about 65 million years ago, is more important from the standpoint of economic potential. It was then that structural and stratigraphic traps developed in reservoir rocks that became sites for deposits of natural hydrocarbons migrating from nearby source beds. More emphasis is thus placed in the atlas on this period of geologic time, although Phanerozoic geology is also shown on a series of plates for completeness. The older geology is known as a result of drilling activities by the Canadian petroleum industry on land-based platforms, marine-based artificial islands and drillships. In this part of the world, north of the northern limit of active permafrost, the depth to the base of permafrost offshore is 700 m below the seafloor, and 740 m on land. Distribution of thinner permafrost zones bears some relationship to the limits of Wisconsinan glaciation, as shown on one of the plates. Permafrost is just one of the concerns confronting development of hydrocarbons in this harsh environment.

'This atlas is designed to serve resource developers, exploration companies, scientific communities, government agencies, schools, and the public. It is also organized to provide background and baseline information for safe environmental and engineering designs.' (from the preface). The Canadian government has done a great service in providing this series of atlas plates which, in some respects, is also an environmental atlas and a manual for safe development of resources in the Beaufort Sea. (John Spletstoeser, Minnesota Geological Survey, University of Minnesota, St. Paul, Minnesota, U.S.A.)

BRIEF REVIEWS

NORTHERN ENVIRONMENTAL DISTURBANCES. Kershaw, P. (editor). 1988. Edmonton, Boreal Institute for Northern Studies (Occasional Publication 24). 70 p, illustrated, soft cover. ISBN 0-919058-69-8. Can\$15.00 inc postage.

A volume including five of the eight papers presented at a workshop in Edmonton, November 1986, on the theme 'Northern environmental disturbances: mitigation and reclamation'. The papers report on long-term experimental work relevant to site reclamation, including surface drainage control and re-establishment of plant cover.

RESEARCH AND MONITORING IN CIRCUMPOLAR BIOSPHERE RESERVES. Simmons, N., Freeman, M. and Inglis, J. (editors). 1987. Edmonton, Boreal Institute for Northern Studies (Occasional Publication 20). 75 p, illustrated, soft cover. ISBN 0-919058-65-5. Can\$15.00 inc postage.

Proceedings of an international symposium held in August 1987 at Waterton Lake, Alberta; the report is pub-

lished jointly by UNESCO-MAB Northern Science Network and the Boreal Institute. Topics covered include resource development in arctic biosphere reserves, integrated global background monitoring networks, public participation in reserve research and management, planning the creation of new arctic reserves, and Soviet contributions on the principles of distribution of reserves and global monitoring networks in the subarctic, and environmental education in biosphere reserves.

SMALL-TYPE COASTAL WHALING IN JAPAN. Freeman, M. M. R. (convenor). 1988. Edmonton, Boreal Institute for Northern Studies (Occasional Publication 27). 116 p, illustrated, soft cover. ISBN 0-919058-75-2. Proceedings of a workshop involving a dozen participants from Australia, Canada, Japan, Norway, UK, and USA, convened in April 1988 to discuss 'small-type coastal whaling'—the excruciating title of a regulated Japanese fishery involving mainly minke, pilot and Baird's beaked whales. This report includes chapters on the history, sociology and current status of Japanese coastal whaling, the distribution and uses of whale meat, appendices and a bibliography.

ICEBOUND: THE JEANETTE EXPEDITION'S QUEST FOR THE NORTH POLE. Guttridge, L. F. 1987. London, Airlife Publishing. 357 p, illustrated, hard cover. ISBN 1-85310-006-4. £13.95.

An account of an ill-starred US naval expedition, led by Lt George De Long, to explore the north polar basin from the Bering Strait. *Jeanette* was caught in the ice, carried past Wrangel Island and finally crushed; De Long and his crew took to the boats, the survivors ending up in the Lena delta. A well-researched and well-told story; this is the UK edition of a book published in 1987 by the US Naval Institute.

THE LIVING TUNDRA. Chernov, YU.I. 1988. Cambridge, Cambridge University Press (Studies in Polar Research). 213 p, illustrated, soft cover. ISBN 0-521-35754-3. £12.95, \$17.95.

Doris Löve's translation of a tundra biology classic, now in soft cover at an acceptable price: the original edition (1905) was reviewed by R. E. Longton in *Polar Record* 22(140): 541 (1985).

OCEANUS 31(2):THE ANTARCTIC. Ryan, P. R. (editor). 1988. Woods Hole, Woods Hole Oceanographic Institution. 112 p, illustrated, soft cover. ISSN 0029-8182/83. US\$2.00 + .05.

Special Antarctic issue of *Oceanus, the International Magazine of Marine Science and Policy*, with timely articles on the Treaty system, the ozone hole, the circumpolar current, the southern ocean and global climate, marine living resources, oil and natural gas, the Soviet Antarctic program, logistics, Antarctica and the Law of the Sea and other contemporary concerns.