

west Siberia and northern Alberta were forced to redefine and renegotiate their perceived identities, and indeed their relationships to the nation-state, as a result of large-scale industrial development and the accompanying environmental degradation of their homelands.

Charles Johnson shows the role indigenous peoples have played, and continue to play, in environmental policy-making in the Arctic. His emphasis is on the social and environmental impact of trans-boundary pollution. In the Arctic, persistent organic pollutants (POPs) enter the food chain at every level. Because they break down more slowly in the Arctic than in more temperate regions, POPs pose greater dangers to human and animal populations. Johnson demonstrates indigenous concerns over pollution and environmental degradation as a public health issue, but also as a cultural issue. His chapter is also representative of indigenous discourses that argue for a recognition of the unique relationship that indigenous peoples have to the Arctic environment, and argue for the inclusion of indigenous perspectives in procedures and processes of environmental policy decision-making.

Discussing the relationship between environmental problems and human rights, Beach and Collings examine, respectively, how Saami reindeer herding as a livelihood is threatened by both state rationalisation and environmentalists in Sweden, and the political and cultural contexts of wildlife management in Canada. In the Saami case, reindeer herding is under pressure from legislation to make it conform to the Swedish state's view of what constitutes profitable business, while environmentalists criticise Saami reindeer herders for abandoning what they see as a 'traditional' lifestyle. In Collings' chapter, the virtues and drawbacks of co-management of wildlife are examined: while the indigenous environmental knowledge of Inuit hunters is considered 'useful' by scientists, Collings argues that such knowledge is not always taken as valid in the same way as the scientific knowledge of biologists. Rather than knowledge being transferred and shared, it is more often controlled, leading to a situation of the passive involvement of local communities rather than active involvement. Thus full community participation is not necessarily achieved, calling into question the effectiveness of co-management as both process and policy.

This book is a valuable contribution to current debates about the impact of rapid social and cultural change and the causes and consequences of the environmental crisis affecting virtually every part of the circumpolar north. It shows how indigenous concerns and anxieties over industrial development, resource exploitation, and environmental degradation arise because of the close relationship between the cultural, economic, political, and ecological situations of native communities. Each chapter points to the importance of ethnography and local case studies in understanding the complexities of local and regional processes as interacting with, being influenced by, and impacted upon by global processes. (Mark Nuttall, Department of Sociology, University of Aberdeen, Aberdeen AB24 3QY.)

ANALYSIS OF SAR DATA OF THE POLAR OCEANS. Costas Tsatsoulis and Ronald Kwok (Editors). 1998. Heidelberg: Springer-Verlag. viii + 290p, illustrated, hard cover. ISBN 3-540-62802-9. 248 DM; £95.50; \$US159.00.

This is a readable and thorough technical volume on the analysis and application of satellite synthetic aperture radar (SAR) data. Since 1991 four key satellites have been flown using this advanced (active microwave) technology: ERS-1 (European Space Agency) in 1991; JERS-1 (National Space Development Agency of Japan) in 1992; ERS-2 in 1995; and, RADARSAT (Canadian Space Agency) in 1995. The ERS-1/2 satellites have routinely produced 100 km swath (width) Earth images with 25 m resolution. RADARSAT can produce 50 km swaths with 10 m resolution imagery; however, in a wide-scan mode of operation (called ScanSAR), 500 km width swaths of 100 m resolution are achieved. This unique data is key to RADARSAT's effective use in operational monitoring of large regions of sea ice. Such polar orbiting satellites have ushered in a new era of remote sensing of the polar regions. These high resolution images of the Arctic and Antarctic will become increasingly important to the study of global environmental change. Without question this timely book provides a comprehensive 'state of the art' of SAR and its many capabilities for monitoring the Arctic and Southern oceans.

Seven chapters are devoted to SAR data analysis, which has yielded a surprisingly wide range of applications. In Chapter 2, a new algorithm automatically classifies ice floes in SAR images; techniques are also presented for the computation of ice-floe size distribution. Useful colour-coded images illustrate the segmentation of a SAR image and the resulting floe-size distribution. In Chapter 3, SAR is used to estimate components of the surface energy balance within the ocean-sea-ice-atmosphere interface ('the marine cryosphere'). During 1990-1995, a pioneering research project in the Canadian Arctic — the Seasonal Ice Monitoring and Modelling Site (SIMMS) — focused on the interrelationships among the geophysical, electrical, and microwave scattering properties of snow-covered sea ice. The project's key findings are summarised, including the successful use of SAR to detect the onset of melt in the cryosphere.

Chapter 4 reports on the efforts to use SAR data better to understand sea-ice deformation on an intermediate regional scale of 10-50 km (between a climate scale at 100-300 km and a floe scale at 1 km or less). At this scale, leads (with resulting thin ice and open water) form from sea-ice divergence, and pressure ridges are created from sea-ice convergence. An automated computer program is described that analyses ice-motion products of the Alaska SAR Facility, selecting only those where there is substantial sea-ice deformation. Several examples illustrate the algorithm's ability to identify openings and changing leads in SAR images. One of the most important and challenging tasks is the possible fusion of data from

different satellite sensors. Chapter 5 discusses efforts to merge active SAR (ERS-1) and passive microwave (SSM/I, Special Sensor Microwave/Imager of the US Defense Meteorological Satellite Program) data using a 'hybrid fusion' approach. Passive microwave data (of a much lower resolution, 25 km) is mapped to the coordinates of the ERS-1, high resolution data; and, an estimate of multi-year ice concentration from the SAR data is used as a constraint in modifying the passive microwave algorithm (for ice-type concentration). The results of the fusion process are promising: initial first-year ice concentrations are significantly improved for the freeze-up season. Chapter 6 uses SAR for studies of ocean-ice interaction, particularly along marginal ice zones and within polynyas. A new method for remote sensing signal analysis, the wavelet transform, has been developed to track more effectively the ice edge, ice-floe motion, and mesoscale eddies in the ice margin.

Techniques for the automatic mapping of the seasonal transitions of sea ice using SAR are presented in Chapter 7. This chapter includes innovative maps showing the dates of melt onset and freeze-up of sea ice in the Beaufort Sea, all computed from ERS-1 data. The algorithms take advantage of a springtime drop in backscatter coinciding with rising local air temperatures; in the autumn freeze-up, the transition to a high, stable backscattering (from a period of erratic values of backscatter) is monitored during cooling. Chapter 8 is a comprehensive treatment of using SAR in the Antarctic for sea-ice studies. The Weddell Sea region is emphasised, since this is where ERS SAR missions were coordinated with field measurements. This chapter is particularly well-illustrated with clear satellite images and data plots; one highly useful plot (page 161) indicates the backscatter measurements for a broad range of ice types in the Weddell Sea. The discussions of the backscatter characteristics of sea-ice types and sections on Antarctic sea-ice dynamics will be invaluable to many investigators.

The second part of the book, in four chapters, focuses on SAR polar systems and facilities. The vision, mission, and capabilities of the Alaska SAR Facility in Fairbanks are fully documented in Chapter 9. Also included is a succinct review of the role of SAR in sea-ice research, covering the need for ice types and concentration, ice motion, and ice morphology, as well as the requirements for effective operational ice information systems. Chapter 10 includes an excellent review of the world's ice information services (US, Canada, the Baltic nations, Russia, and Japan). Key sections review manual analyses of SAR images and the combination of SAR data with other forms of information. The problems of automatic ice classification using ERS-1 data at the US National Ice Center are highlighted (examples being the over-estimation of first-year ice cover at high latitudes, and the misclassification of first-year ice in the marginal ice zone). Such practical experience from the ice centres is of critical value to remote sensing specialists developing SAR algorithms.

Chapter 11 describes the RADARSAT Geophysical Processor System in use at the Alaska SAR Facility. The system is designed to produce five key sea-ice parameters: ice motion, ice age/thickness distribution, melt onset/freeze-up, open water fraction, and backscatter histograms (for use in a variety of studies related to energy and mass fluxes in sea-ice surfaces). Each of the algorithms is discussed and the resulting products reviewed. The final chapter (12) reviews a SAR data analysis system (developed by a group in the UK led by GEC Marconi Research Centre) that has commercial applications, particularly for ice piloting of ships. The original work used ERS-1 SAR data that was analysed by algorithms for ice motion, ice type/concentration, ice edge, and iceberg recognition. The ice piloting system was tested off Greenland in 1994 and it can be adapted for RADARSAT and other future SAR sensors. The chapter also includes an informative section on iceberg detection using SAR, where three characteristics of an iceberg may be identified in imagery: the iceberg itself, an iceberg shadow (the lee of an iceberg for example), and an iceberg wake.

In summary, this volume is a valuable contribution to polar science. It is well-written, superbly illustrated, and contains a useful author citation index for most of the key literature in this field (referenced in the text). The editors are applauded for keeping to a minimum the advanced physics and sophisticated mathematics of this highly technical subject. Thus, the book is likely to become a ready reference for students as well as polar scientists of many disciplines. Since satellite SAR is such a significant tool for studying sea ice and the polar oceans, and will remain so well into the next century, the book is strongly recommended for all polar and remote sensing libraries. (Lawson Brigham, Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER).

THE ROMANCE OF NIKOLAI REZANOV AND CONCEPCION ARGÜELLO: A LITERARY LEGEND AND ITS EFFECT ON CALIFORNIA HISTORY. Eve Iversen. 1998. Kingston, Ontario, and Fairbanks: The Limestone Press. vii + 176 p, illustrated, soft cover. ISBN 1-895901-22-7. \$US20.00.

The story of Nikolai Rezanov and his brief liaison with Concepcion Argüello is well-known in California, but is less familiar in other parts of the world. It has some peripheral interest for readers of *Polar Record*. In brief, Rezanov, born in 1764, was a Tsarist official who was instrumental in the formation of the Russian-American Company, which controlled Alaska until its sale to the United States in 1867. He had married the 14-year-old Anna Shevlikova during a mission to Irkutsk, but she died in 1802 after bearing two children. In 1803 Rezanov sailed in Krusenstern's ship *Nadezhda* on its voyage to the Pacific. His formal appointment was as ambassador to Japan, but on arrival there he was placed under house arrest and then expelled in April 1805. Rezanov then sailed to Petropavlovsk, from whence he proceeded to Novo-Archangelsk (Sitka). This settlement was in severe straits