

that 'in an increasingly interdependent world, in both the economic and the ecological senses of the term, the idea of international cooperation is not just an ideal but an imperative' (page 37). But he is also cautious. Despite evidence of the 'growing ascendance of environmental values over resource-driven geopolitical visions' (page 229) in the polar regions, 'old habits and attitudes die hard' (page 200). There is no guarantee, he advises, that governments will accept the assumptions underlying the new geopolitics. As a result, it is preferable to view ourselves as living not in a world dominated by the new geopolitics, but rather one in a process of geopolitical transition (page 201). (Peter J. Beck, Faculty of Human Sciences, Kingston University, Penrhyn Road, Kingston upon Thames, Surrey KT1 2EE.)

Reference

ATCPs. 1997. *Draft Report of the Twenty-first Antarctic Treaty Consultative Meeting, 19–30 May 1997*. Wellington: Department of Foreign Affairs and Trade.

VOICES IN STONE: A PERSONAL JOURNEY INTO THE ARCTIC PAST. Peter Schledermann. 1996. Calgary: Arctic Institute of North America (Komatik Series No 5). xvii + 221 p, illustrated, soft cover. ISBN 0-919034-87-X. \$Can25.00.

Peter Schledermann's archaeological research in the Smith Sound region of northern Ellesmere Island during the past two decades has been instrumental to an understanding of prehistoric population adaptations and movements in the Canadian High Arctic and Greenland. *Voices in stone* is intended for the non-specialist, although it will certainly appeal to specialists as well, and serves both as a summary of the results of his 12 seasons of field investigations in the Smith Sound area and as a personal narrative of these investigations.

The introductory chapters briefly summarize current archaeological approaches and methods, introduce the reader to the Polar Inuit (the historic inhabitants of Smith Sound), and describe the archaeological context of Schledermann's research. These are followed by a series of chapters describing successive Paleoeskimo (ca 4000–1000 BP) and Neoeskimo (ca 1000 BP to present) occupations. In addition, one chapter deals with evidence for, and influence of, contact with the Greenland Norse colonies, another with European and Euroamerican exploration and settlement, while the final chapter, entitled 'Lessons from the past,' is essentially a personal philosophical essay.

The book is very well written, and various anthropological concepts, such as cultural ecology — which Schledermann relies on as a unifying thread to explain most temporal changes in population levels and population movements in the region — are explained in a simple, clear manner and applied in a straightforward fashion. Furthermore, it presents an interesting 'history' of a long-term archaeological project, from the initial concept of the project through the various survey and excavation stages. In doing so, it illustrates not only the connections between

the various stages and the often heuristic nature of archaeological field projects, but also how logistical and climatic constraints can significantly modify such projects; many readers will readily identify with potentially important locations that are inaccessible, fog-bound landing areas, tents shredded by gale-force winds, and overly curious polar bears.

The book is richly illustrated with excellent colour and black-and-white photographs and a series of fine bird sketches by artist Brenda Carter. A few minor errors of historical fact occur (for example, McClintock met Qitdlarssuaq's group in 1858, not in 'the early 1860s'), but they do not detract from an otherwise very enjoyable book. (James M. Savelle, Department of Anthropology, McGill University, 855 Sherbrooke Street West, Montreal, Quebec H3A 2T7, Canada.)

PHYSICS OF THE UPPER POLAR ATMOSPHERE. Asgeir Brekke. 1997. Chichester: John Wiley and Sons. xi + 491 p, illustrated, hard cover. ISBN 0-471-96018-7. £29.95; \$US50.00.

Physics of the upper polar atmosphere is an excellent and comprehensive summary of present-day knowledge of this region of the Earth's environment, written by a well-known and widely acknowledged expert in the field. The study begins with a detailed account of the Sun as a source of radiation. This is an ideal approach to the subject, because it gives a good understanding of the solar–terrestrial relationships that are involved in determining the nature and properties of the upper polar atmosphere. Starting with the short-wave extreme ultraviolet emissions and working through to the long-wave radio emissions, the properties of these various radiations are described and their origins in the solar atmosphere specified. Two examples of these important solar–terrestrial relationships may be cited: firstly, the extreme ultraviolet emission (between 0.01 and 0.1 μm) from the solar chromosphere, which generates the Earth's ionosphere by photo-ionisation, and, secondly, the far-ultraviolet emission (between 0.1 and 0.2 μm) from the top of the solar photosphere, which produces thermal dissociation of molecular oxygen in the mesospheric and thermospheric regions of our atmosphere.

The second chapter leads on logically to a detailed study of the solar wind and the interplanetary magnetic field, as this region is involved in the transmission of solar particles and emissions to the Earth and its magnetosphere. This section deals with the Sun's magnetic field, the frozen-in field concept, the electric field in the solar wind, and the well-known 'garden hose' effect.

The third chapter deals with the atmosphere of the Earth — its nomenclature and composition, its temperature structure, its frictional drag on Earth satellites, its behaviour as an ideal gas, and its 'oxygen chemistry.' More topically, and perhaps of more general interest, it also deals with 'global warming' and 'ozone holes.' The former is attributed to increasing amounts of carbon dioxide and other 'greenhouse gases' trapping more heat in the

Earth's atmosphere to give higher world temperatures. The latter is thought to be due to partial depletion of the ozone layer over polar regions in the spring by the action of natural and man-made chlorine compounds, including CFC gases. The discussion of both these effects (global warming and ozone depletion) is balanced, due consideration being given to the many natural and anthropogenic factors involved in both these phenomena. Nowadays, a third possible atmospheric pollution effect is also recognised: the apparent increase in the incidence of noctilucent cloud. This phenomenon is observed from time to time at a height of 82 km, close to the inversion layer at the mesopause in the six-week period centred on the summer solstice, that is, around 21 June in the northern hemisphere and 21 December in the southern hemisphere. The clouds consist of a sheet of water-ice crystals that become visible when critically illuminated by the Sun from below the horizon. Their production is thought by some to be related to an increase in atmospheric methane generated by agricultural expansion in the last 200 years or so.

After these general introductory chapters, there are more detailed discussions in more specialised areas. In the first of these, which considers the Earth as a magnet, there is a brief but interesting historical introduction followed by a description of the Earth's field, a mathematical discourse on the magnetic system, and a discussion of secular variations in the magnetic field. However, the bulk of the section is devoted to a general dissertation on the motion of charged particles in a magnetic field and then to Størmer's more specific study of the motion of auroral particles in relation to the so-called forbidden and permitted regions of the Earth's field. The section ends with a consideration of the Van Allen radiation belts, which the author equates with Størmer's forbidden regions, that is, regions into which particles cannot penetrate from the outside in steady-state conditions. The protective effect of these belts against harmful solar and interstellar radiation is noted and some experimental evidence presented that suggests that this protection might be reduced by depletion of the belts following high-altitude nuclear tests.

Two further sections (chapters 5 and 7) deal with the ionosphere. The first is largely concerned with its production by photo-ionisation as a result of solar irradiation, and the second with ionospheric currents. This latter section gives a description and mathematical analysis of the Birkeland field-aligned, sheet currents; the Hall and Pedersen height-dependent, horizontal currents in the E- and F-regions, respectively; the equivalent current systems for different orientations of the B_y and B_z components of the interplanetary magnetic field; the current distributions around the Harang discontinuity; the S_q current system; and the polar-cap current distribution.

The book concludes with two chapters on the magnetosphere and the aurora. The penultimate chapter, on the magnetosphere (the magnetic cavity carved out of the solar wind by the Earth's magnetic field), gives a detailed description of its structure illustrated with some new diagrams that may give the reader some fresh insight

into the 'anatomy' of this region. This section also presents a model of the magnetic field down-tail from the Earth and considers some aspects of magnetic field merging and of convective and field-aligned currents at high latitudes.

The final chapter gives a brief historical account of the aurora followed by studies of its appearance, height, and global distribution. The section ends with a brief account of the auroral substorm process.

The book is very well produced. It is remarkably free from factual and typographical errors — but there are a few that will probably be more irritating to the author than to the reader. Only one is cited here on the ground that it may give rise to confusion. It occurs in Section 1.5, 'The sunspots,' where the heliocentric latitudes are given erroneously in some instances as percentages instead of degrees. It would have been better to record the heliocentric latitudes in °N and °S and not as \pm the cited values. This would have made it quite clear that sunspots tend to appear along two lines of latitude that lie some 30°N and 30°S of the solar equator at the start of a solar cycle moving slowly equatorward over 11.5 years approximately to some 5°N and 5°S of the equator at the end of the cycle.

The book is also liberally illustrated with well-chosen photographs and diagrams. The frontispiece is a particularly spectacular example of a 'type a' auroral curtain. However, it would have been preferable to print it with the sharp, lower border of the curtain toward the bottom of the frame and the diffuse, red, upper border toward the top.

Finally, this book is a most excellent, in-depth study of the physics of the upper polar atmosphere. As such it should appeal to undergraduate, postgraduate, and research scientists working in atmospheric physics, meteorology, aeronomy, auroral physics, and related geophysical and polar disciplines. It also has the merit of bringing together under one cover, much new knowledge presently scattered throughout the literature and current texts. For all of these reasons, this book looks set to become a standard reference manual in polar atmospheric physics for many years to come. (D.A.R. Simmons, 21 Dougalston Avenue, Milngavie, Strathclyde G62 6AP.)

ARCTIC POWER: THE PATH TO RESPONSIBLE GOVERNMENT IN CANADA'S NORTH. John H. Parker. 1996. Peterborough, Ontario: The Cider Press. 85 p, illustrated, hard cover. ISBN 1-896851-00-2. \$Can 19.95.

INUIT: ONE FUTURE – ONE ARCTIC. Mary May Simon. 1996. Peterborough, Ontario: The Cider Press. 85 p, illustrated, hard cover. ISBN 1-896851-10-X. \$Can 19.95.

These two short volumes contain the Trent University Northern Chair Lectures of 1992 and 1993. Since both authors are key figures in the contemporary politics of northern Canada, their accounts can usefully be taken together. John Parker's experience is the earlier, beginning in the 1960s as mayor of Yellowknife and continuing through service on the Carrothers Commission and onto senior executive positions in the Government of the Northwest Territories. As Commissioner during the decade