

Book Reviews

High Latitude Climate and Remote Sensing

K.Ya. Kondratyev, O.M. Johannessen and V.V. Melentyev
John Wiley & Sons, Chichester (1996).
200 pages + viii + 8 colour plates. £50.
ISBN 0 471 96093 4

Readers of this journal will undoubtedly be aware of the significant role played by high-latitude regions in the global climate system, for example through the albedo feedback and thermohaline convection, and of the sensitivity of both polar regions, particularly the Arctic, to climate impacts. The interactions between the major components (land, ocean, ice, atmosphere, biota) have begun to receive detailed scrutiny over the last ten years or so, but our understanding of them is still somewhat limited. This lack of detail is strikingly revealed by the inability of global climate models to account for such climatological data as are available for the polar regions. It is clear that remote sensing, especially from space and especially at microwave frequencies, will increasingly contribute to the 'climate observing system' that is so urgently required. Space borne observations can collect spatial data on a regional scale in a time scale that is short compared to that of what are currently believed to be the climatologically important processes; and microwave observations have the great advantage that, unlike optical observations, they can be made throughout the year.

These remarks serve to place this book in some sort of context. Having said that, however, I find it rather difficult to characterize it accurately. The first third, divided into two chapters, mostly provides a review of the main issues in high-latitude climate studies. Though comprehensive and stimulating, both of these chapters seem somewhat lacking in perspective. Perhaps this is a consequence of the limited state of knowledge regarding the interactions between the main components of the polar climate systems; it is certainly rather frustrating.

The remainder of the book treats the application of remote sensing to high-latitude regions, with a strong bias towards passive microwave techniques applied to polar oceans. Chapter 3 presents a table of spatial and temporal requirements for remote sensing of ice and snow (in fact mainly of sea ice). This is a useful summary, though its value would have been greatly increased if some attempt had been made to relate the requirements to the performance of existing and planned instruments. The second part of this chapter is a short (three page) essay on the use of optical and infrared satellite remote sensing. In such a small space it is hardly possible to do justice to the subject, and one can find fuller treatments of most of this topic elsewhere. Chapter 4 is mainly a review of the microwave dielectric properties of water, ice and snow.

Chapter 5, which I found one of the most interesting and potentially useful parts of the book, presents theory and results of numerical modelling of the microwave emissivity of water, ice, snow and (to a very limited extent) frozen soil. Chapter 6 reviews the use of passive microwave data and, in less detail, imaging radar, in the study of polar environments. Most of this material is readily available elsewhere, and its organization here is not particularly clear. Chapter 7 describes various Russian experimental investigations carried out between 1973–85, into the use of passive microwave radiometry and imaging radar for determining sea ice concentration, type and thickness. The results are not really presented in sufficient detail to enable the reader to assess the claims made for them. It may be true that the technology and innovation displayed here represented significant advances at the time; if so, it is another example of the unhappy effect of the limited possibilities for communication between Russian and western scientists at that time. However, the material must now be mainly of historical interest since the field of microwave remote sensing of sea ice has developed rapidly in the last ten years.

In summary, I have to say that I found this a rather disappointing book. The coverage is more limited than the title suggests, and the linkage between the discussion of high-latitude climate and of remote sensing techniques is less well developed than I would have liked (the use of the word 'and' in the title is quite proper). The 'Anglicization' of the text is also less than perfect in places. Nevertheless, I am sure the book will be read with interest by anyone working in the fields of high-latitude climate research or microwave remote sensing of sea ice, not least for the list of four or five hundred references.

W. GARETH REES

Terra Incognita - Travels in Antarctica

Sara Wheeler
Jonathan Cape, London (1996).
306 pages. £16.99. ISBN 0 224 04183 3

Sara Wheeler's book gives an account of a summer spent with the Americans, Italians and New Zealanders in southern Victoria Land and the British at Rothera on the Antarctic Peninsula, followed by a brief winter Winfly visit back to Victoria Land. She visited these places as a writer and observer, and consequently her view of Antarctica and the role of the stations and their communities, may be expected to be at variance with that of a scientist. The book is written for the lay person and is clearly not intended as anything

other than entertainment. Given this fact, I decided that I should first approach it as if I were an ordinary woman in the street, who has only a passing acquaintance of Antarctica from television, and perhaps the odd magazine article. Having reviewed it from that standpoint, I might then offer the opinion of an experienced female Antarctic scientist who, like the author, has been to both American and British stations and field camps.

It is a well written and entertaining book, with the usual amusing anecdotes and Antarctic myths. Clearly Wheeler was enchanted with Antarctica, particularly the time she spent with the Italians, Kiwis and Americans on their stations and at their field camps. She certainly made full use of her time in Victoria Land visiting a whole variety of places including the Dry Valleys, the South Pole, Terra Nova Bay and Cape Evans, of which she gives us detailed descriptions of scenery, the basics of everyday life and her interactions with scientists and support staff. I was particularly interested in her description of McMurdo, which she loved, unlike the “lower echelons of other Antarctic communities” who seemingly hate it because of its size and sophistication. Interspersed with her own experiences she recounts snippets of Antarctic history which gives the reader a feel for the heroic age of exploration, and puts her modern non-heroic experiences in context. She also gives vignettes of the science projects undertaken by those scientists she came into contact with.

Wheeler is considerably less enthusiastic about her time with the British at Rothera. They were very unwelcoming, uncouth, uncultured and scruffy, unlike the wonderful Italians who drink bottled water and wear designer cold weather gear, or the charming Americans some of whom had “come to bed eyes” or “eyes the colour of cornflower hearts”. Considerable space is devoted to women in Antarctica. They are apparently sparse everywhere except McMurdo. The British are particularly anti-women. One is left feeling that the Great White Continent is the domain of men, where women have to fight for a role. The intrepid Wheeler is to be admired for venturing there, particularly to Rothera, where she was the only woman. I would have liked some photographs of the camps and the more spectacular scenery. It is usual in a book of this type and I was disappointed by the omission.

My opinion of the book as an experienced Antarctic scientist is totally at variance with my perception as a ‘member of the public’. Wheeler’s judgments and statements are based on a relatively short time on the continent and display a rather naive grasp of the *raison d’être* of the entire Antarctic community, its sociology and the logistics of operations. Some of her scientific fact is incorrect, probably because she is simply recounting her understanding of what she has read, or been told.

I particularly take issue with her ill informed opinions on women in Antarctica. McMurdo has a relatively large number of women because unlike the “lower echelons”, the Americans have a very high proportion of support staff.

There are armies of people employed to work in the kitchens (galley), clean and do clerical work. In the real world these jobs are badly paid and usually dominated by women, hence a relatively normal gender balance at McMurdo. On other stations the menial tasks like cleaning and kitchen slave, are undertaken by the scientists and support staff on a rota basis. The proportions of women on most Antarctic stations simply reflects the number of women in science and in the trades in the real world. Many nations, like the Australians with whom I work, have been actively trying to increase the number of women on their programmes. They have also appointed female Station Leaders. To date there have been four, two of whom have held repeat contracts. The Germans have had an all female station. Wheeler is incorrect in her statement that only the Americans take the matter of gender equality seriously.

The much maligned British Antarctic Survey have appointed increasing numbers of women in recent years. I have found my BAS collaborators completely without prejudice against women. I am perplexed by statements like “The women who have breached the BAS defences had fought hard, and minor battles have been won”. Perhaps BAS should have sent Wheeler to Signy Island, which these days has a large proportion of women, particularly in summer. It is regrettable that her experiences at Rothera have soured her view. I am greatly concerned that the public will get an entirely erroneous impression of BAS and the contribution of women to Antarctic science from this book. However, that is a risk any organization takes when they invite writers, photographers and journalists into their midst.

JOHANNA LAYBOURN-PARRY

The Schirmacher Oasis, Queen Maude Land, East Antarctica, and its surroundings

Edited by *Peter Bormann and Dietrich Fritzsche*
Justus Perthes Verlag, Gotha (1995).

(Petermanns Geographische Mitteilungen: Ergänzungsheft Nr. 289)

448 pages, with extra hardbound folder of eight annex maps and additional illustrations. ISBN 3-623-00760-9

There are 64 tables and 354 figures many of which are black and white photographs with color photos in folio form in the attached annexes.

I first picked up this large volume with great interest, as the Schirmacher Oasis is an ice-free area directly across the continent from my own area of knowledge – the Dry Valleys of Victoria Land. This book provides a wealth of detailed information on climatic, atmospheric, geological, glaciological and biological aspects of the Oasis. It will form an invaluable compendium for reference and comparative studies for other parts of the continent.

It is written as a review of the former East German, and Soviet research with a component of studies by the Indian Antarctic programme. The editors point out that the book covers work carried out prior to 1989 and is aimed to serve as a reference source to a key ice free area in East Antarctica. The book is largely descriptive and to some extent reflects the logistic technical and even political difficulties that had to be coped with by the obviously highly motivated and enthusiastic science community that inhabited this part of the continent for 28 years.

The jacket cover description advertises the book for students and scientists. My impression after reading the detailed chapters is that the word "postgraduate" needs to be inserted before "students", as the volume is unashamedly a highly technical work.

There are few abstracts and summaries to the chapters (which would have been of benefit) and the layout of the chapters is not consistent through the book. One chapter does not have an introduction section. There are many authors, who provide often short sections in the chapters.

The Schirmacher Oasis is small (34 km²), projecting up between the continental ice sheet at 12°E, and the inland, ice covered, continental rock shelf. It is characterized by a large number of streams and lakes, a complex geomorphology and geological history. The presence of free water, although the area is classed as arid, assures a rich biological flora. Like all Antarctic Oases there is a positive radiation budget. The combination of these factors makes for a fascinating part of the continent and the author's personal enthusiasm for the area often comes through in the text.

The largest single part of the volume is devoted to geology (111 pages) with geomorphology a further 25 pages. The geology is described in immense detail with conclusions on the structure, composition and history of the earth's crust in Queen Maude Land. The remarkable feature of the geomorphology is the large number of lakes, and the book includes the now famous epishelf lakes of the Wohlthat Massif, Lakes Obersee and Untersee, the deepest on the continent.

The chapter on weather and climate provides a good description on Antarctic climate in general and provides comparative data including long term records for the site from 1961 to the present. Sea-ice observations in the Atlantic sector of the Southern Ocean are described together with their influence on the continent in the Queen Maude Land sector. The influences of the glacial ablation zone around Schirmacher are described in a chapter on ice cover. The late quaternary evolution and recent climatic history are discussed in relation to glacial dynamics. An interesting feature of the area is the remarkable array of ice and snow morphologies that occur there.

The chapter on Hydrology, covering the inland waters was one I personally found of most interest. There are well over 100 lakes and a widely varying range of streams. These can be so abundant in mid-summer as to make the Oasis almost

inaccessible from land. The inland annual meltwater runoff into the oasis is calculated at $8.6 \times 10^6 \text{ m}^3$, which is three to four times that of Antarctica's largest single river, the Onyx River in Victoria Land. Comparative data on lake ice, thermal regimes water chemistry and clarity will prove very useful for studies elsewhere. Lake Untersee is described as the world's most transparent lake on the basis of its extinction coefficient (0.022 m^{-1}). I particularly welcomed the sections on geochemistry and primary production in the lakes, which provide an internationally important reference data set for limnology. The influence of man's activities is clearly seen in the chemistry and productivity of one of the lakes near a research station, and it is to be hoped that these studies will continue.

The Oasis is a biologically rich area with dense mats of algae and cyanobacteria on lake and stream beds comprising, with the phytoplankton, 177 identified taxa. Not surprisingly cryptoendolithic communities are common, as are cryoconite associations, snow algae and some "terrestrial" species. Sixty three taxa are newly described for the antarctic continent. Lichens are particularly abundant and terrestrial foliose mosses are widespread. Wilson's Storm petrels nest at the Oasis which is visited by skuas and penguins. Seal carcass mummies, which I believed were only a feature of the McMurdo Dry Valleys also occur.

The book ends with a chapter on the physics of the middle atmosphere, including ionospheric observations, auroral studies and work on the vertical distribution of ozone. The close associations between the data at Schirmacher Oasis (Georg Forster Station) and the British data set at Halley is illustrated, and the control on ozone exerted by the polar vortex circulation is discussed.

There are a large number of references and a feature of the book is this inventory of a wide array of publications and reports not often viewed in the "western" literature.

There is an extensive index which works!

I commend this book to all serious researchers of the Antarctic continent as a major reference work for comparative studies. I believe it will be cited widely in the future.

CLIVE HOWARD-WILLIAMS

Antarctic Cheilostomatous Bryozoa

P.J. Hayward

Oxford University Press, Oxford (1995).
366 pages. £75. ISBN 0 19 854891 5

The Bryozoa is a somewhat enigmatic phylum in that the group is often covered superficially and briefly in undergraduate invertebrate zoology courses under the banner of being a member of the "minor phyla". Almost by implication, Bryozoa probably would not appear on many students' lists of interesting, numerous, ecologically important or economically valuable higher taxa. Amongst researchers

it probably is fair to say that bryozoans often are considered taxonomically difficult and generally not of especial ecological significance. Such perceptions and general familiarity with the group are curiously counterbalanced by the fact that there is a large and active Bryozoology Society which enjoys triennial international meetings, albeit a caucus of both palaeontologists and neontologists.

In temperate and tropical waters the Bryozoa are often revealed to be a speciose and sometimes numerically important component of hard substratum epifaunal assemblages. As ecologists we must be confident in distinguishing and identifying to species, but this is readily attainable for this phylum in relatively few biogeographic areas. Those of us working in northwest Europe have, therefore, had much to thank both John Ryland and Peter Hayward from Swansea University in providing detailed and exhaustive taxonomic guides to the group, especially in the waters around the British Isles. With this particular book, Hayward has successfully extended his expertise to polar waters and it is at high latitude that the ecological potential of this phylum in shallow waters seems to be maximally evident. In Arctic waters bryozoans can dominate both numerically and in terms of substratum coverage, even on mixed/soft sediments; in the Pechora Sea, for example, encrusting bryozoans may occupy up to 80% of the substratum surface. Also in the Antarctic it is in the sublittoral, where protection from ice damage is afforded, that this group can be dominant amongst epifaunal assemblages and, as the author states, the Antarctic cheilostomatid species embrace representatives of all the major taxonomic groups.

In his Introduction, Hayward presents an interesting summary of the history of Antarctic collections relevant to bryozoan research. It is especially interesting to note his suggestion that taxonomic research progress on this phylum in Antarctic waters is not likely to be held back by future collections, in view of the large amount of material in museums around the world. Presumably the ease of preservation and long-term storage of (calcareous) cheilostomatid species is important in this respect.

Necessarily, the bulk of the text lies in the taxonomic sections, but these follow useful and brief summaries of the Antarctic cheilostomatids, bryozoan ecology and evolution and their zoogeography. Whilst finding these interesting and useful overviews we would have to disagree with the suggestions that the stable, but harsh, Antarctic marine environment results in communities being structured primarily by competition. In deference to non-equilibrium arguments about community structuring it could be argued that disturbance events are more likely to be the major influence.

The systematic accounts are preceded by a comprehensive generic key accompanied by disarmingly simple and clear

supportive diagrams. Importantly, the reader will find much of the necessary, but potentially confusing, morphological jargon readily explained here. By far the largest part of the book is taken up by a combination of the species keys and the respective species descriptions. The fauna described contains 264 cheilostomatid species, 215 of which are considered endemic to the Antarctic. All recorded cheilostomatids from Antarctica have been included. The species descriptions are accompanied by some line and stipple drawings, or SEM photographs, where available. All are of excellent quality and the photographs in particular will be of inestimable value to all wishing to identify to species level. The descriptions themselves are very detailed and emphasize key diagnostic characters where necessary. They also contain the currently available biogeographic information. The book does not contain descriptions of new species, but many of the species have been redescribed and illustrated for the first time. Finally, there is a comprehensive bibliography of both the literature on Antarctic bryozoans and relevant publications from the general field of bryozoan taxonomy. Overall this is a very thorough and comprehensive text which has been produced to a very high level of quality. For many years to come this text surely will be an indispensable source of information, and relief, to those wanting to identify Antarctic bryozoan species.

C.D. TODD & M.M. BAYER

Editor's note: Oxford University Press have offered a special discount for readers of *Antarctic Science*. The volume is available at £56.25 by ordering from Tracey Watson, Life Sciences Marketing, Oxford University Press, Great Clarendon Street, Oxford OX2 6DP, UK [fax +44 1865 267782], stating that you wish to purchase at the special price for *Antarctic Science*.

Atlas de Hielos Marinos

E.E. Faccini & G.J. Alba

Instituto Antártico Argentino, Buenos Aires. (1995).

201 pages. no price. no ISBN

This sea ice atlas is limited to the sector 0–90°W and from 48–78°S. The atlas is organised in six sections. These illustrate the pattern of distribution of the ice edge for each month over the period 1973–90, the variation in ice concentration with longitude, the frequency of occurrence of particular concentrations and the seasonal pattern of change in the portion of the median concentration. There is a limited introduction and bibliography of data sources but no analysis of the patterns.

D.W.H. WALTON