

magnificent translation of Drygalski's *Zum Kontinent des eisigen Südens: Deutsche Südpolarexpeditionsfahrten und forschung des 'Gauss' 1901–1903* by Maurice Raraty, which was published, under the same imprint as the present volume, in 1989. Barr has placed us equally in his debt, and this book is warmly to be welcomed. It will be essential reading for polar historians, as it will restore Filchner's expedition to the standing it merits among early explorations in the Antarctic. He is to be congratulated on making so important a work available for the non-German speaking reader. One should also congratulate the publisher for having the vision to produce the work to such a high overall standard. (Ian R. Stone, The Registry, University of Kent at Canterbury, Canterbury, Kent CT2 7NZ.)

**ANTARCTIC SCIENCE: GLOBAL CONCERNS.** 1994. Gotthilf Hempel (Editor). Berlin, Heidelberg, New York: Springer-Verlag. xii + 287 p, illustrated, soft cover. ISBN 3-540-57559-6. US\$26.00.

In September 1991, the Scientific Committee on Antarctic Research (SCAR) sponsored an international conference on 'Antarctic science – global concerns,' convened in Bremen by Gotthilf Hempel, then director of the Alfred-Wegener-Institute in Bremerhaven. The conference had two objectives: 'to increase public awareness of the importance of Antarctic Science, particularly in relation to global problems, and to foster the interaction of Antarctic scientists working in different disciplines.' From the standpoint of the second objective, the conference was a great success — attendees from a broad spectrum of Antarctic sciences engaged in spirited discussion and debate. Unfortunately, much less success accrued to the first objective, owing principally to a disappointing failure to attract significant public representation at the meeting. Now 17 of the papers presented at that conference, edited by Hempel, have been published in a slim but meaty volume under the same title. The book, even more than the conference itself, will appeal broadly to scientists interested in Antarctic research, but will be unlikely to foster public awareness in the subject.

The papers presented at the conference were organized into four sections: 'The Antarctic in the global scene,' 'Antarctic research on global change,' 'Progress and frontiers in Antarctic science,' and 'The future of Antarctic science.' Those divisions have been dropped from the book, presumably because the absence of nine of the original papers, including three of the four in the first section, would have made the original groupings too unbalanced. The loss of that organization, however, has left the collection of papers oddly unfocused, since no substitute, such as grouping by traditional scientific disciplines, has replaced it. The papers that remain are left in their original order from the conference, but without any section headings. The subject matter wanders back and forth between the upper atmosphere, sea and land ice, oceanography, geology, and human biology with no apparent aim or purpose. Some cross-references between

papers, however, do diminish the sense of incoherence, and the organizational problems certainly should not deter any scientist interested in Antarctic research from acquiring and reading this book. Taken individually, the papers are excellent — expertly written, containing ample references, and, for the most part, readable by non-specialist scientists, although not by the general public.

As Hempel says in the introduction, the main focus is on the role of Antarctica and the Southern Ocean in the world climate system. Sea ice is particularly important. A contribution by Peter Wadhams strongly emphasizes the climatic implications of Antarctic sea ice, and not only summarizes its chief characteristics but contrasts them usefully with those of Arctic sea ice. Eberhard Fahrbach, Ernst Augstein, and Dirk Olbes present a discussion of the interactions between ice (both sea ice and shelf ice) and water, with a particular emphasis on the production of Antarctic bottom water in the Weddell Sea; Augstein adds a five-page prediction on future ocean-atmosphere research in the Antarctic. In a brief but informative review, Michael Spindler and Gerhard Dieckmann discuss the ecological significance of the large population of plants and animals in the sea ice and the immediately subjacent water, and Harvey Marchant examines the impacts of increased UV irradiance (due to the 'ozone hole') on Antarctic terrestrial and marine organisms, particularly those inhabiting the sea-ice zone, and the mechanisms that they have evolved to minimize those impacts. Finally, among the papers related strongly to sea ice, is one in which Jay Zwally discusses the detection of change in Antarctica by remote sensing from satellites; he focuses on changes in the extent of ice on land and sea and also includes a cogent warning about the difficulty of detecting significant temporal trends in time series, particularly when they are poorly sampled.

Two other papers discuss climate-related subjects. In his paper on biogeochemical cycles and their relation to climate change, Paul Tréguer deals first with the way the biogeosystem functions today and then discusses the evidence for a modified functional mode during the last glacial age. A summary by Hans Oeschger of the incredibly broad range of information about the paleoenvironment that can be obtained from ice cores is enhanced by a short section on the dramatic evidence of climatic instability in the North Atlantic region, which was detected recently in ice and ocean cores.

There are also non-climatic connections between the Antarctic regions and the rest of the world. Michael Rycroft's paper discusses Antarctic observations of solar-terrestrial physics, important because the geomagnetic field lines there thread all the interesting regions of the magnetosphere and near-Earth space, as well as the seasonal ozone depletion over Antarctica — the infamous 'ozone hole.' There is a substantial article by Stephen Nicol on the changing perceptions of the role (still recognized as central) of krill in the Antarctic ecosystem. Krill are of global concern because of their resource implica-

tions either as food for whales or as food in their own right. (Anyone who, like this reviewer, has ever wondered whether the word 'krill' is singular or plural, might wish to consider the following quote: 'what are krill and why is Antarctic krill the superb krill?') Gerd Hubold contributes a short article on future biological research related especially to the two-way interactions between environmental change and the biota. On a different time scale, research into Antarctic geology also has strong global implications. J.A. Crame contributes a detailed elucidation of the fossil record of the Antarctic continent and discusses the evolution of polar biota in connection with the rest of the world, whereas Franz Tessensohn focuses specifically on what geological studies of the Antarctic continent can contribute to the solution of global geoscientific problems. And research of global importance is not limited to the inhuman world — D.J. Lugg discusses how using Antarctica as a space laboratory makes important contributions to social and other human research.

Rather different in character from the other articles is the extensive review by W.E. Arntz and V.A. Gallardo of recent progress in research on the Antarctic benthos. This paper, which is concerned with the benthos per se rather than in a global context, is twice as long as the others, has three times as many references, and is the only paper that appears to be written primarily for the specialist rather than for a more general audience. To this non-specialist, it appears to be an excellent review.

Two interesting general articles on the modern aspects of conducting research in the Antarctic form the lead-in to the book. The first is a short summary by the late Nigel Bonner on the tension between environmentalism and scientific research; in the second, David Drewry discusses conflicts of interest in the use of Antarctica. Both show their concern with protecting the conduct of scientific research against political encroachment, which, to these authors, largely means overly zealous environmental restrictions. Richard Laws also touches on these concerns in his preface, which addresses SCAR and the Antarctic Treaty System.

This is a fine book as far as it goes, but it would be much better had it not glaring gaps in its disciplinary coverage. Most of these gaps did not exist in the 1991 conference — papers presented there but missing from the book covered global climate, the mass balance of the Antarctic ice sheet and changes thereof, the marine sedimentary record, marine vertebrate biology, geodynamics, solid-earth geophysical research, and astronomical studies from Antarctic observatories. One can imagine and sympathize with the frustration the editor must have felt in not receiving written versions of those contributions.

Appearing as it does three years after the conference that spawned it, this volume is somewhat out of date. However, most of the papers have been modified to include newer references, in some case half a dozen or more (25 in the paper by Arntz and Gallardo, out of a total of 182). The book is well, if not profusely, illustrated,

handy in size, pleasing in format, and competently copy-edited — typographical errors are very few. At a mere US\$26 (flex-cover), it is a bargain not to be overlooked by anyone interested in Antarctic research. It is just regrettable that it is not more comprehensive. (Charles R. Bentley, Geophysical and Polar Research Center, Department of Geology and Geophysics, University of Wisconsin, Lewis G. Weeks Hall for Geological Sciences, 1215 West Dayton Street, Madison, WI 53706-1692, USA.)

**THE BARENTS REGION: COOPERATION IN ARCTIC EUROPE.** Olav Schram Stokke and Ola Tunander (Editors). 1994. London, New Delhi, and Thousand Oaks, CA: Sage Publications. xi + 239 p, illustrated, hard cover. ISBN 0-8039-7897-9.

With the bipolar global geopolitical system now only a historical memory, scholars and diplomats are searching for new paradigms to anticipate the direction that the international system might take as it enters the twenty-first century. The Cold War geopolitics, whose theoretical basis was a crude form of nationally oriented spatial determinism, is increasingly challenged and replaced by a new geopolitics, which recognizes that spatial patterns and political processes are not contained within national boundaries. The nation-state is part of a world that is a shared arena, and the resultant geopolitical map contains nested regions with overlapping boundaries. As trans-national economic, technological, social, and political forces gain or lose momentum, the regional frameworks — realms, regions, states, and subnational units — are likely to change in status and boundaries. And this, in effect, produces new parts-to-whole relationships within changing spatial-political milieus. The major contribution of *The Barents region* lies precisely in making this point clearly and forcefully in regard to post-Cold War Arctic Europe, and thus unravelling in a systematic and meticulous manner the complex web of factors, forces, and phenomena that stimulate or hinder regional cooperation in the Barents Euro-Arctic region.

The foreword by Thorvald Stoltenberg (who was the Foreign Minister of Norway at the formal inauguration of the Barents region in January 1992) emphasizes the promise and potential of the Barents cooperation as 'a model for East–West cooperation at the regional level that can be used in other regions spanning the former East–West border' (page x). In his view, the main challenge for the EU in the 1990s will be to establish and sustain a link between the eastern and western parts of Europe and to involve Russia in European cooperation.

The volume, succinctly introduced by its editors, is organized in three parts. The first, 'A new policy for the north,' is largely concerned with the vision and forces behind the Barents initiative. The contributors offer wide-ranging perspectives on the *raison d'être* of this bold and innovative experiment in trans-national cooperation. J.J. Holst sees the initiative as a process of development; a meeting-place for constructive dialogue in trade, transport, and environmental protection; and an instrument of