

Book Reviews

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Atlas of Antarctica: topographic maps from geostatistical analysis of satellite radar altimeter data

Ute C. Herzfeld
Springer, 2004
ISBN 3-540-43457-7. 364 pages + CD-ROM, 149.95 €/£115.50/\$159

This has proved a difficult volume to review, primarily because it is not clear who the target audience is. Regrettably, the title is extremely misleading, as this is not an Atlas in the sense understood by most people. The volume is only of interest to persons concerned with the analysis of satellite altimetry, and perhaps (although its cost is prohibitive) as a student text. Its less than comprehensive bibliography, lack of a gazetteer and lack of a page index to the maps is a drawback for even these audiences. It is, indeed, difficult to consider it an Atlas of Antarctica, as the altimeter data presented do not extend south of 81°S, violating the author's own definition of an Atlas (C.2.2 para (i), p. 35). It is of little interest to the general student of Antarctica, and most certainly not to the general public.

The volume is based on a summary of satellite altimeter data prior to IceSat and CryoSat. It explicitly considers the problems of extrapolating track data to a surface, which is a useful contribution to the field of satellite altimetry, and is sadly neglected in other publications. However, it is unfortunately deficient in several other respects. The treatment of corrections to satellite data is incomplete, referring (for example) to only one methodology for carrying out slope correction. At least three methods of slope correction have been published, and the relocation method primarily used in correcting ERS-1 data is not referenced (Rapley *et al.* 1983, 1985, Cooper 1989), although perhaps the personal communication from Bamber (p. 31) is to this method. The method used in this study is the least satisfactory, incurring large errors in the case where the upward radius of curvature of the surface is less than the orbital height of the satellite - a common situation in Antarctica. Given this, the author should certainly have referenced other techniques and defended the choice of method used.

The other major problem with regarding this volume as in any sense an "Atlas" of Antarctica is that the only data source considered is altimetry. The Geosat, SeaSat and ERS satellite altimeters could not effectively track any surface whose slope exceeded the 3dB half-beam-width of the antenna - that is, it could not follow a surface whose slope exceeded about 0.8. Beyond that point, the waveforms rapidly become too distorted for re-tracking, as the power

returned outside the 3dB limit drops rapidly. But this Atlas presents maps covering both mountainous regions and the coastal zone. In these regions, the contours shown are hopelessly unrealistic, as the author has ignored superior sources of information such as the Scientific Council for Antarctic Research's (SCAR) Antarctic Digital Database (www.add.scar.org). The author's claim (p. 114) that the ERS data gives a realistic picture of the Antarctic Peninsula is simply laughable.

The author presents the information as valuable for the ice-sheet modelling community. However, this ignores the fact that equivalent or better digital elevation models incorporating data from many sources including satellite altimeters, are freely available from the National Snow and Ice Data Centre (e.g. <http://nsidc.org/data/nsidc-0082.html>). Vector data of higher resolution and containing many more types of information than the maps in this "Atlas" are available free of charge for non-profit use from the Antarctic Digital Database (www.add.scar.org). It is difficult to see how the publishers justify the high price.

The text associated with each map panel is of poor quality. In areas with which I am familiar, the author has made serious mistakes. For example, on p. 116, she states that the Müller Ice Shelf has broken up. This is not the case, and the Müller Ice Shelf shows no sign of rapid break up, although it is slowly retreating - and colleagues observed this to be the case early in 2005, a few weeks before this review was written. There are errors in toponymy - for example, she refers to the Larsen Ice Shelf as bounded by Jason Peninsula in the north (p. 114). This is incorrect, as the ice shelves north of Jason Peninsula are (or were) part of the Larsen Ice Shelf, whose northern boundary is (or was) at Cape Longing. Glaciers are mentioned in the text for no apparent reason - this in a region where there are hundreds of similar glaciers. Those singled out are by no means the largest in a region. The editing is of poor quality, as in many places the grammatical construction is poor, and there are spelling errors such as "Mt Gandry" instead of "Mt Gaudry" (p. 116). Finally, the author betrays a lack of familiarity with the current state of mapping in Antarctica by giving specific mention to one mapping project near San Martin (p. 116) while ignoring other published photogrammetric mapping projects in the same area.

Finally, the author has ignored the mapping conventions agreed by the Antarctic community, in favour of using the UTM grid system. The SCAR standard projection for maps of Antarctica on this scale is the Lambert Conformal Conic projection, which is greatly preferable (Sievers *et al.* 1989). UTM is not suitable for Antarctic mapping because of the narrow zones, and is not defined south of 80°S. Given the existence of a suitable convention, it is difficult to see why

the author has not used it.

Overall, this is a very disappointing volume. If the opportunity had been taken of combining a new and interesting technique for extrapolating altimeter data with the best techniques of re-processing altimeter data, and then supplementing the results with information from conventional sources in regions where altimetry is inadequate, using coastline data as a control, then this could have been a ground-breaking publication. As it is, the volume falls far short of the claims made by the title.

PAUL R. COOPER

References

- RAPLEY, C.G., GRIFFITHS, H.D. *et al.* 1983. *A study of satellite radar altimeter operations over ice-covered surfaces*. Holmbury St. Mary, European Space Agency: 1–224.
- RAPLEY, C.G., GRIFFITHS, H.D. *et al.* 1985. *Applications and scientific uses of ERS-1 radar altimeter data*. Holmbury St. Mary, European Space Agency: 1–180.
- SIEVERS, J., GRINDEL, A. *et al.* 1989. Digital satellite image mapping of Antarctica. *Polarforschung*, **59**, 25–33
- COOPER, A.P.R. 1989. Slope correction by relocation for satellite altimetry. IGARSS '89 Remote Sensing: an economic tool for the nineties. Vancouver, British Columbia, Canada, IGARSS '89 12th Canadian Symposium on Remote Sensing, vol. 4, 2730–2733.

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Volcano-Ice Interaction on Earth and Mars

Editor J.L. Smellie
Geological Society of London Special Publication, 2002
ISBN 1-86239-121-1. 384 pages, £90/\$150 (members£45/\$75).

This book comprises an outstanding collection of twenty articles by leading volcanologists, planetary scientists and geochemists on many aspects of the interaction of volcanoes and water ice on Earth and Mars. It arose from a meeting with the same title as the book, held in Iceland in August 2000. The book is very well produced, typical of the Special Publications of the Geological Society of London. I am convinced that this book will be the “bible” for glaciovolcanologists for many years.

It is divided into four sections: (1) eruptive, hydrological and glacial dynamics, and tephra chronology of subglacial eruptions (4 chapters); (2) reconstruction of sub-ice volcanoes and ice sheet thicknesses from geomorphological and lithofacies analysis and volatile compositions (8 chapters); (3) remote sensing of terrestrial and martian subglacial features (4 chapters) and (4) hydrothermal evolution, and mineralogical and biological formation of palagonite (4 chapters). The book is worth purchasing for the first two chapters alone, which are very detailed reviews of heat transfer and melting in subglacial eruptions (Wilson

and Head) and of environments of magma-water interaction on Mars (Head and Wilson). Most articles are concerned with basaltic volcanism, but there are three that focus on intermediate to silicic glaciovolcanism. These are some of the first studies published on this type of volcano-ice interaction, and are of particular importance. The book focuses on the physical aspects of volcano-ice interaction, with the exception of the four palagonite chapters and one excellent chapter on volatiles in subglacial basaltic glasses (Dixon *et al.*). My only criticism is that the palagonite chapters do not easily mesh with the title of the book. Palagonite occurs wherever basaltic glass interacts with water, and only one of the chapters addresses the specific topic of palagonite in subglacial environments. Nevertheless they are of very high quality and of great importance to the planetary community where palagonite is a candidate for some of the surface material on Mars. There are five chapters concerned with aspects of volcano-ice interaction on Mars, which is a topic of enormous significance at present, given the astrobiological implications and the recent discovery of abundant water ice in the near-surface of Mars by the Mars Odyssey spacecraft

The editors and authors are to be congratulated on producing an invaluable contribution to volcanology, and a fascinating read.

I.P. SKILLING

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The Moss Flora of Macquarie Island

R.D. Seppelt
Australian Antarctic Division, 2004.
ISBN 1-87693-4 07-7. 328 pages, AU\$55.

This book is the first comprehensive moss floras of any of the six major groups of sub-Antarctic Islands, all of which are highly isolated oceanic islands lying to the south of the Antarctic Convergence. It begins with a short account of the climate, geology, topography and geographical setting of Macquarie Island, and of the island's vegetation, supported by colour photographs. The moss species are then listed, a useful table is provided showing for each one its known altitudinal range on the island, and the phytogeographical relationships of the moss flora are briefly reviewed.

The main part of the work comprises detailed descriptions of the 84 species of mosses so far recorded from Macquarie Island. A key is given to the families, genera and species, and there are also separate keys to the species in individual genera. Gametophytic characters are emphasised in the keys as sporophytes of many species are unknown on Macquarie Island. The descriptions are accompanied by original, high quality illustrations prepared

by the author, and by critical notes citing differences from related species. There is no attempt at providing a comprehensive synonymy, but a complete reference is given for the accepted binomial, and for the basionym of each species where applicable. The taxa are arranged according to the recent classification proposed by Buck & Goffinet (2000) which, as the author points out, results in some unfamiliar placements, e.g. of *Drepanocladus* and *Sanionia* in the Campyliaceae, and of *Dicranoweisia* in the Rhabdoweisiaceae. The occurrence is reported of additional species of *Bryum* and *Pohlia*, as yet unidentified due to the absence of sporophytes in specimens so far collected on the island.

This book should provide, for the first time, a means of readily identifying mosses collected on Macquarie Island and it is to be strongly welcomed.

R.E. LONGTON

Reference

BUCK, W.R. & GOFFINET, B. 2000. Morphology and classification of mosses. In SHAW, A.J. & GOFFINET, B., eds. *Bryophyte biology*. Cambridge: Cambridge University Press, 71–123.

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Antarctic Marine Protists

Editors Fiona J. Scott & Harvey J. Marchant
Australian Antarctic Division, 2005.
ISBN 0-64256-835-9. 563 pages, AU\$96/£39/EU 57.

This book represents a compilation of all known species and illustrations thereof of protist taxa from the Antarctic. That feat alone represents a laudable accomplishment because all taxonomists know only too well how scattered the literature can be and in obscure journals as well. So it is a great asset to have all of the known taxa illustrated in one reference volume. The book provides illustrations of the diatoms, dinoflagellates, haptophytes, prasinophytes, chrysophytes and ciliates described from the Antarctic. Each of which comprises a single chapter, of whom the editors are at least co-author on all the chapters except the one on the silicoflagellates. Each chapter is organized with a simple introduction into the main characters of the group and some historical literature. The rest of the chapter is devoted to the taxa, which have been grouped systematically. However, for some of the groups, the most recent classification system has not been used, which is unfortunate. For example, the revised classification of the diatoms, which appeared in May 2004, and that of the haptophytes, which appeared in 2002, have not been used. Hopefully, workers in each field will realize these oversights. For many taxa, the taxonomic history showing

synonyms, etc. is listed. This will be of interest for people wishing to make new combinations or knowing the taxon under a different name. A description and distribution of each taxon follow. I am only able to comment on the completeness of the literature in the diatoms, there did I note that a few important literature and species were missed. For example, the paper by Hasle 2001 *Diatom Research* 16:1-82 on the revision of the diatom Family Thalassionemataceae was not included and this is disappointing because most of these taxa are Antarctic. In each of the chapters most of the taxa are illustrated in the medium with which they would be identified. For example, most diatoms are shown in light microscopy and in electron microscopy. The haptophytes are illustrated only in electron microscopy because they are impossible to identify with light microscopy. However, a few illustrations of their appearance with light microscopy would have illustrated the problem with taxon identification at that magnification for those not familiar with these taxa. The ciliates are only illustrated by line drawings so one has little idea of how these features will appear in light microscopy or are changed with preservatives. The really only major criticism that I have of the book is that the dinoflagellates, which for the most part can be identified with light microscopy, were only illustrated in electron microscopy. This feature will limit the usefulness of this book for the identification of this protist group in the field. Nevertheless, the authors are to be warmly congratulated for the tedious effort it must have been to collect and verify all the taxa that have been recorded in the Antarctic. It will be an excellent reference volume for all those working in the Southern Ocean. The book will be an important reference source and it will be good value for money.

LINDA K. MEDLIN

Reference

HASLE, G.R. 2001. The marine, planktonic diatom family Thalassionemataceae: morphology, taxonomy and distribution. *Diatom Research*, 16, 1–82.

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Antarctic Challenges: historical and current perspectives on Otto Nordenskjöld's Antarctic Expedition 1901-1903

Editors A. Elzinga, T. Nordin, D. Turner & U. Wrakberg
Kungl. Vetenskaps- och Vitterhets-Samhället i Göteborg (2004)
ISBN 91 85252 64 6. £31

The centenary of Heroic Age exploration has stimulated a series of valuable symposia on particular expeditions. The

first of these was in Belgium and examined the De Gerlache expedition of 1897–99. The resultant volume set a high standard both in terms of historical research and breadth of view (Decleir & De Broyer 2001). The symposium in Göteborg to examine the contributions made by Otto Nordenskjöld's Swedish Antarctic Expedition, held 10–13 May 2001, is reflected in this volume and is another valuable addition to the literature.

It covers both the historic setting of the expedition and, in more detail, the outputs traceable to Nordenskjöld and Carl Skottsberg, the botanist on the expedition and the first person to provide adequate descriptions of the vegetation of the Falkland Islands and South Georgia. At present only Nordenskjöld's official narrative has been translated into English so this volume provides a most welcome introduction to material that appears in the untranslated narratives by Duse, Andersson and Sobral as well as many scientific papers in Swedish.

The book is divided into four major parts. The first deals with "Time Frames", with two papers by R.K. Headland and B.L. Basberg. Headland proposes seven periods of Antarctic exploration beginning with Terra Australis before 1780, followed by Sealing (1780–1892), Continental penetration (1893–1918), Whaling (1919–43), Permanent Stations (1944–58), Treaty (1959–87) and the Regulatory period (1988 to the present). I do not find this especially helpful as the activities all overlap; the Regulatory period could just as easily be called the Tourism period and the greatest expansion of stations and nations occurred after 1958. His pessimistic assertions about possible future developments are certainly arguable with every possibility that the present number of stations will increase rather than decrease (Belgium, China, Czech Republic and Estonia are all planning to build stations), that solutions will be found to the overlaps between potentially conflicting treaty responsibilities (for example between the Law of the Sea and the Antarctic Treaty) and that any mineral exploitation will be more than 50 years into the future and so amenable to future technologies. Basberg's paper provides a brief history of the development of Antarctic whaling. He notes that the Discovery Investigations, often thought to be an entirely British idea, were initiated after an original suggestion by a Norwegian and he points out the tension that existed between the scientific goals and the industry objectives.

The second part is called "Places and People" and deals both with Göteborg and the cultural context that Nordenskjöld worked in as well as with some fascinating personal recollections of both Nordenskjöld and Skottsberg by their respective daughters. As an extension of these remarks about family life there are chapters by Nordin on all of Nordenskjöld's expeditions, another by Lindberg on his ethnographic interests and contributions from both the Magellanes and Greenland, one by Weimark on Skottsberg's research interests and a final one by Lewander

on gender and the expedition. This last seems unusual since in its discussion of male only membership and heroic masculinity it is difficult to see that any gender aspect of the Swedish Antarctic expedition differed from that of other Heroic Age expeditions, reflecting the prevailing cultural context of the time. Indeed, the title of Lewander's paper did not to me reflect the content especially well as she provides, under the guise of gender analysis, an interesting commentary on the social relationships between both the classes represented and the nationalities. Sobral, the only Argentinean, was clearly at a disadvantage in both the daily language and in the cultural norms and must have seen himself as a permanent outsider. And there were stresses within the Swedes (not only between the scientists and the crew) with Nordenskjöld's leadership qualities being questioned after things went wrong.

The third part "The Scientific Core" is 120 pages with nine chapters, aiming to analyse the scientific contributions made by the expedition. The scientific results of the expedition ran to over 4000 pages (of which Skottsberg contributed a quarter) yet very few people these days seem to recognise this and dwell instead only on the loss of the ship and the survival and rescue of the over-wintering parties. Not all of the papers are firmly focussed on their science. The initial chapter by Wråkberg on cartography is fairly general, probably since the mapping achievements of Duse were very limited, in part due to unsuitable equipment but also because Nordenskjöld did not allow sufficient ship time for this work. Nordenskjöld seemed to have had a penchant for renaming features that had already been named, a sure basis for confusion and an approach which some nations continue with even today. Svansson's paper on the oceanography is a good attempt to set the record straight and shows that the temperature data, although collected by amateur oceanographers, was good enough to be used by Brenneker in his key work on the hydrography of the Atlantic sector of the Southern Ocean. Jonsdottir and Moen review the changes in botanical knowledge and although they acknowledge Skottsberg's considerable achievements, by concentrating more on present knowledge they fail to highlight his importance in providing the first professional descriptions of Falklands and South Georgian vegetation and how his studies on marine algae were all that was available for many decades. Larsson showed how the fossils collected allowed Nordenskjöld to conclude that Suess had been right when he suggested the existence of a southern supercontinent. It was to be another 70 years before geological research on Seymour and Snow Hill islands recommenced despite its obvious scientific interest!

The chapter by Hjort reviewing the contribution to glaciation history (principally from South America and Greenland) notes that the work predated the British work on the Discovery Expedition but it appears to have been of less significance. The expedition collected extensive meteorological data (which contributed to the first weather

chart for the area between 30°S and 70°S) and Bodman apparently developed an index of weather severity (chill factor) but this did not survive into the general literature. Emslie's chapter on penguin history simply summarises the research since Nordenskjöld discovered penguin bone deposits on Seymour Island, and Franklin *et al.* treat fish physiology and survival in a similar way with no real link to the expedition.

The final section deals with geopolitics. An initial paper by Lüdecke summarises the major Heroic Age expeditions but adds little new. The other chapters by Elzinga, Vinuesa and Jacobsen provide different perspectives.

Vinuesa provides an Argentinean perspective on international law at that time. His map of the sectoral claims is so bad as to be unreadable and the discussion of the legal basis for various claims provides nothing new. In contrast Marie Jacobsen's Swedish perspective on why Sweden had not made land claims does provide something new and interesting about why Sweden did not attempt to acquire Antarctic territory, and the way in which international law has changed with respect to territorial claims since the 19th century. Elzinga addresses the tensions between nationalism and internationalism, in particular examining the role of the International Polar Commission and the International Research Council and its politics.

Overall this is an interesting and useful book, proving access for non-Swedish speakers to much previously inaccessible information, reviewing the achievements of the expedition in various ways as well as addressing the social and political context in which Sweden embarked on its first Antarctic expedition. It is well edited in English and well produced at a very reasonable price. I strongly recommend it to those interested in the "Heroic Age".

DAVID WALTON

Reference

DECLAIR, H. & DE BROYER, C., eds. 2001. *The Belgica Expedition Centennial: perspectives on Antarctic science and history*. Brussels: VUB Brussels University Press, 367 pp.

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Brief Review

Nimrod – Ernest Shackleton and the extraordinary story of the 1907-09 British Antarctic Expedition

B Riffenburgh

Bloomsbury (2004)

ISBN 0 7475 7254 2. 358 pages. £17.99

With the centenaries of the Heroic Age expeditions arriving one after another there has already been a shower of books on Scott and Shackleton. What does this add to the heavily researched genre for Shackleton? This is the first book since Shackleton's "Heart of the Antarctic" in 1909 to deal with the whole expedition rather than individuals. It has had the benefit of using much of the previously unmined material in diaries and letters which have surfaced over the last 20 years and it is a very readable account, with considerable insights into the characters of the chief players. Riffenburgh makes a particular point of how Shackleton undersold the science they carried out, at least in part because it did not interest him and would not help his personal quest for fame. However, the expedition did achieve a great deal (considering how underfunded it was) with the first ascent of Mount Erebus, the first to the South Geomagnetic Pole, considerable observations on glaciology and the collection of an important range of rock specimens. In addition it trained three men who had a profound effect on the development of Antarctic science - Raymond Priestley, Edgeworth David and Douglas Mawson. This last might have been the greatest contribution to science by the expedition that succeeded because it failed to reach the South Pole.

DAVID WALTON

