Antarctic Science 5 (4): 411–413 (1993)

# Book reviews

## El Niño — Historical and Paleoclimatic Aspects of the Southern Oscillation

Edited by *Henry F. Diaz and Vera Markgraf*
Cambridge University Press (1992)
476 pages. £40.00. ISBN 0 521 43042 9

El Niño is the irregular warming of the sea surface along the coast of Ecuador and Peru in the upwelling zone of the eastern equatorial Pacific Ocean about every three to seven years. The Southern Oscillation is the large-scale sea-level pressure 'seesaw' with opposite variations of pressure between the eastern Pacific Ocean and the Indian Ocean regions. Both are part of the slowly-evolving coupled ocean-atmosphere climate anomalies which have been termed the El Niño/Southern Oscillation (ENSO) phenomenon. ENSO is the largest single source of interannual climate variability on a global scale.

This book is an excellent review of observational aspects of ENSO, historical evidence of ENSO and its variability over the last millennia and paleoclimatic evidence for the existence of ENSO. It arises from a workshop held in Boulder, Colorado in May 1990 on proxy evidence of ENSO-related climate variability. The chapters in the book are based on the papers presented at the workshop but they have been revised, edited and integrated after the workshop so that the book is a coherent and comprehensive review; much more than just a polyglot collection of workshop papers.

The book is divided into five sections by themes, but these sections also provide a progression from finer to coarser time resolution. The first section "ENSO in the modern record" includes reviews of observational aspects of ENSO in the tropics and its links to other regions (teleconnections), as well as a modelling study which considers the possible implications of climate change on ENSO and climate variability. An omission from this section is sufficient review of the mechanisms or theories explaining ENSO as a coupled ocean-atmosphere phenomenon. However, this is understandable given the observational emphasis of the book.

The second section "Use of historical records in ENSO reconstruction" presents studies which examine changes in the frequency and intensity of ENSO events shown by historical records of sea surface temperatures, rainfall, Nile river floods and other climatic indicators. Evidence of ENSO from tree-ring records is described in the third section, using relationships between climatic anomalies forced by ENSO and tree growth. The studies use tree ring data and climate reconstructions from North America primarily, neglecting some of the other dendroclimatic evidence of ENSO from other regions, such as Indonesia, Australia, New Zealand or South America. Some of this evidence is mentioned later in the fifth section. The fifth section considers tropical and subtropical ice cores and tropical corals as monitors of ENSO. Corals, in particular, provide outstanding prospects for new evidence of rainfall and/or temperature variations associated with ENSO, with annual resolution and long records for a range of locations in the tropical Pacific and Indian Oceans. The final section "Low-resolution paleoclimate reconstruction of El Niño/Southern Oscillation: marine and terrestrial proxy indicators" uses records from a range of proxy evidence such as fishery catch, marine sediments, pollen counts and vegetation coverage to investigate the existence of ENSO over the last 8000 years. Only since the late Holocene period (after about 4000 years before the present), do ENSO-related climate variability patterns appear to develop.

This book reviews the evidence for the existence of ENSO and shows that there have been variations in its frequency, intensity and manifestation over the last several thousand years. A distinction must be drawn between the indicators of ENSO activity in the core ENSO regions of the tropical Pacific, and indicators from more remote regions, for which there may be apparent changes in ENSO activity due to changes in the teleconnections to the remote regions, as well as due to real changes in ENSO. Another difficulty with using proxy records is the separation of the ENSO 'signal' from other climatic 'noise'. These issues are addressed in the final chapter "Synthesis and future prospects". The importance of these studies lies in the importance of ENSO for current climate variability and the possibility of inferring changes in the nature of ENSO associated with future climate change from its past variations. Further work on understanding past ENSO variations is needed before this possibility can be realised but this book documents the advances that have been made over the last two decades. I recommend this book very highly to anyone interested in ENSO, climate variability or climate change.

For the readers of *Antarctic Science*, this book should be of general interest because it is an excellent review, but it does not address the possible links between ENSO and polar regions. Although not presented in this book, there is some evidence of links between ENSO and Antarctic sea ice extent. The strong impact of the Southern Oscillation on the circulation in the Southern Hemisphere is likely to lead to some signal of ENSO in Antarctic ice cores, but such polar proxy evidence of ENSO is not described in this book.

DAVID KAROLY

## The Structure and Dynamics of Antarctic Population

*Juan Carlos M. Beltramino*
Vantage Press, New York (1993)
105 pages. $16.95. ISBN 0 533 10205 7

This is a very readable and well-written book which gives a clear account of the growth and movement of human population groups in Antarctica. The population does not, of course, conform to normal patterns of population dynamics since it is entirely temporary and is not subject to the normal family structure. In common with other areas the changing population dynamics of Antarctica is closely related to current interest and practical usefulness of the area in the eyes of the nations which explore it. The first major increase in population related to the International Geophysical Year, while the Antarctic Treaty did much to sustain interest until the possibility of the discovery and exploitation of mineral resources arose. In more recent times the discovery of the hole in the ozone layer and concern about the possible consequences of global warming has seen the continued growth and development of Antarctic interest and the changing pattern of personnel from a predominant meteorological group to a much more varied group of scientists and support personnel. The introduction of women to the Antarctic has not had much effect on population so far but the use of increasing air travel is likely to affect dynamics in the future both from the scientific research point of view and from the effect of more and more tourism and other forms of leisure pursuit.

The book, however, does more than comment upon population dynamics. It also gives a very clear picture of the present population groups in Antarctica and their activities. In equally succinct terms it paints the picture of the historical development, making it a very useful text for the new recruit to Antarctic work who wishes a rapid orientation to the scene. Occasional errors are made in differentiating singular from plural and on page 19 reference to, 'The very well known expedition led by Scott and Amundsen' could cause confusion to the new student of Antarctic history!

Probably, the greatest value of the book, however, is in its provision of the basic, total population data which will allow for the proper evaluation of the epidemiological work which is currently being setup by the human biologists of many nations in the Antarctic. A clear understanding of the illnesses which are likely to take place in these population groups is essential for modern health care provision . Present epidemiological work in the Antarctic is confined to the efforts of a few nations only and the data bases constructed are so fundamentally different that it is likely that a fresh beginning will be needed when and if the nations agree to collect common information. To be of value this data will require to be related to accurate population data. Beltramino's work and this publication ensures that vital information is now available—the rest is up to the human biologists!

This excellent book will form a most useful and interesting addition to the library of the Antarctic human biologist and to medical epidemiologists. It is also a worthwhile introductory book on Antarctic science and would even be of interest to the Antarctic tourist.

J. Nelson Norman

## Fish Endocrinology

*A.J. Matty*
Croom Helm, London (1993)
267pages. £47.00. ISBN 0 88192 024 X

'Fish Endocrinology' is a readable, wide ranging book. The first 200 pages consist of a gland-by-gland description of the anatomy and function of the elements of the fish endocrine system. Each chapter is devoted to a single gland and its hormones (e.g. the pituitary; thyroid) or to a group of associated hormone systems (e.g. pancreatic and gastrointestinal hormones; 'adrenal' and kidney hormones), this section ends with a chapter devoted to the somewhat enigmatic glandular structures associated with homeostasis and rhythmycity: the corpuscles of Stannius, the urophysis and the pineal. Throughout this part of the book there is a strong emphasis on comparing the responses of agnathans, elasmobranchs and teleosts, but there is a minimum of reference to other vertebrate groups; the author demands a reasonable degree of familiarity with mammalian endocrinology.

Next, there is an overshort (six page) chapter on pheremones, that does little beyond providing a brief introduction to alarm substances and to sex-recognition pheremones.

Finally there are two chapters devoted to applied aspects of fish endocrinology. The first of these is concerned with hormones, migration and sea ranching (particularly the hormonal control of 'smoltification'); the second is devoted to hormones and aquaculture, with the emphasis on induction of spawning, control of maturation and growth promotion.

The main problem with the book is its age. First published in 1985, it does not contain a single reference to work published later than 1983, so is effectively a decade out of date. The last ten years has seen a massive expansion of aquaculture and a burgeoning of molecular biology, both trends leaving the volume rather inappropriate for its original target user, the advanced student or the researcher. Instead it now has a useful role as an introductory text, provided that the reader is aware of its age and obsolescence. From the point of view of an Antarctic fish biologist the book has little relevance; virtually all material is related to lampreys, dogfish, goldfish and guppies, or to the stalwarts of the aquaculture industry, the salmonids, tilapias, carp and killifish. Nototheniid fishes merit not a mention!

John Davenport

## Glacigenic Sediments

*K. Brodzikowski* and *A.J. van Loon*
Elsevier Science Publishers, Amsterdam (1991)
674 pages. $131.50. ISBN 0 444 88307 X

This enormous book of almost 700 pages attempts to cover the whole range of glacial sedimentology, except for glaciotectonic deformation which the authors claim will be discussed in a further volume. The best aspect of this book is probably the vast amount of research that it contains in the form of very many references, including many from the Polish and Russian languages. There are also a great deal of examples from all over the world, Svalbard to New Zealand, Alaska to Poland. However, this data has been collated into the authors own terminology, which is very different from that used by the rest of the English-speaking world. This makes the book very difficult to review.

The book begins with an introduction to the history of glacial sedimentology and then goes on to look at different aspects of the glacial environment in turn. Many of these aspects are unusual for books about glacial sedimentology, such as tectonic and atmospheric processes and periglacial processes, although this does provide a different and interesting approach.

No book on glacial sedimentology, could of course, hope to cover the whole subject area to everyone's satisfaction, and any book covering such a dynamic theme does risk becoming rapidly outdated. In this book, although a wide range of subjects are covered, the major contemporary problems in glacial sedimentology are not addressed. That is, the concept of glaciers moving over deforming beds are not mentioned, neither are the problems of distinguishing subglacial tills from galciomarine sequences, or subglacial deformation sequences from melt-out sequences, nor is the problem of the formation of drumlins (subglacial deformation or glaciofluvial) discussed in any detail. However, the book does emphasize other types of sedimentation, whose study is not so fashionable at the moment, and that does give the reader a fresh perspective.

Another problem with the book is that there are so many references it makes the book difficult to read, and in places it is more like a list. Sometimes the key references on a topic are not included, e.g. in the section on drumlins neither Shaw (1983) or Boulton (1987) are mentioned. and the book is unpredictable in references from the late 1980s, some are included, e.g. Eyles & McCabe 1989, Menzies 1989 but others, e.g. Alley *et al.* 1986, Boulton & Hindmarsh 1987, are not.

This book, however, does contain many good ideas, if the reader can cope with the unusual terminology. For instance, in the chapter on subglacial processes, there is a good discussion on lodgement and deformation processes (although not set within the deforming bed model) but then they use the term "basal" till to mean melt-out till. I could not really recommend this book to students because they would be so easily confused. They would do better to read Goldthwait, R.P. & Matsch C.L. (1989) which uses the standard terminology. The authors have also produced a rather complicated coding system for facies analysis based on their terminology, this is also unnecessary as most people interested in that approach use the useful scheme of Eyles *et al.* 1983.

The fact that "glaciotectonic" deformation is not included in the book is disappointing. I think by this they mean proglacial glaciotectonic deformation, as they do discuss subglacial deformation in their chapter on subglacial processes. Too many text books on glacial sedimentology miss out deformation, although it is a very important element of the glacial environment and very difficult to separate from glacial deposition and erosion.

In conclusion, this is a useful review book, and the inclusion of Eastern European references is very interesting. It is a useful resource book for the researcher, looking at the historical background of a subject, but not for a student. Unfortunately the book has a rather old-fashioned approach, and although it does contain a lot of interesting references and ideas, I feel its approach is just too different for it to appeal to a Western audience.

J.K. HART