

Book reviews

Atmospheric Modeling, Data Assimilation and Predictability by Eugenia Kalnay (Cambridge University Press, 2003). ISBN 0521796296. \$99.00.

Reviewers rightly tend to regard publishers' claims with some scepticism. However, in this case I can wholeheartedly agree with at least one of the publisher's claims, namely that the book provides 'clear and intuitive explanations of all the fundamental concepts' underlying the areas it covers. This quality is indeed the book's greatest strength.

While, as the title implies, the book covers many (not 'all' as claimed by the publisher) aspects of numerical weather prediction (NWP), it does not, and nor should it be expected to, cover each aspect in similar depth. Its six chapters are entitled:

- Historical overview of NWP (31 pages);
- The continuous equations (36);
- Numerical discretization of the equations of motion (59);
- Introduction to the parameterization of sub-grid scale physical processes (9);
- Data assimilation (69); and
- Atmospheric predictability and ensemble forecasting (56).

Three appendices are entitled:

- The early history of NWP (3);
- Coding and checking the tangent linear and adjoint models (12); and
- Postprocessing of numerical model output to obtain station forecasts (12).

The references are extensive (45 pages) and up to date (latest 2002).

The publishers claim an extraordinarily wide audience for the book, but it may be more useful to enquire for whom it is most suitable. Given the 'road testing' described in the author's acknowledgments, I concur with the specific claim that it could form the basis of one or more graduate courses. Also, the author's deep appreciation of the practical realities of operational NWP make the book an excellent reference for professionals in that area.

While all chapters are presented in impeccable pedagogical style, Chapters 5 and 6, dealing with the current growth areas of data assimilation and predictability were of the most interest to me. The publisher's definition of data assimilation on the back cover is inadequate (sorry, Cambridge), and readers

should consult page 136. But the chapter itself is uniformly excellent. I particularly liked the way in which it is explained, with the help of exercises for the student, how all the common analysis and data assimilation methods relate to one another. Readers should not be deterred by the number of equations; the intuitive explanations, alluded to in the first paragraph of this review, are at their best here.

The final chapter, on predictability and ensemble forecasting, is the most wide-ranging, its topics extending from chaotic systems, through ensemble methods, to variability on decadal time scales and climate change. I found it somewhat uneven; for example, adjoints, the tangent linear model, singular vectors and Lyapunov vectors are dealt with in considerable detail, but predictability on longer time scales and climate change less so. As elsewhere in the book, however, referencing is very thorough.

Appendix A is an entertaining and somewhat provocative view of NWP in the years 1945-1959, consisting of notes written from memory by Anders Persson. His reference to Lindzen et al (1990) actually appears under Thompson (1990) in the reference list.

I have little doubt that the book will be an important reference for some time to come. My review copy has already been labelled 'Stolen from ...'.

Bob Seaman

Bob Seaman is a research scientist in the Bureau of Meteorology Research Centre (BMRC), and a specialist in data assimilation.

Coastal Management in Australia by Nick Harvey and Brian Caton (Oxford University Press 2003). ISBN 0-19-553794-7. \$44.95.

Meteorologists and oceanographers often come in contact with issues related to the management of the atmosphere or ocean. In Australia, the economic and cultural value of the coastal region is large and thus the management of this resource has been the subject of much study and a number of books have been written about it. For a really up-to-date summary, a good place for readers of this journal to start is Coastal

Management in Australia, by Nick Harvey and Brian Caton. In this relatively slim paperback is a detailed compilation of coastal management issues as they apply to this country.

Coastal management is of course a matter of global concern, so the authors begin by discussing some of the main worldwide trends in coastal management, as well as some of the fundamental principles underlying it. In Australia, there have recently been a number of significant changes in the legislative framework under which the coast is managed, and there is a section which puts this in perspective. Further changes are likely in the near future as an effort is made to provide a more consistent set of regulations throughout the country.

This is not just a book on how to respond to government directives, however. There are detailed sections on coastal processes. These are mostly discussed descriptively; for a more quantitative treatment, Colin Woodroffe's recent book *Coasts* is more appropriate. But for the meteorologist or oceanographer who is encountering a number of these concepts in detail for the first time (such as estimating erosion, for instance), the book provides a useful starting point. In addition, there are case studies illustrating the type of analysis used to quantify the effects of coastal processes.

Human impacts on the Australian coastline are large and will likely increase in the future, so there is a lengthy chapter on their management. This is an exceedingly difficult issue as the human effects on the coast are diverse, ranging from changes in sand transport due to the placement of coastal structures, to impacts on coastal ecosystems and the effects of increasing tourism. According to the authors, the demographic rush to the coast requires urgent planning action to avoid serious impacts on environmental and recreational assets.

The authors do not hesitate to make recommendations for future action. In the section on managing the Australian coast, they point out the great variety of government roles and responsibilities currently in place in Australia. There is a perceived lack of consistency in coastal regulation across the whole country which the authors believe may lead to inadequate management of this precious resource. They suggest a number of approaches in their concluding section, including the development of national coastal policy to provide a genuine framework for national standards. Implicit in this approach is the development of specific goals and performance criteria that will measure whether the coast is well-managed or not.

In general, this book is highly recommended for its scope and its truly up-to-date content. Any meteorologist or oceanographer in Australia who occasionally deals with coastal management issues should own a copy.

Kevin Walsh

Kevin Walsh is a Senior Lecturer in the School of Earth Sciences at the University of Melbourne. Among other things, he teaches a first-year course called 'The Atmosphere and Ocean'. He is also the book review editor of the Australian Meteorological Magazine.