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Book reviews

Land Surface Evaporation — Measurement and Parameterization, edited by T.J. Schmugge and J.C. André (Springer-Verlag, 1991) ISBN 3 540 97359 1. Hard cover. xv + 424 pp., DM168.00.

Climate and climate change research, with a significant emphasis on numerical modelling of the atmosphere-biosphere-ocean system, have expanded dramatically in the last few years, and innumerable meetings, workshops and conferences are being held around the globe to discuss the various aspects of this burgeoning activity. The book under review here is based on one such workshop held in France in October 1988. The book is, in fact, a collection of twenty-six papers (providing a total of twenty-six chapters). The invited speakers to the workshop were asked to provide a written version of their talks for distribution to the attendees. Modified versions of these papers, following a review process, form the basis of the book under consideration here.

The two editors are well known in the land hydrology and atmospheric boundary-layer communities (and beyond), and it must first be said that, overall, they have done a good job. Generally speaking, they have provided an acceptable degree of continuity throughout the book, with the overall objective of presenting a review of land-surface evaporation processes, both from the measurement and modelling points of view. They have mostly succeeded in providing uniformity of presentation, particularly in respect of nomenclature and format, though there are a number of errors that have missed their critical gaze (e.g. the *Quarterly Journal of the Royal Meteorological Society* is abbreviated in at least three ways).

Following an introductory chapter, the first section (Chapters 2 to 7) deals with the parametrisation of land-surface processes in large-scale meteorological and hydrological numerical models. The second, and largest, section (Chapters 8 to 23) is concerned with the physical principles that underlie the measurement techniques and the possible limitations of some of these. It deals with ground-based aircraft and satellite-based instrumentation. The third section (Chapters 24 to 26) addresses the central problem of aggregating, or 'scaling-up', the local values of evaporation fluxes to the regional scale.

The papers are mostly technical in content, or deal with the subject matter at a fairly advanced level. Nevertheless, I believe the book will appeal to a wide cross-section of the scientific community which is interested in the problem of land-surface interaction, and evaporation processes beyond the canopy scale in particular. This volume reinforces the growing multi-disciplinary nature of the subject, involving as it does meteorologists, hydrologists, ecologists and remote sensing experts. It (the book) will face some stiff competition — there are a number of tomes appearing right now based, as in the present case, upon workshops and the like. My own feeling is that the present work will fare better than most due, in no small part, to the good work of the editors.

The editors had a difficult job — the twenty-six chapters are a varied bunch in quality, style, technical content, breadth of focus and, whilst some attempt a review of a particular subject area, others provide a very specific research-oriented analysis. When read from cover to cover, there is a certain 'lumpiness' in the feel of the book; I suspect that many readers, however, after a perusal of the contents, will opt to concentrate on those few chapters closest to their own interests. It should be said that a recurring theme throughout relates to the 1986 Hydrologic Atmospheric Pilot Experiment (HAPEX) — indeed a number of the papers in this category have appeared in similar form elsewhere in the literature. The reviewer must admit to a certain bias, but to my mind the best two papers, in terms of insight provided, clarity of writing (and thus pleasure given in reading), relevance, 'readability' and ease of comprehension, were those by Shuttleworth (Chapter 5: Evaporation Models in Hydrology) and Wyngaard (Chapter 12: On the Maintenance and Measurement of Scalar Fluxes). Wyngaard is an acknowledged master of his craft and it is high time that a publishing group convinced John to write his *magnum opus*. As for Jim Shuttleworth, he has rapidly established himself in the forefront of his field and, as with John Wyngaard above, we await Jim's *magnum opus* (within the next five years?) with great anticipation. These two papers are well supported by a number of others that provide the essential backbone and framework to the whole book.

To summarise — the book has considerable scientific merit, contemporary interest and relevance, and the quality look of the finished prod-

uct reflects upon the hard work put in by the two editors. I suspect that many interested buyers will order through their libraries, or wait for their libraries to obtain the book. It will cost A$118, which is fairly steep, and though not urging anyone to rush out and order from their local bookseller, make sure that your library gets a copy onto its shelves. It is published by Springer-Verlag New York Inc.

Dr John Garratt

John Garratt is a senior principal research scientist in CSIRO. His book on the atmospheric boundary layer will be published by C.U.P. in mid 1992.

Wave Packets and Their Bifurcations in Geophysical Fluid Dynamics by Huijun Yang (Springer-Verlag, 1991) ISBN 3 540 97257 9. Hard cover. ix + 247 pp., DM78.00.

This book is based predominantly on recent work of the author on the theory of Rossby wave packets in barotropic shear flows, and the application of this theory to planetary-scale mid-latitude atmospheric flows. The theory is based on the usual quasigeostrophic equations for the flow of a single-layer fluid over topography on a β-plane, with the novel twist here that β is also allowed to depend linearly on the latitudinal co-ordinate. To obtain a description of the wave packet the equations are linearised and the theory then follows a conventional course. Most of the discussion then centres on how the structure of a Rossby wave packet is affected by the various parameters associated with the underlying basic state, such as the shear of the basic flow, the β-term and the topographic slope.

After a short introductory chapter which presents some standard background material in geophysical fluid dynamics, the author proceeds in chapter two to develop the general theory of wave packets. This material is well known but it is useful to have it summarised here, although a new-comer to the theory of waves would probably find this treatment in forty pages too condensed to be any more than a useful guide to the literature. The main part of the book starts in chapter three with derivation of the equations for a Rossby wave packet. Then there follows, in chapters three through to six, a comprehensive analysis of how the structure of a wave packet is affected by the underlying basic state parameters. Chapter seven describes less comprehensively the analogous theory when the basic flow is baroclinic, while chapter eight discusses some aspects of wave propagation in relation to teleconnection phenomena. As well as the summary of wave-packet theory in chapter two, the later chapters also include brief outlines of stability and bifurcation theory of dynamical systems since these concepts are used in the present application.

While it might be useful to have the author's recent research brought into a single monograph, I am doubtful if this book will be of great interest except to those whose field of research involves atmospheric Rossby waves. It would also be of some value to those wishing to learn about the modern theory of linearised wave motion in a geophysical fluid dynamics context. However, even from this perspective, the book is of limited value since it does not touch at all on any aspect of nonlinear waves or wave interactions. From a broader point of view it will also fail to satisfy readers seeking an understanding of how theoretical ideas relate to observed mid-latitude atmospheric flows since the author's approach ignores such relevant topics as baroclinic instability and dissipative processes, while, as already mentioned, totally ignoring nonlinear effects. Of course it is any author's prerogative, as here, to concentrate on a specialised topic, but the present text's total emphasis on linearised Rossby wave packets has the consequence that the book will be of only limited interest.

Professor Roger Grimshaw

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Global Environmental Change edited by Robert W. Corell and Patricia A. Anderson (Springer-Verlag, 1991) ISBN 3 540 53128 9. Hard cover. xiv + 264 pp., DM150.00.

This book contains the Proceedings of the NATO Advanced Research Workshop on the Science of Global Environment Change held in Italy May 21–June 2, 1990. As a climate change researcher I found this book somewhat disappointing due to the overemphasis on explanation of the 'alphabet soup' of the innumerable acronyms of various international bodies that are now involved in climate change at the expense of discussion on the science that needs to be done. That this state of affairs could happen is not surprising when we read in the preface that:

> 'This NATO Workshop ... focussed on the state of knowledge in global change science and on assisting the Scientific Affairs Division of NATO in designing a 5-year program of Advanced research Workshops and Advanced Study Institutes in the area of global change that

would make a meaningful contribution to the international activities already underway'.

The book itself is broken up into five parts:

- Introduction
- Opening Addresses
- Global Environmental Change: The State of the Science
- Modeling and Data Needs
- Scientific Goals of International Research Programmes.

Apart from Part 3 and small sections in Parts 4 and 5, the book is devoted primarily to the 'administrative' component of global environmental change. Those who require information regarding the innumerable interlocking research organisations and their associated activities will find much of interest, but an understanding of the way in which international science is organised at a high level does not help at all in actually *doing* the relevant science.

In Part 3 the contribution by Max Beran, 'The Climate System and Hydrological Cycle', is an excellent very broad overview of climate change from the perspective of a hydrologist. Other contributions in this section attempt (not quite so successfully) to present overviews of the problems of climate change from a multi-disciplinary research perspective: areas considered include 'the human dimension', 'ecosystems' and 'biogeochemical processes'.

Modelling aspects of the climate change problem are only dealt with in a rather cursory way in a contribution by Berger et al. devoted to astronomical climate modelling; ocean modelling is discussed in the contribution by David Anderson describing the World Ocean Circulation Experiment in Part 5.

This book cannot be recommended for individual purchase. It does, however, have some relevance as a reference volume in a large library. Members of the 'scientific administration' community may find it useful in unthreading the interlocks between the various international activities — at least the 'alphabet soup' of acronyms may be a little clearer.

Dr Bryant McAvaney

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