

Book reviews

Air Pollution. Volume VI: Supplement to Air Pollutants, Their Transformation, Transport, and Effects. ISBN 0 12 666606 7 495pp. \$US70.00.
Volume VII: Supplement to Measurements, Monitoring, Surveillance, and Engineering Control. ISBN 0 12 666607 5 544pp. \$US69.50. **Volume VIII: Supplement to Management of Air Quality.** ISBN 0 12 666608 3 197pp. \$US43.50. Edited by Arthur C. Stern. (Academic Press, Inc., Florida, 1986)

The supplements to *Air Pollution* are, like the foundation volumes, intended for professionals in the sciences, engineering, meteorology, biology, medicine, law and public administration. The reader is presumed to have an 'adequate background in his or her profession'. The result is a mixed success.

Clearly, a difficult decision had to be made: whether to update the five volumes of the third edition of Stern's monumental and important books, published in 1976-77, by producing a fourth edition or, the course chosen, supplement the Third Edition by preparing addenda which give access to findings over the intervening 10 years.

For a balanced view of an area of interest access to the first five volumes of the Third Edition will be required. There is no easy correspondence between the chapters in the supplements and those in the base set. So much so that the editor provides a table indicating which volume/chapters might need to be referenced!

Volume VI *Supplement to Air Pollutants, Their Transformation, Transport, and Effects* places new emphasis on indoor pollutants, sulphur oxides, their long-range transport, and effects of particles on visibility and health. There are chapters on the title topics and a new chapter on 'Effects of Acidic Deposition on Aquatic Ecosystems' which discusses much recent work, but its conclusions regarding control measures are likely to date quickly as further findings become available. The chapter on 'The Transport of Pollutants' does little more than provide a short overview of recent work in this vast subject. Simulation modelling is discussed in only the briefest terms.

While the chapters in this volume appear to be of a very high standard and are well researched, the cross-referencing to previous volumes for the rest of many subjects is intrusive to the flow of the presentations.

Alternatively, the context of past work contained in the earlier volumes is simply assumed.

With regard to Volume VII, *Supplement to Measurement, Monitoring, Surveillance and Engineering Control*, more emphasis is now placed on the SO₂ contribution to acid rain and reduced visibility than on health effects, on the inhalable particulate fraction than the total particulate loading and on the measurement of acidic precursors and radicals as well as ozone itself.

There are now excellent sections on measuring particulates and hydrocarbon sampling, but both old and modern methods for SO₂, O₃, and NO_x are given equal prominence. A chapter on 'Source Surveillance' gives a satisfactory overview, especially regarding motor vehicle emissions. More than half the book covers 'Control Devices' and 'Process Emissions and Their Control' in five chapters, and these give a comprehensive update to information in Volume IV of the Third Edition.

In Volume VIII, *Supplement to Management of Air Quality*, the confusion generated by appending to an existing edition is most evident. The result is a relatively expensive book, difficult to follow and of marginal relevance in Australia. There are chapters on 'Air Quality Management in the United States', 'United States Clean Air Act Litigation', 'Air Pollution Control Programs - Worldwide' (none southern hemispheric!), and 'Air Pollution Personnel and Their Development'.

The last chapter of Volume VIII, 'Air Pollution Standards' does provide a reference for standards on a worldwide basis. However, if the values quoted for Australia are indicative of the care taken for other places then this chapter too will be of marginal interest. This is because the figures quoted for Australia do not apply in all States, or alternatively they are NHMRC guideline values, not standards.

Although some subjects are not covered in any depth or for a variety of reasons may not be applicable to Australian conditions, the third edition of *Air Pollution* with the new supplements is an excellent reference work for those engaged in the air pollution management field.

Peter Manins

This review was written by Peter Manins, Project Director of the Latrobe Valley AirShed Study. His thanks to Dennis Hearn, Scientific Officer, Assessments and Research, Environment Protection Authority for reviewing Volume VII; and Peter Williams, Senior Environmental Management Engineer, State Electricity Commission of Victoria, for reviewing Volume VIII.

Advances in Geophysics. Volume 29: Anomalous Atmospheric Flows and Blocking. Edited by B. Saltzman, R. Benzi and A. C. Wiin-Nielsen (Academic Press Inc., Florida, 1986) ISBN 0 12 018829 5. 459 pp. \$US85.00.

This volume contains a series of articles arising from a workshop on 'Global Scale Anomalous Circulation in the Atmosphere and Blocking' held in August, 1984 in Rome. Preliminary versions of the articles were presented at the workshop but they have been carefully edited and combined to form a coherent set. The articles include reviews and original research on the low-frequency variability of the atmosphere and persistent anomalous flow from observational, theoretical and numerical modelling perspectives. This subject area has received intense research and achieved significant progress over the past decade, and these articles provide a good review of the state of knowledge and research in it in 1984.

The articles have been separated into three groups based on their different perspectives, introduced by a brief historical review of studies of the global-scale circulation by Aksel Wiin-Nielsen. The first group of articles on observational studies includes papers by Dole on the life-cycles of persistent anomalies over the north Pacific, by Schilling and by Hansen on planetary wave variations, and by Shutts on transient eddy forcing of a blocking event. The papers by Dole and Shutts consider regional forcing of blocking events and the effects of transient eddies whereas the papers by Schilling and Hansen take a global view and provide observational evidence of a bimodal distribution of planetary wave amplitudes. This bimodal distribution is consistent with the theory of multiple equilibrium states for the atmosphere.

The second, theoretical group, includes papers by Speranza and by Sutera on the theory of topographic instability and multiple equilibrium states, by Pierrehumbert on local baroclinic instability, by Egger on stochastic forcing of blocking by transient eddies and by Lindzen on atmospheric planetary waves. The papers by Speranza and Sutera on multiple equilibria link very well with the observational papers by Schilling

and Hansen while those by Pierrehumbert and Egger on transient eddies link well with the observational papers of Dole and Shutts. As might have been expected, Lindzen has provided a cautionary note in his review to some of the enthusiasm apparent in the other papers. He points out that anomalous atmospheric flows, although persistent relative to synoptic features, are not persistent or large in amplitude when compared with typical atmospheric planetary waves and may be understood (possibly?) in terms of free Rossby waves.

The final group of papers describes a range of numerical modelling experiments. These are interesting, but not all quite as directly related to the theme of the book. Included here are papers by Frederiksen on three-dimensional instability theory relevant to blocking, by Simmons on operational forecasting at ECMWF, by Tibaldi on the role of envelope orography, by Mechoso et al. on sensitivity to horizontal and vertical resolution, by Kalnay and Mo on forcing of a case of large-amplitude, short-scale stationary waves in the southern hemisphere and by Shukla on the role of SST anomalies in forcing anomalous extra-tropical flow. Although these numerical modelling experiments are diverse, they provide a useful survey of the problems which operational and research models have in maintaining large-scale anomalous flow features and some possible ways to improve their performance.

Overall, this book contains a number of very interesting research articles and reviews. Although the title is *Anomalous atmospheric flow and blocking*, the emphasis is more on anomalous flow and less on blocking. The observational evidence for multiple equilibrium states is new and provides some support to this theory. The quality of the technical production and editing is very high, with clear diagrams and a very few minor typographical errors.

I would recommend this book to any researcher who wishes to know the current state of research in the subject of anomalous atmospheric flow, or who wants a useful reference on this subject, which includes a range of observational, theoretical and modelling perspectives.

David Karoly

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