Book reviews

Encyclopedia of World Climatology, edited by John E. Oliver (Springer, 2005), ISBN 1-4020-3264-1, 854 pp., $500.00.

The *Encyclopedia of World Climatology* is an updated reference volume (its precursor was the 1986 *Encyclopedia of Climatology*), intended to provide the educated layperson with the basics of our current understanding of climate, climatology and climate change. The book further lays claim to the task of 'meeting the needs of specialists [and] university students…'. It is organised alphabetically with topics ranging from the Madden-Julian Oscillation to Climatic Determinism, from Lapse Rate to Seasonal Affective Disorder. Around 200 entries are supplied by 150 scientists, largely from the United States.

The topics in this fascinating volume are idiosyncratic indeed. And therein lies its charm. I could not wait to find out what it had to say about 'Art and Climate', a chapter in which I found out that ancient Roman landscapes depicted uniformly cloudless skies until around the 4th century AD. Or 'Atmospheric Nomenclature', which recounted the history of the classification of atmospheric layers. Or 'Archeoclimatology', which I discovered was a subspeciality of palaeoclimatology that develops very localised estimates of weather patterns in the distant past. And that is just the As.

However, it must be said that the entries are highly variable in their quality, detail, and intended audience. For example, the entry on jet streams includes an albeit simple differential equation and yet the entry on winds relies on delta notation to express the hydrostatic and geostrophic equations. In another example, the article on the Intergovernmental Panel on Climate Change (IPCC) consists of two short paragraphs largely lifted from the IPCC website, and does not even mention the Framework Convention on Climate Change – in fact, the entry on the Institut Pierre-Simon Laplace des Sciences de l'Environnement (IPSL) is longer. Cross-referencing of articles is also somewhat lacking – the aforementioned entry on IPCC did not reference the entry on the Kyoto Protocol, for example, and there is no entry for the World Meteorological Organization at all.

This variability across the encyclopaedia is, of course, a reflection of the way in which it was compiled. Entries were written by a range of scientists with different backgrounds, many of them luminaries in their field. Many of the entries were lightly revised from the 1986 edition which no doubt had a somewhat different intended audience. Further, many of the entries are very US-centric in their viewpoints (blizzards, for example, apparently only occur in North America). This approach requires a strong hand and a clear vision on the part of the primary editor.

A further disappointment in this volume is the poor quality of the figures. Many figures look like very bad photocopies; several of them are illegible. For example, Figure A84 probably shows the troposphere, stratosphere, mesosphere and thermosphere, but you would not be able to obtain that nomenclature from the figure itself. There is no excuse for this kind of problem in these days of electronic publishing. The figure quality detracts substantially from the volume and makes it appear quite amateurish. With a retail price of $500 one would expect better.

Who would use such a book? I suggest that the 'educated layperson' of the introduction would find this book rather frustrating. While it is entertaining to look up entries on the 'Spring Green Wave', 'Indian Summer', or 'Local Winds' (cockeyed bob, anyone?), I suspect that the entry on 'Radiation Laws' provides just enough information (and calculus) to confuse rather than enlighten. While each entry does include a bibliography for further investigation, many of the references (such as Ertel (1942) – in the original German) would be beyond the reach of all but the most tenacious lay reader.

The primary use of this encyclopaedia, as I see it, would be for the teacher at the secondary or tertiary level (and even, in some cases, at the primary level). This book is ideal for looking up those interesting little factoids that enliven our classes and make our field relevant and concrete to students. For students for whom science is not their first love, linking climate to politics, art, architecture and religion can serve to stimulate an interest that might even last longer than one semester. For that purpose, I'll be happy to have this book on my shelf.

Amanda H. Lynch

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Weather Analysis and Forecasting: Applying Satellite Water Vapour Imagery and Potential Vorticity Analysis by Patrick Santurette and Christo Georgiev (Elsevier, 2005), ISBN 0126192626, 179 pp., $85.00.

This book is intended to be a practical training guide for weather forecasters in how to combine the dynamical concepts of 'Potential Vorticity Thinking' with interpretation of satellite Water-Vapour (WV) channel imagery to assist their interpretation of numerical weather prediction (NWP) model guidance. Its format and structure is more in the vein of a training manual than an undergraduate textbook, and as such it contains a large number of very instructive practical examples. The detail in these examples, though, will require some commitment from the reader if maximum value is to be gained from the book, although there is still benefit in a less rigorous reading. However, the authors' espousal throughout the volume of a concept dear to this reviewer's heart – the use of independent data to 'track' the evolution of an NWP model forecast – is to be encouraged, and the content of this book constitutes a valuable resource for the practicing meteorologist.

There are four chapters in this book. The first two are relatively short, with the first summarising the 'Potential Vorticity Thinking' concepts of dynamic meteorology, and the second providing an overview of the principles of radiative transfer to explain the information content, strengths, and limitations of water-vapour channel satellite imagery. This reviewer found the dynamics chapter a little short, and I feel that most meteorologists should supplement their reading of this chapter with a contemporary textbook or review volume, as well as the classic paper of Hoskins et al. in the QJRMS in 1985 (these references are listed in the book). I felt that the balance and content of Chapter 2 was just about right for a practicing meteorologist, and should constitute a valuable resource on the forecast office reference shelf.

Chapter 3 constitutes some 33 per cent of the book, and presents a large number of examples of WV imagery features compared with NWP fields, and discusses the particular features of the upper-tropospheric flow that led to those features, and their association with the patterns and features of the Potential Vorticity (PV) field. The key concept here, as has been described elsewhere, is that descending air in the upper troposphere has both low humidity (dark in WV imagery) and more cyclonic PV. There is considerable detail in these cases, which either complements or extends the examples presented in Weldon and Holmes' 1991 NOAA technical report and the examples in Bader's 1995 book, *Images in Weather Forecasting*.

Chapter 4 occupies nearly half the book, and presents actual examples of comparison between NWP fields and WV imagery, and discusses at length how a forecaster can interpret apparent mismatches between an NWP model's depiction of the PV or dynamic tropopause height structures and the WV imagery. A particular strength of this chapter is that it proposes a systematic process for this assessment, and while it is presented in tabular form, is essentially a decision tree. This process description is followed by a number of excellent case studies illustrating the various options presented during this process. The final section of this chapter presents a methodology whereby a forecaster, having identified a mismatch between NWP fields and the WV imagery, can modify the initial state of the NWP model by first adjusting the model's PV field to better match the WV imagery and then use PV inversion techniques to obtain the mass and wind increments that are used to modify the initial state of the NWP model. Two examples of successfully modified forecasts are presented, but no assessment of any routine application of this technique is discussed.

I have slightly mixed feelings about this book. Things that I liked were the detailed and well argued case studies that would make excellent teaching examples to trained forecasters; the accessible description of the strengths and weaknesses of WV imagery in Chapter 2, which would benefit any meteorologists who feel they lack skills in interpretation of these images; the excellent structured process for comparing NWP model fields and WV imagery; and the summary sections at the ends of Chapters 3 and 4 that refresh the memory of the key points of each section of these rather long and detailed chapters.

The features that left me less satisfied were the slight clumsiness in the language that I assume arose in translation (one example of which is the use of the expression 'bad weather system' on Page 70); aspects of layout that sometimes had diagrams several pages from the discussion pertinent to those diagrams, even though effective understanding required frequent referral between text and diagram; and the choice of colours, contour thicknesses, and label or wind barb sizes made many of the diagrams rather harder to interpret than I would prefer (although younger eyes than mine may cope better). Finally, I have some reservations about the routine application of the PV adjustment process, as the adjustment that a forecaster must make is quasi-subjective, and that the balance condition and

boundary conditions specified do affect the solution of the PV inversion (the authors do acknowledge that there is frequently no unambiguous interpretation of these patterns). One wonders if the same, or even improved, results might not be achieved using four-dimensional variational assimilation of the WV radiance data.

In summary, there is valuable information in this book, and if meteorologists were to apply themselves to a detailed study of its contents, then their professional skills would be enhanced. The presentation of the book is such, though, that many may not dedicate sufficient effort. A second edition of the book with careful attention to the language, the layout, and the graphics, would be a boon.

Graham Mills

Graham Mills has worked in the Bureau of Meteorology's research branches since the mid-1970s. He has a keen interest in the application of NWP to the prediction of significant weather events, and currently leads two of the Bushfire CRC projects in BMRC.