

Book reviews

Atmospheric Science: An Introductory Survey (second edition) by John Wallace and Peter Hobbs (Academic Press 2006). ISBN 0-12-732951-X. \$85 (hardback).

This one-volume introduction to the broad field of atmospheric science is not really intended as a stand-alone textbook for a University-level meteorology subject. Rather, it is designed to provide background information for such subjects, as a source book for a range of topics. As such, it succeeds brilliantly.

The first edition was published in 1977 and remains a classic meteorology text. A lot of things have happened since then, so this edition is a useful update to the earlier book. There are now chapters on climate dynamics and atmospheric chemistry, as well as sections explaining the science behind remote sensing. But the core elements of the first edition, atmospheric thermodynamics and dynamics, remain.

This book has a number of strengths that make it commendable to students and working scientists. It is quite clearly written, although occasionally important concepts are introduced without much preparation. The authors can be forgiven for this, as this book is a resource rather than a discursive text, and also they had a lot of material to cram into one volume. The diagrams are terrific and instructors can download electronic versions of them from an associated website.

An excellent and thought-provoking chapter on the earth system as a whole identifies the main driving forces that determine the climate of the planet and the composition of its atmosphere. A section on thermodynamics gives a basic but thorough explanation of the important thermodynamic properties used in meteorology, such as adiabatic processes, potential temperature and so on. The chapter on radiative transfer includes a nice explanation of how satellites calculate remotely sensed quantities from radiances, providing a link between the often dry theory of radiation and an important real-world application.

The new section on atmospheric chemistry deals with both large-scale effects such as the ozone hole and with smaller-scale phenomena such as air pollution. The basics of cloud microphysics and the atmospheric boundary layer are described in other chapters. Sections on atmospheric dynamics, weather systems and climate dynamics complete the book.

A distinctive element of this text is the very large number of exercises provided, often with fully worked solutions. In addition, more solutions to exercises are given at the accompanying website. These would be very useful for students trying to enrich their knowledge, and are quite handy as review material for instructors.

Given the enormous range of topics covered here, it would be unwise to recommend that anyone wanting to learn about meteorology should devour this book in one gulp. But as a supplement to a carefully designed set of courses based predominantly on other texts, or as a general source book for the active researcher, I would strongly recommend this book. The price is very reasonable for a book of such quality and puts it well within the range of a student budget, which is quite unusual for a hardback these days.

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Tropical Meteorology, Volumes 1, 2 and 3 (revised edition), by G.C. Asnani (Indian Institute of Tropical Meteorology 2005). ISBN 8190040022. US\$275.

As if the first edition wasn't imposing enough, G.C. Asnani has released a revised edition of his tome *Tropical Meteorology*. Now in three volumes, *Tropical Meteorology* is more encyclopaedia than textbook, covering a large range of topics from atmospheric tides, climate change, monsoon dynamics, thunderstorms, and why sunspots avoid the solar equator! It features greatly expanded chapters on the various monsoon systems of the world (including the American monsoon), and parametrisation and initialisation. Rather than attempt to cover the entire three volumes, I will examine some of the areas that most interest me – as a taste of what lies in store for the avid reader and tropical aficionado.

Chapter 5 (volume 2) deals with near equatorial flow patterns. It provides a nice historical introduction to studies of the Madden Julian Oscillation (MJO) and El Niño–Southern Oscillation (ENSO), and a section on some of the socioeconomic impacts of ENSO. Asnani's historical approach to subjects means that sections are often far more bloated with material than need be, depending on your interest. If a broad coverage of each researcher is of interest (such as in a literature survey of a thesis), then it could prove quite helpful. However, it means that a given section, such as that covering the MJO, is far larger than it needs to be, and lacks cohesion. It was also an unfortunate omission not to include any of the work by Matthew Wheeler and co-workers on the MJO and tropical waves, much of which is operationally focussed and some of which was published well before the release of the new edition. I have a couple of small nitpicks: it is El Niño not El Nino; and it means 'the boy child', not 'the child', since it was noticed locally at Christmas.

Chapter 10 (volume 2) covers mesoscale circulations from thunderstorms to tsunamis and lake breezes. There is much interesting material, but again it is arguable how much of it is necessary. The treatment on hailstorms is largely dedicated to the mid-latitudes, although the lack of work on hail in the tropics justifies this to a degree. However, the inclusion of hail suppression experiments seems unwarranted, given that none of them have been conducted in the tropics.

The large chapter on the Australian monsoon (chapter 13, volume 3) covers definitions of onset, retreat, and the various convective systems associated with it. The section on monsoon onset and retreat definitions merely lists those extant in the literature without offering a comparison or critique. Further, the omission of Wasył Drosdowsky's work on onset is hard to understand, especially given the objective nature of the definition employed and his analysis of the relationship of monsoon onset to ENSO. The coverage of the relationship between the monsoon and the MJO is disappointingly short. Asnani also uses odd terminology, comparing break monsoon to 'normal monsoon' (as opposed

to active monsoon which is in common usage). The treatment of squall lines and the North Australian Cloud Line plays second fiddle to a large discussion of the Morning Glory, including the rather odd reference to a non-scientific Australian website that discusses the Morning Glory in the context of gliding. There is also a reasonably up-to-date discussion of Hector, the thunderstorm that regularly occurs over the Tiwi Islands north of Darwin.

A few general comments are also in order. The strength of these volumes is the mathematical treatments, including sections on the vertical propagation of waves, equatorial waves, inertial oscillations and parametrisation of the tropical planetary boundary layer. Each chapter is extensively referenced, although the monsoon over Australia and the southwest Pacific less so. This makes these volumes a useful summary of the work in various areas over many years, sometimes back into the 19th century. Each chapter ends with an extended summary, but these summaries have a tendency to be a little too long. The quality of the figures is good in general, although on occasion there are some poor reproductions from other's work. There is inconsistent usage of the article, which eventually becomes annoying. There is also an inconsistency in the way papers are referenced; for example, sometimes volume number and date are given in the text, and other times simply the usual name and year. One particularly peculiar feature is that whenever figures from the work of others are shown that were in the previous edition, both the original reference and Asnani (1993) are given. I can't see why this later attribution is warranted.

Overall, this is not a text for students, but a worthwhile book for any library to have as it contains a wealth of material that could be, with patience and perseverance, mined from it.

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