An Introduction to Atmospheric Physics

Author: Andrews DG
Publisher: 2000, Cambridge University Press, Cambridge, UK; 229 pp., 103 figs., 3 tables; Hardback; £ 50.00; ISBN 0-521-62051-1

The textbook sets out to introduce *Atmospheric Physics* to graduate students or other scientists dealing with the topic for the first time. A basic understanding of undergraduate physics and mathematics is required, although the author successfully attempts to assist the reader.

The book is organised in eight chapters. The first serves as a general introduction with the aim of making the reader's mouth water: current topics are well presented to illustrate the relevance of atmospheric physics to our understanding, e.g. of atmospheric models as applied to the discussion of global climate change, and to the basics of our understanding of meteorology and climatology, and atmospheric chemistry. The second chapter is dedicated to atmospheric thermodynamics and discusses the transport of atmospheric constituents, and energy transfer. Chapter 3 illustrates the topic of atmospheric radiation, introduces the basic laws and applies them to radiative transfer, molecule spectroscopy, absorption by atmospheric gases, heating rates, etc. The next two chapters deal with basic fluid dynamics, with mass conservation and the many forms of movement of air masses and, thus, with wind dynamics on all atmospheric scales. Vorticity, geostrophic winds, gravity waves and Rossby waves, and the special conditions of boundary layers and related instabilities are also introduced. Does Chapter 6 on stratospheric chemistry seem out of place? No, because the use of basic physical principles is being nicely illustrated in this layer of considerably lower molecule density. Chapter 7 relates to the modern methods of atmospheric remote sounding. Sophisticated observations are almost entirely dependent on these methods, be it for the detailed investigation of higher atmospheric layers or the comprehensive coverage of tropospheric processes of our planet in real time and large-area coverage or be it the investigation of extra-terrestrial atmospheres, e.g. on the moons of Jupiter. The concluding chapter 8 on atmospheric modelling introduces the hierarchy of models and their different concepts.

Each chapter ends with a commented (!) reference list, and a series of problems, delivered to help the reader test his or her understanding of the preceding context. All figures are simple and clear (and well suited for use in the classroom). The book ends with a bibliography and a concise index.

The book is well made and can be fully recommended as a good textbook for a thorough introduction to atmospheric physics.

Air Composition & Chemistry

Author: Brimblecombe P
Publisher: 1996, 2nd ed. Cambridge University Press, Cambridge, UK; 253 pp., 75 figs., 44 tables; Hardback; USD 75.00, £ 52.50; ISBN 0-521-45366-6

While it is already a recommendation to see a textbook published in a subsequent edition, seeing the editor of the international leading journal 'Atmospheric Environment' as an author should fulfil the promises. Readers interested in a thorough introduction to atmospheric chemistry will certainly appreciate this well-organised and presented textbook. The book is organised in nine chapters. It starts with a general introduction to the atmosphere, it chemical composition, residence times, size and pressure variation and further basics of atmospheric physics. The second chapter explains about the natural components of air with its biological, geochemical and intra-atmospheric sources, the sinks, residence times and global cycles. The third chapter is dedicated to gas phase chemistry, a very important section that demonstrates the particular chemical processes in the atmosphere that are so different, e.g. from water chemistry. Here, reaction rates, the role of photochemistry, and the extreme relevance of radicals in atmospheric chemical processes are being introduced. Chapter 4 discusses the role of aerosols, their characteristics and properties with special emphasis on particle surface reactions. The following chapter relates to the aqueous system, and the interaction of dry gas and aerosols with all forms of water in the atmosphere, it discusses cloud physics, the transfer of gases to liquids and chemical reactions within cloud (and fog) droplets. While these first five chapters were dedicated to natural processes alone, the sixth chapter is devoted to sources of pollution that are primarily of anthropogenic origin. Low and high temperature sources, combustion, incineration and photochemical pollution are some of the topics. The following chapter discusses effects of air pollution in urban air on human health, on animals and plants, on building materials, and delivers up-to-date information on acidic precipitation and global pollution in general. From this thorough base, chapter 8 ventures into upper atmospheric levels and briefly introduces some of the important peculiarities of stratospheric chemistry, including aerosols and the ozone layer, and touches on some chemical processes in the ionosphere. The book concludes with chapter 9, where the evolution and composition of planetary atmospheres (including planet Earth) are discussed, a short but thorough introduction to a fascinating topic that helps us to better understand our own situation.

All chapters are backed up by current references for further reading and fundamental works. The formulae are well explained and many more complicated contents are illustrated through the use of simple and clear graphics. The use of tables is restricted to some very basic and helpful data. The book is very well written and truly helps the student of atmospheric chemistry to learn and understand the necessary basics. As always, there will occasionally be a need to consult other sources as well, but if one single book has to be chosen, it should be this one.