

# BOOK REVIEW

---

*Geoffrey K. Vallis: Atmospheric and Oceanic Fluid Dynamics: Fundamentals and Large-scale Circulation.* Cambridge University Press, 2006, 745 pages, 16 chapters.

*Geoffrey K. Vallis* condensed his great teaching experience into the textbook on atmospheric and oceanic dynamics. The material is divided into four major parts: (i) fundamentals of geophysical fluid dynamics, (ii) instabilities, wave-mean flow interaction, and turbulence, (iii) large-scale atmospheric, and (iv) large-scale oceanic circulation.

The introductory part, starting from classical concepts of fluid dynamics and thermodynamics, studies the effects of rotation and stratification, shallow water, geostrophic and quasi-geostrophic flow systems, vorticity and potential vorticity, as well as the Rossby waves. The second part guides the reader through barotropic and baroclinic instability, wave-mean flow interaction, theory of incompressible and geostrophic turbulence. Moreover, this part is closed with discussion of turbulent diffusion and eddy transport. The third part is focused on large scale atmospheric circulation: the overturning circulation (Hadley and Ferrel cells), zonally averaged mid-latitude atmospheric circulation, and planetary waves. The subject of the closing part is the wind- and buoyancy-driven as well as simultaneous wind- and buoyancy-driven ocean circulation. Each chapter was designed to form self-contained unit.

The text was written to satisfy the requirements of graduate courses, and it is readable. The basic material was supplemented with parts which contain advanced mathematical derivations, which may be omitted on first reading, and discuss modern research topics. The chapters end with very useful notes, including a short biography of the scientists who have made major contributions to the studied fields, list of further reading, and set of unsolved problems. The author appeals to the readers to post their own problem solutions and to extend the currently very poor set of solutions published on the web site associated with the book. All the figures, many in color, the errata, and the ongoing discussion may be downloaded from the web site.

The book represents a comprehensive survey on the theory of geophysical fluid dynamics, large-scale atmospheric and oceanic dynamics combining needs of graduate students and researchers too. It has the potential to become the standard reference for modern topics of the atmospheric and oceanic dynamics including climate systems.

*Á. Bordás*