



# Quasi-Geostrophic Theory of Oceans and Atmosphere: Topics in the Dynamics and Thermodynamics of the Fluid Earth (Atmospheric and Oceanographic Sciences Library)

By *Fabio Cavallini, Fulvio Crisciani*

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This book contains a detailed presentation of mathematical computations. It uses a main unifying technique (asymptotic expansion based on scale analysis) throughout the book to develop various applications.

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## **Editorial Review**

### From the Back Cover

Large scale flows are strong movements in the atmosphere and in the oceans, governed by the balance between Coriolis and pressure gradient forces (geostrophic equilibrium). This book describes the dynamics, mechanics and thermodynamics of these winds and currents. It is written for researchers, but also accessible for students in the field, since it also gives an overview of applied quasi-geostrophic theory suitable to advanced undergraduate and beginning graduate courses.

Chapter 1 presents concepts and equations of classical inertial fluid mechanics. Chapter 2 deals with the equations of thermodynamics that close the governing equations of the fluids. Then, the motion is reformulated in a uniformly rotating reference frame. Chapter 3 deals with the shallow-water model and the homogeneous model of wind-driven circulation. The chapter also describes a classical application of the Ekman layer to the atmosphere. Chapter 4 considers the two-layer model, as an introduction to baroclinic flows, together with the concept of available potential energy. Chapter 5 takes into account continuously stratified flows in the ocean and in the atmosphere.

### About the Author

Dr. Fabio Cavallini has more than 35 years of experience in oceanography. He is specialized in numerical modeling, theory and data processing in oceanography, ecology, hydrology as well as seismic and electromagnetic wave modelling.

Dr. Fulvio Crisciani is lecturer at the University of Trieste (Italy). He has more than 25 years experience in oceanography and is specialized in geophysical fluid dynamics and the climate of the gulf of Trieste.

## **Users Review**

### **From reader reviews:**

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