BUOYANCY-DRIVEN FLOWS

Buoyancy is one of the main forces driving flows on our planet, especially in the oceans and atmosphere. These flows range from buoyant coastal currents to dense overflows in the ocean, and from avalanches to volcanic pyroclastic flows on the Earth's surface. This book brings together contributions by leading world scientists to summarize our present theoretical, observational, experimental, and modeling understanding of buoyancy-driven flows.

This book strongly emphasizes the ocean, which displays an exceptionally wide range of buoyancy-driven flows. Buoyancy-driven currents play a key role in the global ocean circulation and in climate variability through their impact on deep-water formation. Correctly representing buoyancy-driven processes not currently resolved in the ocean components of climate models is a challenge. The limitations of current modeling techniques are examined, and recommendations are made for the proper physical parameterization of buoyancy-driven processes in order to accurately project long-term water mass evolution. Buoyancy-driven currents are also primarily responsible for the redistribution of fresh water throughout the world's oceans. In addition to fresh water, buoyancy-driven flows transport heat, nutrients, sediments, biogeochemicals, pollutants, and biological organisms along many continental shelves and thus have significant impacts on ecosystems, fisheries, and the coastal circulation.

This book is an invaluable resource for advanced students and researchers in oceanography, geophysical fluid dynamics, atmospheric science, and the wider Earth sciences who need a state-of-the-art reference on buoyancy-driven flows.

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