MS6I_10716

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Wave Vortex Interactions in the Atmosphere and Oceans; with Applications to Climate

Onno Bokhove

Department of Mathematics, University of Twente, The Netherlands

In the atmosphere and oceans, there is often a large separation in time scales between the slow large-scale motion of the fluid and the rapid small-scale wave motion and turbulence. These small-scale processes cannot be captured by numerical models. Hence, the feedback of the unresolved wave and turbulent motion on the large-scale dynamics requires parameterization. For hydrostatic primitive equations, we introduce the dynamics of gravity-wave and vortical modes, potential vorticity, and the (Hamiltonian) balanced description of the slow, large-scale dynamics in terms of the vortical motion. Various mechanisms to generate and absorb gravity waves will be reviewed with an eye on extending current parameterization schemes. Our aim is to address the question: can we construct an accurate (atmospheric) climate model with a balanced model as dynamical core and with dissipative and non-dissipative parameterization schemes for the gravity-wave activity?

View the extended summary