

# Waves and related dynamical processes in geophysical fluid dynamics

Vladimir Zeitlin

*Université P. et M. Curie/Ecole Normale Supérieure, Paris, France*

*zeitlin@lmd.ens.fr*

## Abstract

In the first lecture I will give an overview of principal types of waves, important at medium and large scales in the atmosphere and ocean: inertia-gravity waves, Rossby waves, coastal waves, frontal waves, equatorial waves, and describe their role in various dynamical processes in geophysical fluid dynamics

In the second and third lectures I will show how classical barotropic and baroclinic instabilities of jets, vortices and density currents can be understood in terms of phase-locking between the waves propagating on their background. I will demonstrate that inertial, symmetric and centrifugal instabilities can be interpreted in terms of waves trapped in the flow. I will also explain the notion of radiative instability

In the fourth lecture I will recall the resonant interactions between dispersive waves and explain the mechanism of resonant excitation of wave-guide modes by free waves in coastal and equatorial wave-guides.