

Ocean-atmosphere interaction: from air-sea coupling to baroclinic instability

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Abstract

This lecture is intended to give an introduction to baroclinic instability and its interaction with surface forcing, i.e. topography, surface fluxes, etc. The Regional Climate Models (RCMs) are widely used to simulate climate variability and changes over specific regions, such as the Mediterranean. Within the Mediterranean region, the atmospheric flow interacts with mountains and the ocean, resulting in a strong modification of its vertical and horizontal structure.

Linear idealized baroclinic waves interacting with topography are examined in the context of quasi-geostrophy. The purpose is to provide a simple conceptual interpretation of the modification of the atmospheric flow resulting from interactions with topography.

An in deep analysis of baroclinic storms in coupled and uncoupled RCM simulations is presented. Significant changes have been observed between the two sets of run, suggesting a relevant influence of air-sea fluxes on the evolution of lee-cyclogenesis.