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Atmospheric low-frequency variability induced by an oceanic SST front in an indealized model

Bruno Deremble (1), Eric Simonnet (2), Michael Ghil (1,3)

(1) Laboratoire de Météorologie Dynamique, ENS, Paris, France (deremble@lmd.ens.fr), (2) Institut Non Linéaire de Nice, Valbonne, France (Eric.Simonnet@inln.cnrs.fr), (3) Department of Atmospheric and Oceanic Sciences and Institute of Geophysics and Planetary Physics, University of California, Los Angeles, USA (ghil@lmd.ens.fr)

Atmospheric response to a mid-latitude sea surface temperature (SST) front is studied, while emphasizing low-frequency modes induced by the presence of such a front. An idealized atmospheric quasi-geostrophic (QG) model is forced by the SST field of an idealized oceanic QG model. The originality of this model lies in the parametrization of the Ekman boundary layer in the model's atmospheric component. In fact the atmosphere is forced by the pressure gradient anomaly created by variations of the air temperature in the Ekman layer.

The equilibria of the atmospheric model are computed using a continuation method. The strength of the oceanic forcing as well as the shape of the SST front are the two main components needed to understand the presence of the atmospheric equilibria. A link is established between the model's time integrations and these equilibria. Finally, low-frequency modes of atmospheric variability are identified and associated with successive Hopf bifurcations.