The Abdus Salam
International Centre for Theoretical Physics


Conference on Teleconnections in the Atmosphere and Oceans
17 - 20 November 2008

# NAO-like variability and the impact of thermal land-sea contrast

**Franco Molteni, Fred Kucharski and Martin King**

Abstract:

The impact of thermal land-sea contrast between continents and oceans on the dominant modes of variability in Northern Hemisphere winter is investigated using AGCM simulations with different specifications of surface boundary conditions. Specifically, this study examines the role of thermal equilibration of planetary waves in setting the regional and hemispheric structure of low-frequency variability modes such as the North Atlantic Oscillation (NAO), the Northern Annular Mode (NAM) and the Cold Ocean – Warm Land (COWL) pattern. It is suggested that, while in a thermally quasi-symmetric world patterns associated with annular modes and planetary wave equilibration would be clearly distinct over the whole hemisphere, the strong thermal contrast at the North America – North Atlantic boundary modifies both such patterns by introducing a NAO-like response to the variability of surface heat fluxes. As a result, while these hemispheric dynamical modes retain a distinct structure over the Pacific sector, they are less distinguishable over the Atlantic sector, where the both resemble the 'localized' NAO pattern obtained by regional or rotated EOF analysis. This hypothesis may explain why the teleconnections between the NAO and North Pacific anomalies appears different when inter-annual and inter-decadal variability are considered.