Abstract Details

Corresponding Author : Dr. hsien-wang ou (dou@ldeo.columbia.edu)

Organization: lamont-doherty earth observatory

Category: Interdisciplinary Working Groups

Paper ID: 57-IWG-A1404

Title: (IWG6) Thermal field of a coupled ocean-atmosphere system: A conceptual model

Abstract:

The paper continues the author's effort to construct a deductive theory of a coupled ocean-atmosphere system forced by the solar insolation. Ou (2001) has determined the global mean fields, which provide the necessary constraints for the present derivation of the meridional thermal field. The model closure invokes MEP (Maximized Entropy Production), a thermodynamics principle widely used in turbulence and climate theories, and whose support is further strengthened by recent developments. Extending laboratory results, both ocean and atmosphere are first reduced to two thermal masses, with their boundaries aligned at the ocean surface. Subjected to obvious physical con-straints, a robust solution is then found, characterized by an ice-free ocean, near-freezing cold masses, mid-latitude fronts, and comparable ocean and atmosphere heat transports. The presence of polar continents however sharply reduces the ocean heat transport beyond the tropics, but leaves the thermal field largely unchanged. The model system, while greatly reduced, is nonetheless consistent with the large-scale organization of the observed thermal field. And given the limitation of the model approximation, the solution is quite sensible, whose robustness is a direct consequence of MEP. The model re-sults reinforce the premise of energy-balance models that the surface temperature field is largely controlled by thermodynamics, independent of the explicit dynamics.

Presentation Mode: Oral

Keywords: MEP,earth's climate,coupled ocean-atmosphere system

Status: Pending.

Co-Authors

No.	Title	First Name	Family Name	Organization