

AGU Fall Meeting 2014
15-19 December 2014
San Francisco, CA
Moscone Center

Session: *Advances in Weather and Climate Science Enabled by Atmospheric Profilers*

Session Description:

Atmospheric temperature, humidity and cloud profilers operating on satellites provide some of the most important data for numeric weather prediction, but they also play a crucial role in the study of atmospheric phenomena that control and define weather and climate and provide a unique view of their vertical structure. For this session we invite contributions that highlight new results in a broad variety of studies of atmospheric processes and intraseasonal to interannual climate variability using observations from infrared sounders, such as the Atmospheric Infrared Sounder (AIRS), microwave sounders, such as the Advanced Microwave Sounding Unit (AMSU), and radar, such as CloudSat. Examples of relevant topics are moist thermodynamic processes, the Madden-Julian Oscillation (MJO) and the El Nino Southern Oscillation (ENSO). Many such studies will make use of data from complementary sensor systems as well. We also encourage contributions that show how reanalysis data contrast with or complement the satellite data.

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Title

Thermodynamics in the suppressed phase of the Madden-Julian Oscillation using a multiplatform strategy

Abstract

The Madden-Julian Oscillation (MJO) represents a prominent mode of intraseasonal tropical variability. It is manifest by coherent large-scale changes in atmospheric circulation, convection, and thermodynamic processes. Preconditioning of the environment prior to the active phase of the MJO has been noted, but the balance of theorized mechanisms to accomplish this process remains unresolved. Further, there is a lack of consensus on the means by which primary initiation of an MJO event occurs. Observational and modeling efforts have recently been undertaken to advance our understanding of the physical underpinnings governing MJO development. However these intensive studies are often limited in space and/or time and are potentially subject to model deficiencies. Satellite observations, especially those providing vertical resolution of temperature and moisture, provide an opportunity to expand our knowledge of processes critical to MJO initiation and preconditioning.

This work will provide an analysis of suppressed phase thermodynamics with an emphasis on the use of a complementary suite of satellite observations including AIRS/AMSU-A profiles, CERES radiative fluxes, and cloud properties observed by MODIS. Emphasis of this work will regard the distribution of cloud regimes, their

radiative-convective effects, and their relationship to moist static energy during the recharge and suppressed stages of MJO initiation and eastward propagation. The analyses will make use of cloud regimes from MODIS observations to provide a compositing technique that enables the identification of systematic connections between different cloud regimes and the larger scale environment. Within these cloud regimes, the relationship between the associated cloud-radiative effects observed by CERES, vertically-resolved and vertically-integrated thermodynamics using AIRS/AMSU-A observations, and atmospheric boundary layer fluxes will be demonstrated.