2013 AMS Annual Meeting
6-10 January 2013
Austin, TX
The Austin Convention Center

Session: 25th Conference on Climate Variability and Change

Author: J. Brent Roberts[1], Carol Anne Clayson[2]
[1] NASA/MSFC, Earth Science Office
[2] Woods Hole Oceanographic Institution

Title
Tropical ocean surface energy balance variability: Linking weather to climate scales

Abstract
Radiative and turbulent surface exchanges of heat and moisture across the atmosphere-ocean interface are fundamental components of the Earth's energy and water balance. Characterizing the spatiotemporal variability of these exchanges of heat and moisture is critical to understanding the global water and energy cycle variations, quantifying atmosphere-ocean feedbacks, and improving model predictability. These fluxes are integral components to tropical ocean-atmosphere variability; they can drive ocean mixed layer variations and modify the atmospheric boundary layer properties including moist static stability, thereby influencing larger-scale tropical dynamics.

Non-parametric cluster-based classification of atmospheric and ocean surface properties has shown an ability to identify coherent weather regimes, each typically associated with similar properties and processes. Using satellite-based observational radiative and turbulent energy flux products, this study investigates the relationship between these weather states and surface energy processes within the context of tropical climate variability. Investigations of surface energy variations accompanying intraseasonal and interannual tropical variability often use composite-based analyses of the mean quantities of interest. Here, a similar compositing technique is employed, but the focus is on the distribution of the heat and moisture fluxes within their weather regimes. Are the observed changes in surface energy components dominated by changes in the frequency of the weather regimes or through changes in the associated fluxes within those regimes? It is this question that the presented work intends to address. The distribution of the surface heat and moisture fluxes is evaluated for both normal and non-normal states. By examining both phases of the climatic oscillations, the symmetry of energy and water cycle responses are considered.