The Role of Ocean Stratification in the Propagation of Intraseasonal Oscillations

Janet Sprintall
Scripps Institution of Oceanography
La Jolla CA 92037
1-858-8220589
jsprintall@ucsd.edu

Intraseasonal Madden-Julian Oscillation (MJO) atmospheric forcing exerts a profound influence on the near ocean surface layer of the tropics through the coupled air-sea system that in turn affects the structure, development and propagation of the mesoscale convective systems that are part of the MJO. Models suggest that an accurate depiction of the upper ocean stratification in the Maritime Continent (MC) is necessary to correctly reproduce intraseasonal variability. Nonetheless, the dynamics and time scales of the processes and characteristics at the air-sea interface during MJO events are still not well understood. In particular, little is understood about the role of upper ocean salinity in MJO variability. Since salinity controls stratification throughout much of the MC it can play a critical role in the complex coupling of the air-sea system during MJO events. In many MC regions, a salt-stratified but isothermal "barrier layer" can exist that traps fluxes of heat, freshwater, and momentum to a thin surface layer. Climatological variations in the thickness of the barrier layer during MJO events are known to drive SST anomalies that influence the coupled air-sea system.

The project objective is to understand the mechanisms responsible for upper ocean stratification variability in the MC, with a particular attention on near surface salinity stratification and how this influences the structure and propagation of MJO convection and winds. High-resolution ship-board measurements of the upper ocean temperature and salinity will be obtained using a portable underway CTD (uCTD) system as part of the PISTON project to study the boreal summer intraseasonal oscillations, and also within the Banda Sea in Indonesia. The data will provide distinct case studies of the ocean conditions during MJO events, that will be examined in concert with remotely-sensed and other *in situ* datasets. Specific science objectives are to (1) determine the characteristics and the time and space scales of upper ocean salinity variability of importance to MJO variability; (2) identify the main forcing mechanisms that control that salinity variability; and (3) establish connection with the intraseasonal MJO atmospheric phenomena and relationship to the propagation characteristics (speed, intensity, MJO phase, geographical location etc) of the MJO across the MC.