Ocean Skin Temperature Variability during Active and Suppressed Phases of an MJO

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The Madden-Julian Oscillation (MJO) is an intraseasonal oscillation which is most closely identified with the tropical Indian and Pacific Oceans, characterized by an eastward progression of a large (~2000 km) pattern, extending from the equator into the adjacent subtropical belts, with enhanced and suppressed rainfall. In the context of DYNAMO, understanding the complex processes involved in locations such as the MJO as it passes over the eastern Indian Ocean are necessary steps for evaluating the modulation of SST and atmosphere-ocean feedbacks, for validating ocean and climate models, and for making prognostic assessments of oceanic circulation.

Here we augment the existing measurement capabilities of the NOAA P-3 aircraft platform that is used for in-situ and remote sensing observations of the atmosphere. We deployed high-resolution infrared (IR) imaging of the ocean surface temperature to simultaneously identify the mechanisms responsible for the upper-ocean response and water mass modification within the MJO region. Airborne IR imagery provides high spatial resolution calibrated SST variability. The image scale is roughly 500 m to 1000 m (depending on altitude) with resolution of order 1 m. The system allows us to characterize SST signatures including upper-ocean convection, freshwater lenses due to rain, Langmuir circulation, internal waves, and ramping of near-surface stratification at scales of *O(1m-1000m).* These measurements will elucidate a variety of mechanisms related to atmospheric and sub-surface phenomena that produce horizontal variability in SST over a wide range of scales under MJO forcing. This study will investigate the mesoscale, sub-mesoscale, and small-scale variability. In addition, we quantified the wave breaking statistics throughout the phases of the MJO.

Further, we instrumented the R/V Revelle with up- and down-looking narrow field-of-view radiometers to measure long-time series of SST. Time series of SST reveal the response of the skin temperature to convection. We investigate the magnitude of the SST response, its duration, and recovery to convective events during the active and suppressed phases of the MJO.