

Cooperative Indian Ocean Experiment on Intraseasonal Variability in Year 2011 "CINDY2011"

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This presentation is to introduce the outline and preliminary results of a international field experiment named "Cooperative Indian Ocean Experiment on Intraseasonal Variability in Year 2011 (CINDY2011)".

The principle target of CINDY is the Madden-Julian Oscillation (MJO) which is the dominant intraseasonal mode in the tropics to impact the global weather and climate. The MJO is usually characterized as an active cloud envelope which primarily initiates over the Indian Ocean and then propagates toward the western Pacific in slow speed (5 m/s). The insufficient observational data, however, make it difficult to clarify the mechanism of the MJO, or to reproduce the MJO by the numerical models.

To meet these scientific necessities, we designed an international project CINDY, with its U.S. component "Dynamics of Madden-Julian Oscillation (DYNAMO)", to have a field experiment. The four months from October 2011 to January 2012 was dedicated as the intensive observing period (IOP).

As the principle component, we set up the observation array in the central Indian Ocean. The array consists of island sites, research vessels, moorings, etc. To observe the atmospheric condition, radiosonde was launched 4 or 8 times per day at six sites. In particular, this network with frequent radiosonde observation is designed to accurately estimate adiabatic heating rate (a.k.a. Q1 and Q2 of Yanai et al. 1973). The three sites equipped various types of weather radars to retrieve the information on the precipitating / non-precipitating cloud systems over the array. The detailed oceanic profiles and surface meteorological parameters were captured by the vessels and buoys. Airplanes and floats were also deployed in the array to retrieve the atmospheric and oceanic status in detail.

During the IOP, we succeed to capture three convectively active phase of the MJO. The first one, which was identified as the MJO in the western Indian Ocean in the end of October, was characterized by weak westerly wind and active convection was observed only in the northern part of the array. The second one in the end of November also appeared in the western Indian Ocean but active convection appeared also southern part. The third one in the December appeared in the central Indian Ocean. In the all three events, the gradual growth of the moist layer toward the active period was captured. This was more clear in the northern and equatorial sites, while unclear in the southern sites. The organized cloud systems were captured frequently by the radars on the equator, while only in the second (November) event by the radar on R/V Mirai at the southern site. The oceanic observation at R/V Mirai captured clear diurnal variation in the oceanic mixing layer.

These observed dataset are now under the quality-control. After 12 months from the end of the field campaign, the quality-controlled dataset will be made available to the broader scientific community.

Keywords: Madden-Julian Oscillation (MJO), Intraseasonal Variation (ISV), Field Experiment