

Title: Formation and Development of Transient Eddies within an MJO

Authors: Kazuaki Yasunaga

Temporal variations in tropical convection occur on various scales ranging from hours to seasons and beyond. The Madden–Julian oscillation (MJO; Madden and Julian 1971, 1972) is one of the most prominent phenomena regulating the tropical convection. Now, many features of the MJO are well described. However, several fundamental issues still remain unexplained. For example, scale-interaction between the MJO and non-MJO perturbations is one of the main issues on the MJO. The present paper, therefore, explores whether perturbations within an MJO have dominant time and horizontal scales or not.

A field observational campaign called CINDY/DYNAMO was conducted over the central equatorial Indian Ocean in October–December 2011. During the campaign, large-scale-organized convection associated with an MJO broke out, and formation and development of transient eddies were prominent during the MJO active phase over the Indian Ocean. Eddies have a zonal scale of 2000–3000 km and time scale of 8–10 days. Following the shift of the convective active area associated with an MJO, the eddy packet moves to the east, although each eddy slowly propagates to the west.

In order to examine the robustness, we also conducted the wavelet-analysis of multi-year reanalysis datasets (JCDAS), and it is turned out that the eddy formation and development are significant features of an MJO. Moreover, results from the composite analysis suggest that the eddy plays an significant role in the advection of the dry-air behind an MJO.