MJO Events Observed from AMIE/DYNOMO/CINDY and ARM Long Term Measurement at TWP

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Abstract

- MJO events are selected according to MJO index from Nation Weather Service Climate Prediction Center. MJO index is also used to classification the MJO event.
- MJO events at Gan and Manus during AMIE are associated with low level westerly and high level easterly wind anomalies; while the magnitude are larger at GAN than at Manus (Fig 1 and 2).
- The tilted structures of moisture at Gan are correlated with U wind and precipitating clouds developing from low to middle and high level. While such tilted structures are not apparent at Manus.
- The observation during AMIE/DYNOMO/CINDY inspire these questions:

  Would all the MJOs at TWP weaken?

  If not, would the strong cases at TWP be similar to those at AMIE Gan?

Results from AMIE/DYNOMO/CINDY

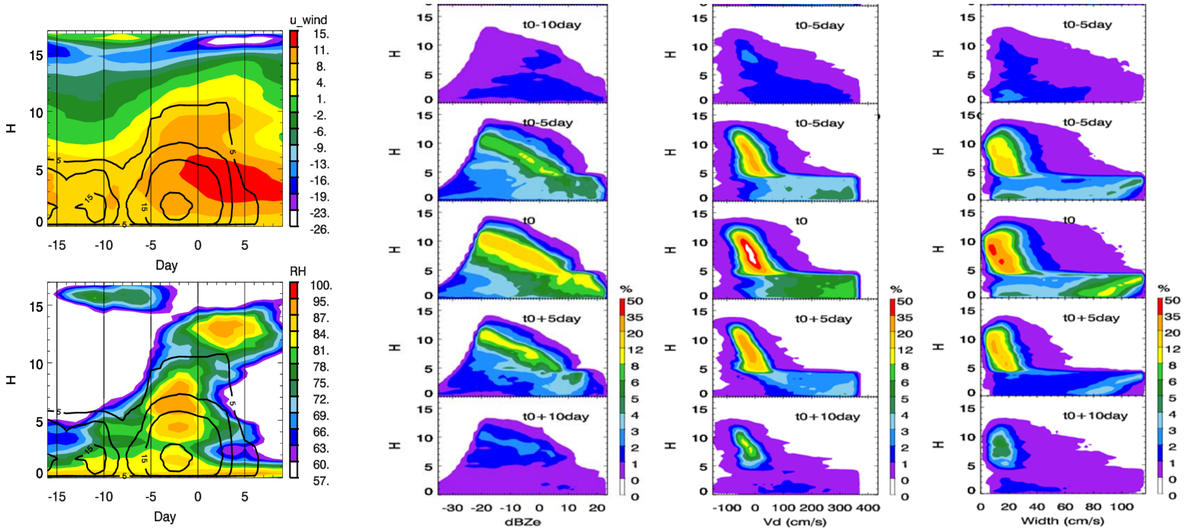


Figure 1. Vertical structure of Uwind and RH in color contour overplotted with precipitating cloud fraction in black line from ARM KAZR radar observed at Gann during AMIE experiment. The time lag is with respect to the time of local maximum total precipitable water. On the right are the composite radar moments during 5 phases.

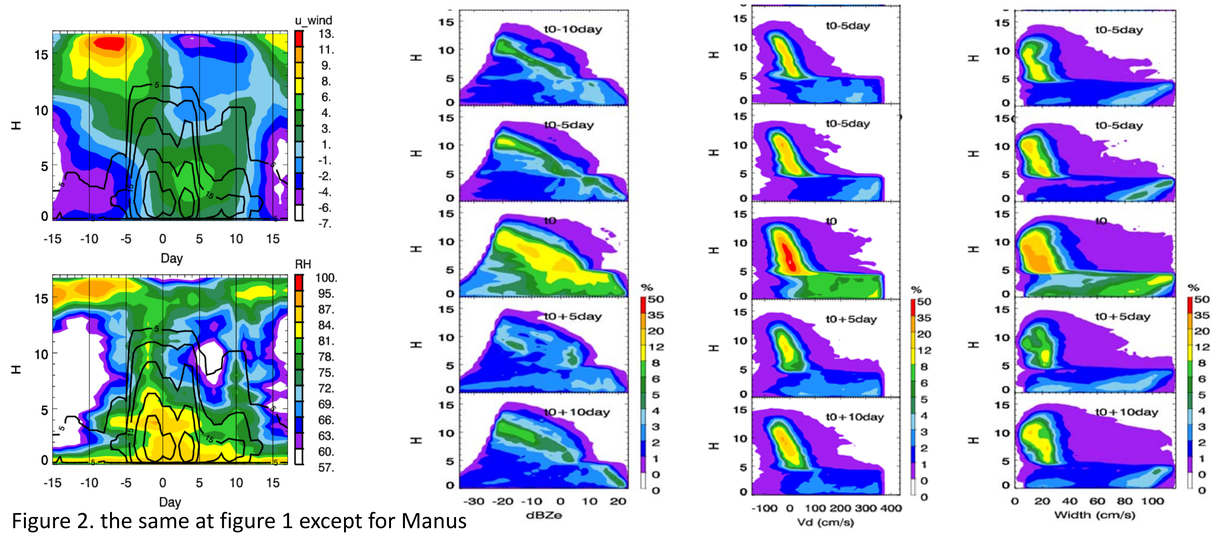


Figure 2. the same at figure 1 except for Manus

Results from long term observation at Manus and Darwin

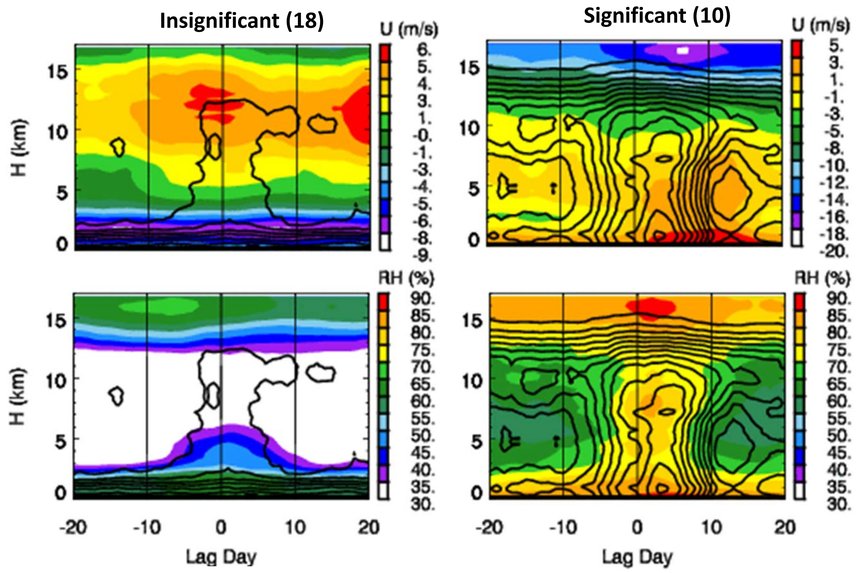
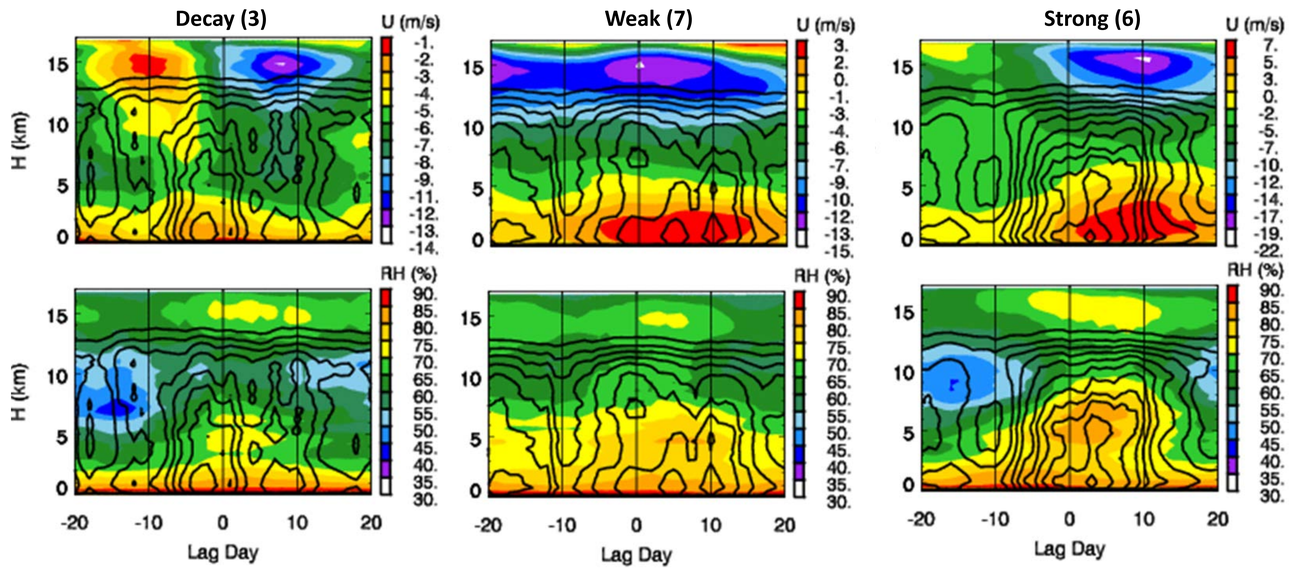


Figure 3(Left). MJO composite vertical profiles of wind field and relative humidity over-plotted with cloud occurrence in black lines for insignificant (summer) and significant (winter) cases at Darwin.

Figure 4 (Below). MJO composite vertical profiles wind field and relative humidity over-plotted with cloud frequency of occurrence in black lines decay, weak, and strong MJO cases at Manus, which are classified by MJO index



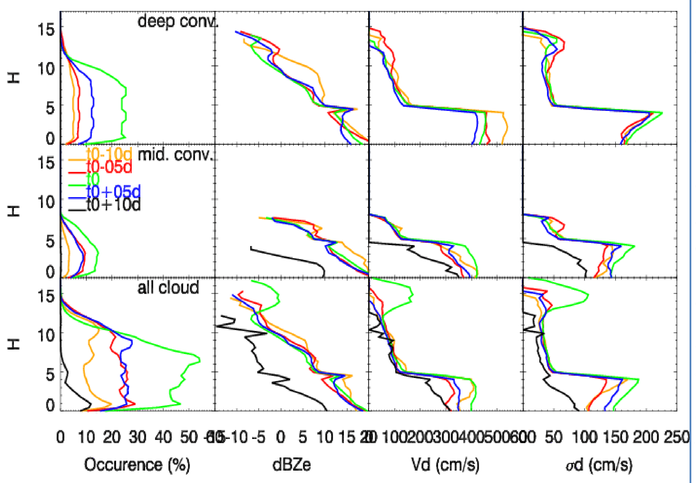


Figure 5. Composite vertical profiles of cloud occurrence, radar reflectivity, Doppler velocity and spectrum width for 5 phases.

Summary

- Large scale environment play an important role in MJO event formation locally (Fig 3 and 4).
- The strong MJO cases at Manus and significant case at Darwin (Fig 3 and 4) show some similarity in wind, humidity cloud fields with MJO at AMIE Gann.
- The composite vertical profiles of strong cases at Manus show that the middle level convection tend to increase at T0-5day phase, while the deep convection tend to increase sharply during T0 phase, the occurrences of both deep and middle convection decrease quickly (Fig 5) after the peak.