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Department of Atmospheric Sciences Seminar Announcement

Department of Atmospheric Sciences, S.O.E.S.T., University of Hawai'i at Mānoa
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Two-way Interaction between MJO and High Frequency Waves in the Maritime Continent in Boreal Winter

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Date: Wednesday, November 7, 2018
Refreshments: 3:00pm at MSB lanai
Free Cookies, Coffee & Tea Provided
(Please Bring Your Own Cup)
Seminar Time: 3:30pm
Location: Marine Sciences Building, MSB 100

Abstract:

The Madden-Julian Oscillation (MJO) is the dominant tropical rainfall variability at intraseasonal time scales (e.g. 20-100 day). Previous studies have shown that models have deficiencies in simulating the weakening of the intraseasonal oscillation in the Maritime Continent (MC) and the subsequent decay or eastward propagation. In this study, I will discuss the mechanisms of a two-way interaction between MJO and high frequency waves (HFW) and the importance of this interaction for helping the eastward propagation of MJO over the MC region. The two-way interaction refers to the modulation of HFW by MJO and the upscale feedback from HFW to MJO.

With regard to the modulation of HFW by MJO, it is found that strengthened HFW activity appears in the center of and to the west of MJO convection during its active phase, while weakened HFW activity appears to the east of the convection center. The opposite is seen during the MJO suppressed phase. On the other hand, the upscale feedback from HFW to MJO constitutes of nonlinear rectification of condensational heating by HFW and high frequency eddy momentum transport. We find that the nonlinear rectification of condensational heating by HFW helps the establishment of shallow clouds to the east of MJO convection, which helps its eastward propagation. We then show that the high frequency eddy momentum transport affects MJO momentum tendency and helps the eastward propagation of MJO zonal wind anomalies. This work gives a new comprehensive picture of the two-way interactions between MJO and HFW and provides information that can improve MJO simulation in the Maritime Continent.