UNIVERSITY of HAWAI'I MĀNOA

Department of Atmospheric Sciences & IPRC
Joint Seminar Announcement

Department of Atmospheric Sciences, S.O.E.S.T., University of Hawai'i at Mānoa
2525 Correa Road, HIG 350; Honolulu, HI 96822 ☎956-8775
&
International Pacific Research Center, S.O.E.S.T., University of Hawai'i at Mānoa
1680 East-West Road, POST 401; Honolulu, HI 96822 ☎956-5019

SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY

SEMINAR TITLE:

Fundamental Causes of Propagating and Non-propagating MJOs in MJOTF/GASS models

Lu Wang, Ph.D.
Postdoctoral Researcher
International Pacific Research Center, S.O.E.S.T.
University of Hawaii at Manoa

Date:	**Wednesday, April 12, 2017**
Refreshments:	**3:00pm at MSB courtyard** **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 mode of tropical intraseasonal variability, characterized by prominent eastward propagation over the Indian Ocean during boreal winter. This study investigates the fundamental causes of differences in the eastward propagation of the MJO in multi-models that participated in the MJO Task Force (MJOTF) and the GEWEX Atmospheric System Study (GASS) multi-model Intercomparison project. These models are categorized into good and poor groups characterized by prominent eastward propagation and non-propagation, respectively. Column integrated moist static energy (MSE) budgets are diagnosed for the good and the poor models. It is found that a zonal asymmetry in the MSE tendency, characteristic of eastward MJO propagation, occurs in the good group, while such an asymmetry does not exist in the poor group. The difference arises mainly from anomalous vertical and horizontal MSE advection. The former is attributed to the zonal asymmetry of upper-middle tropospheric vertical velocity anomalies acting on background MSE vertical gradient; the latter is mainly attributed to the asymmetric zonal distribution of low-tropospheric meridional wind anomalies advecting background MSE/moisture field. Based on the diagnosis above, a new mechanism for MJO eastward propagation that emphasizes the second-baroclinic-mode vertical velocity is proposed.

A set of atmospheric general circulation model experiments with prescribed diabatic heating profiles were conducted to investigate the causes of different anomalous circulations between the good and the poor models. The numerical experiments reveal that the presence of a stratiform heating at the rear of MJO convection is responsible for the zonal asymmetry of vertical velocity anomaly and is important to strengthening lower-tropospheric poleward flows to the east of MJO convection. Thus, a key to improve the poor models is to correctly reproduce the stratiform heating. The roles of Rossby and Kelvin wave components in MJO propagation are particularly discussed.