UNIVERSITY of HAWAI'I MĀNOA

Department of Atmospheric Sciences Seminar Announcement

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SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY

Tropical Cyclone Mekkhala (2008) Formation over South China Sea: Land-based convection effects in monsoon environment

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Date: **Thursday, June 23, 2016**
Refreshments: **12:30pm**
Free Cookies, Coffee & Tea Provided
(Please Bring Your Own Cup)
Seminar Time: **1:00pm**
Location: **IPRC Conference Room, POST 414**

Abstract:

Recent tropical cyclone (TC) formation studies investigated physical mechanisms by which tropical oceanic convection contribute to open-ocean TC formations. This study focuses on the effects of land-based mesoscale convective system on the formation of Tropical Storm Mekkhala (2008) off the west coast of the Philippines using the Weather and Research Forecasting model. Five control-land experiments reasonably replicate the observed low-level minimum sea level pressure. To demonstrate the contribution of the land-based convection, sensitivity experiments are performed by changing the land of the northern Philippines to be water. All five of these no-land experiments fail to develop Mekkhala.

The Mekkhala tropical depression develops when an intense, well-organized land-based mesoscale convective system moves offshore from Luzon island and interacts with an oceanic mesoscale system in a strong monsoon westerly flow. Due to this interaction, a mid-tropospheric mesoscale convective vortex (MCV) develops offshore from Luzon where monsoon convection continues to contribute to low-level vorticity enhancement near the mid-tropospheric mesoscale vortex center. In the no-land experiments, wide-spreading oceanic convection induces a weaker, loosely-organized mid-level vortex farther east in a weaker monsoon vortex. Thus, the monsoon convection-induced low-level vorticity remained separate from the mid-tropospheric MCV, which finally resulted in a failure of the low-level spin up. This study suggests that land-based convection can play an advantageous role in a TC formation by influencing the intensity and the placement of the incipient mid-tropospheric MCV to be more favorable for TC low-level circulation development.

Throughout all ocean basins, a number of TC formations occur near a coastal area or an island. An unexpected formation of a near-coastal TC may have an immediate threat to human life, economy, and agriculture since the TC landfall can occur just a few days after the formation. As this study firstly suggests the positive land impacts on a TC, further understanding of near-coastal TC mechanism is required.