M.S. Defense Announcement
Kyle Chudler
December 17, 2018 at 10:00am

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Defense
ATS West Seminar Room (121 ATSW)

Post Defense Meeting
Riehl Conference Room (211 ACRC)

Committee:
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Impact of the Boreal Summer Intraseasonal Oscillation on the Diurnal Cycle of Precipitation in the Island of Luzon

The Asian Summer Monsoon (ASM) is a major component of the global weather system with impacts across multiple scales. Driven by the thermal contrast between the Asian continent and the Indian and Pacific Oceans, the monsoon winds bring warm, moist air into the south Asian and maritime continents, along with copious amounts of rain. One striking feature in rainfall climatology of the ASM is the precipitation maxima located off the western shores of the Western Ghats, Myanmar, and the Philippines. These locations all feature elevated terrain features along their western shores. The question arises: why, when monsoon winds impinge upon these mountains, does the precipitation preferentially fall off-shore, rather than directly over the mountains where orographic enhancement is strongest?
The main source of intraseasonal variability during the summer months in the ASM region is the Boreal Summer Intraseasonal Oscillation (BSISO). Different phases of the BSISO bring vastly different atmospheric conditions to the ASM region. In this study, the impact of the BSISO on the occurrence of off-shore precipitation around the island of Luzon is examined. Twenty years of high-resolution TRMM and GPM satellite radar measurements and precipitation estimates are gathered to analyze the structure and location of raining systems. Precipitation estimates show that off-shore precipitation occurs much more frequently during active BSISO phases. Importantly, results also show that a clear diurnal cycle still exists over land during these phases, despite increased cloud cover and reduced solar heating/instability generation. It is hypothesized that the interaction between strong low-level monsoon winds and the diurnal cycle over land is what promotes off-shore precipitation, either through the generation of wind shear (which supports off-shore propagation), or convergence between these winds and a cold pool or land breeze. The stronger low-level winds also cause greater ocean surface energy fluxes, which further promote precipitation. During inactive phases, despite the stronger diurnal cycle over land, the lack of a strong low-level wind results in an environment less conducive to off-shore rainfall.