

Observational study on multi-scale variability of precipitation in the northwestern coastal area of Luzon Island, the Philippines: Results of YMC-BSM 2018 field campaign

*Satoru Yokoi¹, Kunio Yoneyama¹, Ryuichi Shirooka¹, Esperanza O. Cayanan², Cynthia O. Iglesia²

1. Japan Agency for Marine-Earth Science and Technology, 2. Philippine Atmospheric, Geophysical and Astronomical Services Administration

During summer monsoon season, large amount of precipitation is brought to the windward side of the mountains in the Asian monsoon domain, including the northwestern coastal area of Luzon Island, the Philippines. Temporal variability of precipitation is caused by various large-scale atmospheric phenomena, such as insolation diurnal cycle, tropical depressions, tropical cyclones or typhoons, and intraseasonal variability. To understand multi-scale interaction associated with precipitation variability, we conducted a field observation campaign in the northwestern coastal area of Luzon Island in July-August 2018 under Years of the Maritime Continent - Boreal Summer Monsoon study in 2018 (YMC-BSM 2018) project. Among the observation items done in the campaign, this presentation reports analysis results of 6-hourly radiosonde observation and 10-minutely surface meteorology observation at Laoag weather station, and 10-minutely volume scan of an X-band weather radar temporarily installed at a hill about 6 km to the south of the station. We found several interesting characteristics of precipitation variability in the observation period. In early part of August 2018 when weak easterly wind prevailed in the lower troposphere, diurnal cycle was clearly observed in the radar data and characterized by afternoon precipitation over land and evening offshore migration of precipitation areas at about 3-4 m/s speed. In the middle and late part of the month, the easterly wind was replaced with westerly wind associated with arrival of a convectively active phase of northward-propagating intraseasonal oscillation, and the diurnal cycle became obscured. Instead, there were two heavy precipitation events in this period, which were associated with further intensified westerly wind condition caused by westward-propagating quasi-biweekly oscillations. Furthermore, precipitation over land during the two events fluctuated on daily timescale associated with variation of the strength of lower-tropospheric winds blowing toward the mountain range, which was caused by cooperative influence of the quasi-biweekly oscillations and developing tropical depressions over the South China Sea.

Keywords: Precipitation diurnal cycle, Intraseasonal oscillation, Luzon Island, the Philippines, Intensive observation