

Intra-seasonal oscillation and typhoon activity obtained by long-term observational project around warm pool region

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The warm water pool region in the tropical western Pacific is a key area for the global climate system, as strong atmospheric convective activity in this area is the driving engine of the atmosphere. However, there are many processes between meso-scale convective activities and the global-scale climate, and these are not fully understood yet. To understand the mechanism of cloud-precipitation processes and air-sea interactions over the warm water pool in the tropics, there are in need of further investigation on the western Pacific monsoon and the tropical-extratropical interactions. Toward these objectives, we have continued a long-term observational project named PALAU (Pacific Area Long-term Atmospheric observation for Understanding climate change) around the tropical western Pacific near the Republic of Palau. The main target of this project is to describe multi-scale interactions of cloud systems to intra-seasonal oscillations affected by monsoon activities.

Since November 2000, we have been continuously operating surface weather observation sites in Palau. We also have conducted several intensive field campaigns targeted for various phenomena. During the campaigns, Research/Vessel Mirai and G-II aircraft were used as plathome for atmospheric and oceanic observations. Doppler radars were utilized to obtain the internal structure of cloud systems. To capture monsoon activity with wide area, we constructed intensified sounding network from Philippines, Palau, and Yap to Guam. Quasi-real-time forecasts were also executed by using numerical models.

From the results of PALAU observations, it is indicated that the variability of monsoon activity and ENSO are strongly affected to the structure of convections over the warm water pool region. Formation of the initial stage of tropical cyclones are frequently observed around Palau. In the case of PALAU2013 which is one of the intensive observation campaigns, three events of the early stage of tropical cyclones were captured in one month. All of the initial disturbances corresponded to a kind of easterly waves with vortical structures, and after passing through Palau, they developed to the typhoons on the Philippine Sea. Because these typhoons caused strong surface westerly winds in the formative period, they represented a close relation with the monsoon onset and the intensification of the activity of intra-seasonal oscillations over the tropical western Pacific.

Currently, we also have a plan of intensive observation around Palau in the boreal summer of 2018, as a part of YMC (Years of the Maritime Continent) campaign.

Keywords: YMC, PALAU, Intra-Seasonal Oscillation