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Asian Monsoon Years (2007-2012): Vietnam Philippines Rainfall Experiment 2010 (VPREX2010)

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We conducted the intensive observation, Vietnam Philippines Rainfall Experiment 2010 (VPREX2010) in autumn and early winter, 2010, using the automatic-weather stations, the rain-gauge network, the weather radars and radiosondes. The purpose of the experiment was to understand the generation and maintenance mechanism of the heavy rainfall in central Vietnam and in the Philippines. Preliminary results are introduced in this paper. Along the east coasts of Vietnam and Philippines, precipitation in autumn and winter is the major source of annual precipitation. Especially over central Vietnam, more than 70% of annual precipitation occurs from September to December. The rainfall event in this season tends to provide significant amount of precipitation in a short time. In this paper, rainfall event exceeding 50 mm/day is called "heavy" rainfall. It has been pointed out by the previous studies that the coupling between winter monsoon surges and tropical disturbances causes the heavy rainfall over central Vietnam. The interannual variation has been also studied and it was shown that the rainfall amount tends to be greater and that the heavy rainfall occurrence is more frequent in La Nina years. However, the generation and maintenance mechanism of heavy rainfall is not fully understood and therefore the physical relation to ENSO is not known. Understanding of the rainfall variation related to ENSO is strongly expected from the viewpoint of not only scientific interest but also socio-economical importance. Detailed horizontal structures of rainfall events was observed by the dense rain-gauge network distributed at 30 stations and the automatic weather stations at the 3 stations around Da Nang City in central Vietnam, and by the routine radars, hydrological and meteorological instruments of Vietnam National Hydro-Meteorological Service. In order to capture the westward-propagating tropical disturbances and the winter monsoon surges and to clarify the vertical structure of the convections, the intensive radiosonde observations were conducted at Da Nang, Vietnam (four times-daily launch) and at Cebu, Philippines (twice-daily launch). The semi-real-time forecast experiment using the Non-Hydrostatic Model (NHM) of Japan Meteorological Agency was executed in parallel with the observations. The VPREX2010 data is planned to be utilized in the ALERA-2 experiment to obtained the fine assimilation data Although the total rainfall amount during the observation period (October and November, 2010) was smaller than the climatology in spite that the greater amount of rainfall was expected because the observation period was just at the pre-mature phase of La Nina, the several heavy rainfall events were successfully captured at most of the observation sites. Seven times of the large-scale heavy rainfall events were observed in central Vietnam. Preliminary analysis of the daily rainfall amount at Da Nang and Hovmoeller diagram of 850 hPa relative vorticity show that the rainfall activity at Da Nang was intensified when the tropical disturbances arrived at the east coast of Vietnam. It is also seen that the intensification of the rainfall activity was accompanied by the modification of the structure of vortex disturbance. The result suggests that an interaction between the disturbances and topographical forcing play a role in the intensification of the rainfall activity.