Huang, Mu-Qun, P.-L. Lin, and Y.-L. Lin, 2019: Orographic Effects of Heavy Rainfall Event in Mei-Yu Season. 16th Annual Meeting of Asia-Pacific Geophys. Soc. (AOGS). July 28-Aug 2, Singapore. [Abstract # AS27-A023]

Heavy rainfall event occurred at the northern coastal area at Taiwan on 2nd June 2017. The convective system with heavy rain intensity larger than 50mm per hour, lasted for 10 hours and accumulated more than 600mm rainfall. This event occurred in the Mei-Yu season, which is one of the rainy seasons in Taiwan. The synoptic environment over Taiwan showed that clearly upper level divergence providing favorable condition for low-level convection development. southwesterly monsoon, which came from Indo-China peninsula and South China Sea with high equivalent potential temperature and unstable air flow, brought in abundant water vapor to Taiwan and enhanced the convective precipitation. Meanwhile, a squall-line system gradually approaching the northern coastal area of Taiwan. A strong radar line echo arrived at 2nd June 03 LST and stayed at coastal area until 12 LST. The maximum accumulated precipitation is 645.5mm.

This study used Weather Research and Forecasting (WRF) Model simulated this event and to get higher temporal and spatial resolution data for analyzing. The result of control run (CTRL_run) showed high consistency with the observed daily precipitation. We compared the vertical water vapor flux from total vertical motion with upper motion by orographic effect, and the result showed that there was high vertical water vapor flux (>60 $gkg^{-1}ms^{-1}$) in the convective squall-line system. The vertical vapor flux generated by orographic effect is 15 ($gkg^{-1}ms^{-1}$) over the windward side of Young-Ming mountain. The two orographic sensitivity experiments were also conducted in this study. One removed Taiwan island terrain (NT_run) and the other removed Young-Ming mountain (NY_run). Compare to the CTRL_run, the results of NT_run showed that the convective line moved more southward, the daily accumulation rainfall (458mm) was lesser, and the wind speed over Taiwan Strait was slower. As to the results of NY_run, it showed the same rainfall distribution but less 30mm precipitation than CTRL run. Through the sensitivity tests, results showed that the orographic effect played an important role in the movement of the system. A quasi-stationary and long duration convective system were able to cause more accumulation precipitation. Strong prevailing wind over Taiwan Strait brought in a large amount of unstable air parcel and abundant water vapor, facilitated low-level convergence and the development of convective system.