A Subtropical Oceanic Mesoscale Convective Vortex Observed During SoWMEX/TiMREX

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This study examines a subtropical mesoscale convective vortex (MCV) that occurred from 1800 UTC 4 June to 1200 UTC 6 June 2008 during Intensive Observing Period (IOP) 6 of the Southwest Monsoon Experiment (SoWMEX) and the Terrain-influenced Monsoon Rainfall Experiment (TiMREX). This MCV has brought heavy rain to SW of Taiwan and caused flood in the second largest city of Taiwan, Kaohsiung.

A dissipating MCS reorganized within a nearly barotropic vorticity strip which formed as a southwesterly low-level jet developed to the south of subsiding easterly flow over the southern Taiwan Strait. Convection developed in the down-shear left direction and was suppressed in the upshear direction. The cyclonic circulation was confined beneath 5.5 km with a horizontal scale of 160-200 km, and had a maximum shear vorticity of 10^{-3} s^{-1} of the inner mesovortex embedded in the deeper convection. The oceanic MCV exhibited a downshear tilt with height. A warm core and mesolow were initially collocated with the convection. While the MCV moved towards Taiwan, the rainfall east of the MCV was enhanced, yet dry air entrainment penetrated into the MCV center and inhibited the convection. Weak vertical shear appeared to tilt the vortex, but more disruptive to the vertical structure was the blocking effect of Taiwan's topography. Corresponding weakening of the MCV occurred as the convection became well displaced from the lower-tropospheric cyclonic circulation.