# A Numerical Simulation of Tropical Cyclone Formation with MCSs Merger

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Ritchie and Holland (1997) and Kieu and Zhang (2008) reported examples of tropical cyclone formation accompanied by merging of meso-scale convective systems (MCSs) or meso-scale convective vortices (MCVs). However, these were not enough to understand how and what is MCVs merging. Then, the purpose of the current study is to investigate what occurred in MCSs merging tropical cyclone formation process. We simulated a typical MCSs merging case with the WRF-ARW model. The selected case is T0118 which was first identified as Tropical Depression (TD) at 13.5N 166.5E and developed to typhoon intensity at 14.6N 161.5E. We applied quadruply nested computational domains in which the smallest grid resolution is 1 km (448×439 grids). The model is initialized at 0000 UTC 15 Sep 2001, and is integrated for 6 days. The model initial and lateral boundary conditions are taken from the NCEP/FNL data. According to the best track data, T0118 was organized at 0600 UTC 17 Sep 2001 at 13.5N, 166.5E. The simulated TD is organized almost at the same time, but the location is about 3°to the north of the real one. In the simulated merging process, two low level cyclonic vortices are being merged gradually, and two large cloud areas have been also merged at same time, which clouds correspond to these identified as MCSs by satellite images. When low-level vortices are merging, a cold core vortex exists at 10 km level. The cold core vortex has metamorphosed to a warm core vortex. We also found a mid-tropospheric cyclonic circulation exists on just above the melting layer in stratiform cloud. We can see progression of Potential Vorticities (PV) strengthening, and strong PV region that was firstly restricted at mid-troposphere seems to be elongating to lower troposphere gradually. I'll talk about more details of these features in a presentation.