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The impact of Microphysics and Data assimilation on simulation of Typhoon Morakot

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Typhoon Morakot struck Taiwan on the night of Friday August 7th, 2009 as a category 2 storm with sustained winds of 85 knots (92 mph). Although the center made landfall in Hualien county along the central east coast of Taiwan and passed over the central northern part of the island, it was southern Taiwan that received the worst effects of the storm where locally as much as 2200 mm (2.2 m) of rain were reported, resulting in the worst flooding there in 50 years. The result of the enormous amount of rain has been massive flooding and devastating mudslides. More than 600 people are confirmed dead. In this paper, we will present the results from high-resolution (2-km) WRF with improved Goddard microphysics for this typhoon case. The results showed that the improved microphysical scheme captured both in terms of maximum rainfall area and intensity. The model results also showed that the heavy amounts of rain over the southern portion of the island is due to persistent southwesterly flow associated with Morakot and it's circulation was able to draw up copious amounts of moisture from the South China Sea into southern Taiwan where it was able to interact with the steep topography.
In the paper, we will also present results from sensitivity test of microphysics and PBL on the precipitation processes (rainfall) associated with Typhoon Morakot (2009). In addition, we will present high-resolution visualization (at model time step, 10 second; and grid mesh, 2-km) to show the evolution of Typhoon Morakot (i.e. surface rainfall, wind, moisture, inert tracer and cloud properties).