Geophysical Research Abstracts
Vol. 13, EGU2011-5256, 2011
EGU General Assembly 2011

Effects of Asymmetrical Latent Heating on Typhoon Movement Crossing Taiwan: Morakot (2009) and Fanapi (2010)

Chung-Chieh Wang (1), Hung-Chi Kuo (2), and Yu-Han Chen (1)

(1) Department of Earth Sciences, National Taiwan Normal University, Taipei, Taiwan, (2) Department of Atmospheric Sciences, National Taiwan University, Taipei, Taiwan

Morakot (2009) and Fanapi (2010) are two west-moving typhoons that made landfall over Taiwan. The former affected southern Taiwan during 7-9 Aug 2009 and produced record-breaking total rainfall amount (up to 2.85 m in 3 days) and the worst typhoon-induced damages in 50 years. The latter (18-19 Sep 2010) also cuased serious flooding over the coastal plains in southwestern Taiwan. After crossing the Central Mountain Range (CMR) of Taiwan, both tropical cyclones (TCs) exhibited asymmetrical rainfall pattern with most rain to the south/southeast of their center, as well as a reduction in translation speed.

Numerical experiments have been carried out for the case of Morakot using the Cloud-Resolving Storm Simulator (CReSS) of Nagoya University at 3-km horizontal grid spacing and the European Center for Medium-range Weather Forecasts (ECMWF) Year of Tropical Convection (YOTC) analyses (at 0.25 deg. latitude/longitude and 6-h resolution) as initial and boundary conditions (IC/BCs). Sensitivy tests with varying water vapor amount and terrain height of Taiwan were also performed, thus allowing the model TC to evolve with different magnitude of latent heating (LH) effect. The results indicate that in addition to an already slow steering flow of about 10 km/h, the LH effect (to the rear of the TC center) caused Marokot to further slow down to about 5 km/h during 0000-1200 UTC on 8 Aug, which was the period when the rainfall intensity was the greatest (in observation). Thus, the period of heavy rainfall was lengthened and the tremendous rainfall amount was achieved.

Using similar method, simulations of Fanapi will be carried out. After crossing the CMR, the westward moving speed of Fanapi reduced from about 20 to 10 km/h for about 12 h temporarily (0600-1800 UTC 19 Sep). Compared to Morakot, the steering flow was stronger, translation speed faster, the TC size smaller, and the heavy rain occurred closer to the TC center in the case of Fanapi. It will be interesting to compare and contrast the simulation results of the two TCs.