



Rainfall enhancement associated with a landfalling TC and its cloud microphysical processes

Xiaopeng Cui and Chenping Ren

Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China (xpcui@mail.iap.ac.cn)

Tropical cyclones, especially landfalling cases, could bring about heavy rainfall, gales and storm surges leading to severe disasters, in which the heavy rainfall is the most common one. The continuous and large extent of heavy rainfall is dangerous and disastrous, while the more dangerous one is the so-called rainfall enhancement (or rainfall reinforcement), that is, sudden changes (increases) in the intensity of rainfall. This kind unusual behavior of rainfall is very difficult to forecast.

Bilis, a tropical cyclone (TC) coded as 0604 in China, formed on July 9 2006 over waters to the east of the Philippines. Afterwards it moved northwestward, intensifying gradually and turning into an intense tropical storm (TS). It made two landfalls in Yilan of Taiwan province and Xiapu of Fujian province of China. Bilis was on land for about five days, sweeping over several provinces of China with accumulated rainfall of 300-500 mm in some of the regions, causing heavy floods and exposing many persons to its attack. After its second landfall, from 1800 July 14 to 0600 July 15 (UTC), the rainfall associated with Bilis increased sharply near the borders among Hunan, Jiangxi and Guangdong provinces with a maximum rain rate of around 100 mm/6hr, that is, rainfall enhancement occurred.

The rainfall enhancement process is simulated by using a mesoscale model with two domains, and the highest horizontal resolution is 3 KM. Verification is performed by comparing simulated track, Minimum Sea Level Pressure (MSLP) and rainfall with their observed counterparts, respectively, which shows that the model reproduced the track and intensity of Bilis, and its associated rainfall enhancement after its landfall very well though some differences still exist between observation and simulation. Then some diagnostic analysis is carried out based on the high-resolution simulation data to study the cloud microphysical characteristics and mechanisms associated with the above mentioned rainfall enhancement.