The Effect of Taiwan Terrain on Typhoon Gladys (1994) Part I: Observational Study

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ABSTRACT

Due to the existence of the complicated terrain and the elevated Central Mountain Range (CMR) in Taiwan, significant variations of track and intensity of typhoon occur as typhoons approached the island. The interaction of a typhoon with CMR also produces significant mesoscale variations in terms of wind and precipitation over Taiwan. In this paper an observational study of Typhoon Gladys (1994) is carried out to understand the effect of Taiwan Terrain on Gladys. Numerical studies are also performed in the follow-up paper (Part II).

Gladys made landfall near northeastern Taiwan (Sue-Au) at 0250 UTC on 1 September and left Taiwan near Hsin-Chu at 0600 UTC on the same day. A local low, induced by the interaction between the environmental mean flow and CMR, was analyzed to the west of CMR when Gladys crossed Taiwan. Another local low was found at southeastern Taiwan, which did not form until Gladys's main circulation reached the east coast of Taiwan. It appears that this local low was induced by the so-called föhn when the flow associated with Gladys crossed over the mountain near the eastern Taiwan and resulted in the subsidence warming of the air.

The heavy precipitation associated with Gladys mainly occurred at the upwind mountain area in the northern and northeastern Taiwan. The radar echo and the retrieved wind showed that Gladys has a small eye, and the eyewall structure was changed due to the effect of Taiwan topography, thus Gladys's intensity was greatly reduced after landfall.

Key words: Typhoon, Local low, CMR, Föhn