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On Typhoon Track Deflections near the East Coast of Taiwan

Abstract

From 1960 to 2010, 84 typhoons made landfall on Taiwan island with deflection track (DT). Among them, 49 cases deflected leftward, while 35 cases deflected rightward. In the right-hand turning cases, 66% of typhoons deflected south of 23°N. Meanwhile, 90% of the 18 cases with a larger deflection angle ($\alpha > 20°$) and all 7 cases with looped track (LT) deflected north of 23°N. If terrain blocking were the only factor responsible for DT, the maximum deflection would be expected near the peak of the Central Mountain Range (CMR). However, the observations indicate that additional facts must contribute to DT. To investigate the physical mechanisms, idealized WRF simulations were conducted with potential vorticity (PV) tendency diagnosis. Thus, the contributions from horizontal advection (HA), vertical advection (VA) and diabatic heating (DH) to the typhoon track can be quantified. The results show that cross-mountain flow induces vertical stretching (VA), and the terrain-induced subsidence suppresses storm convection to increase heating asymmetries (DH). Both VA and DH lead to a southwestward deflection track.

Keyword

Potential Vorticity (PV) Tendency Diagnosis, Track Deflection

Reference

Hsu, L.-H., S.-H. Su, R. G. Fovell, and H.-C. Kuo, 2018: On typhoon track deflections near the east coast of Taiwan. Mon. Wea. Rev., 146, 1495–1510. https://doi.org/10.1175/MWR-D-17-0208.1