

Inner-core wind estimation in a concentric eyewall replacement of Typhoon Trami (2018) based on the Himawari-8 satellite

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ABSTRACT

Dynamics of rapid changes of intensity and structure in an eyewall replacement cycle of tropical cyclones remain an open question. To clarify the dynamics of the inner eyewall decaying, a quantitative estimation of inner-core wind fields based on highly frequent observation images with 2.5-min temporal resolution in the Himawari-8 satellite (Tsukada and Horinouchi 2020) is applied to Typhoon Trami (2018) which had a clear concentric eyewall structure. A high tangential wind of 50 m s^{-1} is estimated at a radius of 30 km, which is located in the inner edge of the inner eyewall, during an active stage of the inner eyewall. During the decaying stage of the inner eyewall, the estimated tangential wind rapidly decreases to about 20 m s^{-1} at a radius of 24 km. The satellite-based tangential winds are validated with dropsondes around the inner core by the T-PARCII aircraft. Vorticity field retrieved by the satellite-based tangential winds during the decaying stage exhibits a rapid decrease in an outer part of the eye and the inner eyewall, and a slow decrease near the storm center. Examination on an absolute angular momentum coordinate indicates that the rapidly slow-down rotation in the outer edge of the eye and inner eyewall is faster than a slow-down rotation explained by surface friction. It suggests that asymmetric eddies transport angular momentum across the moat in the inner eyewall dissipation. This study is the first examination of dynamical contributions of asymmetric eddies to the inner-eyewall dissipation based on satellite-estimated tangential winds (Tsujino et al. 2021).

REFERENCES

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