

Deep Eye Clouds Observed in Tropical Cyclone Trami (2018) during T-PARCII Dropsonde Observations

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ABSTRACT

The sporadic formation of short-lived convective clouds in the eye of Tropical Cyclone (TC) Trami (2018) is investigated using dropsonde data and simulation results from a coupled atmosphere–ocean model (Hirano et al. in press). According to the satellite data, top height of the convective clouds exceeds 9 km above mean sea level, considerably taller than that of typical hub clouds (2–3 km). These clouds are located 10–30 km away from the TC center. Hence, these convective clouds are called deep eye clouds (DECs) in this study. The dropsonde data reveal increase in relative humidity in the eye region during the formation of DECs. Short-lived convective clouds are simulated up to the middle troposphere in the eye region in the coupled model.

Investigation of thermodynamic conditions shows a weakened low-level warm core and associated favorable conditions for convection in the eye region during the formation of DECs. DECs are formed after the weakening and outward displacement of convective heating within the eyewall. To elucidate the influence of the changes in convective heating within the eyewall on the formation of DECs, we calculate secondary circulation and associated adiabatic warming induced by convective heating within the eyewall using the Sawyer–Eliassen equation. In the eye region, weakenings of subsidence and associated vertical potential temperature advection are observed as DECs are formed. This suggests that the weakening and outward displacement of convective heating within the eyewall create favorable conditions for the sporadic formation of DECs.

REFERENCES

Hirano, S., K. Ito, H. Yamada, S. Tsujino, K. Tsuboki, and C.-C. Wu, in press: Deep Eye Clouds Observed in Tropical Cyclone Trami (2018) during T-PARCII Dropsonde Observations. *J. Atmos. Sci.*, <https://doi.org/10.1175/JAS-D-21-0192.1>.

Keywords: deep eye clouds, dropsonde observations, a coupled atmosphere–ocean model