

Yamada, H., K. Ito, K. Tsuboki, T. Shinoda, T. Ohigashi, M. Yamaguchi, T. Nakazawa, N. Nagahama, and K. Shimizu, 2021: The double warm-core structure of Typhoon Lan (2017) as observed through the first Japanese eyewall-penetrating aircraft reconnaissance. *J. Meteor. Soc. Japan*, **99**, <https://doi.org/10.2151/jmsj.2021-063>.

Plain Language Summary: Eyewall-penetrating upper-tropospheric aircraft reconnaissance was carried out for Typhoon Lan (2017). This was the first case of a Japanese research group observing the inner core of an intense typhoon using dropsondes. We captured a double warm-core structure persisted in an environment with a strengthening vertical wind shear. Based on analyses of thermodynamics, we hypothesize the contribution of a high enthalpy air transported from the eye boundary layer into the upper warm core via the eyewall for the continuous eye warming.

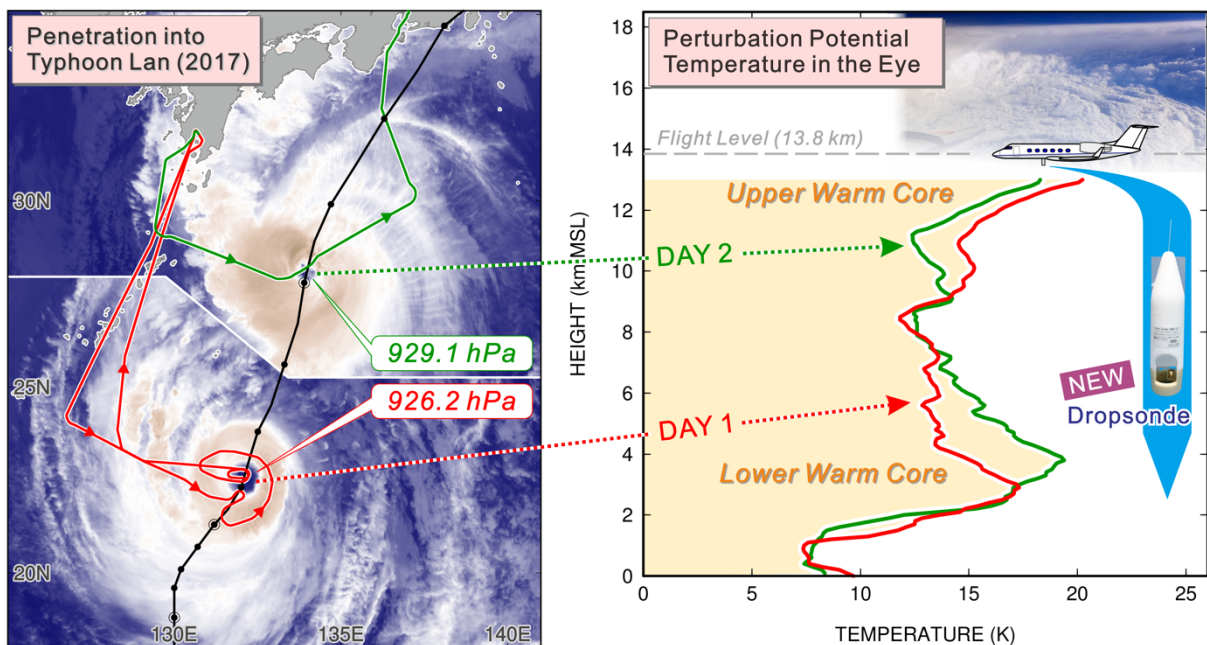


Figure 1. (left) Flight paths superimposed onto infrared images during penetration into the eye. Highlighted values are the minimum sea-level pressures observed by a newly developed dropsonde system. (right) Vertical profiles of the observed perturbation potential temperature within the eye, showing a double warm-core structure persisted during two flight missions.

- The two warm cores show a difference in the equivalent potential temperature (θ_e) of more than 10 K, suggesting different air origins.
- The thermodynamic pathway of high- θ_e air into the upper warm core from the eye boundary layer was characterized by temperatures almost fitted to a single moist adiabatic line.
- This study demonstrates the significance of eye-penetrating upper-tropospheric reconnaissance for understanding thermodynamic processes related to typhoon intensity.