

A change in the inner-core structure of Typhoon Trami (2018) as observed through upper-tropospheric aircraft reconnaissance of T-PARCII

*Hiroyuki Yamada¹, Kazuhisa Tsuboki², Taro Shinoda², Hisayuki Kubota³, Yukihiro Takahashi³, Norio Nagahama⁴, Kensaku Shimizu⁴, Tadayasu Ohigashi⁵, Kosuke Ito¹, Munehiko Yamaguchi⁶, Tetsuo Nakazawa⁶

1. University of the Ryukyus, 2. Nagoya University, 3. Hokkaido University, 4. Meisei Electric, 5. National Research Institute for Earth Science and Disaster Resilience, 6. Meteorological Research Institute, Japan Meteorological Agency

Upper-tropospheric aircraft reconnaissance with dropsonde deployment using a Gulfstream-II aircraft was carried out for the inner core of Typhoon Trami on four successive days since 25 September 2018. According to the JMA best track, the central pressure reached its minimum value of 915 hPa on the first day and was subsequently maintained at 950 hPa for three days. Using dropsonde data, this study examined the change in the inner-core structure associated with the intensity change. Based on satellite imagery, this intensity change was associated with the rapid expansion of the eye (with radius increasing from 35 to 90 km) and the gradual increase in the eyewall cloud-top height. A composite analysis of dropsonde profiles in the radius-height domain on each day revealed a change in the flow structure, with the decrease (increase) in the tangential wind component near the radius of 40 km (120 km). This caused an increase in the radial gradient of angular momentum, corresponding to an increase in inertial stability. These results suggest that this typhoon underwent the structural change similar to eyewall replacement cycle while the central pressure was maintained.

Acknowledgements: This work was supported by JSPS KAKENHI Grant Numbers JP16H06311, JP16H04053, JP18H03805, and the Science and Technology Research Partnership for Sustainable Development (SATREPS) Understanding Lightning and Thunderstorm (ULAT) project.

Keywords: aircraft reconnaissance, tropical cyclone, western North Pacific