

Typhoon observations using an aircraft from the upper troposphere in the T-PARCII project

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A typhoon often brings about severe disaster by strong winds and heavy rainfall in East Asia, thus accurate prediction of typhoon track and intensity is a social requirement. By recent efforts of meteorological agencies, prediction of typhoon tracks has been improved steadily. However, that of typhoon intensity has not been improved for last few decades. Furthermore, the historical data of typhoon (best track data) have large uncertainty between the Joint Typhoon Warning Center (JTWC) and Japan Meteorological Agency (JMA) after the US aircraft reconnaissance of typhoons was terminated in 1987. To improve estimations and forecasts of typhoon intensity as well as its track, we conduct the Tropical cyclone-Pacific Asian Research Campaign for Improvement of Intensity estimations/forecasts (T-PARCII) project.

We utilized a commercial jet aircraft Gulfstream-II (G-II) of Diamond Air Service (DAS). In 2017, we penetrated 3 times into the inner core region (eye) of the intense typhoon Lan (T201721). In 2018, we penetrated 6 times into the eye of the intense typhoon Trami (T201824). Total 9 times penetration into the eye safely without severe turbulence and approximately 90 times dropsonde observations are conducted at the center of the eye and its surrounding region from a height of 13.8 km. Central pressure of typhoons is observed by dropsondes and compared with the estimated value by the JMA (Dovolak method). In the case of the Lan, the observed central pressure slightly increases from 926 hPa on October 21 to 928 hPa on 22. On the other hand, the JMA best-track data indicated that the central pressure decreases from 935 hPa on October 21 to 915 hPa on 22. The observations also shows a significant double warm core structure in the eye. In the case of the Trami, significant weakening of its intensity from September 25 to 26 with a large change of eye diameter from 60 km to 200 km. The thermodynamic structure in the eye of the Trami is quite different from that of the Lan.

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