Consideration for continual implementation of typhoon intensity measurement using a civil jet

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Several methods of typhoon intensity estimation using a microwave radiometer and a ground-based Doppler radar have been developed in addition to the conventional Dvorak method using geostationary satellite images. However, in the western North Pacific, these methods cannot be sufficiently verified due to lack of observation near the center of tropical cyclones since aircraft reconnaissance by the US military was ceased in 1987. The major obstacle of aircraft reconnaissance is the difficulty of having a specially-designed propeller aircraft that withstands strong turbulence. Since wind speed in a typhoon are the strongest in the lower troposphere and becomes weaker with height, it takes a great deal of labor and expense to measure the center position and the center pressure of a typhoon through low altitude flight with slow speed. On the other hand, since the winds are usually weak in the upper troposphere, it may be possible to fly into the typhoon center if it is possible to avoid heavy icing risk in a convective updraft by using a weather avoidance radar. In T-PARCII (Tropical Cyclone-Pacific Asian Research Campaign for Improvement of Intensity Estimations / Forecasts), we succeeded in observing the central pressure of Super Typhoon Lan (2017) by using a commercial jet aircraft (Gulfstream-II) with a newly-developed dropsonde system. This flight was made in the upper troposphere (43,000ft or approximately 13.7 km) and was marked by weak turbulence inside the typhoon. In addition to this case, there are three other cases of typhoon penetration flight for broadcast program, which did not seem to experience severe turbulence. Based on these cases, we will discuss the choice of aircraft and the method of flight for continual implementation of typhoon intensity measurement using a civil jet.

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