

New observation strategies for typhoon intensity over the western North Pacific

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Recent activities on typhoon intensity observation/estimation using aircraft reconnaissance and ground-based Doppler radars in the western North Pacific are introduced. Since aircraft reconnaissance by the US military was ceased in 1987, new techniques of intensity estimation using microwave radiometer and a geostationary satellite are used in this basin without enough verification. 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 is stronger in the lower troposphere, it takes a great deal of labor and expense to measure the center position and the central pressure of a typhoon through low-altitude flight with slow speed. On the other hand, since the winds become weaker in the upper troposphere, it is possible to fly into the typhoon center if the risks of heavy icing and severe turbulence in a convective burst can be avoided by using an airborne weather radar. During T-PARCII (Tropical Cyclone-Pacific Asian Research Campaign for Improvement of Intensity Estimations / Forecasts), we succeeded in observing the central pressure of two intense typhoons, Lan (2017) and Trami (2018), by using a commercial jet aircraft (Gulfstream-II) with a newly-developed GPS dropsonde system. These flight missions were made in the upper troposphere (43,000ft, approximately 13.7 km) and were marked by very weak turbulence during eyewall penetration. These flights demonstrated a possibility of typhoon intensity observation using a civil aircraft. In the Pacific coast of Japan and Philippines, Doppler radars became available in this decade. The combination of aircraft reconnaissance off the coast with the ground-based velocity track display (GBVTD) analysis near the coast will provide accurate information on typhoon intensity.

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