

Improvements in the forecast of TC Lan (2017) by assimilating dropsondes from T-PARCII and DOTSTAR

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Tropical cyclone (TC) Lan (2017) exhibited the lowest minimum sea level pressure (MSLP) of the year and made a landfall on Japan with the gale wind radius more than 800 km. Before its landfall, airborne dropsonde observations were conducted by the projects of Tropical cyclones-Pacific Asian Research Campaign for Improvement of Intensity estimations/forecasts (T-PARCII) and Dropwindsonde Observations for Typhoon Surveillance near the TAIwan Region (T-PARC). Because the improvements in the TC forecast quality is critical in terms of disaster prevention and mitigation, we conducted data assimilation and following forecast experiments to evaluate the impacts of these observations. To do so, the Japan Meteorological Agency (JMA) non-hydrostatic model (NHM)-based variational data assimilation (JNoVA) system was used to conduct data assimilation experiments with and without these aircraft observations. JNoVA is a four dimensional variational (4D-Var) data assimilation system with the outer loop horizontal grid spacing of 5 km and to cover the dropsonde observations obtained we ran 12 assimilation cycles (from 0300UTC 21 October through 1500UTC 22 October) in which the length of each data assimilation window is 3 hour. At the end of each cycle, 36-h forecast experiments were conducted by using JMA-NHM. As a result, it was shown that track forecasts were improved by up to 16% around for the forecast time of 21-36 hour and MSLP forecasts were improved by up to 30% for the forecast time of 15-36 hour owing to the assimilation of dropsonde observations. Although further checks are still needed, current preliminary results are very encouraging toward the improvements in the forecast quality leading to the disaster prevention and mitigation.

