

The Impact of Airborne Doppler Lidar Wind Measurements on Numerical Simulations of Tropical cyclones

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Abstract

During the THORPEX Pacific Asian Regional Campaign (TPARC) and Tropical Cyclone Structure 2008 (TCS08) field experiment, an airborne Doppler Wind Lidar (DWL) was onboard the U. S. Naval Research Laboratory's P-3 research flight. It was the first time the DWL was used for a tropical cyclone mission. This paper presents the first results demonstrating the impact of airborne DWL measurements on the numerical simulation of Typhoon Nuri in its formation phase and Typhoon Hagupit in its intensification period. With an advanced research version of the weather research and forecasting (WRF) model and its data assimilation systems, numerical results show that the DWL data have a positive impact on the numerical simulations of typhoons in terms of their evolution, track and intensity.

Dropsondes released in the areas where the DWL was operating show good agreement for the measured winds. Compared with the three-dimensional variational method, a four-dimensional variational data assimilation system is deemed to be more promising for assimilating the DWL data.