

Operational Evaluations on an Auto-Dealiasing Algorithm for Tropical Cyclones

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Abstract

In this study, a proposed vortex-based Doppler velocity dealiasing (VDVD) algorithm for tropical cyclones (TC) is evaluated from an operational perspective. The algorithm is based on an inner-outer iterative procedure uses a Rankine-combined-vortex model as a reference field for dealiasing. The structure of the reference vortex is adjusted in the inner iterative procedure applies the ground-based velocity track display (GBVTD) technique. The outer loop, based on the GBVTD-simplex, is used for TC center correction. The VDVD is able to recover the aliased Doppler velocities not only from a simulated symmetric vortex but also those are superimposed with wavenumber-1 asymmetry, radial wind or mean flow. For real cases, the VDVD provides dealiased Doppler velocity with higher quality than that of an automated 2D multipass Doppler radar velocity dealiasing scheme. It is suggested that the VDVD algorithm is capable of improving the quality of downstream applications of TCs and other storms. However, the accuracy of typhoon centers derived from the VDVD might decrease when those centers are within and close to the radar maximum detective range. Therefore, for operational purpose, a designed constraint based on the real-time typhoon centers issued by the CWB in Taiwan is required. The preliminary results show that the constraint is able to increase both the stability of typhoon centers and the quality of dealiased Doppler velocity derived from VDVD.

Key words: radar, Doppler velocity, velocity dealiasing, Typhoon, tropical cyclone