

WSR-88D-derived Diagnosis of Tropical Cyclone Intensity Changes Near Landfall

Final report to the Joint Hurricane Testbed

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Project Abstract:

This project provides TPC with a radar-based hurricane diagnostic software package, the Vortex Objective Radar Tracking and Circulation (VORTRAC), that tracks intensity (via central pressure) and radius of maximum wind (RMW) of landfalling tropical cyclones. The central pressure and RMW are retrieved from the ground-based velocity track display technique (GBVTD) and the hurricane volume velocity processing method (HVVP) anchored by the surface pressure observations from coastal weather stations, buoys, and dropwindsondes. VORTRAC provides TPC/NHC with automatically-updated charts of radar-derived, TC central surface pressure and its tendency. In addition, the radius of maximum wind and its tendencies will also be offered in chart form.

Summary of Year 2 Accomplishments:

A mid-term report for the second year was submitted in February 2007 and a progress of the project was reported at the 2007 Interdepartmental Hurricane Conference in New Orleans, Louisiana. We have improved and completed the user interface of the VORTRAC package and tested the prototype, alpha, and beta versions of the VORTRAC package using analytical and archived real data at UCAR. Incrementally improved versions of VORTRAC have also been ported, built and tested on the JHT server computer at TPC/NHC since March 2007. The release version 1.0 of VORTRAC

(comprised of 74 source code files), was implemented on 31 August 2007, and is documented in the attached user's manual.

Lee, Harasti and Bell were present at TPC/NHC between 23-31 August 2007 to test the beta version of VORTRAC. VORTRAC was demonstrated to TPC/NHC and JHT staff, and our TPC POC's recommended improvements were implemented in the 1.0 release. Since there were no landfalling tropical cyclones during this time period, both a real-time data simulation and several archived data tests were performed. Archived level-II volume scan data files of Hurricane Danny (1997) from the two WSR-88D radars KMOB and KLIX were uncompressed, copied and re-compressed across the TPC/NHC network in 5-6 minute intervals to simulate the current real-time level-II data arrival frequency at NHC. These two data streams were simultaneously processed by VORTRAC at this real-time frequency, while comparing the VORTRAC result displays for consistency. These comparisons and 'simulated real-time' tests led to some data quality control and I/O improvements that were implemented in the 1.0 release. Several tests were also performed on archived WSR-88D level-II data taken during Hurricanes Charley (2004), Dennis (2005) and Ernesto (2006). These tests lead to further improvements in the HVVP component of VORTRAC, also implemented in the 1.0 version.