The impact of assimilating satellite-derived winds, airborne Doppler radial velocity and dropsonde data on the analysis and prediction of Hurricane Earl (**2010**) using an ensemble Kalman filter

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Satellite-derived rapid-scan winds or atmospheric motion vectors (AMVs), airborne Doppler radar radial velocity (Vr) and dropsonde observations are assimilated for rapidly intensifying Hurricane Earl (2010) using the ARPS ensemble Kalman filter (EnKF) system at cloud-permitting 4 km grid spacing while the WRF ARW model is used for the forecasting. The enhanced satellite-derived winds from the Cooperative Institute for Meteorological Satellite Studies (CIMSS) during the Pre-Depression Investigation of Cloud-Systems in the Tropics (PREDICT) experiment can provide the circulation information at higher spatial and temporal resolutions than the routine operational AMVs. A 40-member ensemble is created from the operational global ensemble forecast system. The assimilation of Vr data improves the analysis of the inner core axisymmetric circulation and warm core thermal structures within a deep, intense vortex while the impact of assimilating dropsonde data is mostly in the lower troposphere. The assimilation of Vr and dropsonde also improves the 36 hours intensity forecast. The impact from the assimilation of satellite-derived wind on the track and intensity forecast is discussed. Multiple microphysics (MP) and planetary boundary layer (PBL) parameterization schemes are employed in the ensemble to partly account for model uncertainty and the results are compared with experiments using a single suite of physics.

References:

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