

Idealized Space-Based Doppler-Wind Lidar in a Hurricane OSSE

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Lisa Bucci, Cooperative Institute for Marine and Atmospheric Studies, Miami, FL; and
S. J. Majumdar, R. Atlas, S. Greco, and G. D. Emmitt

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The lack of vertical wind profiles in the tropical atmosphere, particularly over the oceans, suggests that there is room for improvement in initializing numerical forecasts of tropical cyclones (TCs). Vertical wind shear is a commonly examined quantity that can strongly influence the structure and evolution of a TC. However, previous studies have shown that a more comprehensive representation of the 850-200mb wind profile is needed to predict how the wind shear will affect the TC. One instrument that could potentially measure detailed wind profiles in the environment of a TC is a space-based Doppler Wind Lidar (DWL). Earlier Observing System Simulation Experiments (OSSEs) have shown the potential for improving TC track forecasts as a result of assimilating simulated DWL data. This study expands on these previous efforts by investigating how the assimilation of idealized simulated DWL wind observations modifies the vertical wind shear profile of the near TC environment, thus changing its organization and intensification. Synthetic DWL observations were simulated from a high-resolution regional "Nature Run" of a hurricane and the tropical atmosphere, and assimilated using an Ensemble Square-Root Kalman Filter. Results from these analyses and subsequent forecasts using the Hurricane Weather and Research Forecast (HWRF) regional model will be presented.