

## **The Impact of Assimilation of Unmanned Aerial System Observations on Numerical Weather Prediction Modeling of Modified Refractivity and Electromagnetic Propagation**

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The Trident Warrior observational field campaign conducted off the U.S. East Coast in July 2013 included the deployment of an unmanned aerial system (UAS) with several payloads on-board for atmospheric and oceanic observation. Measurements collected from seven UAS flights over five days were assimilated into a three-dimensional variational data assimilation system (NAVDAS) used to generate analyses for a numerical weather prediction (NWP) model (COAMPS<sup>®</sup>). Profiles of modified refractivity (M) in the lower atmosphere are diagnosed from the model forecast fields. NWP modeling experiments with and without the assimilation of UAS measurements demonstrate the impact of UAS data assimilation (DA) on forecasts of modified refractivity profiles, including the presence and characteristics of atmospheric ducts. These forecasts are verified using a set of 50 radiosondes launched in the vicinity of the UAS flights. Results indicate significant model forecast error reduction in the M profiles at short lead times (less than 12 hours) with UAS DA. Propagation path loss modeled using NWP model forecast fields matches well the path loss modeled using radiosonde measurements, which included periods of varied atmospheric conditions. Results will also be shown for the impact of UAS DA on propagation path loss.