

Assimilation of Ground- and Space-Based Ionosphere Observations in WACCMX+DART

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The ability to perform whole atmosphere data assimilation in the Whole Atmosphere Community Climate Model with thermosphere-ionosphere eXtension (WACCMX) is implemented using the Data Assimilation Research Testbed (DART) ensemble adjustment Kalman filter. This presentation primarily focuses on the recent implementation of the assimilation of ground-based Global Navigation Satellite System (GNSS) total electron content (TEC), and Constellation Observing System for Meteorology, Ionosphere, and Climate (COSMIC) radio occultation (RO) observations. The effectiveness of assimilating ground-based GNSS TEC and COSMIC RO observations in constraining the ionosphere is first demonstrated through a set of Observation System Experiments (OSEs). The OSE results demonstrate that the assimilation of the ionosphere observations results in a reduction of the bias in the ionosphere in both the analysis fields and short-term forecasts. Using the 2009 sudden stratospheric warming (SSW) as a case study, results are also presented that demonstrate the value of simultaneously assimilating observations in the lower-middle atmosphere (0-100 km) and the ionosphere.