

Joint Assimilation of Tropospheric Emission Spectrometer and Microwave Limb Sounder Ozone Measurements in the GEOS-Chem Chemistry Transport Model

Jessica L. Neu (1), Kevin W. Bowman (1), Nathaniel J. Livesey (1), Michelle L. Santee (1), Meemong Lee (1)

(1) Jet Propulsion Laboratory, California Institute of Technology

We present results for a joint assimilation of O₃ measurements from the Aura Tropospheric Emission Spectrometer (TES) and Microwave Limb Sounder (MLS) instruments in the GEOS-Chem chemistry-transport model using a 3-Dvar assimilation system. We show that O₃ from either instrument alone improves performance relative to sondes over North America from near-surface (900 hPa) to the middle stratosphere (10 hPa). As expected, TES measurements provide a larger correction in the troposphere and MLS measurements provide a larger correction in the stratosphere. The joint assimilation reduces the error to within 10% over the entire pressure range for most of continental U.S. We discuss the characteristics of the assimilation, including the interplay between the measurements in the region in which they overlap and the vertical propagation of information, and address the potential for “chemical reanalysis” products for model evaluation.