

6.036 Spatial and temporal variability of in-situ and column integrated trace gases during DISCOVER-AQ.

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Abstract:

We quantify spatial and temporal variability of both in-situ mixing ratios and column integrated O_3 , NO_2 , CO , SO_2 , and $HCHO$ during the four deployments of the NASA Earth Venture mission DISCOVER-AQ (Deriving Information on Surface conditions from Column and Vertically Resolved Observations Relevant to Air Quality). These deployments consist of month-long campaigns over Baltimore, MD (Jul 2011), the San Joaquin Valley, CA (Jan-Feb 2013), Houston, TX (Sep 2013), and Denver, CO (Jul-Aug 2014). Using structure function analyses, we compare simulated variability of output from the regional chemical models WRF/Chem and CMAQ with variability observed during the campaigns. The Tropospheric Emissions: Monitoring of Pollution (TEMPO) instrument will be the first NASA mission to make atmospheric composition observations from geostationary orbit and partially fulfills the goals of the Geostationary Coastal and Air Pollution Events (GEO-CAPE) mission. Our analysis quantifies how often the atmosphere exhibits observationally relevant gradients in several key trace gas species, over what length scales they occur, and over what time periods. We compare both observed and simulated variability to the precision requirements defined by the science traceability matrices of these space-borne missions to explore how they relate to the science questions they are tasked to address.