2.165 Assessing the spatial distribution and seasonal variation of atmospheric CH2O column abundance using the GEOS-5 model and OMI retrieval.

Presenting Author:
Qing Liang, NASA Goddard Space Flight Center, qing.liang@nasa.gov

Co-Authors:
Eric Fleming, NASA GSFC/SSAI
Can Li, NASA GSFC/UMD ESSIC

Abstract:

Formaldehyde (CH_2O) is a key atmospheric oxidation intermediate that is primarily formed when hydroxyl radical (OH) reacts with volatile organic compounds (VOC) and is removed by photolysis, reaction with OH or deposition. CH_2O is an important precursor for tropospheric ozone and PM2.5. Therefore accurate abundance estimates and source attribution of CH_2O is of critical important for surface air quality assessments. Because its primary sources vary substantially from one region to the next and its short lifetime of just a few hours, CH_2O in the atmosphere features a highly inhomogeneous distribution. CH_2O is predominantly produced from methane oxidation in remote oceans, while nonmethane VOCs of biogenic and anthropogenic origins are primarily CH_2O sources in terrestrial and urban areas. CH_2O is detectable from satellite-based UV/visible spectrometers and global mapping of CH_2O column abundances are available from remote-sensing platforms, e.g., the Ozone Monitoring Instrument (OMI) and the Suomi National Polar-orbiting Partnership/Ozone Mapping and Profiler Suite (S-NPP/OMPS). For this work, we combine the modeled CH_2O from the NASA Goddard GEOS-5 full chemistry simulations (Nielson et al., 2017) with the OMI CH_2O retrievals (Li et al., 2015) to conduct a full evaluation of the geographic distribution and seasonal variation of CH_2O column abundances, focusing on the high CH_2O column abundance hot spot areas, e.g., the biogenic dominant Southeast U.S. and the Amazon region, the biomass burning dominant central Africa, and the anthropogenic emissions dominant East Asia region. We will conduct a suite of model sensitivity simulations to quantify the contribution of key VOCs and their emission sources to the atmospheric CH_2O abundance. The GEOS-5 CH_2O will be evaluated against OMI retrievals to assess whether the model provides a realistic representation of VOCs that are key to atmospheric air quality studies.