3.012 Investigating biomass burning aerosol in North America.

Early Career Scientist

Presenting Author:
Therese (Tess) Carter, Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, MA USA, tscarter@mit.edu

Co-Authors:
Colette Heald, Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, MA USA

Abstract:

Fires and the aerosols that they emit have important implications for air quality, visibility, health, and climate, but the abundance and properties of carbonaceous aerosol (both black carbon and organic carbon) from biomass burning remain uncertain and poorly constrained. To explore this, we compare GEOS-Chem model simulations driven by a variety of fire emissions inventories (Global Fire Emissions Database version 4 (GFED4), Quick Fire Emission Dataset (QFED), and Fire INventory from NCAR (FINN)) to black carbon (BC) and organic aerosol (OA) concentrations observed during three fire-influenced aircraft campaigns in North America (ARCTAS, DC3, and BBOP). To constrain the optical properties associated with these emissions, we compare MODIS aerosol optical depth (AOD) observations with AOD simulated with GEOS-Chem both during the campaigns of interest and also globally in a longer, ten-year simulation. Comparing ten years of MODIS AOD against two chosen inventories - a bottom-up approach using fire counts, GFED4, and a top-down one employing fire radiative energy, QFED, brackets the uncertainty associated with emissions. This ten-year simulation provides additional insights on seasonal and interannual trends of emissions and AOD across the inventories.