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- A51F-0123: Model Analysis of Tropospheric Aerosol Variability and Sources over the North Atlantic during NAAMES 2015-2016

  Friday, 16 December 2016

  08:00 - 12:20

  - Moscone South
  - - Poster Hall

The North Atlantic Aerosols and Marine Ecosystems Study (NAAMES) is a five-year Earth-Venture Suborbital-2 Mission to characterize the plankton ecosystems and their influences on remote marine aerosols, boundary layer clouds, and their implications for climate in the North Atlantic. While marine-sourced aerosols have been shown to make important contributions to surface aerosol loading, cloud condensation nuclei and ice nuclei concentrations over remote marine and coastal regions, it is still a challenge to differentiate the marine biogenic aerosol signal from the strong influence of continental pollution outflow. We examine here the spatiotemporal variability and quantify the sources of tropospheric aerosols over the North Atlantic during the first two phases (November 2015 and May-June 2016) of NAAMES using a state-of-the-art chemical transport model (GEOS-Chem). The model is driven by the Modern-Era Retrospective analysis for Research and Applications, Version 2 (MERRA-2) from the NASA Global Modeling and Assimilation Office (GMAO). It includes sulfate-nitrate-ammonium aerosol thermodynamics coupled to ozone-NOx-hydrocarbon-aerosol chemistry, mineral dust, sea salt, elemental and organic carbon aerosols, and especially a recently implemented parameterization for the marine primary organic aerosol emission. The simulated aerosols over the North Atlantic are evaluated with available satellite (e.g., MODIS) observations of aerosol optical depths (AOD), and aircraft and ship aerosol measurements. We diagnose transport pathways for continental pollution outflow over the North Atlantic using carbon monoxide, an excellent tracer for anthropogenic pollution transport. We also conduct model perturbation experiments to quantify the relative contributions of terrestrial and oceanic sources to the aerosol loading, AOD, and their variability over the North Atlantic.

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