Global Aerosol Forecasting and Assimilation System at NCEP: Overview and Status

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Efforts to develop global prognostic aerosol capability at NOAA National Centers for Environmental Prediction (NCEP) have been underway, which in turn is part of NCEP's modeling efforts toward a unified modeling framework. In specific, NCEP is constructing NOAA Environmental Modeling System (NEMS) as its next-generation operational system and has collaborated with NASA Goddard Space Flight Center (GSFC) to develop NEMS GFS Aerosol Component (NGAC) system for predicting the distribution of atmospheric aerosols. NGAC Version 1.0 (NGAC V1) provides the first operational global dust forecasting capability at NOAA (http://www.ftp.ncep.noaa.gov/pub/data/nccf/com/ngac for real-time NGAC digital products and http://www.emc.ncep.noaa.gov/gmb/sarah/NGAC/html/realtime.ngac.html for the web-based graphics).

The rational for developing a global aerosol forecast and assimilation capability at NCEP includes: (1) to improve weather forecasts and climate predictions by taking into account of aerosols effects on radiation and clouds; (2) to better utilize satellite observations by incorporating aerosols as a key component, e.g., atmospheric correction; (3) to provide aerosol lateral and upper boundary conditions for regional aerosol/air quality models; and (4) to assess aerosol impacts on climate, human health, ecosystem, and visibility. The ultimate goal at NCEP is a full-blown Earth system with the inclusion of aerosol-radiation feedback and aerosol-cloud interaction. Due to resource constraints, the current operational configuration is to maintain a low-resolution system for aerosol prediction and a high-resolution system for medium range weather forecasting.

While development work remains, ground work has been laid for building a global aerosol forecasting/assimilation system within NGAC and Gridpoint Statistical Interpolation (GSI) at NCEP. This presentation will provide an overview of the NGAC global aerosol forecasting system, demonstrate the use of satellite-based biomass burning emissions for improving aerosol forecasts, and discuss the status on the development of GSI aerosol data assimilation.