NOAA'a National Air Quality Forecast Capability for ozone and fine particulate matter

J. McQueen[1], J. Huang[1,2], H. Huang[1,2], P. Lee[3], I. Stajner[4]

1: NWS/NCEP, 2: IMSG corp., 3: NOAA/Air Resources Laboratory, 4: NWS/STI

The NOAA National Air Quality Forecast Capability, NAQFC, provides 2 day model forecasts of ozone and fine particulate matter surface concentrations twice per day at 06 and 12 UTC cycles. The NAQFC operational forecast for ozone (O_3) for the nation was implemented in September 2007 and for fine particulate matter (PM2.5) in January 2015. The NAQFC is made up of the North American Non-Hydrostatic Multiscale Model (NAM-NMMB) 12 km numerical weather prediction model and the EPA Community Model for Air Quality (CMAQ) using Carbon Bond-V (CB-V) gas phase chemistry and AERO-IV particulate processing. Predictions are available in real-time for the continental U.S., Alaska and Hawaii.

Offline coupling between NAM and CMAQ is achieved at hourly intervals by interpolation from the NAM to CMAQ horizontal and vertical grids. Anthropogenic emissions are updated monthly from the EPA National Emission Inventory for base year 2011. Wildfire smoke emissions were included in 2015 and based upon the U.S. Forest Service BlueSky smoke emission system and the NESDIS Hazardous Mapping System (HMS) fire locations updated daily. Dust emissions were also included in 2015 using a friction velocity and soil moisture criteria based approach. Dust lateral boundary conditions are provided by the NCEP NEMS Global Aerosol Capability (NGAC) V2 with climatological values from NASA GEOS-Chem for other species. The number of vertical levels was increased to 35 and an analog bias correction for PM2.5 was implemented in 2016. Predictions are available to U.S. State air quality forecasters and the public from the NWS National Digital Guidance Database (NDGD): http://airquality.weather.gov/ with experimental model predictions at: http://www.emc.ncep.noaa.gov/mmb/aq/.