NATIONAL WEATHER SERVICE

NOAA Air Quality Program: National Air Quality Forecast Capability

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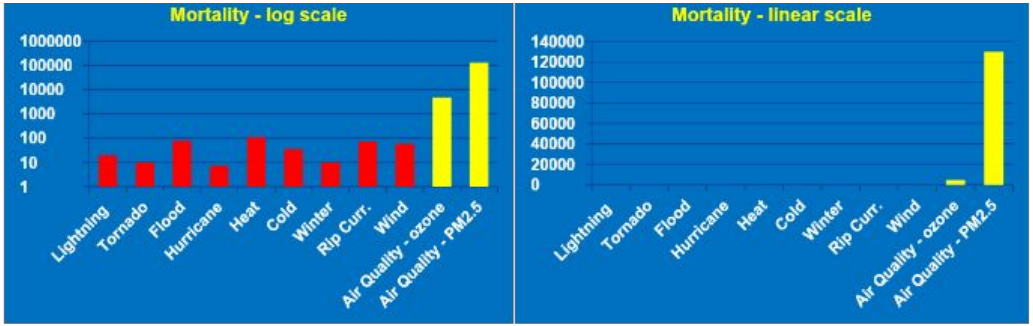
With contributions from the entire NAQFC Development/Implementation Team

Outline

- NOAA's Mandates for AQ/AC Research and Services
- Overview of NAQFC Program
- Interagency Collaboration Activities
- Upcoming Model Implementation
- NOAA Upcoming Presentations

NOAA's mandates for atmospheric composition research, operations, and products

- NOAA has numerous legislative, interagency, and international mandates for its research and operational predictions of atmospheric chemistry and composition e.g. 2021 EPA-NOAA MOA on Cooperation in Forecasting Air quality.
- NOAA's Atmospheric Composition research and operations support the agency's mission to **protect lives and property.**



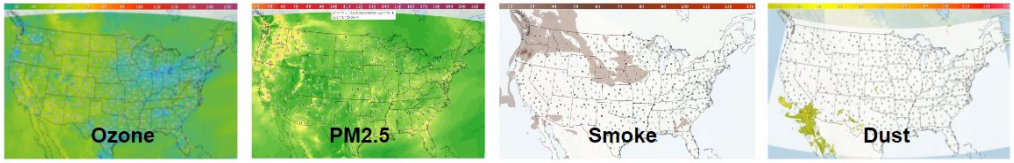
Red: Weather fatalities for 2018 (source: https://www.weather.gov/hazstat/)

Yellow: Air Quality mortality for 2005 (source: Fann et al., Risk Analysis, 2012 https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1539-6924.2011.01630.x)

National Air Quality Forecast Capability

We improve the basis of air quality alerts and provide air quality information to people at risk to further NWS mission of protecting life and property and the enhancement of the national economy.

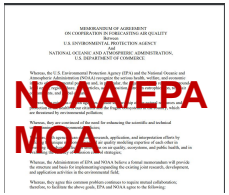
National Air Quality Forecast Capability (NAQFC) develops and implements operational air quality forecast guidance for the United States.



Operational Forecast Products (72/48 hours):

- Ozone nationwide (CMAQ)
- Fine particulate matter (PM2.5) nationwide (CMAQ)
- Smoke nationwide (RAP-Smoke)
- Dust over CONUS (HYSPLIT)

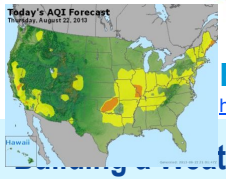
Air quality forecasting relies on a strategic partnership with the Environmental Protection Agency (EPA) and state and local air quality forecasters.



NOAA
Develop & evaluate models; provide operational AQ predictions

EPA
Maintain national emissions, monitoring data; disseminate/interprete AQ forecasts

State and local agencies
Provide emissions, monitoring data AQI forecasts



EPA AirNow
https://www.airnow.gov/national-maps/

Operational Models: Global

- GEFS-Aerosol (EMC, ARL, CSL, GSL, STAR)
  - One member of GEFSv12
  - Coupled atmosphere-wave-aerosol
  - Aerosol Optical Depth (AOD), Particulate Matter (PM), PM smaller than 2.5 μm
  - Provide LBC to AQM
- Planned upgrade to GEFSv13 in FY26
  - Fully coupled: atmosphere-land-wave-ocean-ice-aerosol

Long-range transportation of Saharan dust

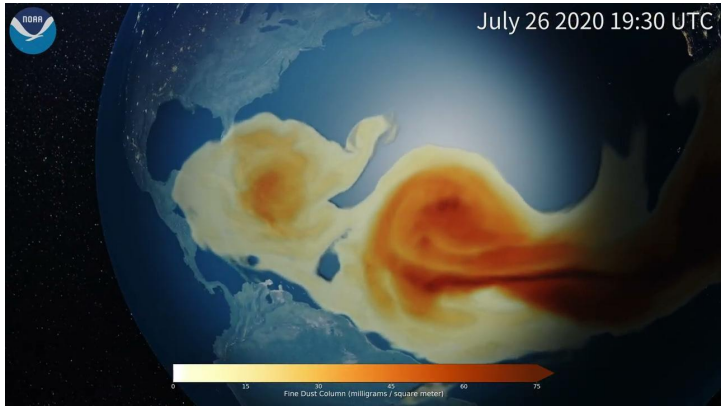
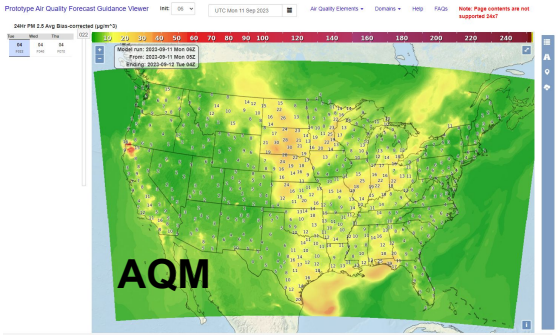
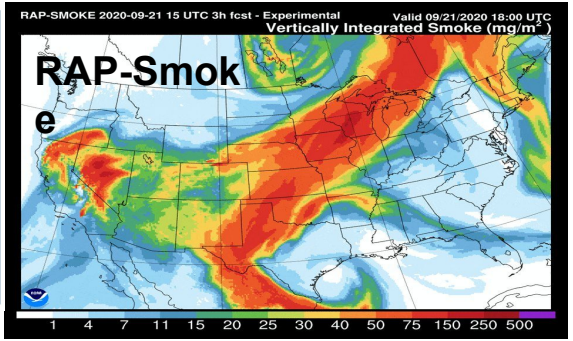


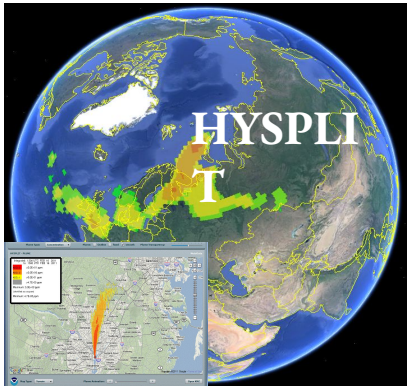
Image credit: Eric Hackathorn, NOAA Global Systems Laboratory

Operational Models: Regional

- AQM (EMC, ARL, PSL, STAR)
  - O_3 and PM2.5
- HYSPLIT-Dust
- RAP- and HRRR-Smoke
- On-demand HYSPLIT runs for radioactive/chemical events with TOA, and volcanic ash ensemble

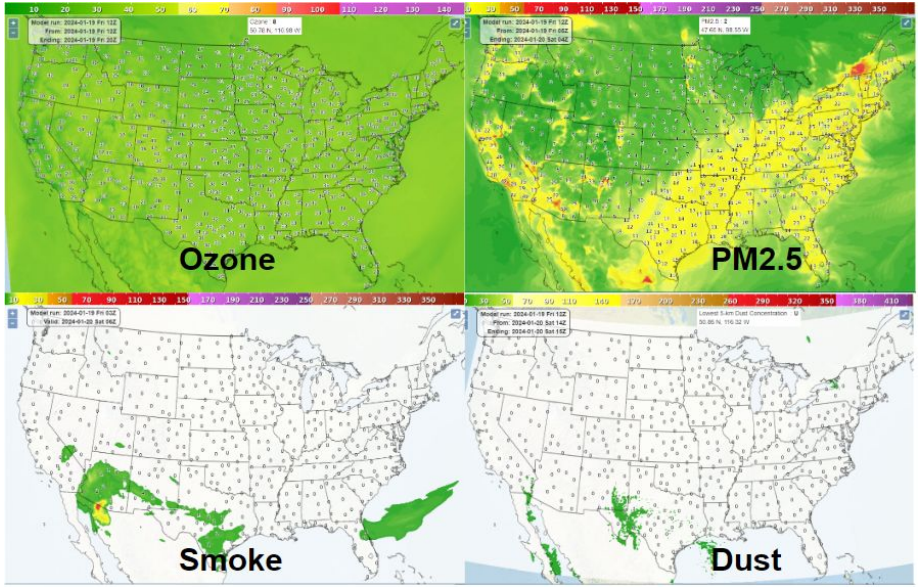




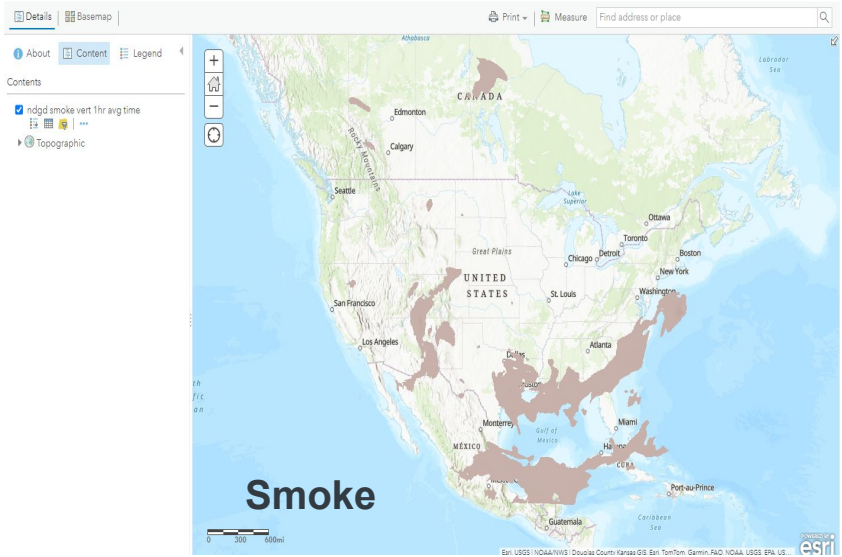


Graphical Forecasts

NAQFC Graphics on AWS:
https://digital.mdl.nws.noaa.gov/airquality/



GIS data on AWS:
https://www.weather.gov/gis/cloudgiswebservices



Gridded Binary File

GRIB2 format

NOMADS:
https://nomads.ncep.noaa.gov/

TGFTP:
https://www.nco.ncep.noaa.gov/pmb/products/aqm/

Historical database (National Digital Guidance Database):
https://www.ncei.noaa.gov/has/HAS.FileAppRouter?datasetname=9950_01&subqueryby=STATION&applname=&outdest=FILE

UVI (Ultraviolet Index)	daily	-	https	-
Regional Models				
ObsProc (Observations Processing)	variable	-	https	-
AQM Daily Maximum	06Z, 12Z	grib filter	https	OpenDAP
AQM Hourly Surface Ozone	06Z, 12Z	grib filter	https	OpenDAP
HIRESW Alaska	06Z, 18Z	grib filter	https	OpenDAP
HIRESW CONUS	00Z, 12Z	grib filter	https	OpenDAP
HIRESW Guam	00Z, 12Z	grib filter	https	OpenDAP
HIRESW Hawaii	00Z, 12Z	grib filter	https	OpenDAP
HIRESW Puerto Rico	06Z, 18Z	grib filter		
HREF Alaska	06Z, 18Z	grib filter		
HREF CONUS	00Z, 12Z	grib filter		
HREF Hawaii	00Z, 12Z	grib filter		
HREF Puerto Rico	06Z, 18Z	grib filter		

NCEP Products Inventory

Air Quality Model (AQM) Products

Updated: 06/10/2021
Information about AQM Products

CC is the model cycle runtime (i.e. 00, 06, 12, 18)
FF is the model forecast time from 01-72

The **Inventory** links contain detailed model information.
Use as a guide when selecting specific parameters from NOMADS through the grib filter option

INVENTORY			Availability on NCEP FTP SERVER and NOMADS	Availability on NWS FTP SERVER
AQM				
Description	Filename	Inventory		
1hr Avg Ozone Conc	aqm.tCCz.ave_1hr_o3.227.grib2	FH		
8hr Avg Ozone Conc	aqm.tCCz.ave_8hr_o3.227.grib2	FH		
Daily Max from 1hr Ozone Conc	aqm.tCCz.max_1hr_o3.227.grib2	FH		
Daily Max from 8hr Ozone Conc	aqm.tCCz.max_8hr_o3.227.grib2	FH		
1hr Avg Ozone Conc (biased cor)	aqm.tCCz.ave_1hr_o3_bc.227.grib2	FH		
8hr Avg Ozone Conc (biased cor)	aqm.tCCz.ave_8hr_o3_bc.227.grib2	FH		
Daily Max from 1hr Ozone Conc (biased cor)	aqm.tCCz.max_1hr_o3_bc.227.grib2	FH		
Daily Max from 8hr Ozone Conc (biased cor)	aqm.tCCz.max_8hr_o3_bc.227.grib2	FH	GRIB2 via ftp GRIB2 via https	Binary Format
1hr Avg Particulate Matter	aqm.tCCz.ave_1hr_pm25.227.grib2	FH		
Daily Avg Particulate Matter	aqm.tCCz.ave_24hr_pm25.227.grib2	FH		
1hr Avg Particulate Matter (biased cor)	aqm.tCCz.ave_1hr_pm25_bc.227.grib2	FH		
Daily Avg Particulate Matter (biased cor)	aqm.tCCz.ave_24hr_pm25_bc.227.grib2	FH		
Daily Max from 1hr Particulate Matter	aqm.tCCz.max_1hr_pm25.227.grib2	FH		

NOAA NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Home | Climate Information | Data Access | Customer Support | Contact | About

Home > Archive Information Request System > Order Data

National Digital Guidance Database (NDGD)

Select Call Sign(s)
ALL (05/30/2007 - 09/09/2023)

Select WMO Header(s) (sort by - WMO Header(s) / Description)
ADM - Administrative Messages

Select Start Date (YYYY/MM/DD)
2023 / 09 / 09
Select End Date: (YYYY/MM/DD)
2023 / 09 / 09

Delivery Destination: FTP

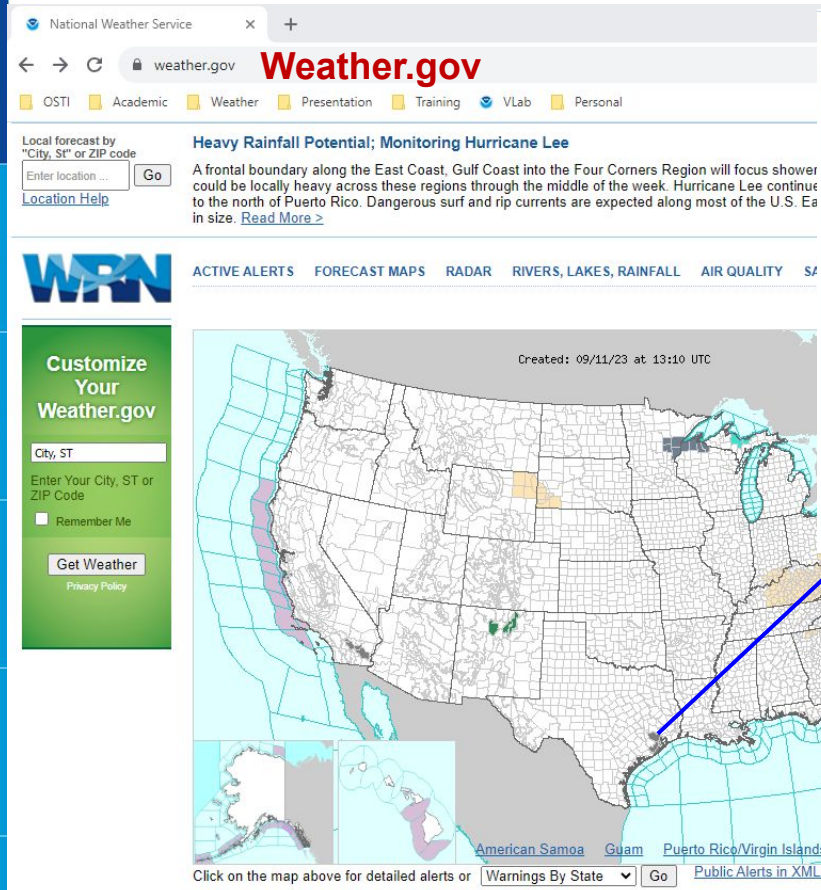
Submit Batch (skip file selection)?: ○ Yes ◉ No

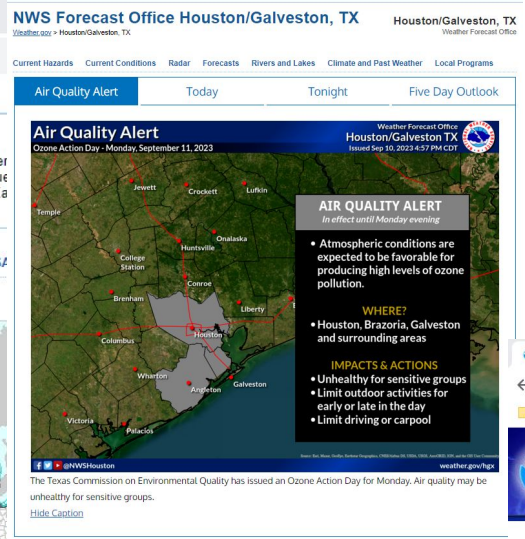
Email Address

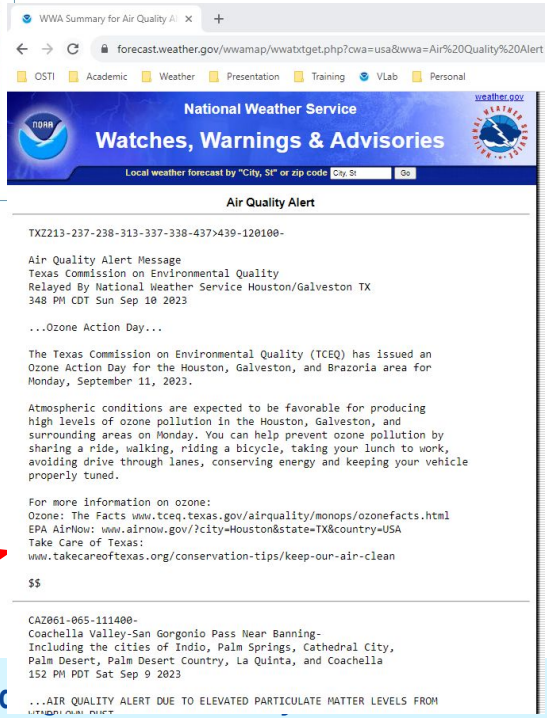
Important Notes:
-- If your data request will contain more than 2,000 files, you must select "Yes" for the Submit Batch option above.
-- There is a data volume limit of 250 Gigabytes per request.

Proceed With Order | Reset Form

Alerts and Warnings







Air Quality Forecasters Workshop

Date: 12-13 October 2023

Cadence: Annual

Location:College Park, MD

Purpose: Bring together NWS AQ forecast model developers, state and local government AQ forecasters, and representatives from other partner agencies to review NWS AQ forecast performance as well as to discuss research gaps and AQ forecaster needs.

Workshop Summary: https://vlab.noaa.gov/web/osti-modeling/aq-workshop-2023-summary

AQ WORKSHOP 2023 SUMMARY

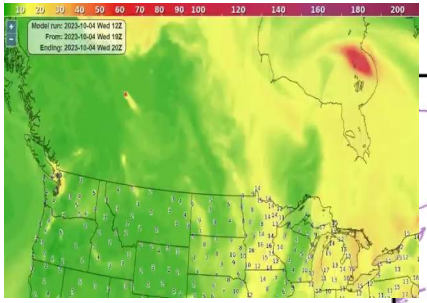
Workshop in-person attendees (October 2023)

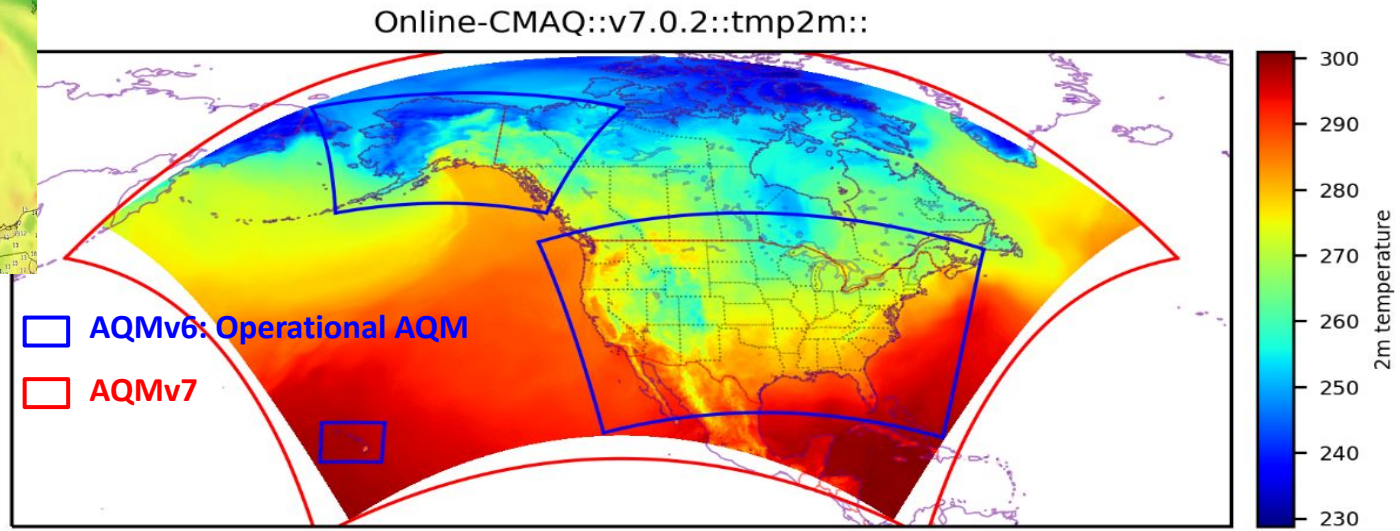
The National Oceanic and Atmospheric Administration National Weather Service (NOAA/NWS), under its air quality program, the National Air Quality Forecast Capability (NAQFC), hosted the annual Air Quality Forecasters' Focus Group Workshop on October 12-13, 2023. The NAQFC develops and implements operational air quality (AQ) prediction models to provide AQ forecast guidance for forecasters employed by local and state agencies. These agencies disseminate the forecasts to the public through NWS Forecast Offices and other outlets. This annual workshop provides a unique opportunity for AQ forecasters to share their experiences as end users of model guidance with model developers and AQ researchers from NOAA, the Environmental Protection Agency (EPA), and Environment and Climate Change Canada (ECCC). The purpose of the workshop is to review assessments of the strengths and weaknesses of the AQ model guidance, examine current model development and research initiatives, and use forecaster feedback to identify gaps and/or misalignment between model performance, current R&D initiatives, and forecasters' needs.

The workshop was conducted in a hybrid format, with 76 total participants, including 24 in-person attendees. It consisted of 4 distinct sessions. The first session included presentations on current methods and capabilities within the NWS, highlighting the meteorological and air-chemistry components of the operational AQ modeling systems, objective assessments of performance,

AQM v7 Implementation

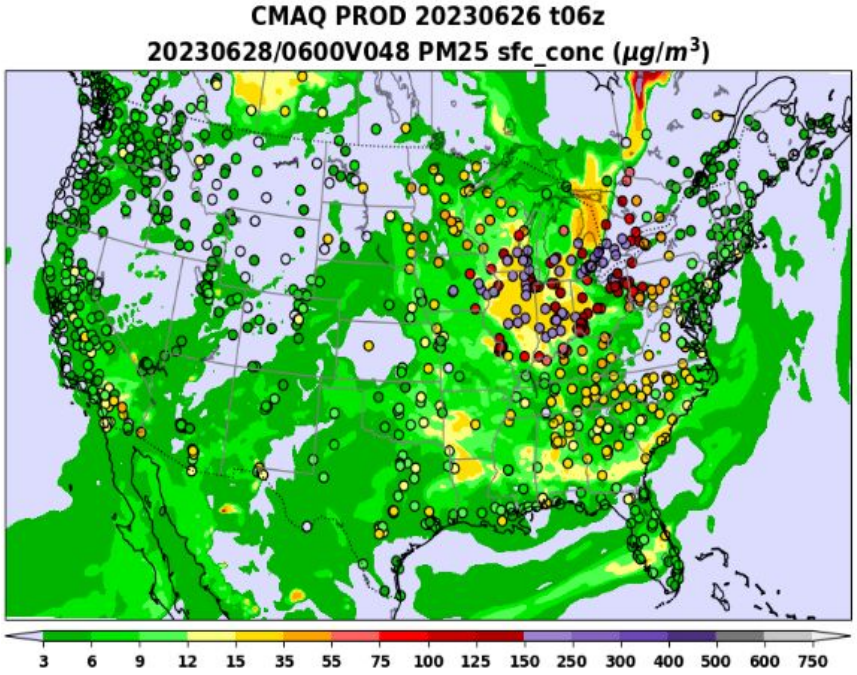
- 13-km grid spacing over north America
- First **online-coupled weather and chemistry model** at NOAA
- High-resolution hourly Regional ABI and VIIRS fire Emissions (**RAVE**)
- Sofiev plume-rise algorithm
- Updated LBC (AM4+GEFS-Aerosols) and wet deposition
- Fengsha dust module
- When? Spring 2024
- Public Information Statement (https://www.weather.gov/notification/)

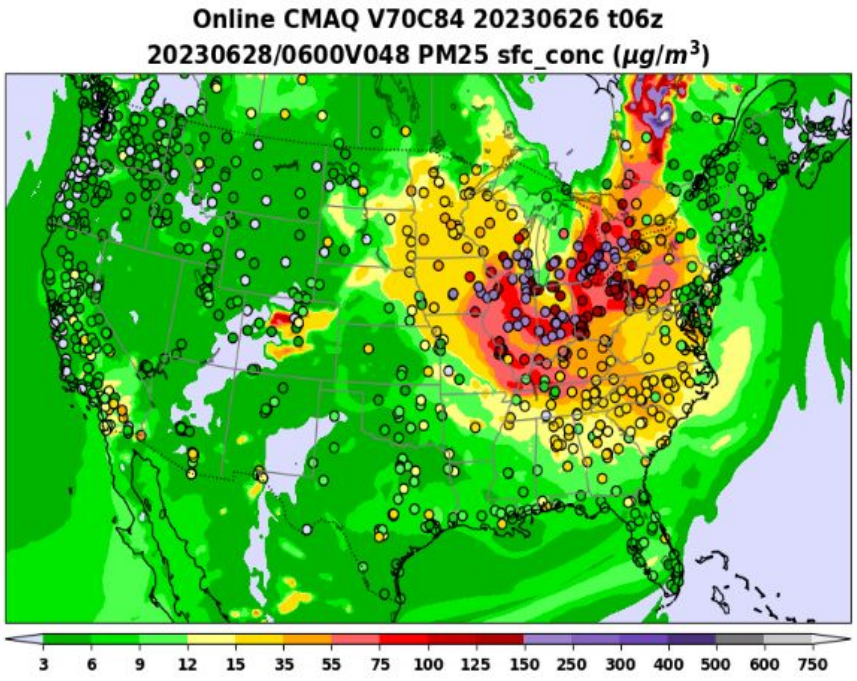




AQMv6 (left) vs AQMv7 (right) PM2.5 Forecast

Quebec wildfire events on June 26, 2023





[Figure provided by Jianping Huang]

NAQFC Upcoming Presentations

26th Conference on Atmospheric Chemistry

10B.5 Development of a Data-Driven Machine-Learning Based Aeolian Threshold Friction Velocity with Applications to the NOAA FENGSHA Dust Emission Model in the Rapid Refresh Forecast System with Smoke and Dust (RRFS-SD) and the National Air Quality Forecast Capability (NAQFC)
Barry Baker et al., Wednesday, January 31, 2024 11:45 AM - 12:00 PM 321/322 (The Baltimore Convention Center)

608 Impacts of the 2023 Canadian Fires on US Air Quality Simulated by NOAA UFS-AQM with Aerosol Data Assimilation
Youhua Tang et al., Wednesday, January 31, 2024 3:00 PM - 4:30 PM *Hall E (100 Level, The Baltimore Convention Center)*

23rd Joint Conference on the Applications of Air Pollution Meteorology with the A&WMA

1.1 Evaluation of NWS Operational Weather Model Planetary Boundary Layer Heightsusing the Unified Ceilometer Network
Jeffery McQueen et al., Monday, January 29, 2024 8:30 AM - 8:45 AM *316 (The Baltimore Convention Center)*

149 Gridded Post-Processing Air Quality Predictions based of the Community Multi-scale Air Quality (CMAQ) Model
Stefano Alessandrini et al., Monday, January 29, 2024 3:00 PM - 4:30 PM *Hall E (100 Level, The Baltimore Convention Center)*

11A.5 Breathing Better: On NOAA's Air Resources Laboratory Continuous Development of the National Air Quality Forecasting Capability
Barry Baker et al., Wednesday, January 31, 2024 2:45 PM - 3:00 PM *Holiday 5 (Second Floor, Hilton Baltimore Inner Harbor)*

12th Symposium on the Weather, Water, and Climate Enterprise

150 Evaluation of the NOAA National Air Quality Forecast Capability
James Hyunwoo Park, Monday, January 29, 2024 3:00 PM - 4:30 PM Hall E (100 Level, The Baltimore Convention Center)