What is the Future of Air Quality Forecasting in the U.S.?

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Outline of Discussion

• Current Status of AQ Forecasting in the U.S.
• The World Today – hyper local
  – Weather
  – Information
• So....What About?
  – Integrate modeling with city forecasts
  – Use gridded surface to apply forecasts to the community level
  – Day Part forecasting
• Messaging Challenges
• Future AirNow Forecast Submittal System Improvements
  – What is Needed?
• Forecasts are made for the maximum 8-hr average for ozone and the 24-hr average midnight to midnight Air Quality Index for PM2.5 and PM10 for major MSAs in the United States
  – Typically for cities with over 350k in population
  – Current and Next Day forecasts (some agencies forecasts out for longer periods)
  – PM2.5 and ozone (some agencies forecast for PM10 and other criteria pollutants)
  – Some areas constrained by state/local regulations (forecasting only for nonattainment areas for example)

• Forecasting is Voluntary
  – Agencies issue forecasts through their own platforms and submit their forecasts to AirNow via the Forecast Submittal System in AirNow-Tech (or via FTP/file)
  – May be inconsistencies with cities/areas between the states and AirNow

• The AirNow Forecast Submittal System built in early 2000’s
  – May be stifling normal innovation in forecasting due to the current structure of the application?
    ✓ Agency forecasting staff turnover and legacy AirNow forecasting system
• Most information is delivered to you based on your location (community level)
  – Data and information
  – Weather is all about local

• So can the air quality community be more community level oriented? If so how do we do this?
  – Should forecasts be more “community” friendly?
  – Does it make sense to break up a large MSA into smaller recognized communities or reporting areas?
  – Are state/local agencies ok with trying to broaden the scope/extent of the forecast areas?
  – Should AirNow extrapolate grid cells for smaller communities from the CONUS surface of the forecasts (the current forecast contour map)?
  – Should numerical models be a part of the national forecast map (a true blended data product)?
• Are numerical models good enough to integrate with your forecasts?
  – Many weather websites and TV meteorologists show weather information as it evolves throughout the day
    • Can the modeled hourly estimates be blended with your maximum AQI forecast to allow daypart information? (using NOAA, private, or in-house models)
    • Break up the AQI forecast into hour blocks for day part reporting (i.e., showing how ozone levels change throughout the day)?
  – Can major city/reporting areas be broken down into the community level with gridded surface?
  – S/L/T agencies flow one minute data to NOAA to improve models?
• Is machine learning robust enough as well?
• **Current Conditions vs. Forecasts**
  – Concentrations may be hard to understand for the public
  – How has EPA’s Nowcast impacted the forecasts?
    ✓ showing hourly AQI information while the forecast is for the maximum 8-hr ozone or a 24-hr average for PM
  – How can we better communicate the forecast and hourly air quality conditions to the media and public?

• **Sensors, Sensors Everywhere – more pollutants**
  – With more small sensors coming to the marketplace measuring more pollutants, are agencies looking into forecasting more pollutants?
    ✓ SO2, CO, NOx

• **The Forecast Discussion box**
  – Can agencies utilize more to communicate air quality changes, patterns, trends during the day?
  – Are there hurdles/constraints to this?
• FSS application designed and implemented in early 2000’s
  – Need to update and make mobile friendly like new airnow.gov website
• Numerical model incorporation
  – Are there other models besides NOAA that we need to bring in?
  – Can we utilize/incorporate the model better in the user interface?
• User design – make it easier to submit forecasts and not over burden the forecaster
  – More visual aids/tools?
• City relationships
  – Assign multiple suburbs, neighboring cities to larger MSA if the forecast would be the same (to facilitate adding more reporting areas/communities)
• Other thoughts/ideas?
• IF we ever get the resources to improve this application – we will actively seek out help in the design/features!
Some Ideas - NWS Gridded Forecast editor

- Allow editing to boundaries of reporting areas or forecast data assimilation itself

Forecast Submittal System
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