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

John E. White and Phil Dickerson, U.S. EPA Office of Air Quality Planning and Standards
Marcus Hylton and Alan Chan, Sonoma Technology, Inc.

National Air Quality Conference
January 25th, 2018

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?***

Current Status of AQ Forecasting

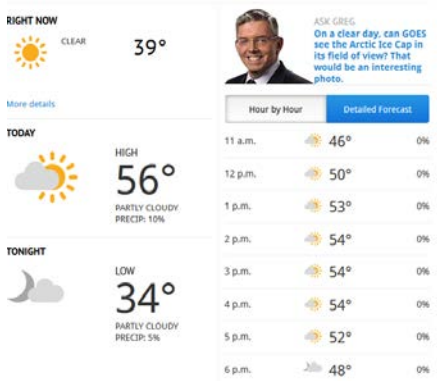
- **Forecasts are made for the maximum 8-hr average for ozone and the 24-hr average midnight to midnight Air Quality Index for PM2.5 and PM10 for major MSAs in the United States**
  - *Typically* for cities with over 350k in population
  - Current and Next Day forecasts (some agencies forecasts out for 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

The World Today – Hyper Local

- **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?

- **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?**



Messaging (can be challenging)

- **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?

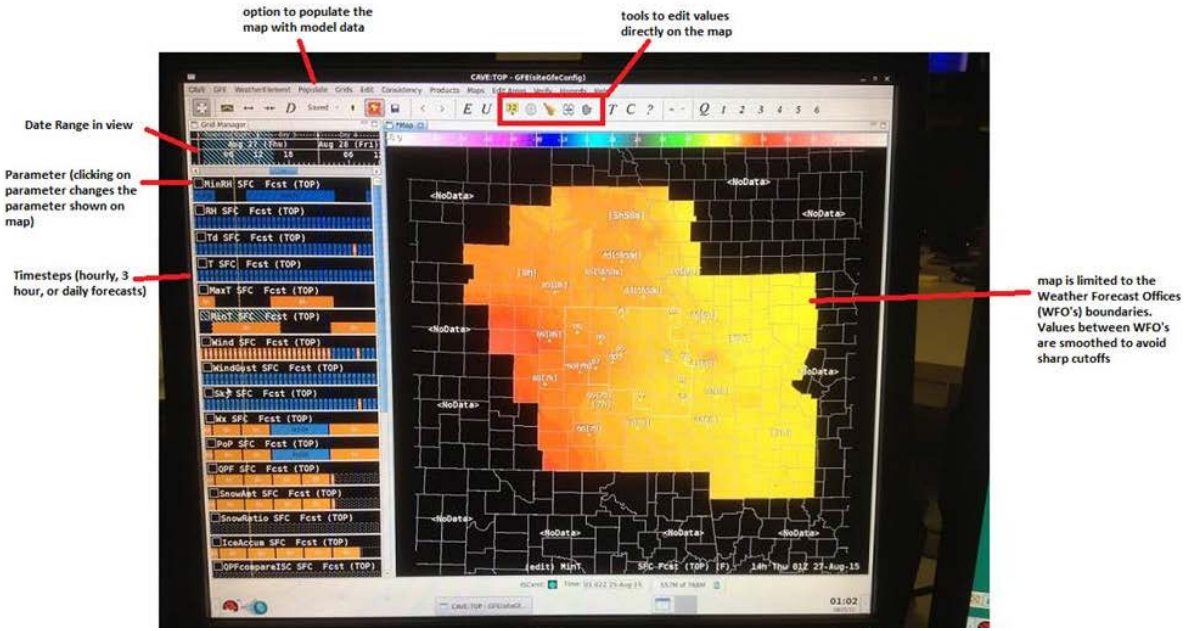
Forecast Submittal System

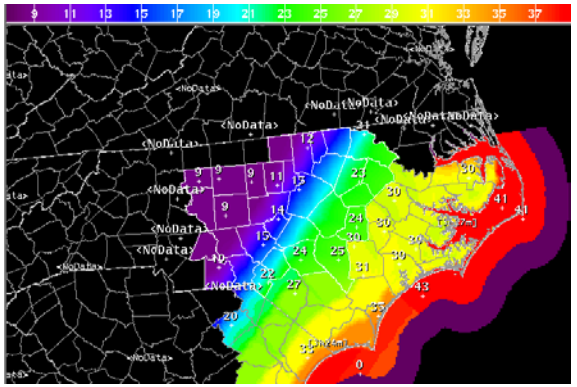
- **FSS application designed and implemented in early 2000's**
  - Need to update and make mobile friendly like new airnow.gov website
- **Numerical model incorporation**
  - Are there other models besides NOAA that we need to bring in?
  - Can we utilize/incorporate the model better in the user interface?
- **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!**

Forecast Submittal System

Some Ideas - NWS Gridded Forecast editor

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





Contacts

John E. White
white.johne@epa.gov

Phil Dickerson
dickerson.phil@epa.gov

AirNow Data Management Center
AirNowInfo@sonomatech.com

Sonoma Technology, Inc.