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?***

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

- **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?**
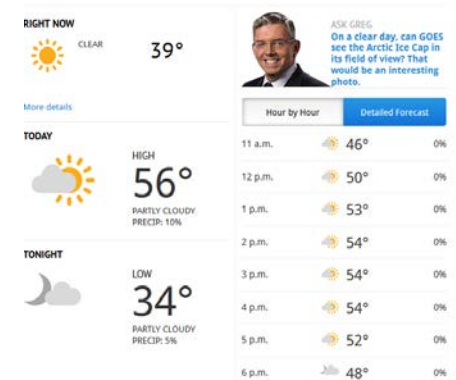
Messaging (can be challenging)

- **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!**

Some Ideas - NWS Gridded Forecast editor

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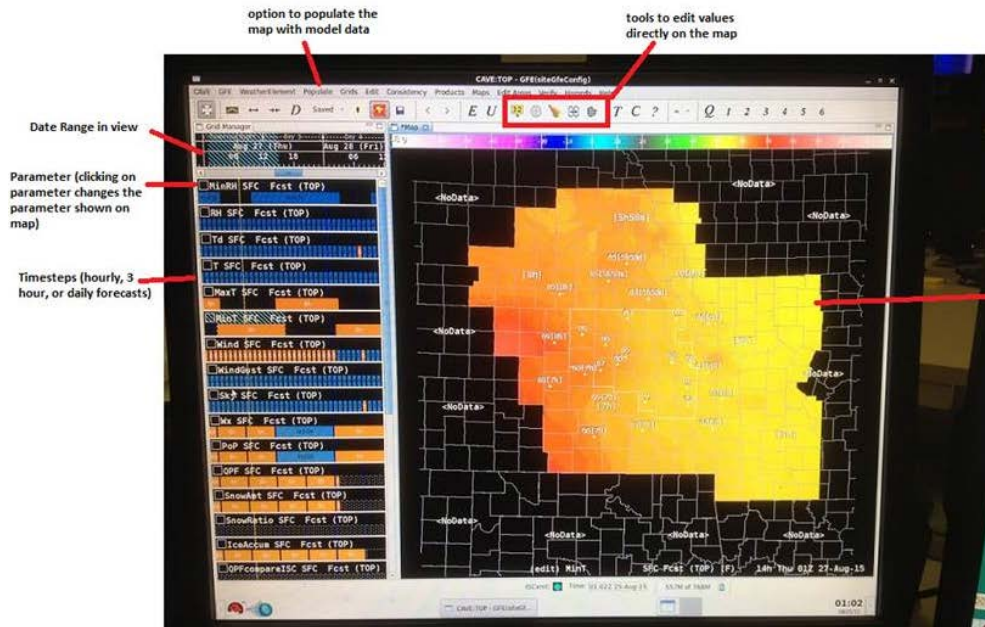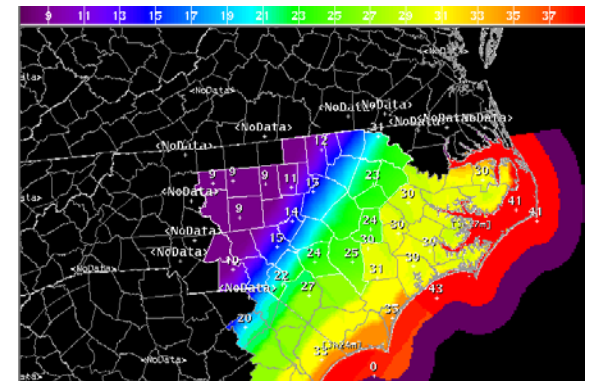
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