

Guidance for submitting an EE report

- Are you ready for an exception event?
 - May 25, 2016 NE Ozone event
 - Sept 6, 2017 NW really high ozone event
 - Sept 1 and 2, 2017 SW ozone event
- Do you really need to do this?
 - EPA has some advice about what you need to know
 - Does it affect your designation—attainment/nonattainment
 - Clean air act deadline, clean air determinations, SIP issues
 - Those ‘bullets’ help you decide if this affects you
 - Attainment status for Connecticut changed
 - If you excluded the exceptional event
- Lots of EPA guidance documentation on how to ID and treat EE’s
- You need:
 - A conceptual model describing the event
 - A demonstration that the event happened
 - Analyses comparing the claimed event-influenced concentrations
 - Demonstrate it wasn’t controllable or preventable
 - Caused by human activity unlikely to reoccur or a natural event
- Tail of tiers
 - Tier 1: clearly influence exceedances
 - Tier 2: less evidence
 - Tier 3: does not fall into those requirements, need all the evidence you can get
- Sept 6, 2017
 - Lots of monitors on AirNow
 - All showing big problems, Tier 1
- May 25, 2016
 - Tier 3
- Are your Q’s and D’s in order?
 - How much NOx and VOC came off the fires
 - Take the ratio of Q/d
 - This is required for Tier 2
 - Fairly straightforward
 - Distance from the fire important, the further away, the smaller the ratio
 - Kept the event described from being Tier 2
- Lots of tools available for weight analysis
- CALIPSO
 - Pick your day
 - Narrow swath
 - Showed a low level plume, was useful in this case
- Worldview
 - Showed a pretty big plume
- Aerosol watch (every 15 minutes)
 - GOES 16 & AirNow
 - really helpful for an EE
- 2016 For McMurray, Alberta wildfire
 - Some aerial photos (from planes)

- MODIS/VIIRS Satellite with AOD estimations
 - Showed daily movement of plume
- Shared links to CT DEEP EE documents
- NOAA Aerosol watch Aug. 18, 2018
 - When he added AOD you could really see the most intense part of the plume, but AOD treated it as clouds—so that’s a limitation. No accurate PM measurements/calculations
- EPA RSIG
- TROPOMI NO2 available since July 2018
 - Tropospheric ozone (supposedly)—a difficult thing to get
 - You can use Open Access Hub for TROPOMI retrieval
 - Use panoply to display satellite data
- Feb 4
- RSIG for TROPOMI NO2 retrievals
 - Shows clearly where the NO2 levels are elevated
- GCAS NO2 flyover animation (LISTOS)
 - To show where the sources are using stacks
 - 3D visualization
 - Using ArcGIS (ArcGlobe)
 - Overlaid with satellite imagery
 - Are mobile sources truly 50% of their emissions? Not seeing that yet
- OMI Satellite animation NO2 trend
 - Animation created by NASA Goddard shows decrease 05-16
 - Comparison with point sources maps (proportional symbols to represent EGU reported NOx emissions)
- Challenge: rapidly changing NOx levels in NYC area
- Suggestions
 - Integration of all satellites on one application
 - RSIG needs more tropomi and wind vector
 - Looking forward to TEMPO
- Q&A/Discussion
 - NOx emissions in TX
 - Average different time periods for different goals—be very careful how you use the data

Health and AQ Applications

- 2017 NAS Decadal Survey
 - One of the missions had to do with aerosols
 - Take in inputs from whole community
 - 290 questions filtered to 35
 - AQ listed 3rd
 - Lots of discussion of benefits of satellite data for society in many applications
 - Charged NASA with working on this
- NASA Study plans
 - Aerosols and Cloud Convection Precipitation Study
 - Designing implementation, at the stage where feedback is important from the community
- A +CCP
 - \$1.6 bil sounds like a lot but they need more than that
 - Active sensors and passive riometers

- Will have a larger swatch and more information about clouds
- Space based mission but will also include aircraft and models and simulation to improve algorithms and get the most benefit
- Aerosol Attribution
 - AQ forecasting and decision-making
 - Relevant geophysical properties
- Wildfires will be an emphasis because of the potential to provide useful speciation and context
- How do you use aerosol satellite data and how would you like to see it improved?
 - Important that air quality practitioners get involved at this stage when their input can shape the data production

TEMPO Space-borne and TOLNet Ground Based observations for AQ science and applications

- TEMPO can provide high resolution data for small areas in CONUS
 - Similar to Sentinel-4 and GEMS
 - S America, Africa and Australia not covered
 - TEMPO hourly NO₂ sweep
 - Much higher spatial res than predecessors
 - NO₂, HCHO and O₃
 - 6 science questions drove the development of TEMPO
 - Variations in emissions, processes, pollution and climate, feedbacks, AQ assessments and forecasts, intercont. Transport, episodic events
 - Invitation to send in (nothing formal) one-page proposal about what you'd like to look at with TEMPO
 - Examples
 - TEMPO synthetic observations
 - RSIG
 - For subsetting, visualization, and product distribution—to make TEMPO more accessible without a PhD
 - Tempo.si.edu
 - Can read the green paper, can contribute to it
 - Can use the instrument to look at whatever you want if you work with the TEMPO team
 - SPoRT
 - Been used for weather for 15 yrs
 - Example
 - Exceptional event in SW CONUS
 - There's a plant to work on problems specific to these regions
 - Traffic, biomass burning
 - You can look at every hour, which will allow for separate analysis in morning, afternoon, evening, night
 - NO_x studies
 - Lightning, soil
 - Halogens
 - Not EPA criteria gas, but interesting
 - Spectral indicators
 - AQ and health
 - Clouds and aerosols
 - Will be next to GOES, provide similar stuff
 - The bad news

- You will not see the very lowest ground-level air, which of course is what you want. This will not replace EPA ground monitor data.
- TOLNet
 - Tropospheric ozone LIDAR network
 - UAH Ground-based O3 lidar
 - There are things you cannot get from a satellite that you can get from a ground-based lidar
- The combination of different sources of information allow you to piece together a well-rounded image of what's going on, what's causing changes in tropospheric ozone, etc.
- Examples of use of these instruments at different locations and in different situations
 - Hart-miller island vs. UMBC
 - SCOOP
 - LISTOS
 - Long island sound, aircraft simulator
 - SE wildfire impacts//agriculture fires
- Conclusion
 - Synergy of space-born sensors with ground based and aircraft lidars has the potential to paint a more complete picture than any tool used alone
 - TOLNet science team and TEMPO science team can work together

Q&A/Discussion

- South Coast—operationalizing TEMPO—will they lose measurements a quarter of the time due to other projects requiring attention elsewhere?
 - TEMPO does not provide standard operational data, you cannot depend on it because NASA does not have the same obligations as NWS
- Quick look data?
 - Not available?
- Is there another/back up TEMPO?
 - TEMPO is the same instrument as GEMS
 - If there is a launch failure, there's no back up
- Early adopters—test run dataset (not actual data, just sample data) for 2013 all year
 - No charge, just ask to become one
- Any initiative to track infrared gases?
 - Not on this mission but there is another, and a couple non-NASA missions, and also TROPOMI
- Mike—How much more quickly could you perform the same EE analysis a second time using the framework you built?
 - Less than half the time, maybe a quarter

Wrap up

- Going to try to get a work group together so the states can have a website to contribute to
- Town hall at AMS meeting Boston January 2020 early adopters meeting
- Going to form an A+CCP early adopters group, EE and wildfires will be a main group of users