GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

TEMPO/GeoXO for Georgia EPD's Air Quality Management

Byeong-Uk Kim, Xiangyu Jiang, and Asher Mouat
Data and Modeling Unit
Planning and Support Program
Georgia EPD - Air Protection Branch

TEMPO/GeoXO ACX Joint Science Team Workshop
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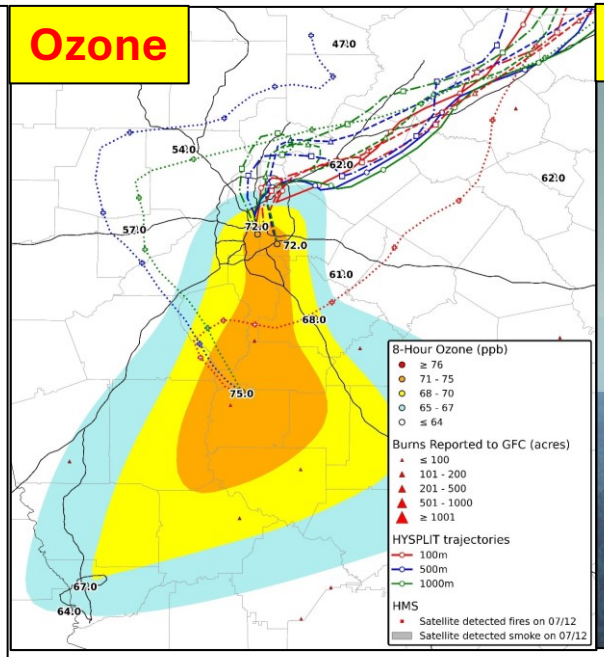
Regulatory Requirements and Georgia EPD's Mission

- National Ambient Air Quality Standards (NAAQS) and Regional Haze Rule (RHR)
- State Implementation Plans (SIPs)
  - Plans to comply with NAAQS and RHR
- Georgia EPD's Mission
  - These regulatory requirements are necessary to protect public health and ecosystem.
  - Consequently, meeting these requirements following the Clean Air Act is the most critical mission for Georgia EPD.
    - **An Exceptional Event Demonstration is a regulatory tool for air agencies to remove "uncontrollable" events to show compliance with the NAAQS.**

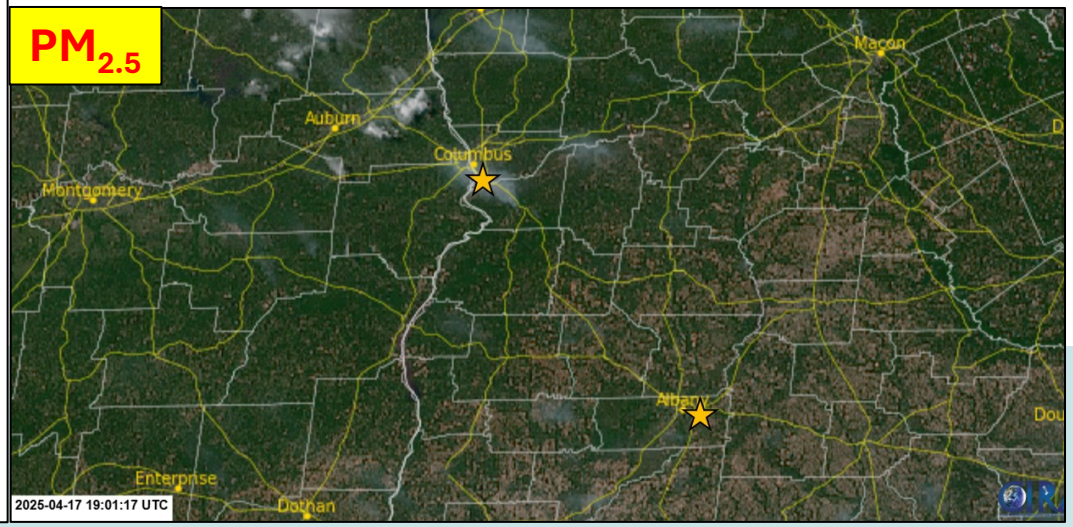
Ozone



Regional Haze

"Natural" visibility conditions by 2064

$PM_{2.5}$



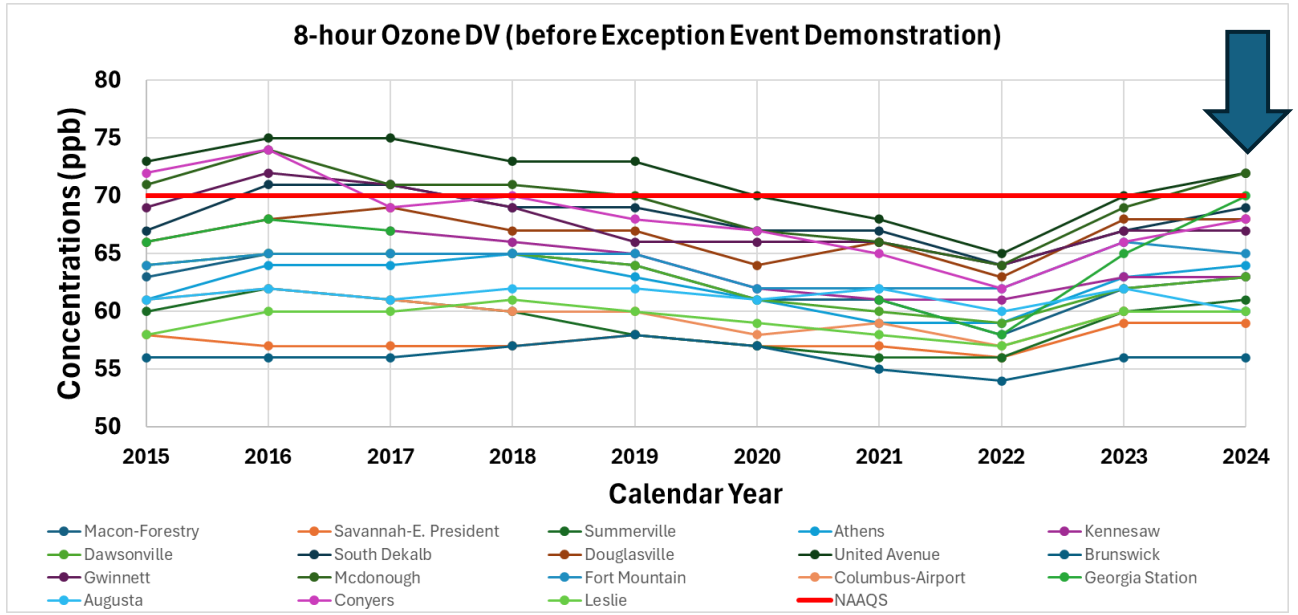
National Ambient Air Quality Standard (NAAQS)

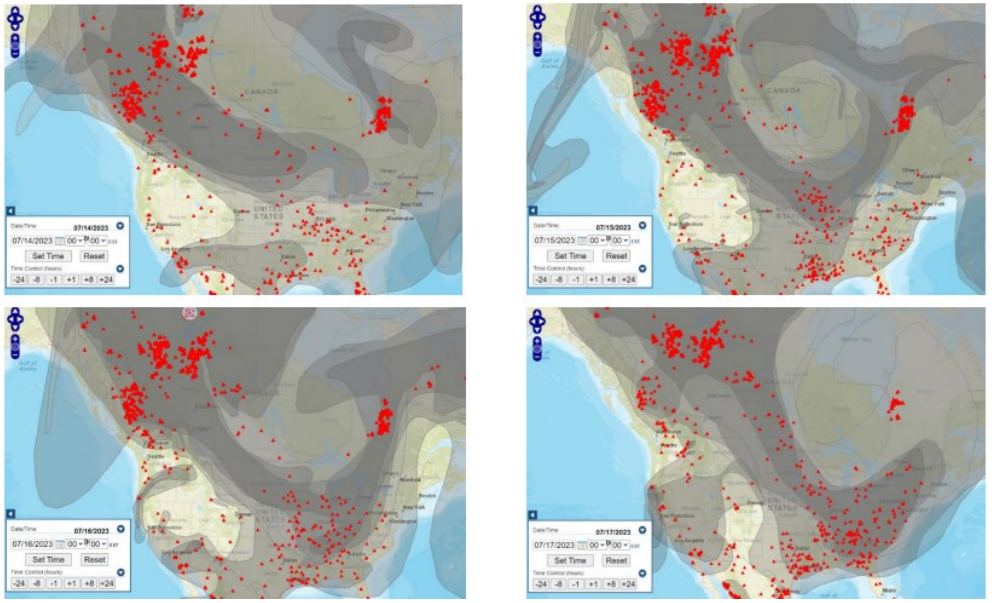
- National Ambient Air Quality Standards
  - Primary (Health Based)
  - Secondary (Welfare Based)
- Four Basic Elements of all NAAQS (e.g., O_3)
  - Indicator (e.g., O_3 for photochemical oxidants)
  - Averaging time (e.g., 8-hour average)
  - Form (e.g., annual 4th highest daily maximum averaged over 3 years)
  - Level (e.g., 70 ppb)
- Design Value (DV)
  - Calculated "level" of an indicator with measured concentrations (FRM/FEM only)
  - To be compared with the corresponding NAAQS level
  - Following the averaging time and form of the corresponding NAAQS
  - **DV is the ultimate index to determine future compliance with NAAQS.**

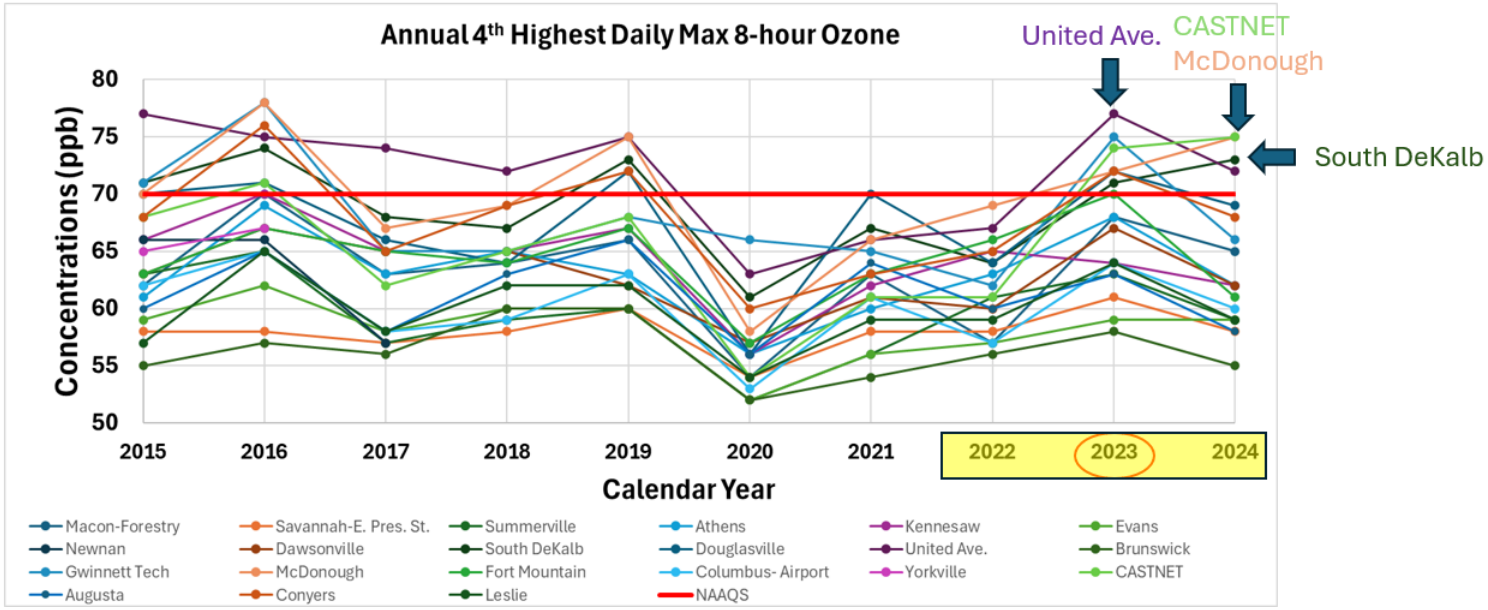
Pollutant [links to historical tables of NAAQS reviews]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 µg/m^3 (1)	maximum arithmetic mean of 3 consecutive monthly means in a 3-year period
Nitrogen Dioxide (NO_2)		primary	1 hour	100 ppb	Annual 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O_3)		primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	9.0 µg/m^3	annual mean, averaged over 3 years
		secondary	1 year	15.0 µg/m^3	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		primary	1 hour	75 ppb (4)	Annual 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	1 year	10 ppb	annual mean, averaged over 3 years

Satellite products that can be used to provide DVs with/without exceptional events will be helpful.

Ozone Air Quality Trends in Georgia



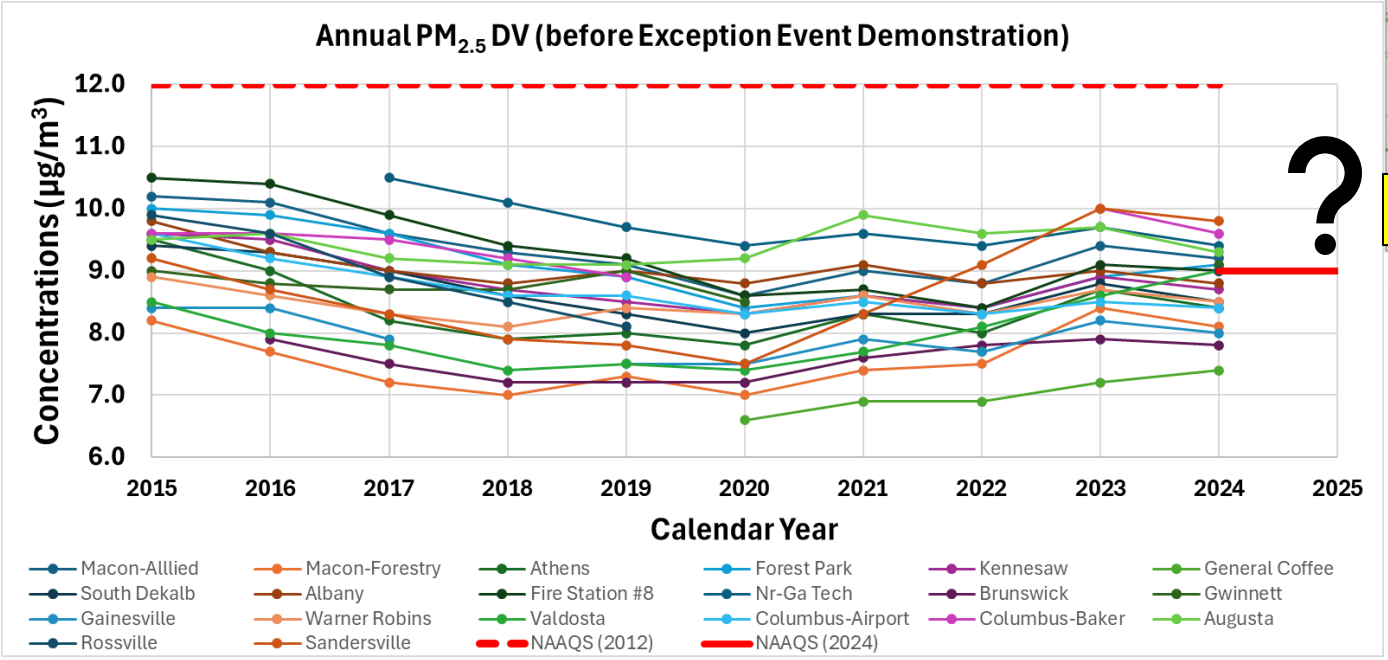


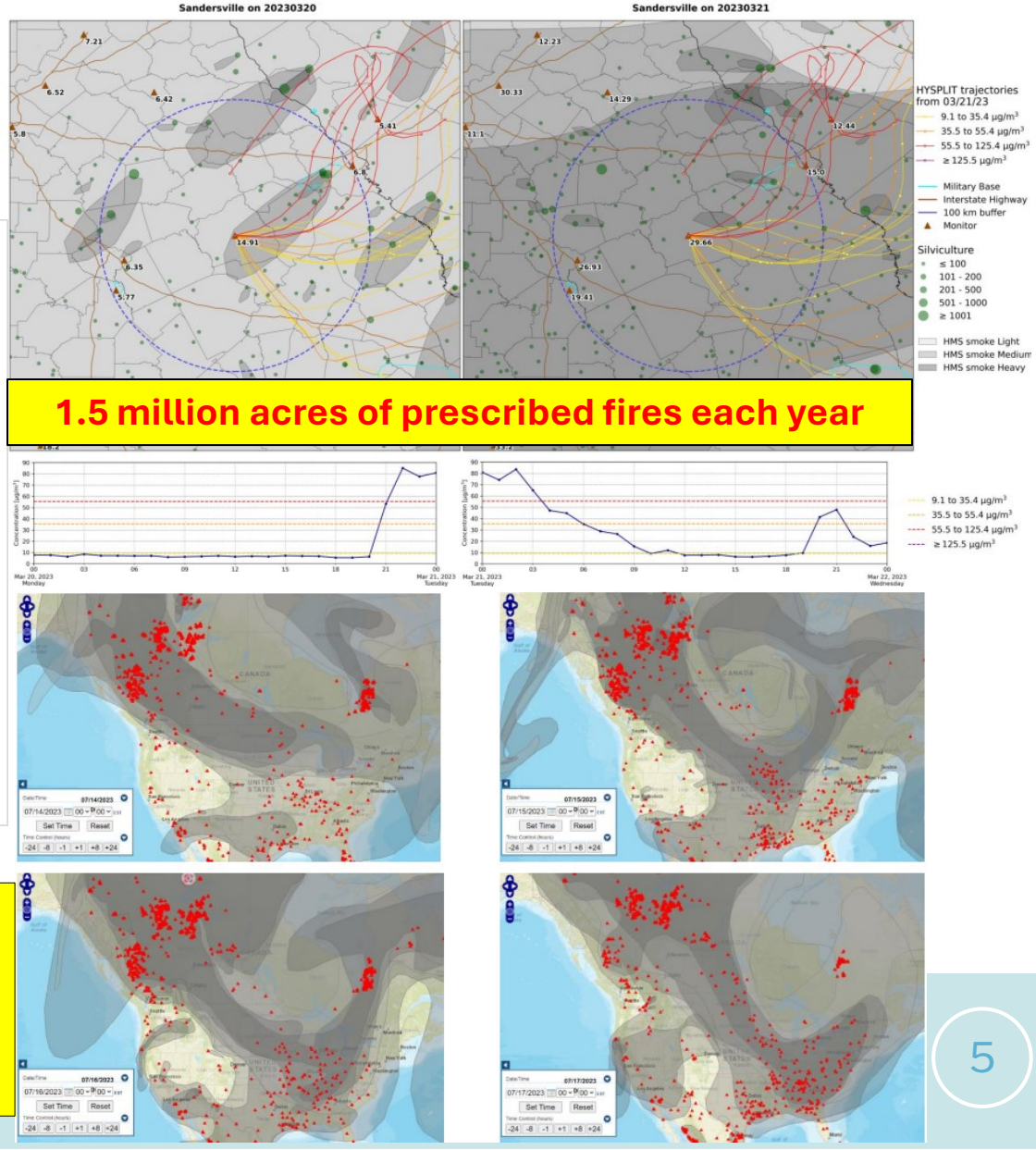


For 2023, many ozone sites including the Metro Atlanta area ozone sites seemed to have been influenced by Canadian Wildfires.

Therefore, Georgia EPD plans to develop and submit Exceptional Event Demonstrations for ozone.

$PM_{2.5}$ Air Quality Trends in Georgia

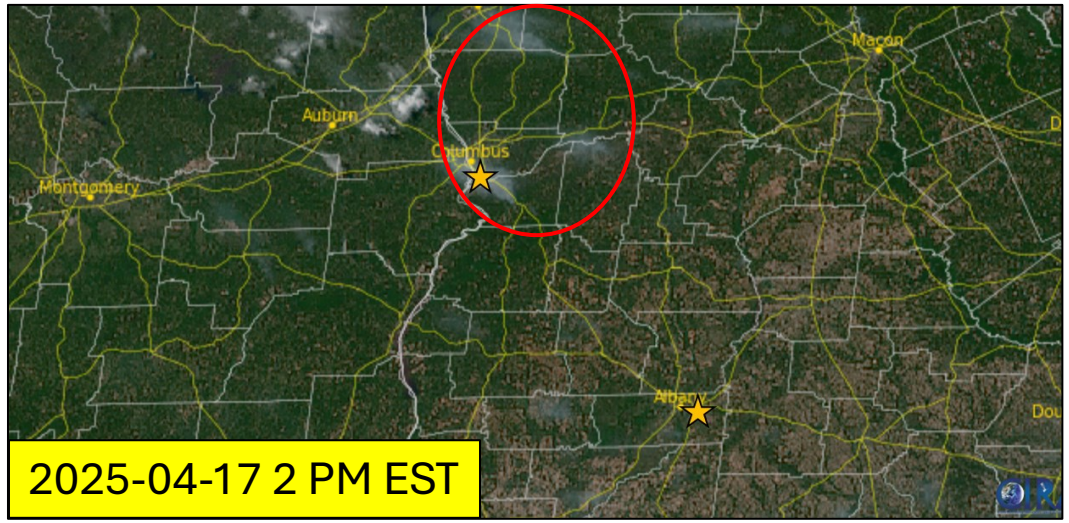


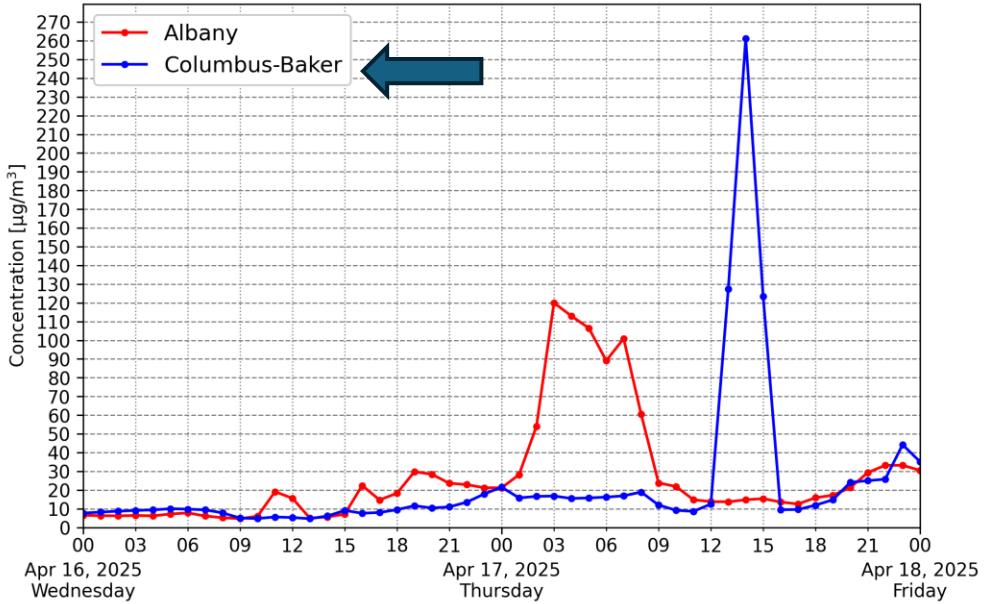


Georgia EPD submitted Exceptional Event Demonstrations for 104 event days for the 2024 annual $PM_{2.5}$ NAAQS.

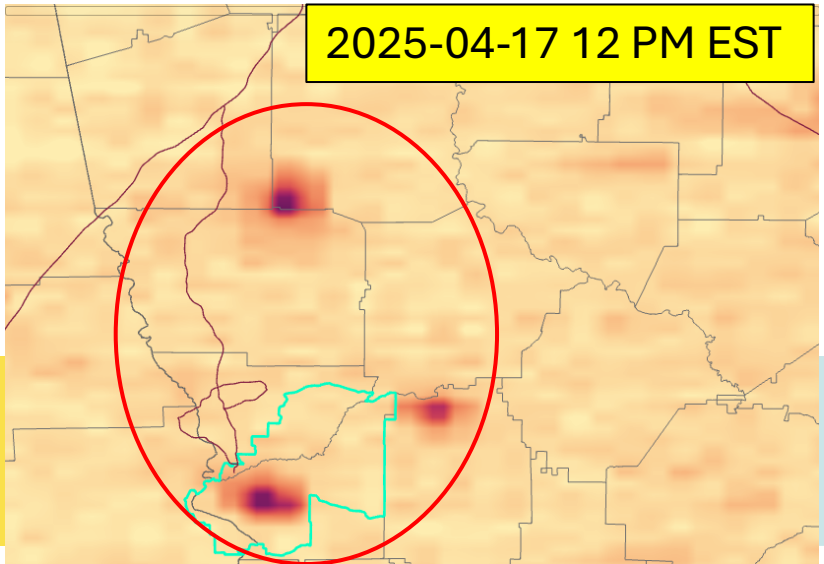
Use of TEMPO Data in Georgia EPD: Exceedance Reports

GOES19 via RAMMB-SLIDER





TEMPO via ArcGIS



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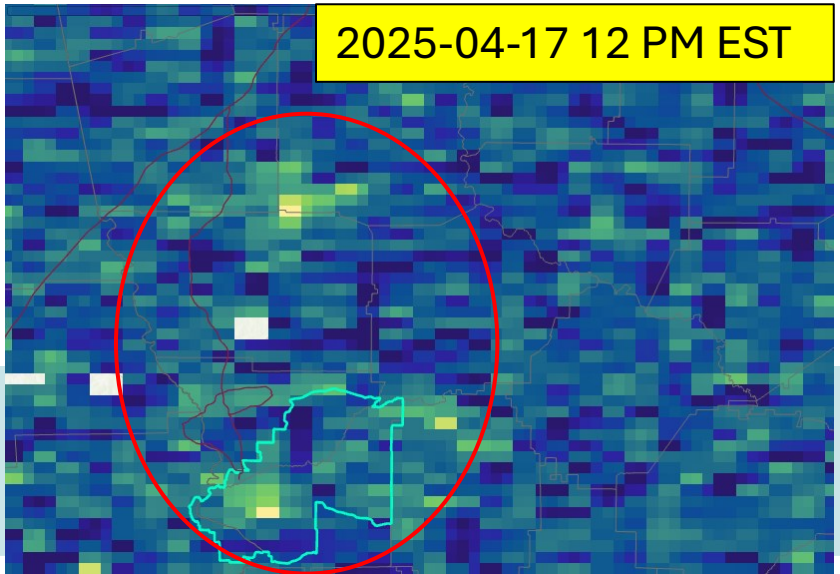
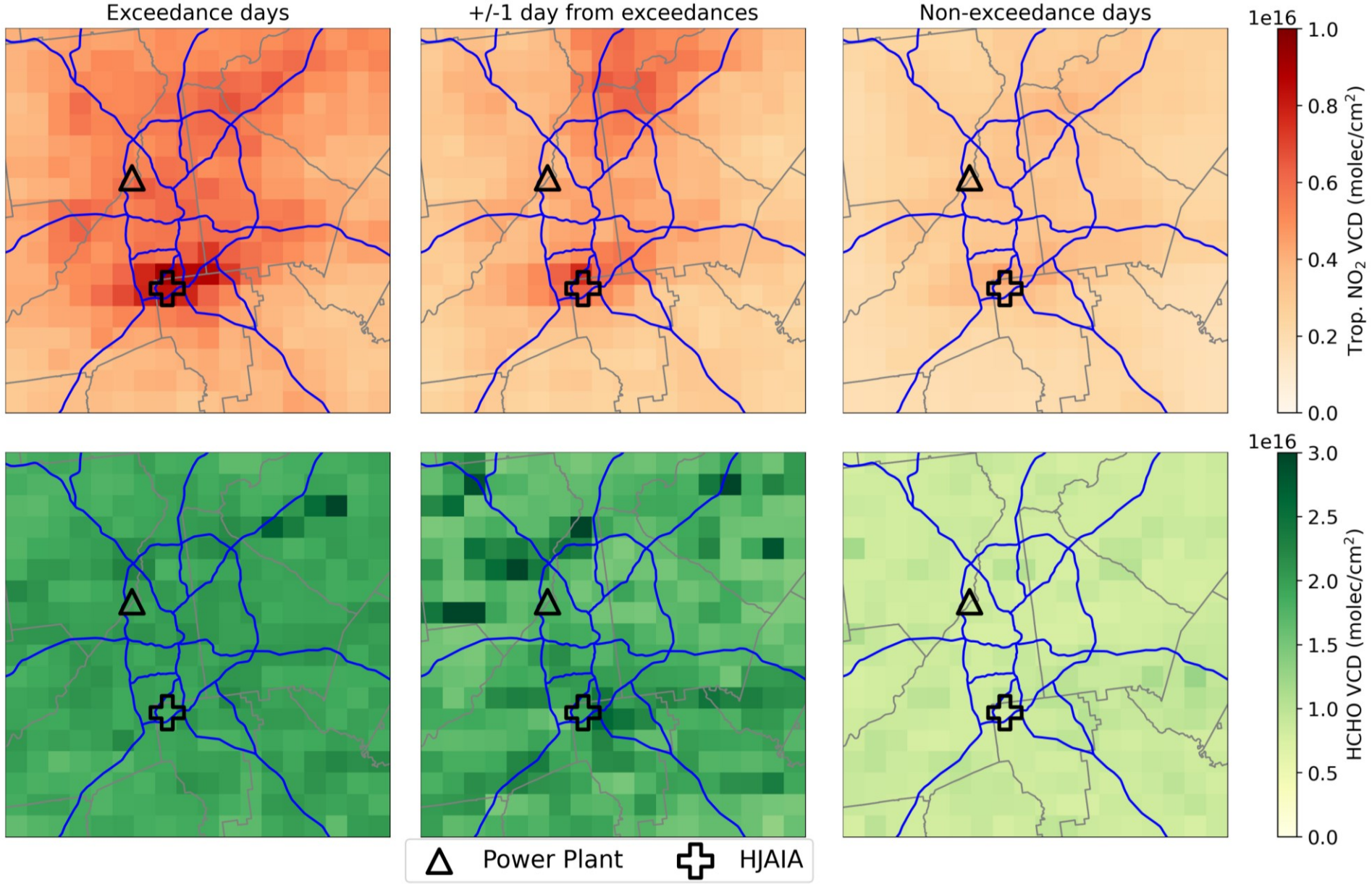
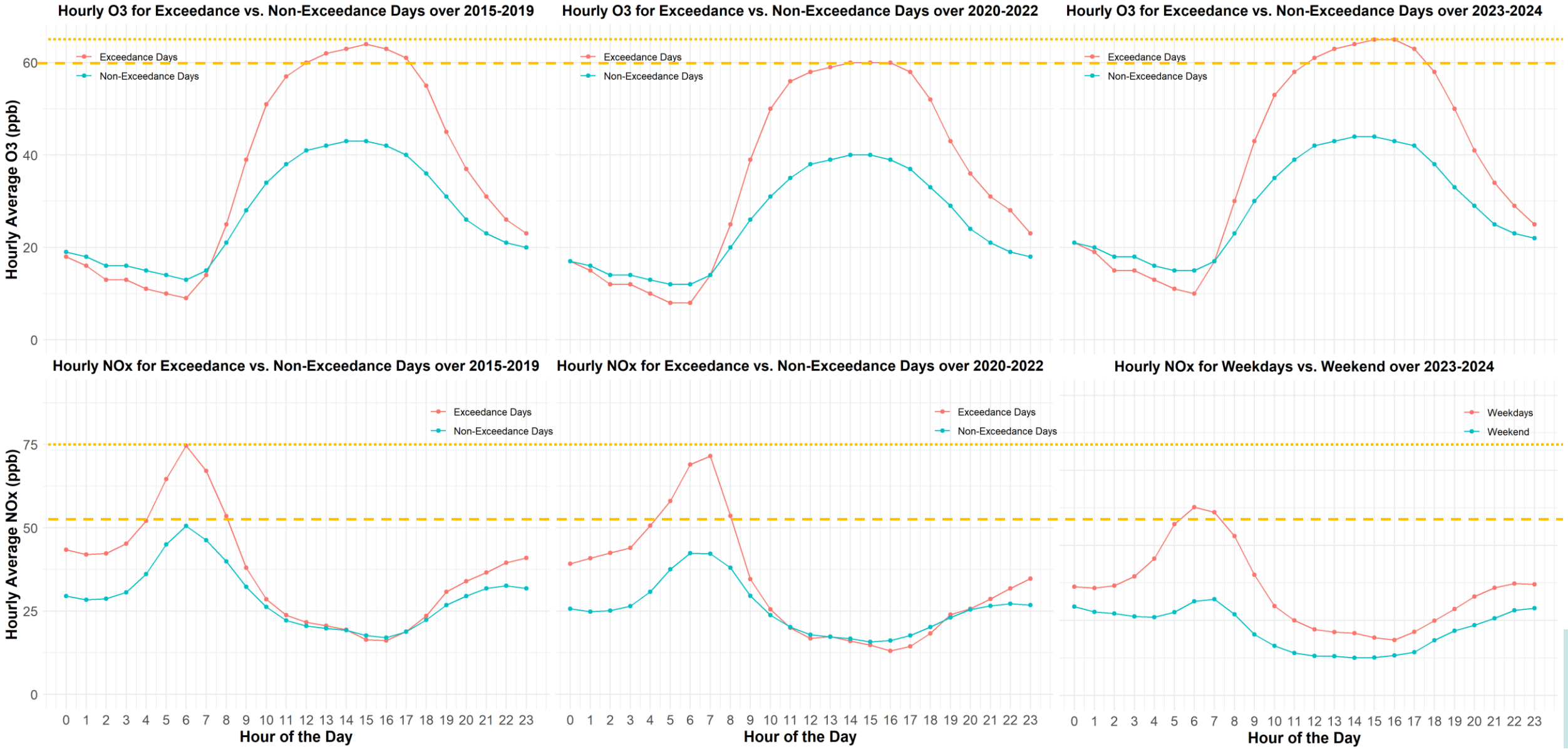


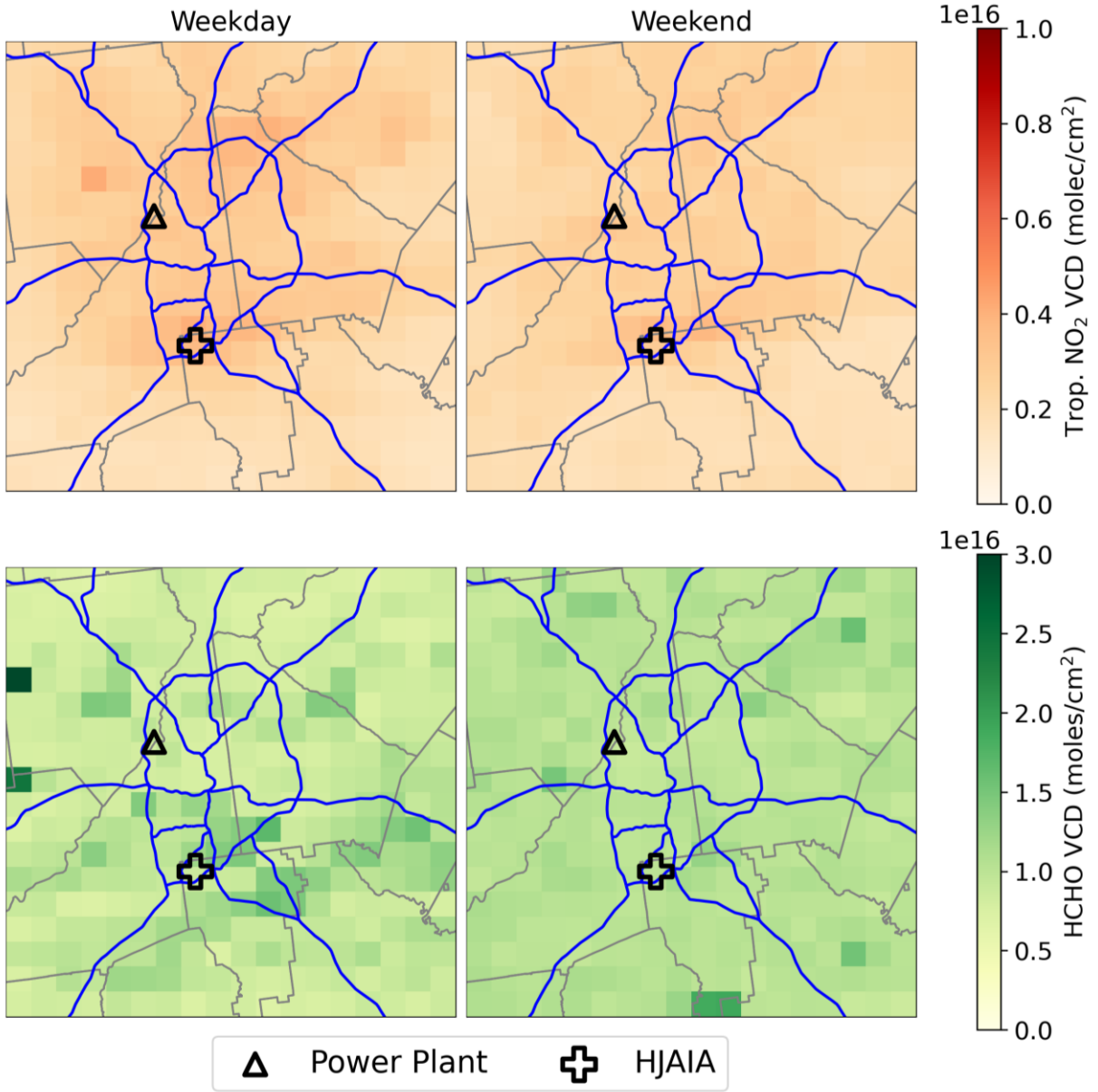
NO_2 and HCHO VCDs: Exceedance vs non-Exceedance March-October 2024 (9 AM-7 PM EST)



Diurnal O_3 and NO_X: Exceedance vs Non-exceedance March-October during pre-COVID, COVID, and post-COVID



NO_2 and HCHO VCDs: Weekdays vs Weekends March-October 2024 (9 AM-7 PM EST)



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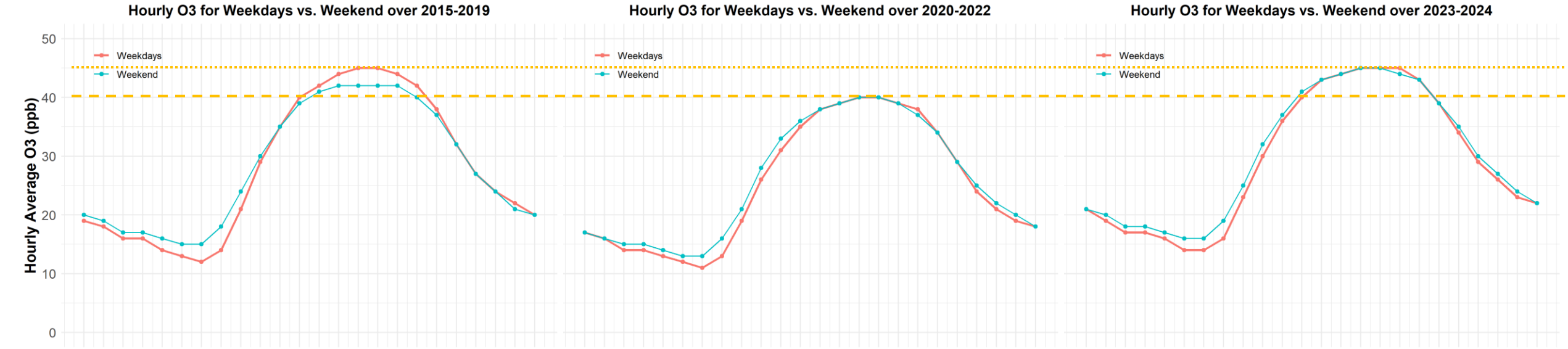
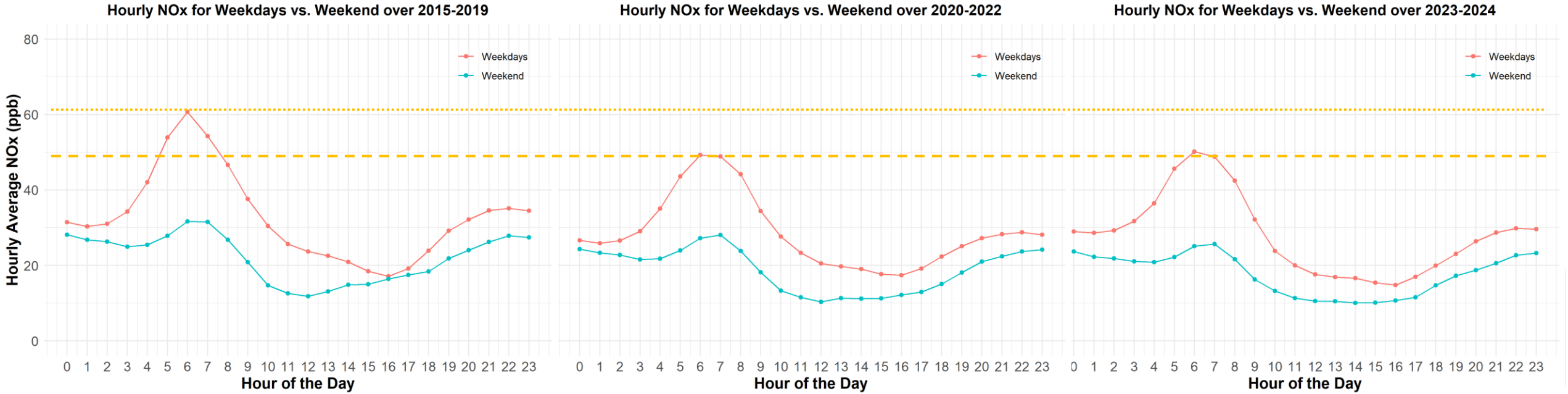
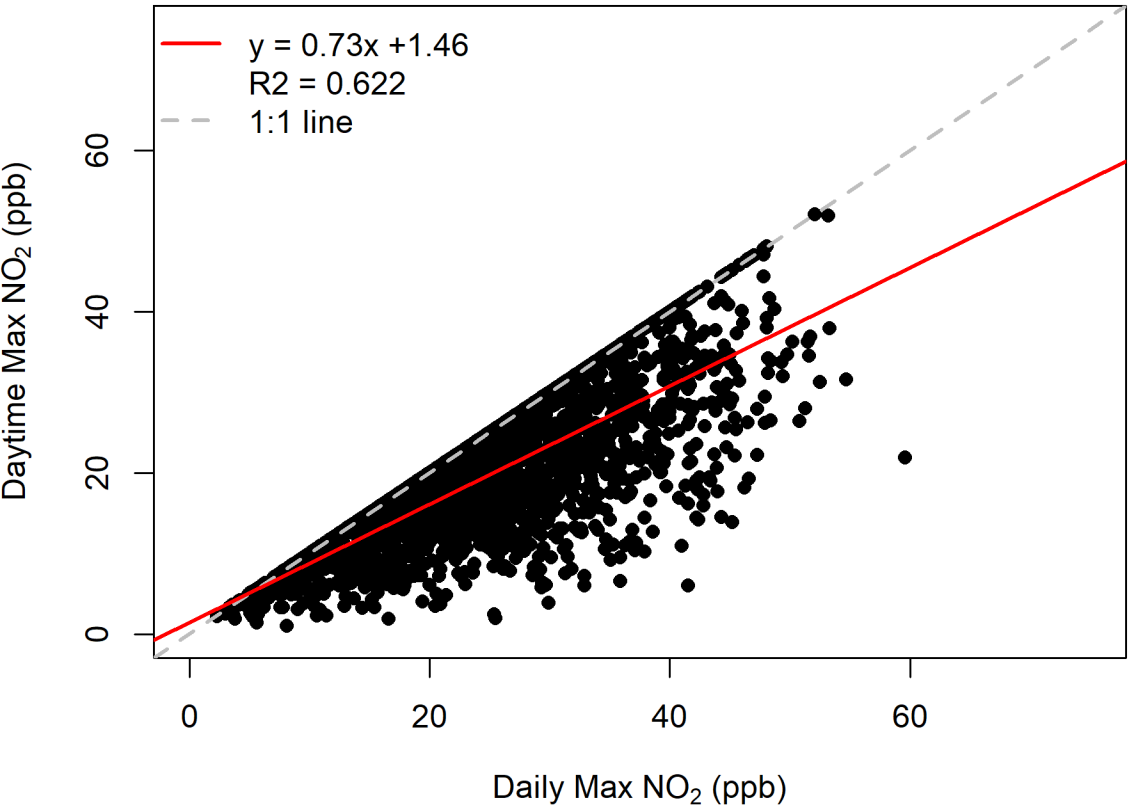




Need for Ground Level NO_2 Data in Rural Area

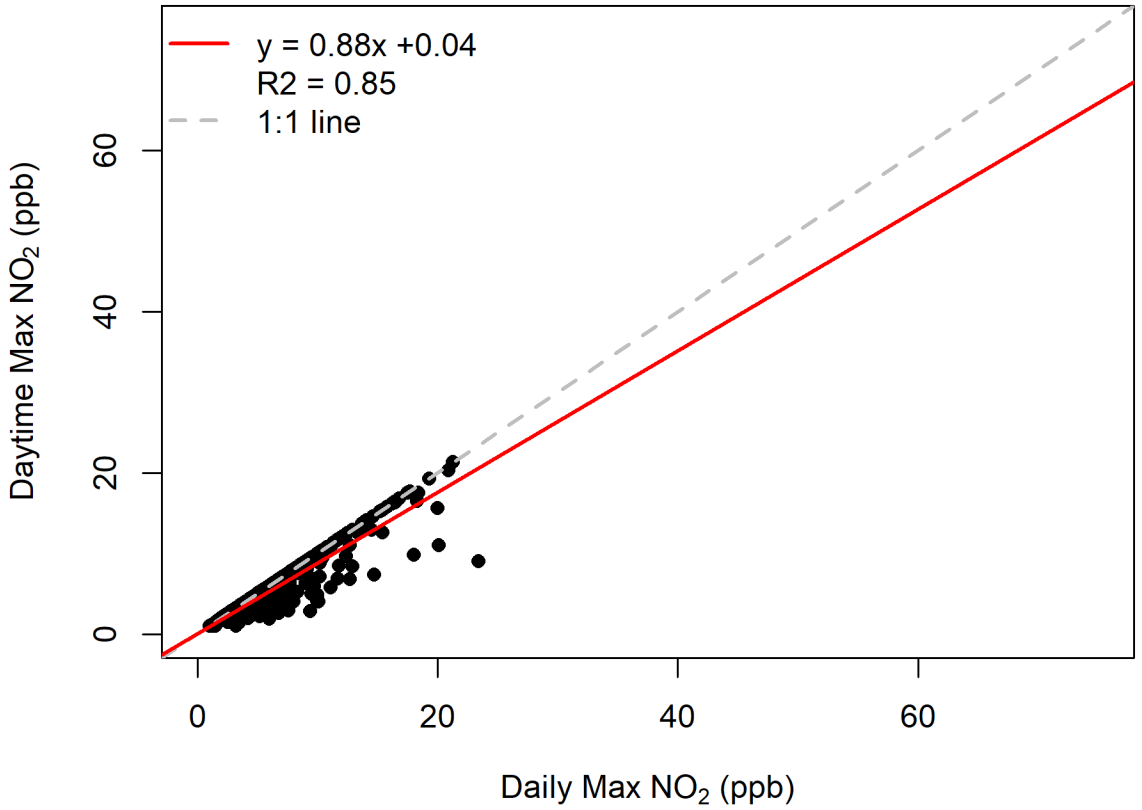
All Active Urban NO_2 Sites

Daily vs. Daytime Max hourly NO_2 at All NO2 sites over 2023-2024



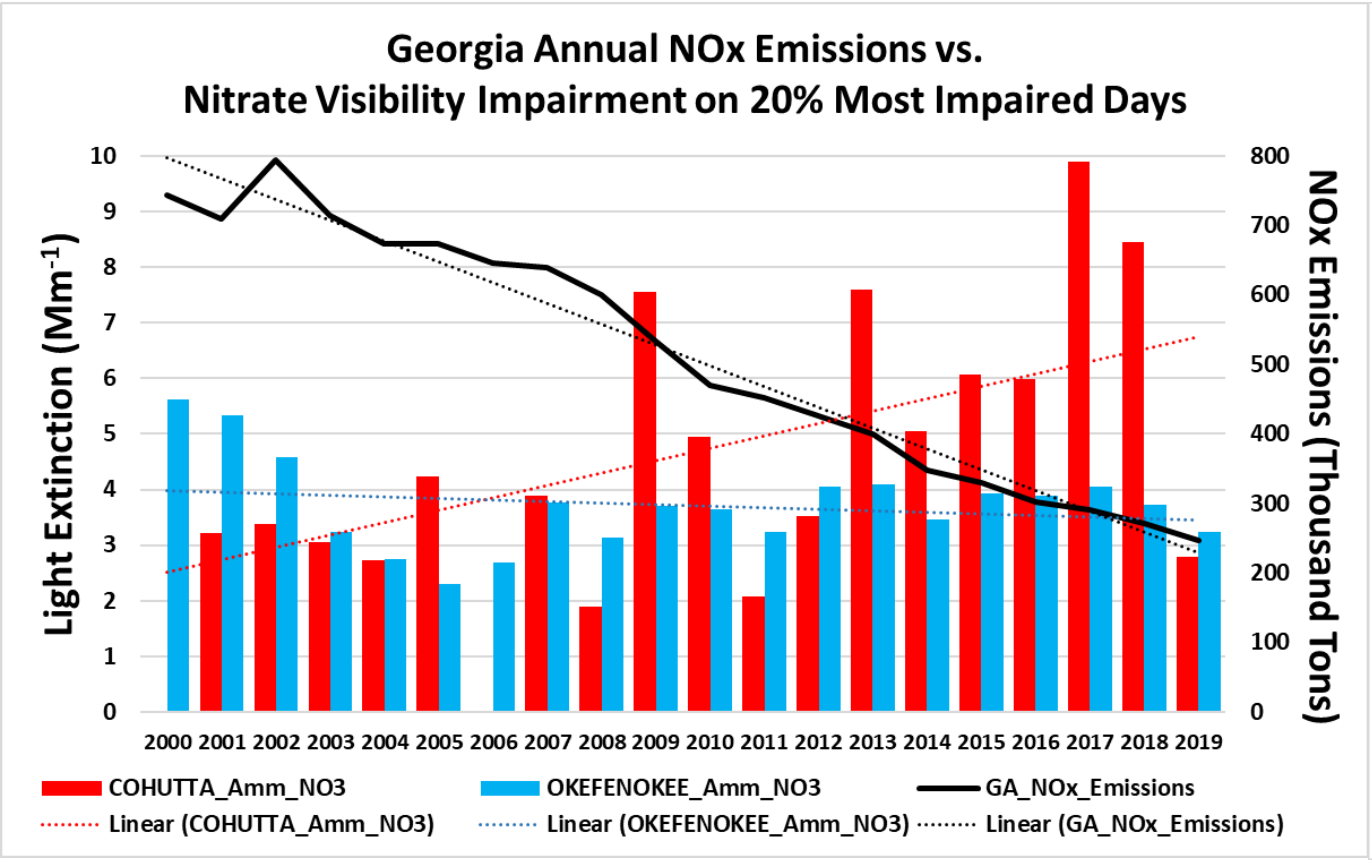
Discontinued Rural NO_2 Site

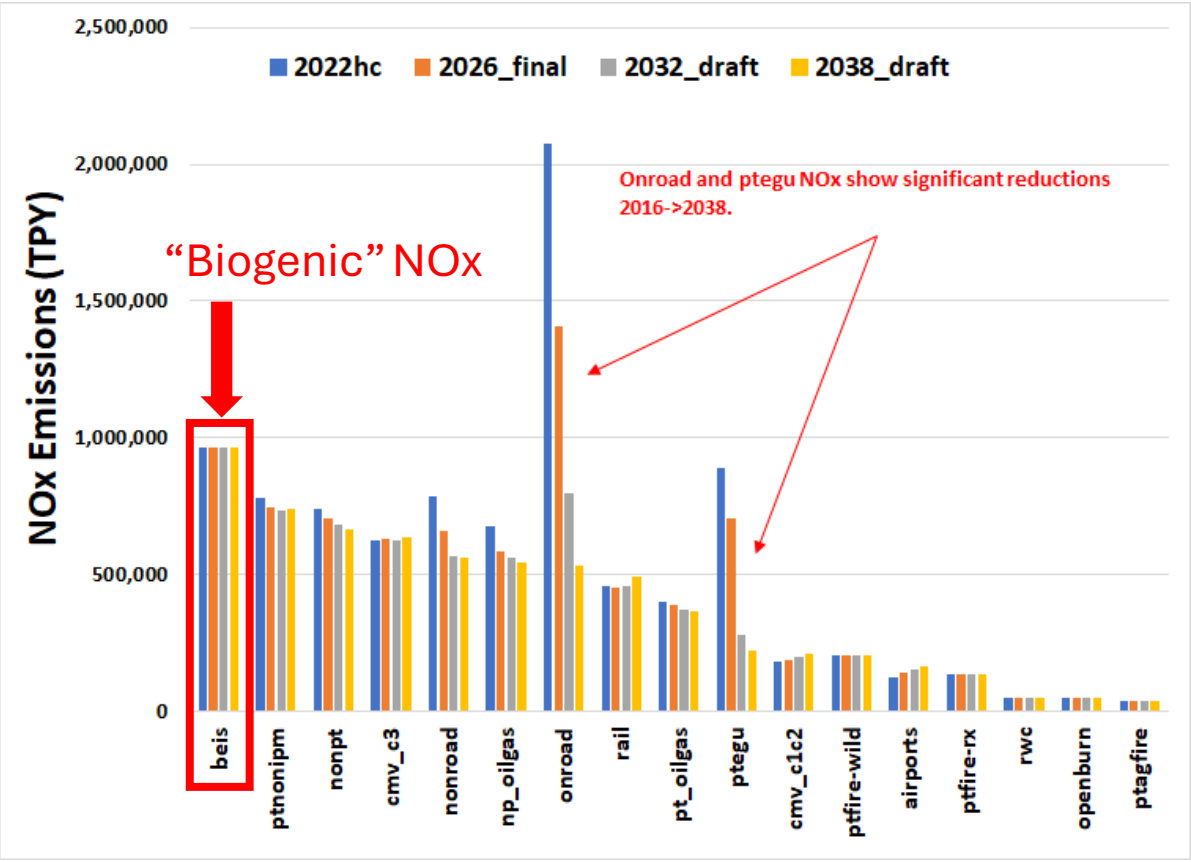
Daily vs. Daytime Max hourly NO_2 at site 132470001 over 2015



Can max daytime 1-hour NO_2 be a good proxy for max daily 1-hour NO_2? Max daily 1-hour NO_2 is needed for "background concentrations" during NAAQS analysis in PSD permit modeling.

Nitrate vs. NO_x Emissions





IMPROVE Steering Committee is in the process of cutting operating costs for the network in the coming months.

Summary

- Satellite products providing DVs with/without exceptional events will be helpful for air agencies to comply with NAAQS and to focus on "controllable" emissions.

- Georgia EPD uses TEMPO data for various air quality analysis:
  - Investigating causal-relationships between $PM_{2.5}$ exceedances and fires (both prescribed fires and wildfires)
  - Understanding cause of high ozone events
    - Ozone formation regime (i.e., NOx vs VOC): Post-COVID
      - Differences between exceedance days and non-exceedance days
      - Differences between weekdays and weekends
    - Impacts of wildfires
  - Examining potential use of satellite derived products for regional haze (AOD vs visibility), source-oriented monitoring, and permit modeling purposes
    - Need for Rural NO_2 Monitoring

Contact Information

Byeong-Uk Kim, Ph.D.
Georgia Dept. of Natural Resources
4244 International Parkway, Suite 120
Atlanta, GA 30354

Byeong.Kim@dnr.ga.gov
470-524-0734

Questions?