

# Modeling Committee Update

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## OTC Committee Meeting

April 11, 2017  
Washington, DC



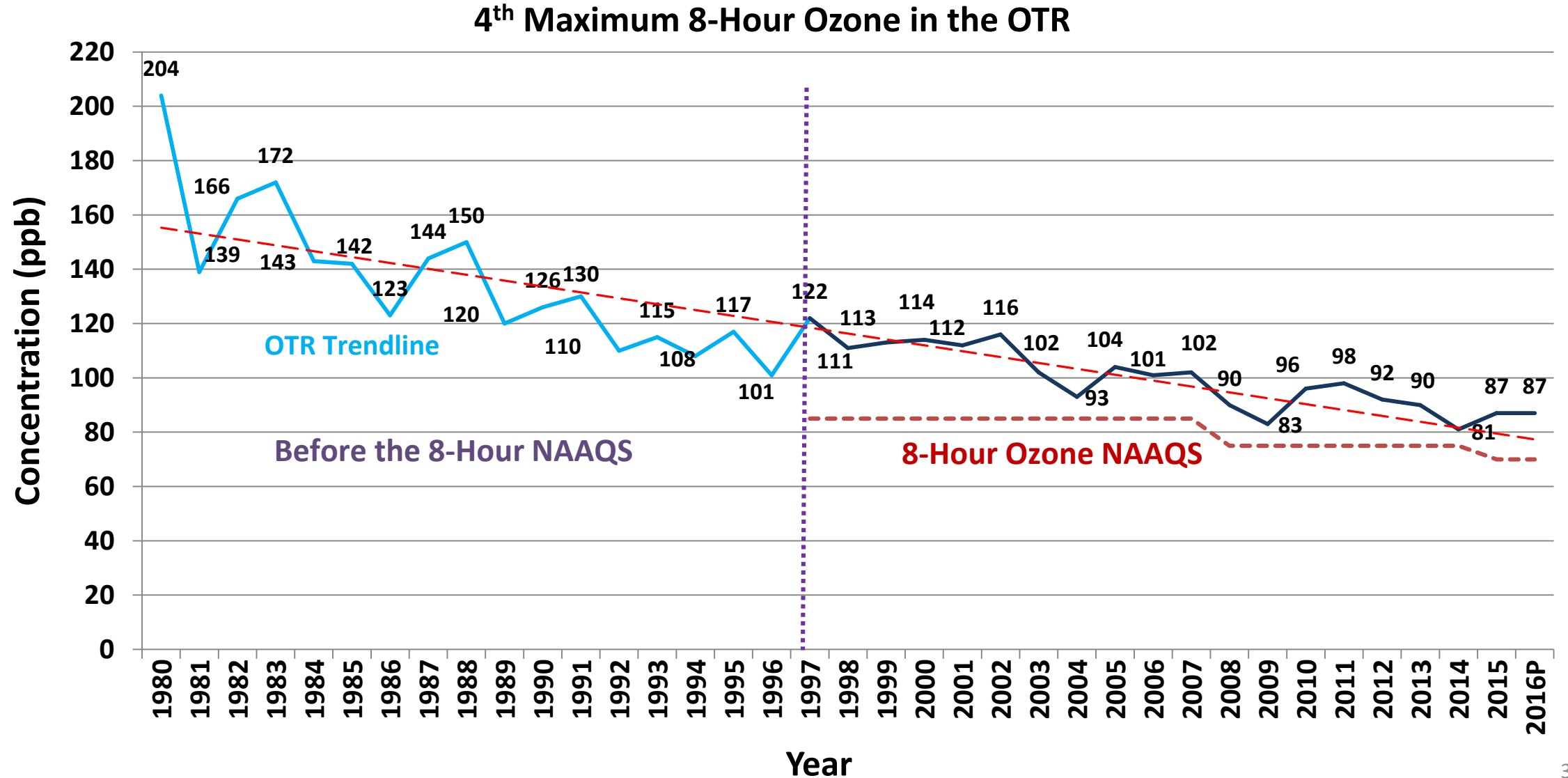
**OZONE** TRANSPORT COMMISSION

# Overview

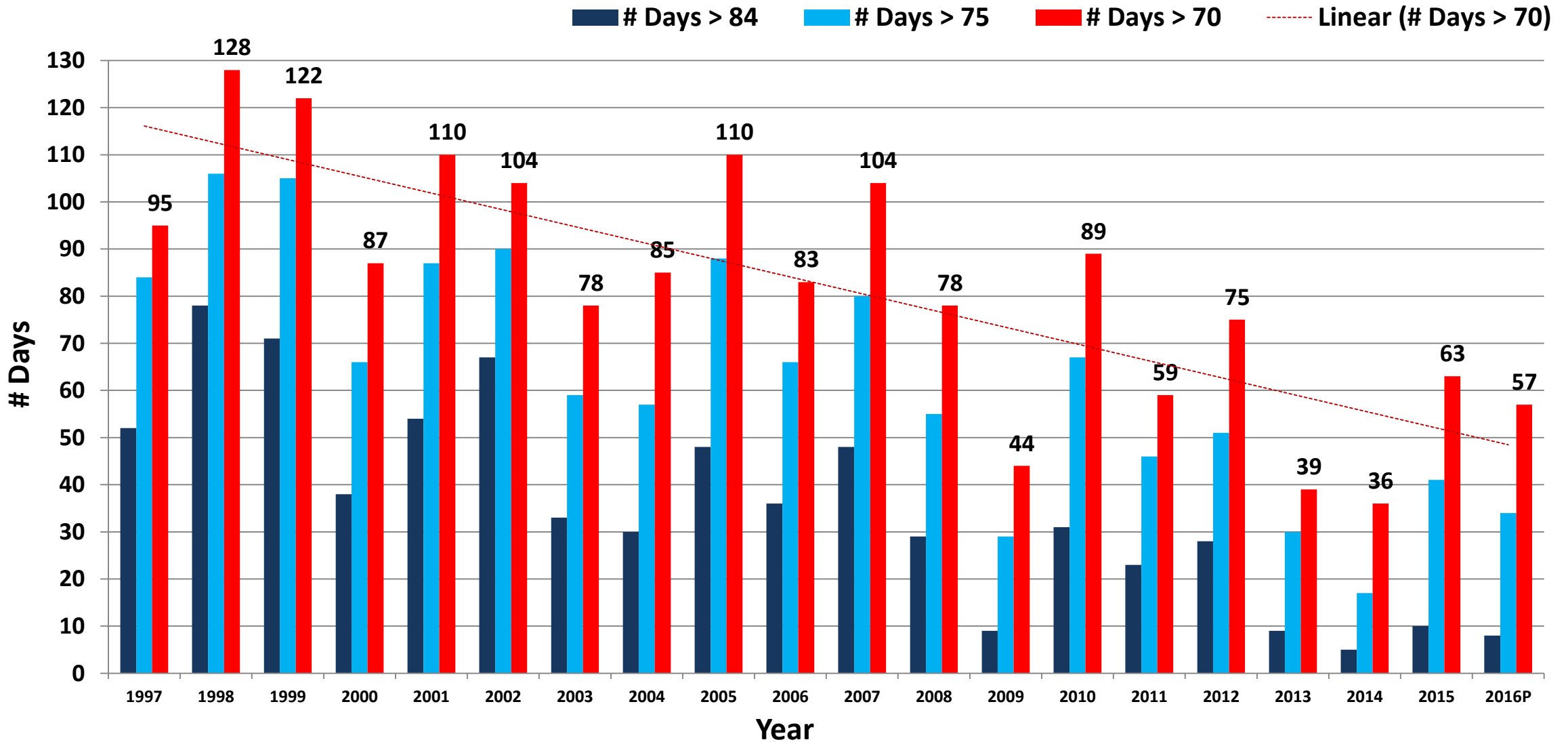
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1. Monitored Results
2. Ozone NAAQS Schedule
3. Enhanced Monitoring Plan (EMP)
4. OTC 2011 Modeling Platform
  - a) Recent Modeling
  - b) Emission Inventory
  - c) Planned Modeling
5. EPA Ozone Contribution Modeling

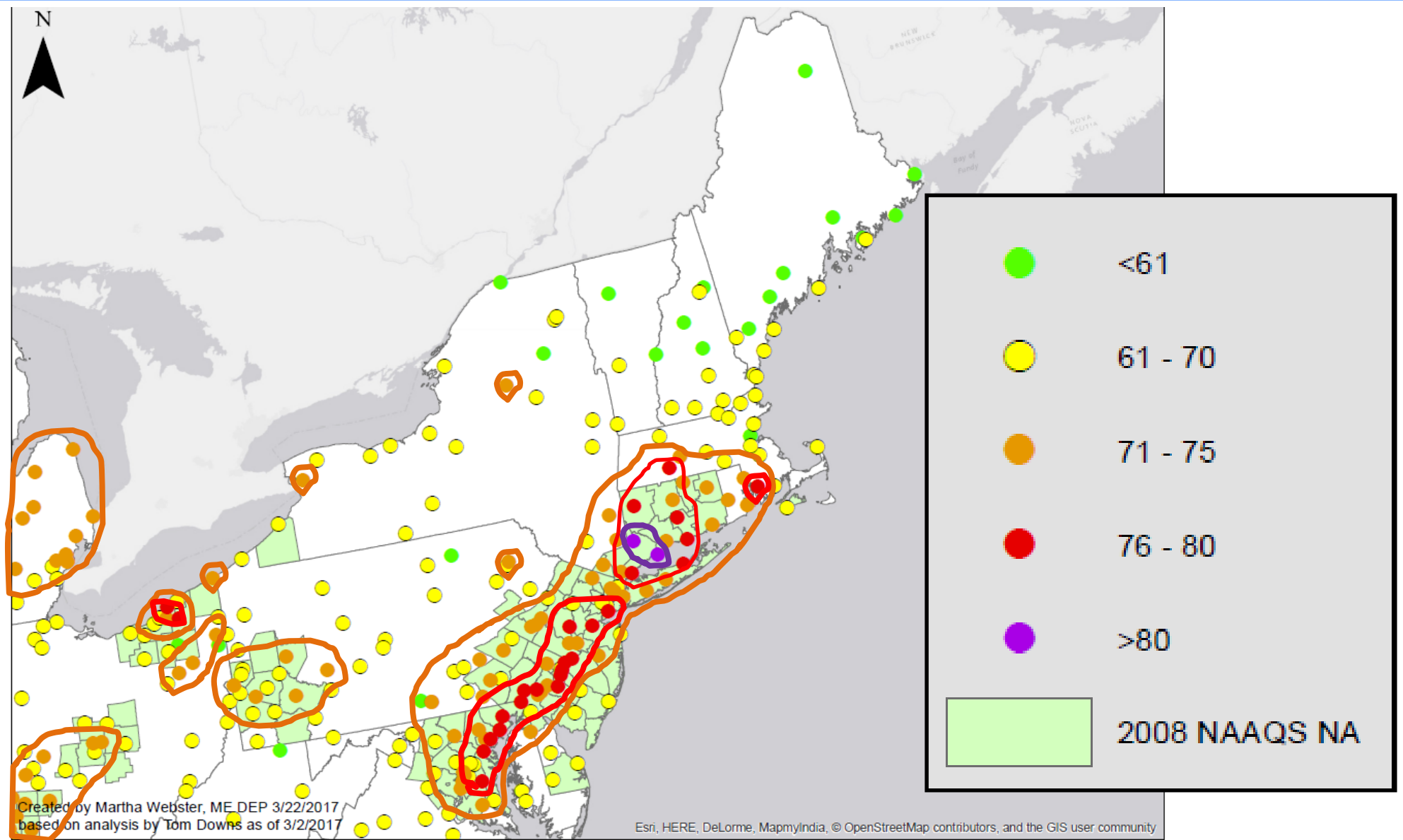
# 1. Ozone Trends in OTR



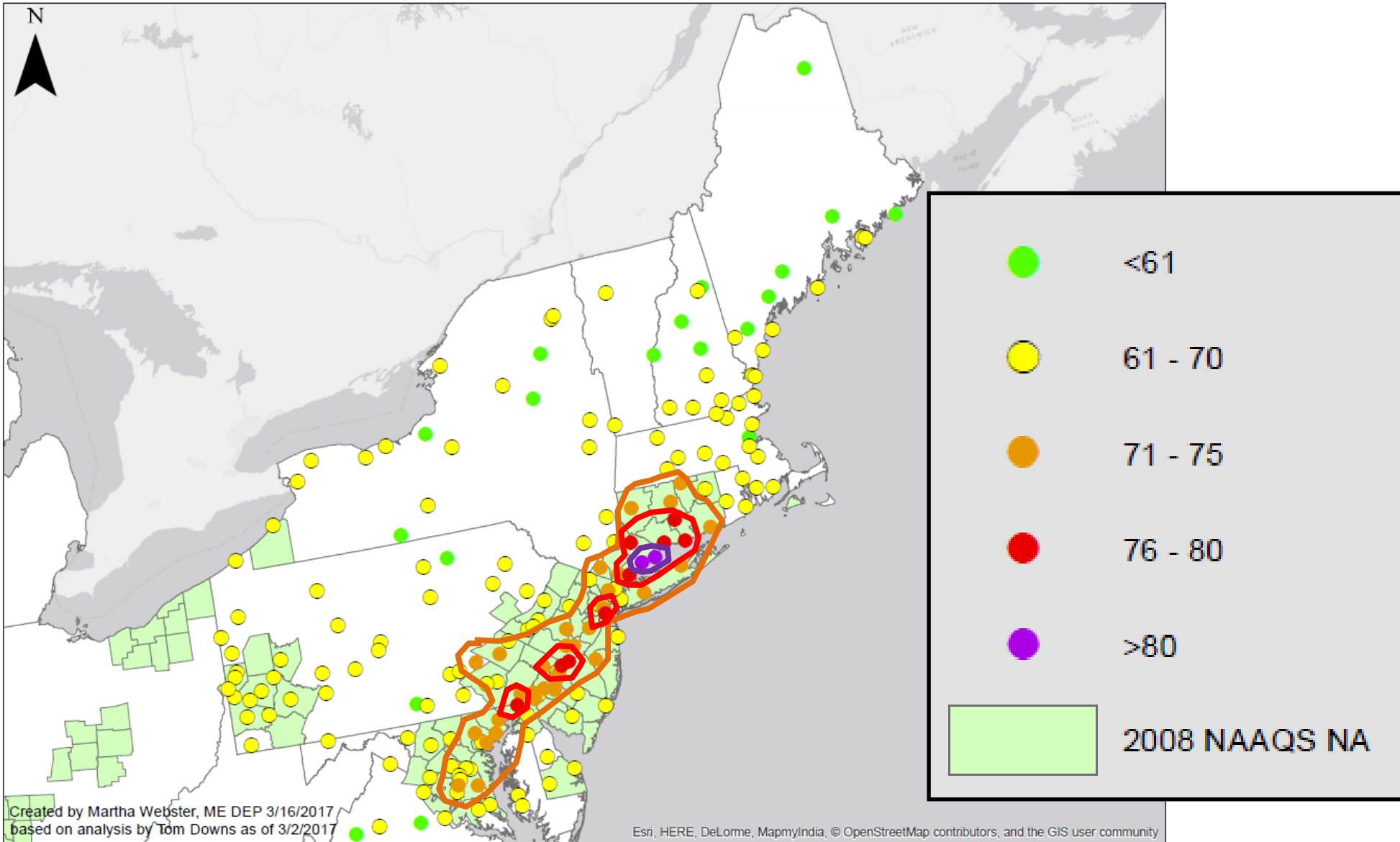
# 1. Trends for OTR Exceedance Days



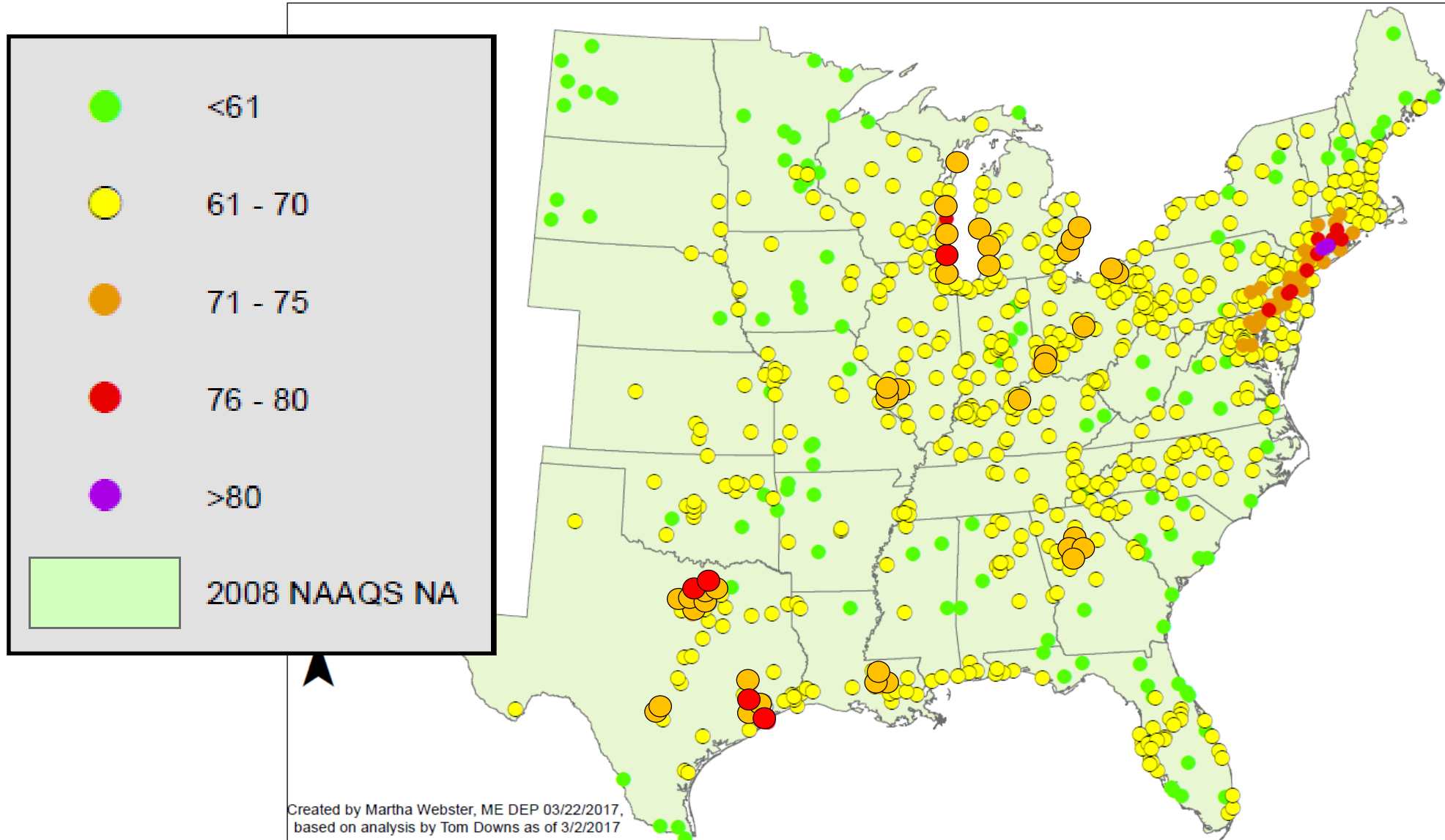
# 1. 2016 4<sup>th</sup> High 8h Ozone Value (Preliminary)



# 1. 2014-16 8h Ozone Preliminary Design Value



# 1. 2014-16 8hr Ozone Preliminary Design Value



## 2. Ozone NAAQS Planning Timeline





### 3. Enhanced Monitoring Plans (EMP)

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- Requires states with moderate or above ozone NAA & OTR states to submit an EMP as part of 2015 Ozone NAAQS process
- Plans due to EPA on 10/1/2019, or 2 years after moderate or above designation
- Effort underway to coordinate between states & EPA through OTC workgroup
  - Gain regional benefits from plans
  - More knowledge on transport
  - More knowledge of air/sea affect on ozone
  - Information to improve model performance
- Will be future updates at OTC meetings and opportunity for comment

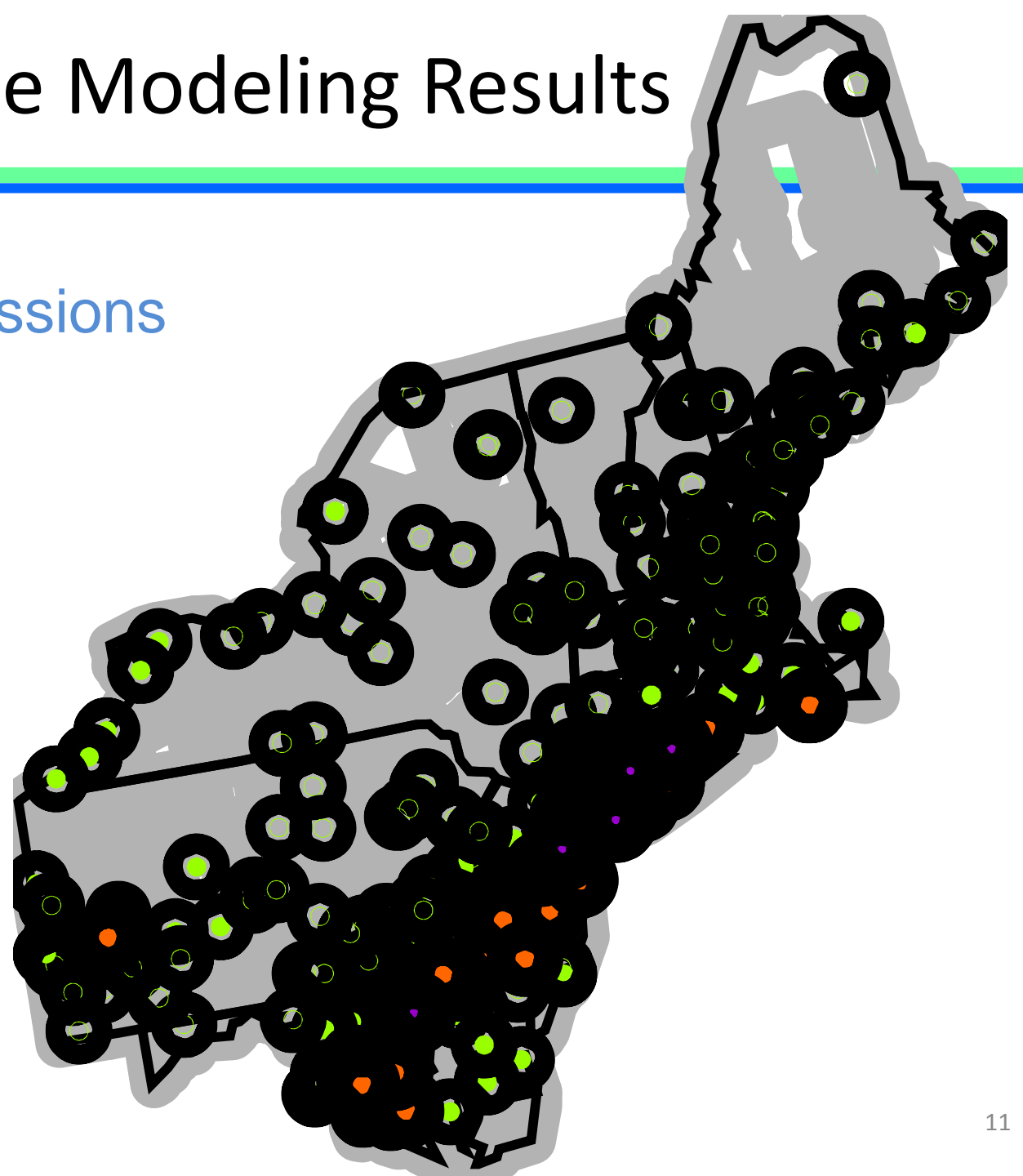
## 4. Recent OTC Modeling

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- 2017 Base Case
- 2017 Near water RRF adjustments
- 2017 Comparison between photochemical models

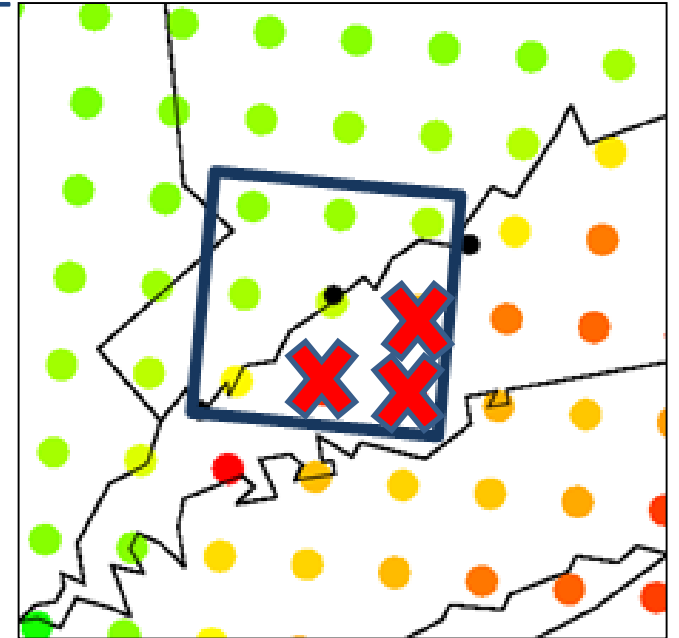
# 4. OTC 2017 Base Case Modeling Results

## 2017 MARAMA Beta Emissions



# 4. Land-Water Interface Monitors

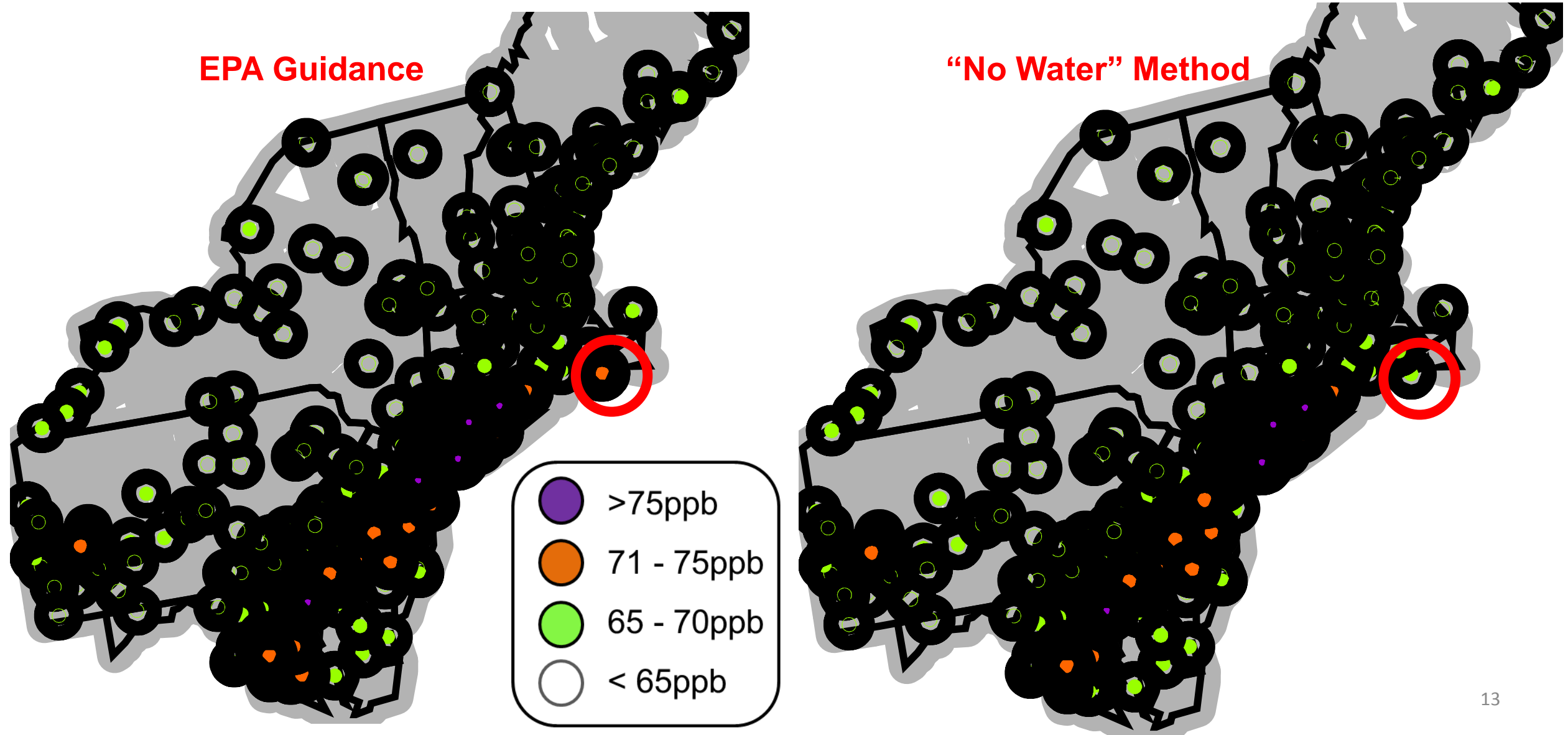
- Modeled Results at Monitors near water:
  - Model performance indicates risk of substantial over-prediction
  - Monitors can become rigid to control – don't respond
- Following EPA Guidance, grid cells over water are included in calculations for coastal monitors
- Ozone tends to model higher over water so this can distort the results
- Modeling Committee has developed a different approach that reduces this effect
  - Removes over water model grid cells from the 9-grid cell calculation



# 4. 2017 SIP Ready Base Case Modeling Results

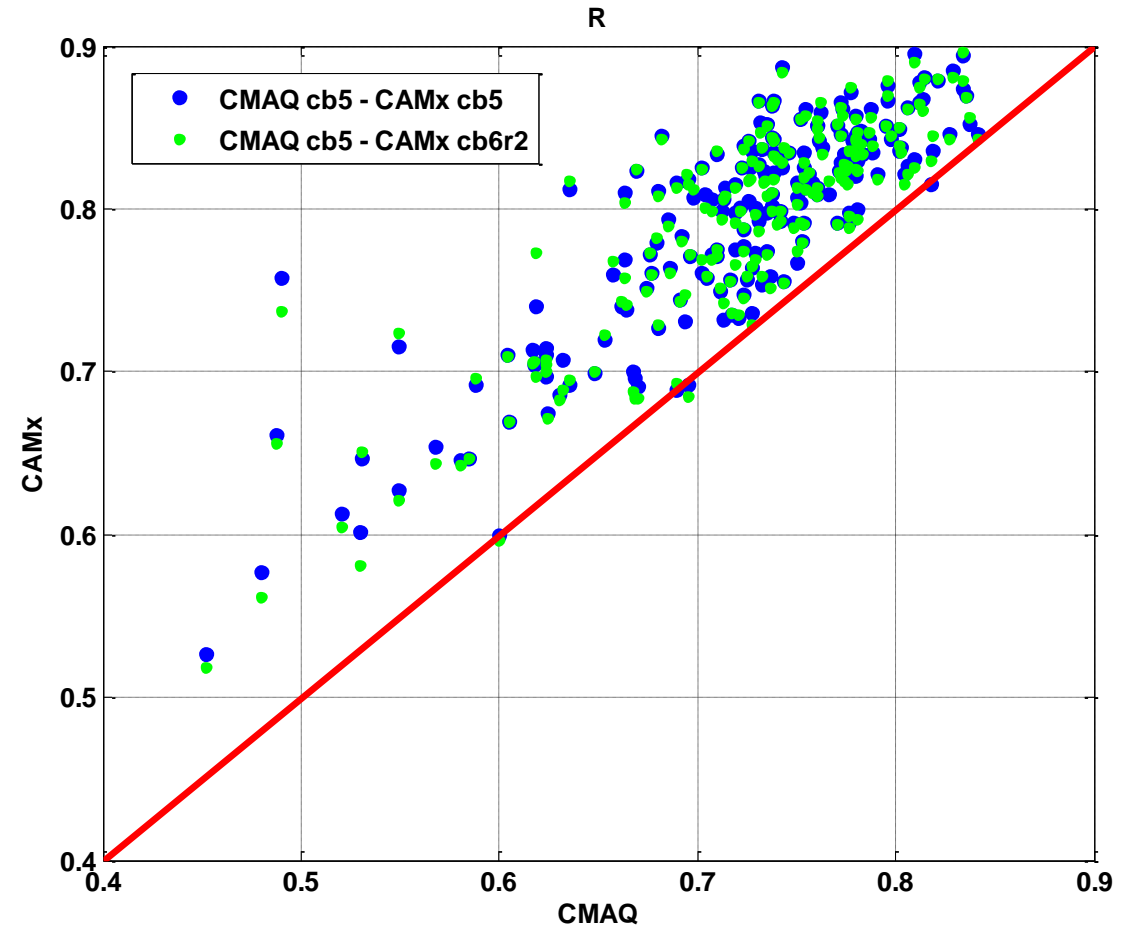
**EPA Guidance**

**"No Water" Method**



# 4. CMAQ v5.0.2 Vs. CAMx v6.40

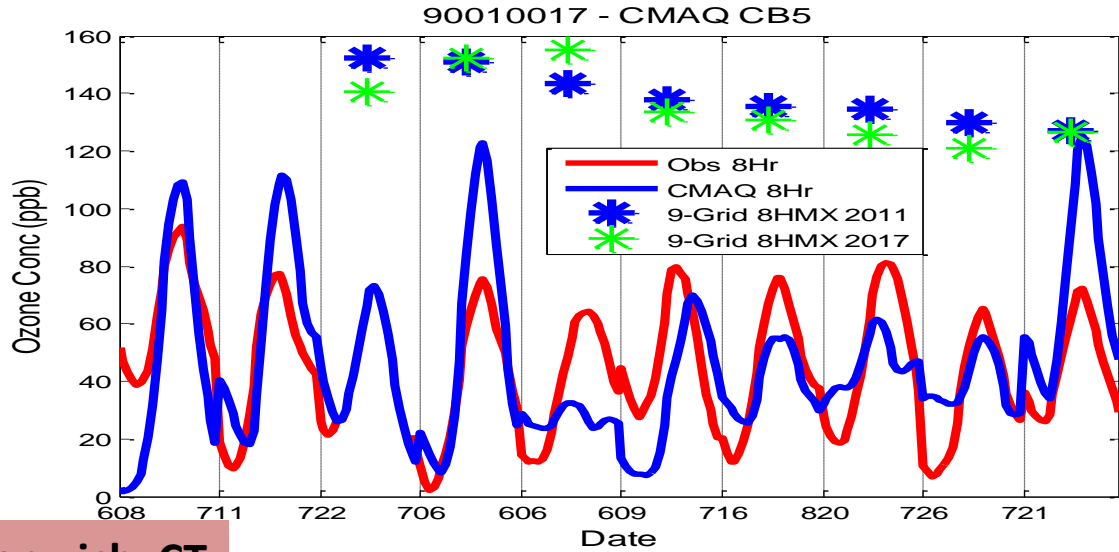
	CMAQ v5.0.2	CAMx 6.40
Met Inputs	MCIP	wrfcamx
Emissions	SMOKE (CB5)	cmaq2camx (CB5)
IC/BC	Geos_Chem	cmaq2camx
PBL Scheme	ACM2	YSU
Kz fix	KzMIN	kvpatch
Chemistry	CB5	CB5/CB6r2
Run Time	45 min/day	10/12 min/day



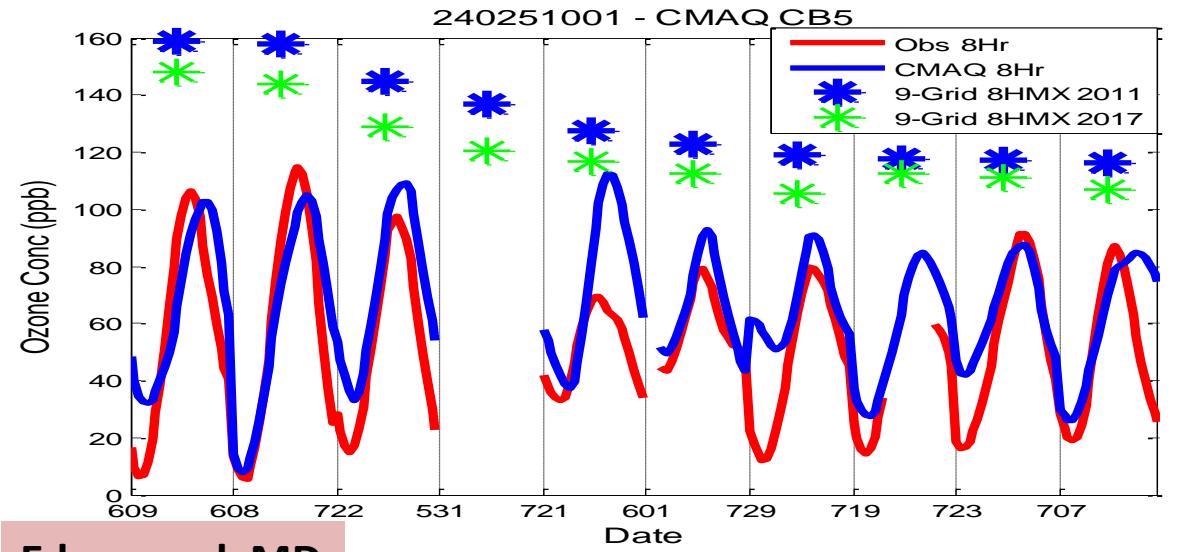
## 4. CMAQ Vs. CAMx

AQS Code	Site	DVC 2011	CMAQ DVF 2017 beta2	CAMx DVF 2017 CB5 beta2 kvpatch	EPA CAMx DVF 2017 Ek
090019003	CT Sherwood Island – Westport	83.7	83	78	76
240251001	MD Edgewood	90.0	81	81	78
360850067	NY SUSAN WAGNER HS	81.3	78	76	75
090010017	CT Greenwich Point – Greenwich	80.3	77	74	74
090013007	CT Lighthouse-Stratford	84.3	77	76	75
090099002	CT Hammonasset – Madison	85.7	77	77	76
361030002	NY BABYLON	83.3	77	77	76
090011123	CT Western Conn State Univ-Danbury	81.3	74	73	71
240053001	MD Essex	80.7	74	73	71
340150002	NJ Clarksboro	84.3	74	74	72
360810124	NY QUEENS COLLEGE 2	78.0	74	74	73
090110124	CT Fort Griswold Park-Groton	80.3	73	72	70
240090011	MD Calvert	79.7	73	71	69
240150003	MD Fair Hill	83.0	73	73	69

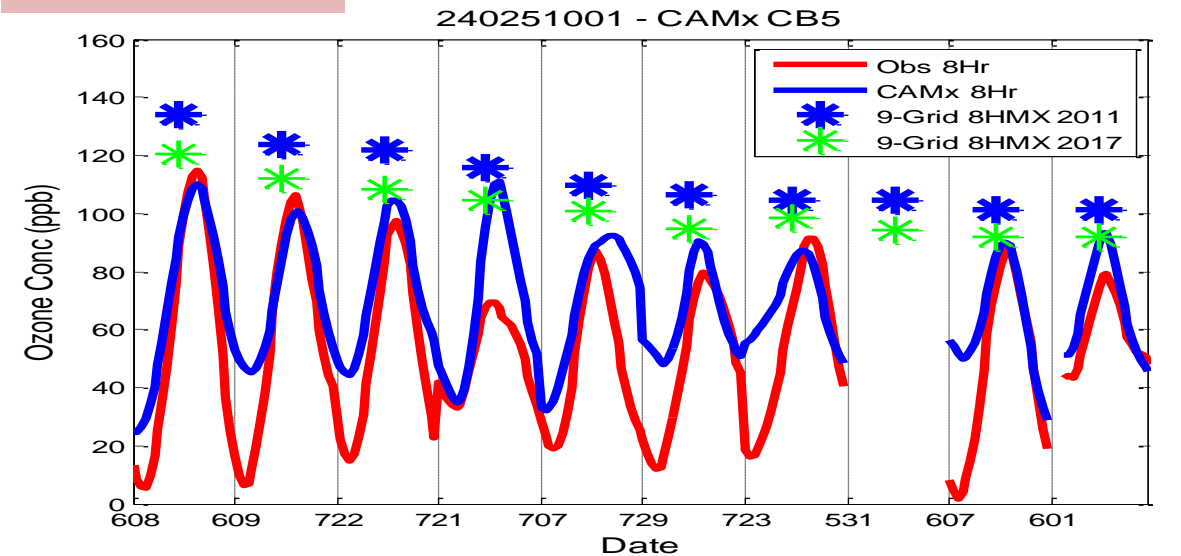
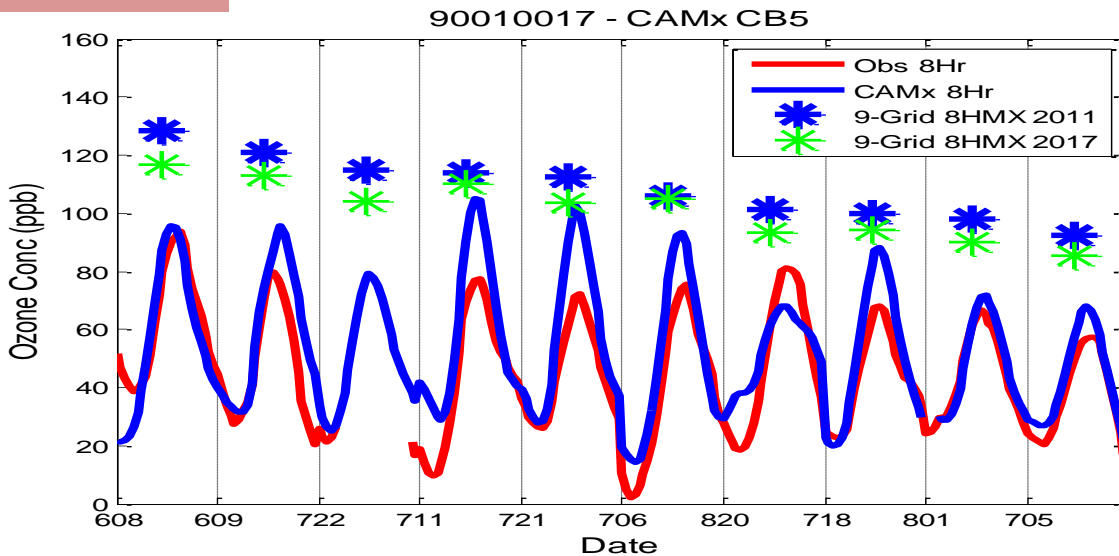
# 4. CMAQ v5.0.2 Vs. CAMx v6.40



Greenwich, CT



Edgewood, MD





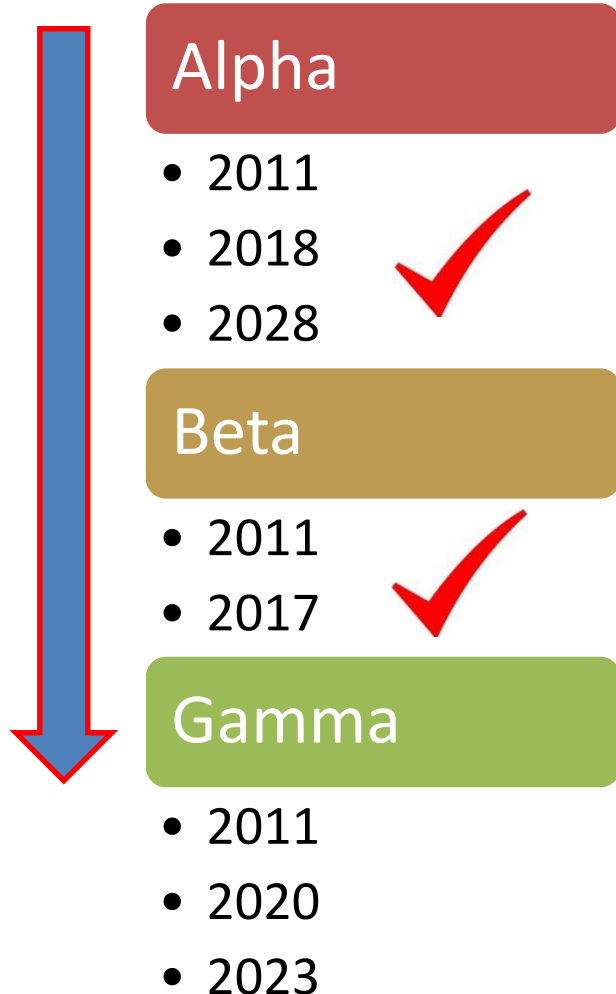
## 4. CMAQ v5.0.2 Vs. CAMx v6.40

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### Summary

- Over OTR (including VA) ozone monitors, CMAQ & CAMx had similar performance, with CAMx a little bit better than CMAQ in terms of NMB, NME & R.
- CMAQ & CAMx yielded similar 2017 DVF, but CAMx had lower DVF over CT monitors near coast.

# 4. Near-Term OTC/MARAMA Emission Inventories



- **Gamma Inventory Improvements are Beginning**
  - Project future year to **2023 & 2020**
  - Upgrade to **ERTAC v2.6**
  - 2023 Mobile: EPA MOVES & Nonroad
  - 2020 Mobile: 2017→2023 Interpolation
  - Remove rules no longer considered OTB
  - EMF Growth for point & maybe area
  - For 2020 some sectors interpolated
  - Other updates for 2011/2023 from EPA v6.3

# 4. Gamma Inventory Photochemical Modeling Plan

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Beta Modeling Complete & Documented

2011 Gamma Emission Inventory Base Case

- To ensure consistent inventories and update chemistry

2023 Gamma Emission Inventory Base Case

- For use in transport modeling

2020 Gamma Emission Inventory Base Case

- For use in Serious 2008 NAAQS Ozone SIPs

Update Documentation

# 4. Current OTC 2020/2023 Modeling

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## Modeling intended to provide early direction & SIP support

- 2020 interpolated projection (2008 NAAQS Serious Nonattainment)
  - Interpolation between Beta 2017 & EPA 2023 inventories
  - IPM data to be replaced with ERTAC for EGUs
  - CSAPR-U Cap estimated adjustment factor
- 2023 projection (2015 NAAQS Moderate Nonattainment)
  - EPA 2023 inventory
  - IPM data to be replaced with ERTAC for EGUs
  - Non-EGU point to have adjustment factors applied
  - CSAPR-U Cap estimated adjustment factor

# 5. EPA Contribution Modeling

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- Considers all monitors currently exceeding:
  1. The 2015 ozone NAAQS
  2. The 2008 Ozone NAAQS
- EPA ozone contribution modeling with:
  1. 2017 emission inventories
  2. 2023 emission inventories
- Highlighted states contribute 1% or more of the applicable NAAQS

Answers the questions:

1. What states contribute to current nonattainment
2. What states will still contribute 1% or more should monitors currently in nonattainment not reach attainment by 2023

# 5. 2008 Ozone NAAQS: 75ppb - $\geq 1\%$ Contributing States

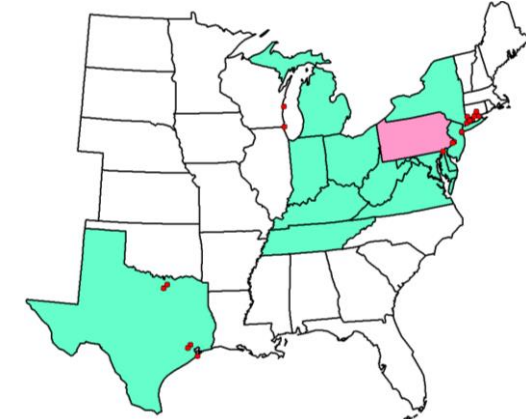
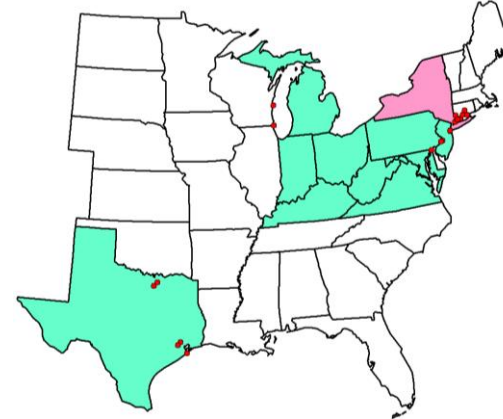
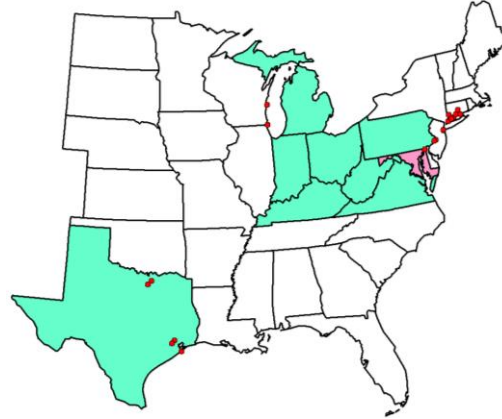
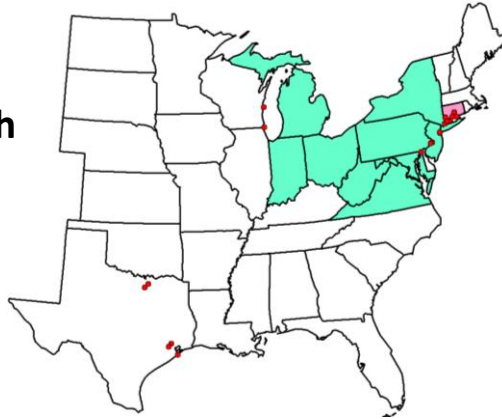
Connecticut

Maryland

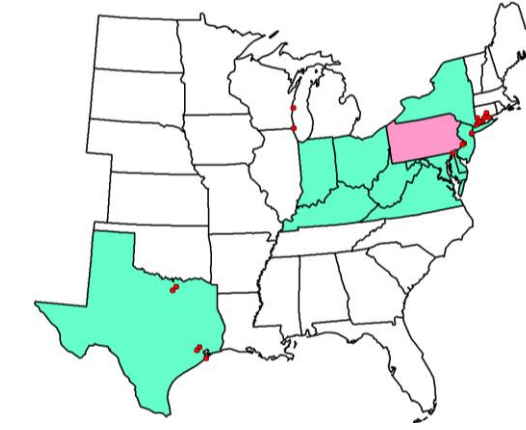
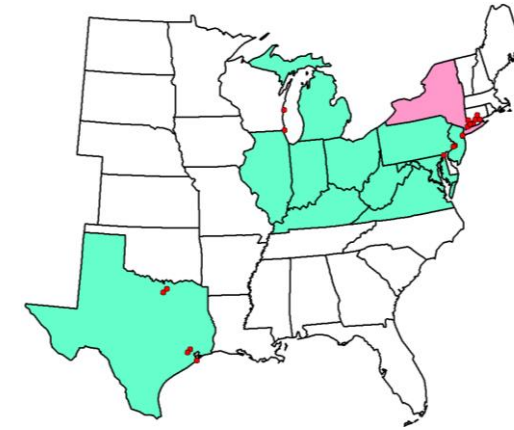
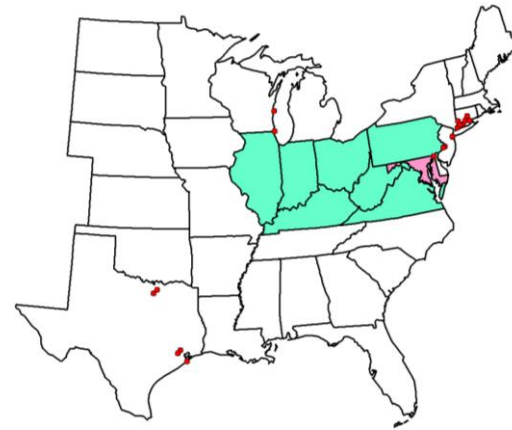
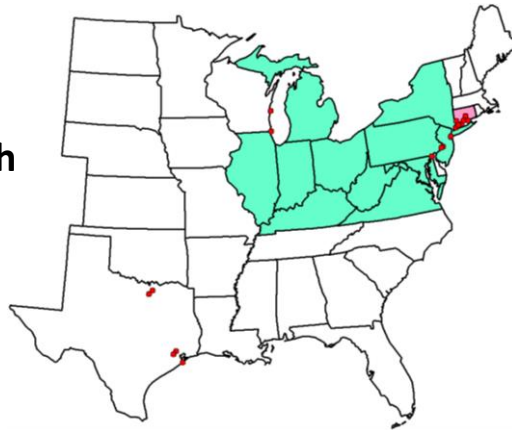
New York

Pennsylvania

Contributors with  
2017 Emissions



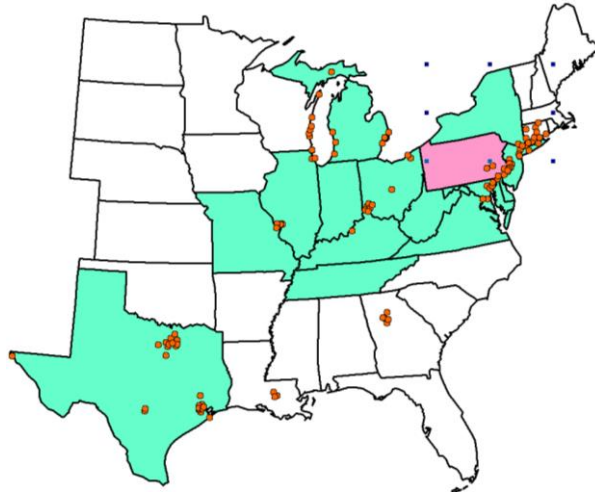
Contributors with  
2023 Emissions



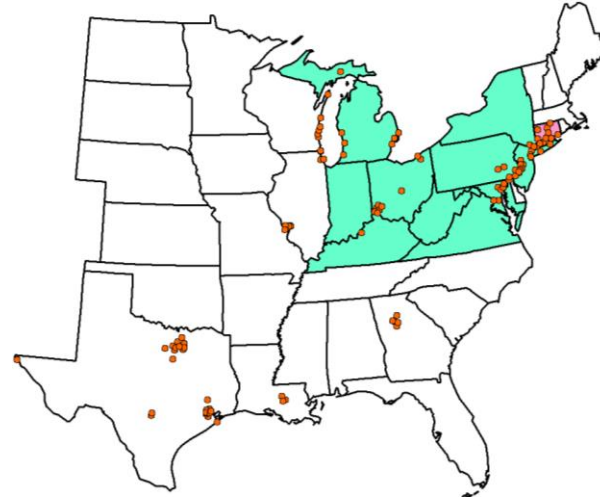
# 5. 2015 Ozone NAAQS: 70ppb - $\geq 1\%$ Contributing States

Contributors with  
2017 Emissions

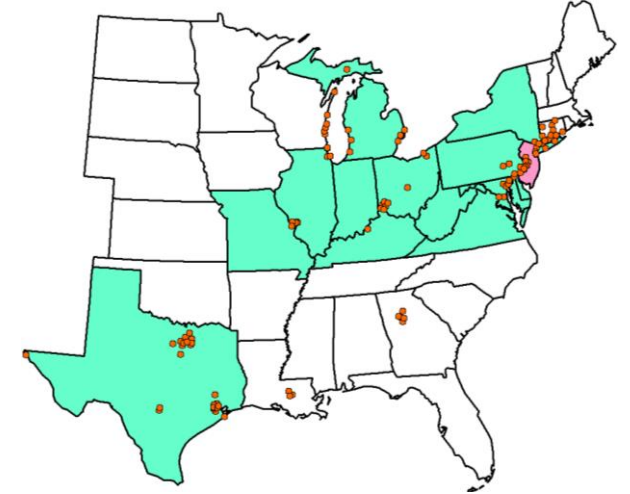
Pennsylvania



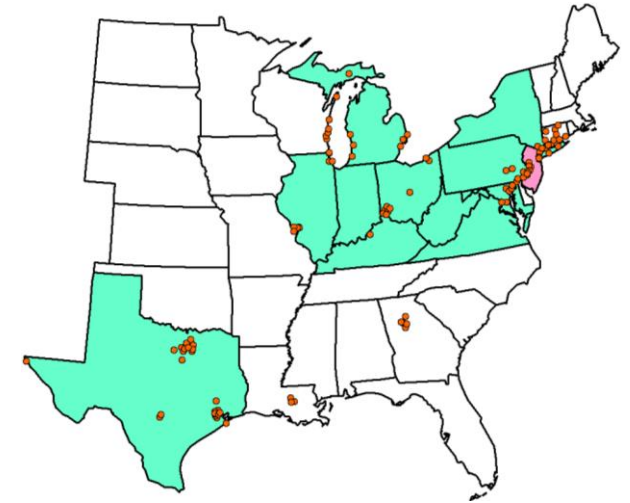
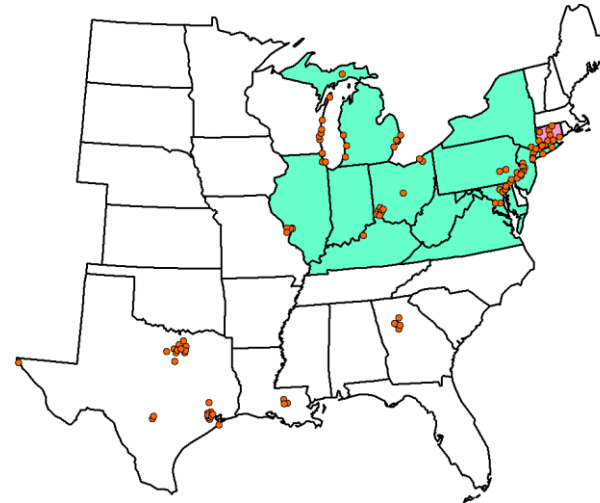
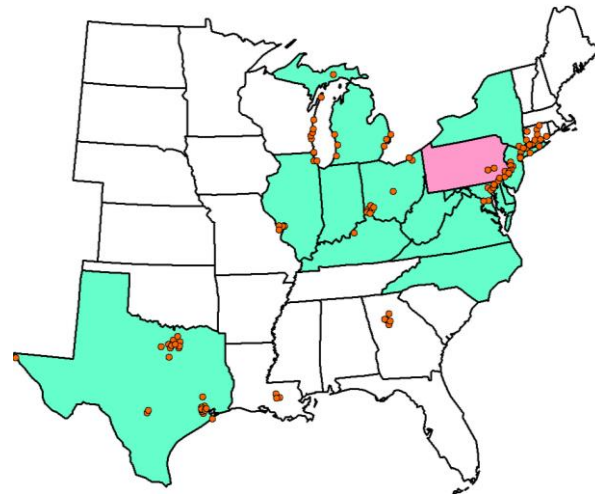
Connecticut



New Jersey



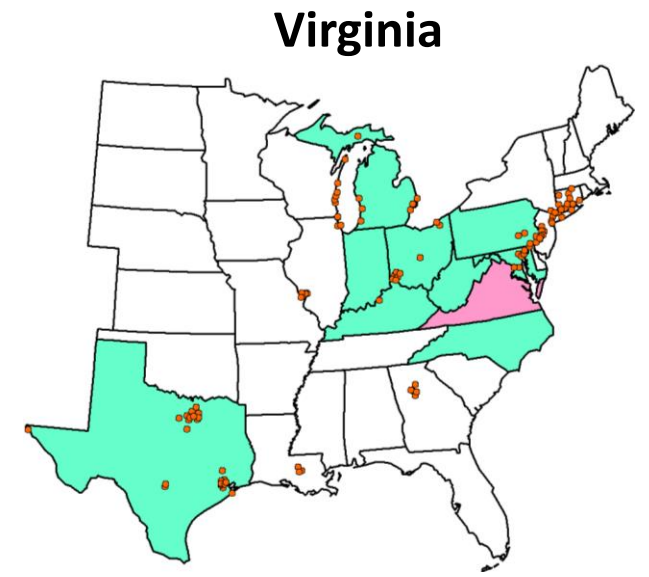
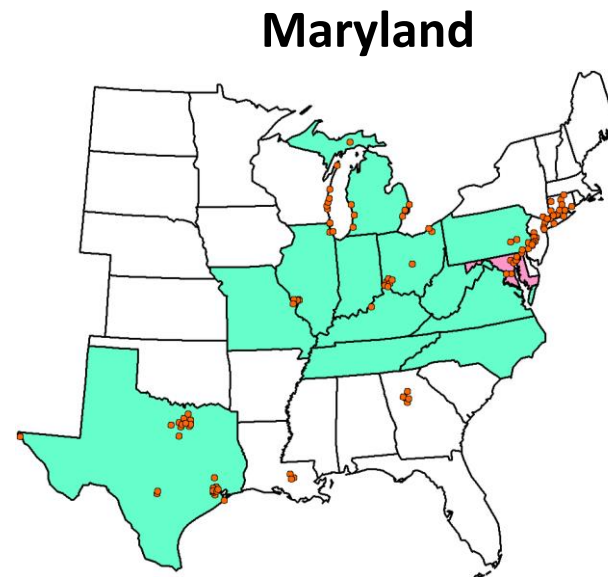
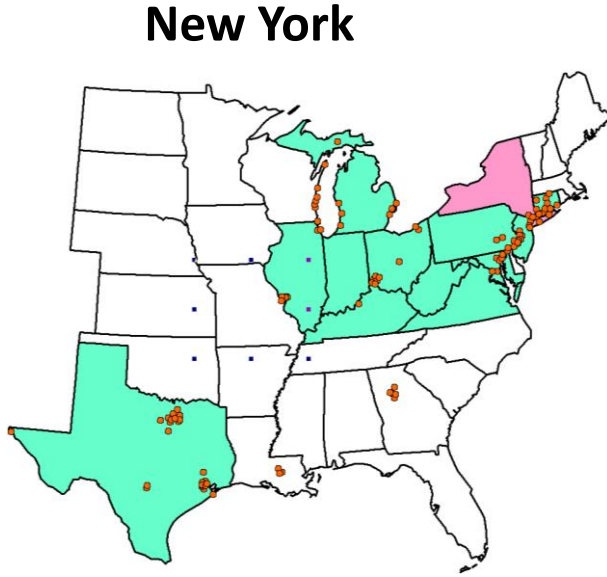
Contributors with  
2023 Emissions



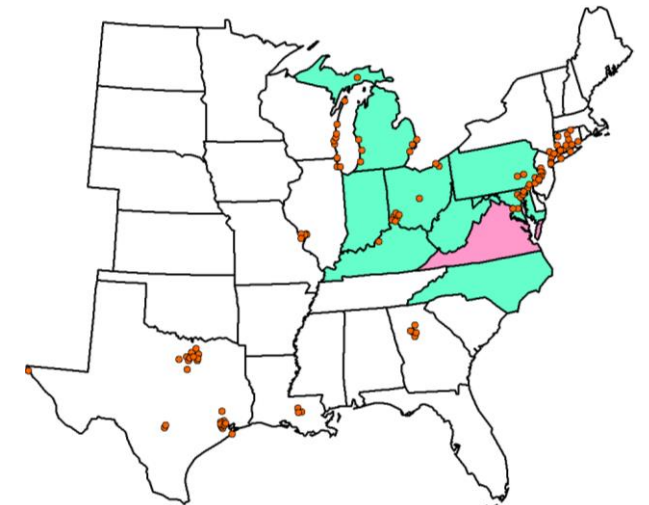
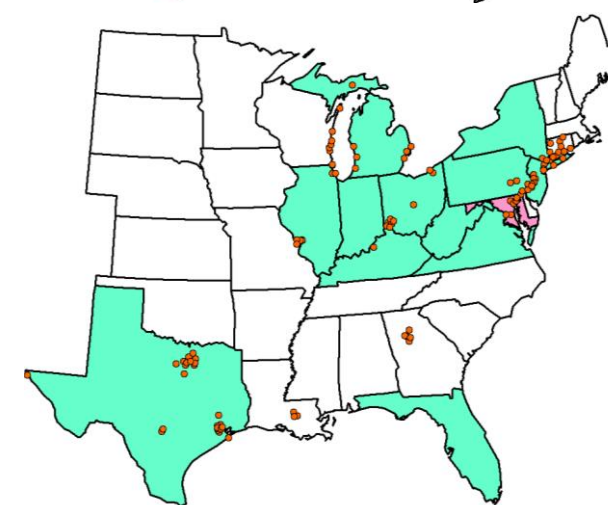
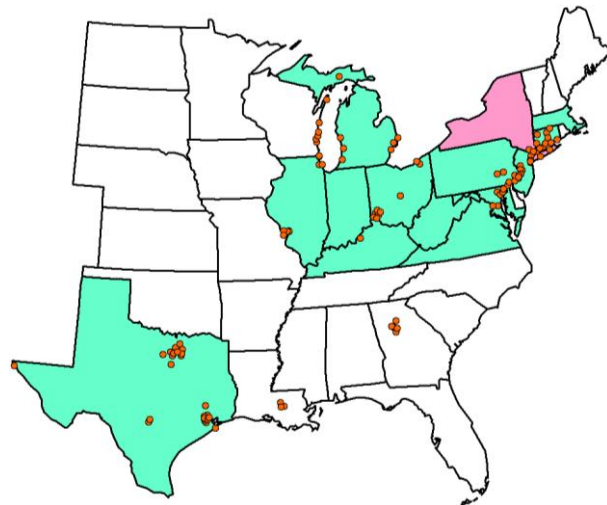


# 5. 2015 Ozone NAAQS: 70ppb - $\geq 1\%$ Contributing States

Contributors with  
2017 Emissions



Contributors with  
2023 Emissions





# Conclusions & Next Steps

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- OTC modeling indicates that:
  - CMAQ performs reasonably well when modeled values for monitor grid cells are compared to monitored data
  - CMAQ & CAMx perform comparably
- Ozone exceedances in OTR in 2016 ozone season similar to 2015
- Enhanced Monitoring Plans (EMPs) being discussed
- Emissions inventory projections to 2020 & 2023 being prepared for transport & attainment SIP
  - Initial modeling will be performed with an interpolated inventory
  - Improved Gamma emission inventories to be available during summer/fall 2017

# Questions

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