

# Modeling Committee Update

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## OTC Committee Meeting

September 20, 2016

Washington, DC



**OZONE** TRANSPORT COMMISSION

# Overview

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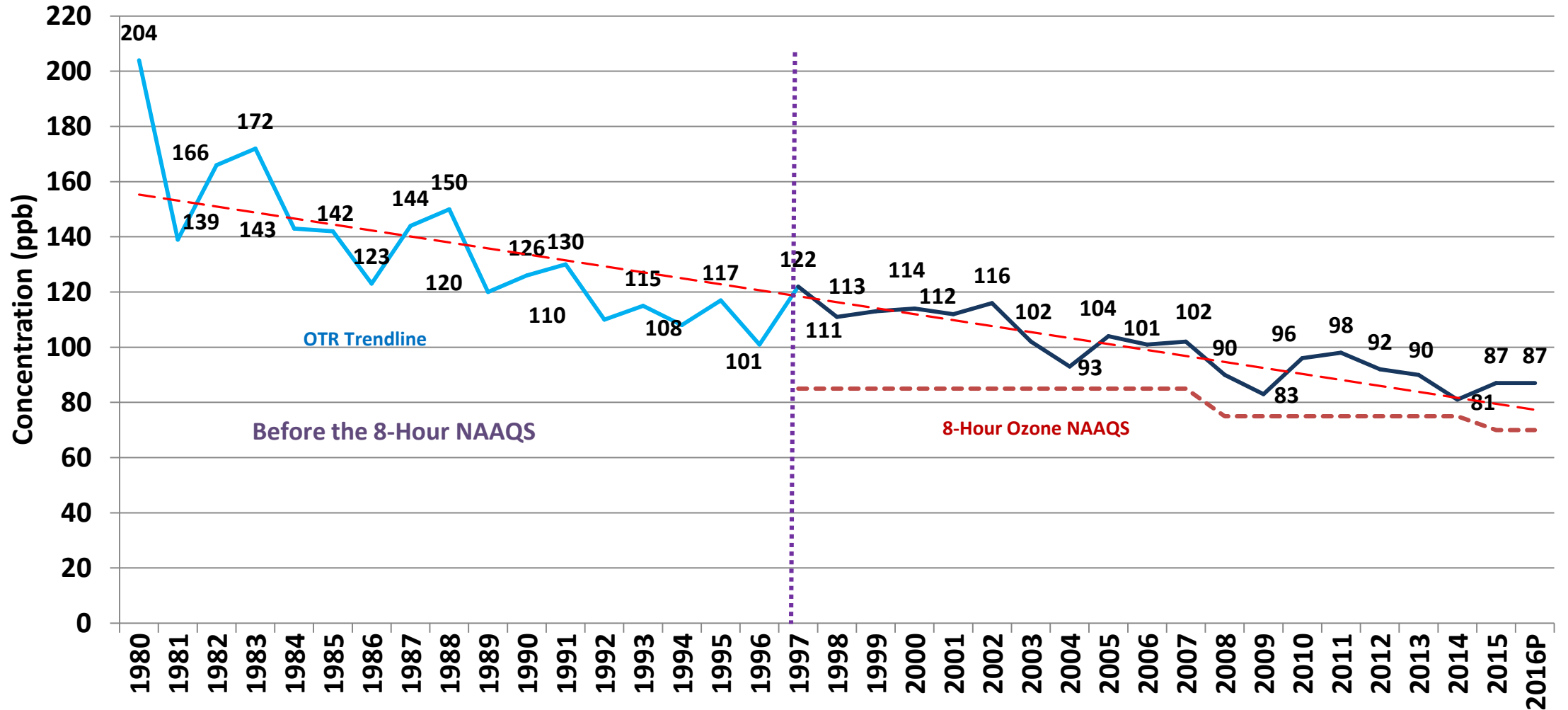
1. Monitored Results
2. Ozone NAAQS Schedule
3. OTC 2011 Modeling Platform
  - a) TSD
  - b) Inventory
  - c) Modeling
    - i. Episodic Results
    - ii. Land-water Results



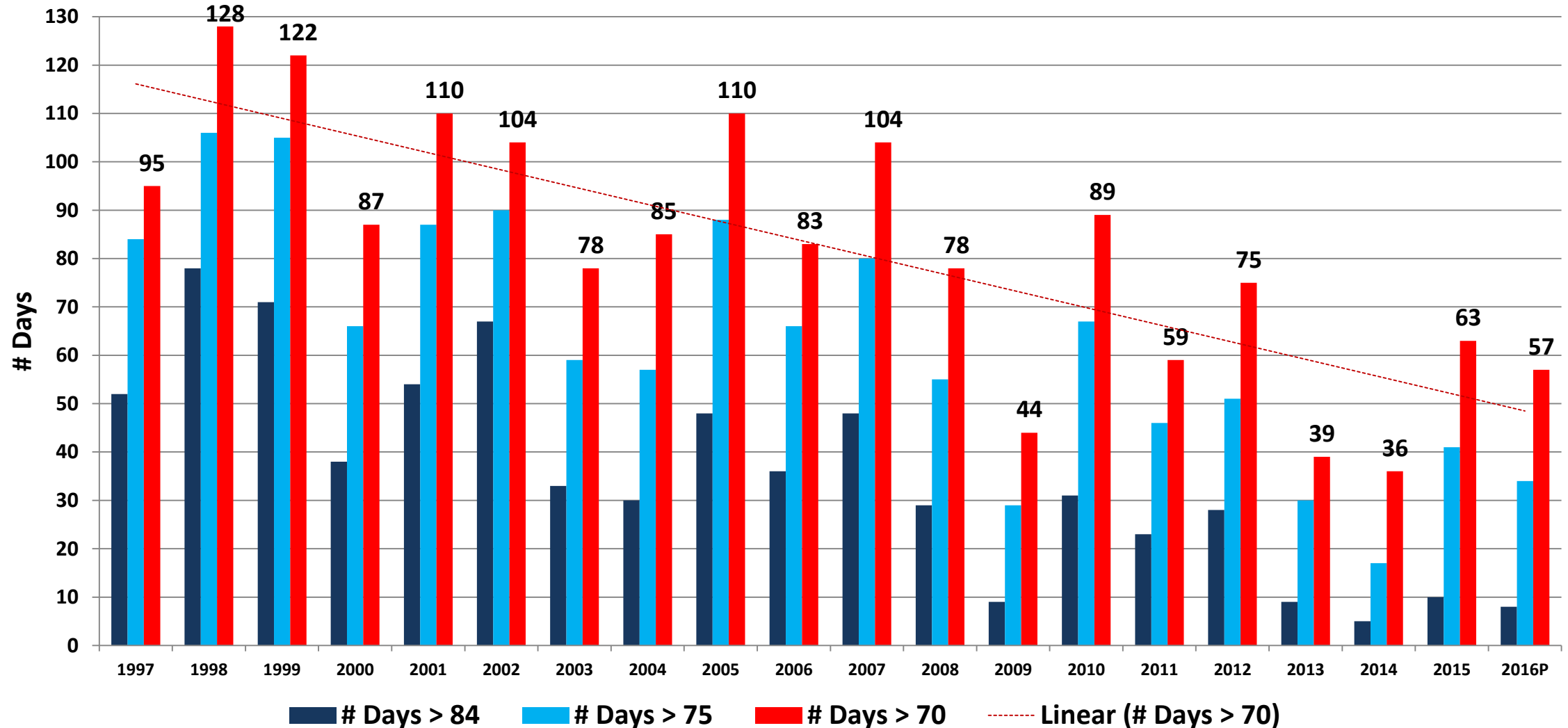
# Monitor Results

# Ozone Trends in the OTR

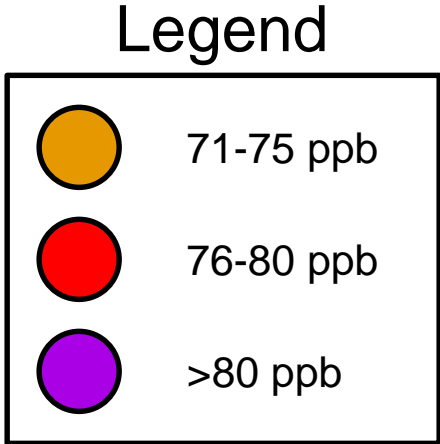
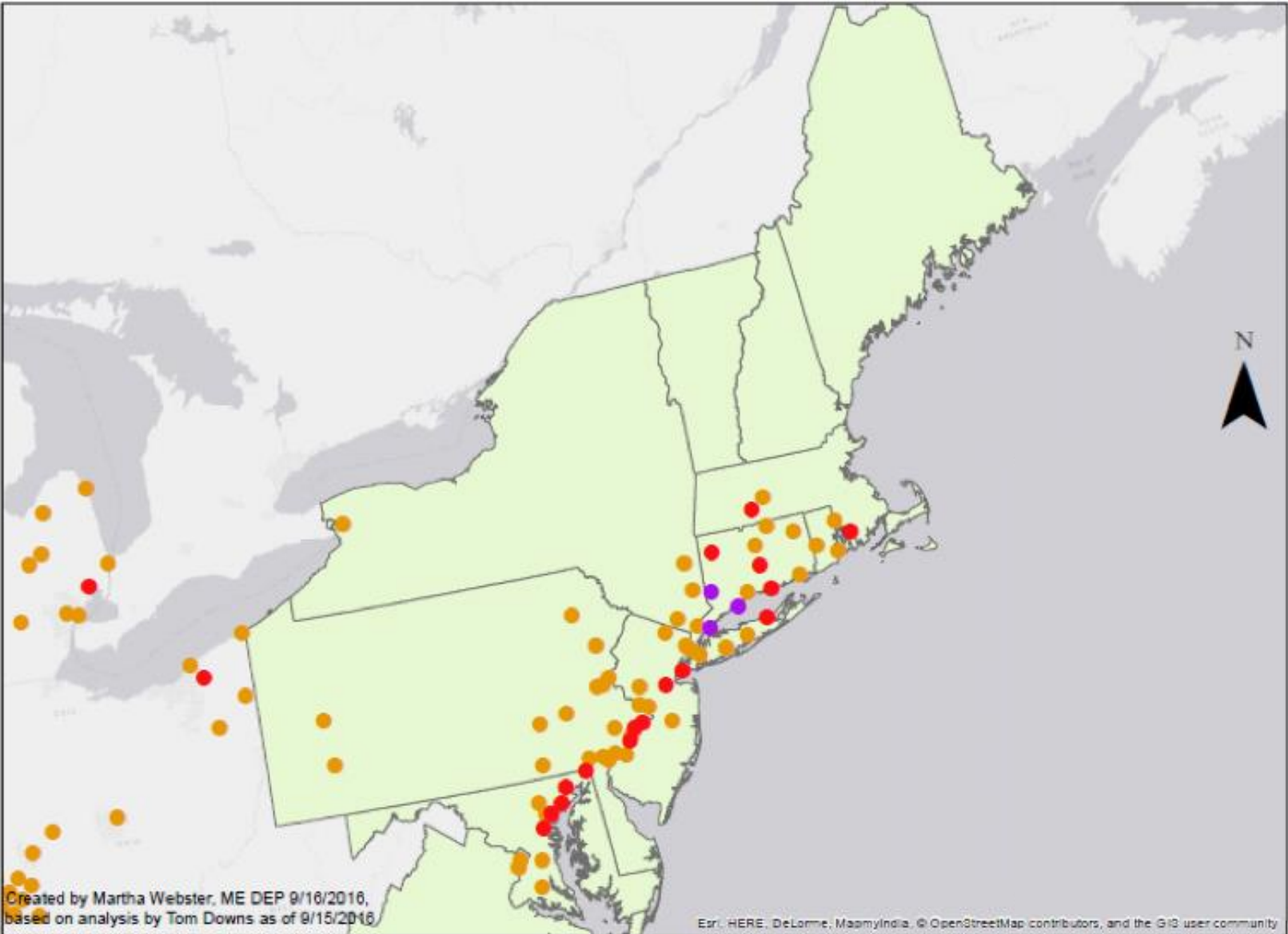
## 4th Maximum 8-Hour Ozone in the OTR



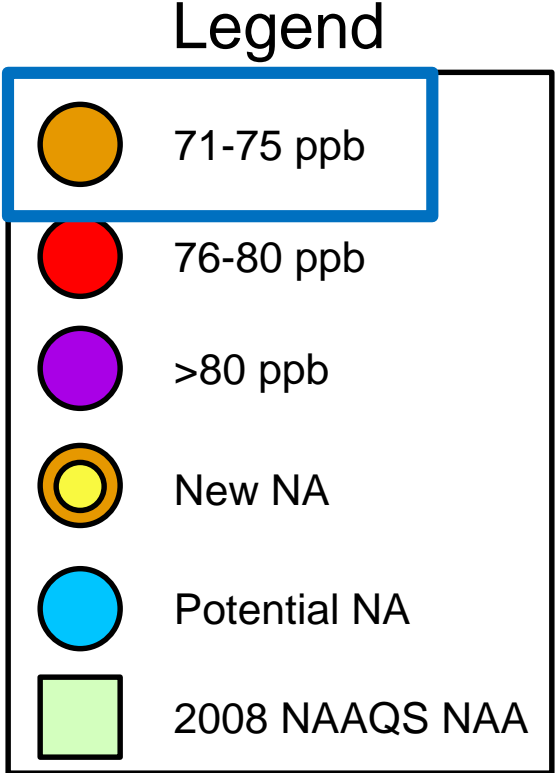
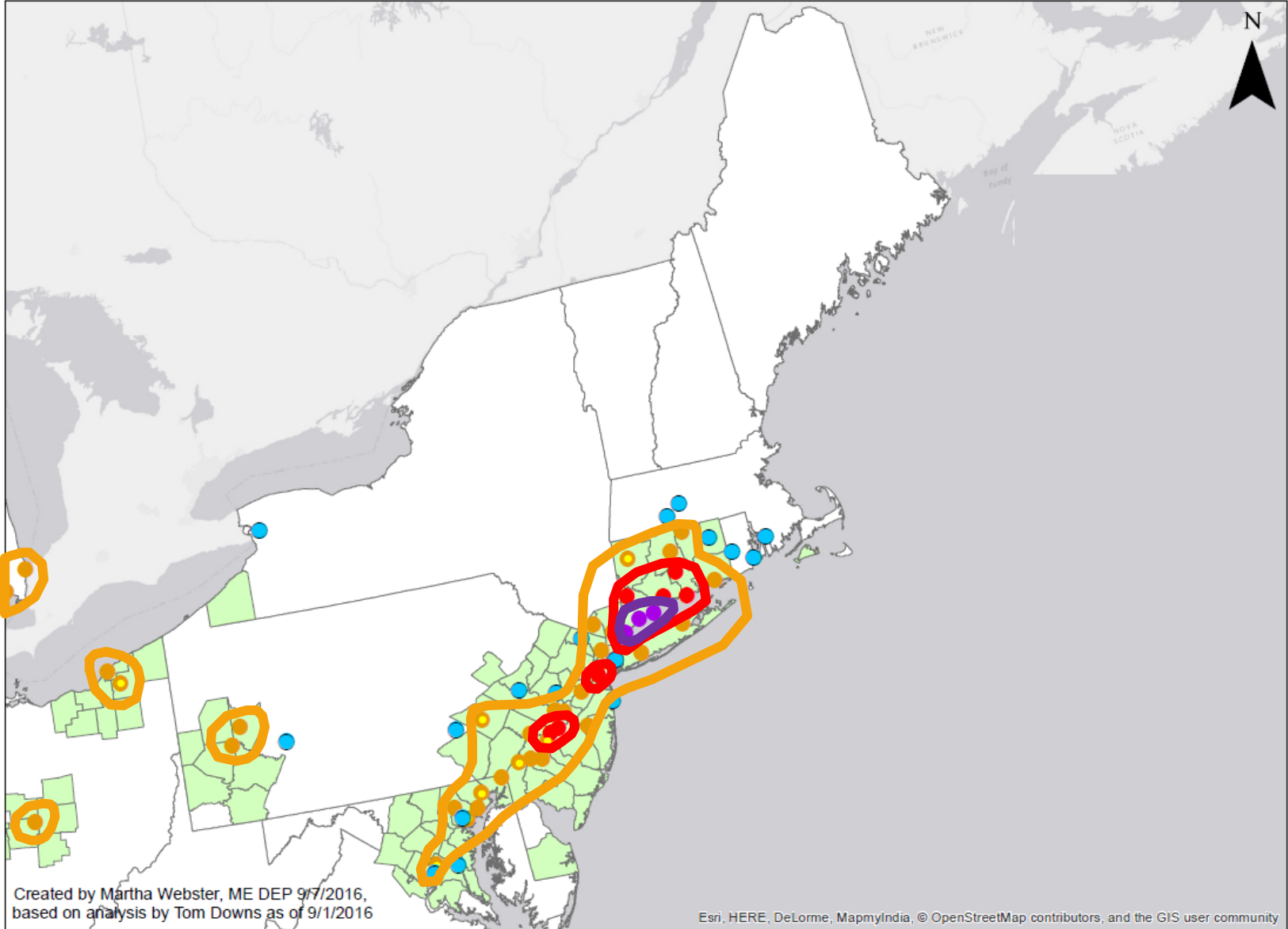
# Trends for OTR Exceedance Days to 9/15/16



# 2016 4th High 8hr Ozone Value (Preliminary)



# 2014-16 8hr Ozone Preliminary Design Value



- 2017 Potential NA is when either:**
- 2014-16 DV and 2017 Threshold are below 71ppb
  - or
  - 2013-15 DV > 70 ppb



# Ozone NAAQS Schedule



# Ozone Planning Timeline



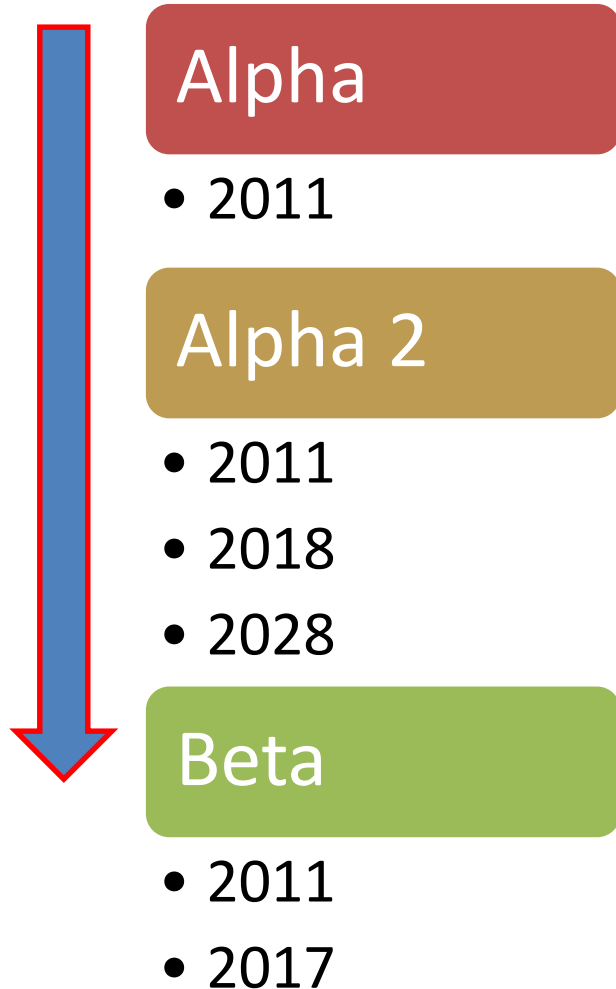


# OTC 2011 Modeling Platform

# 2011 SIP Modeling Platform TSD

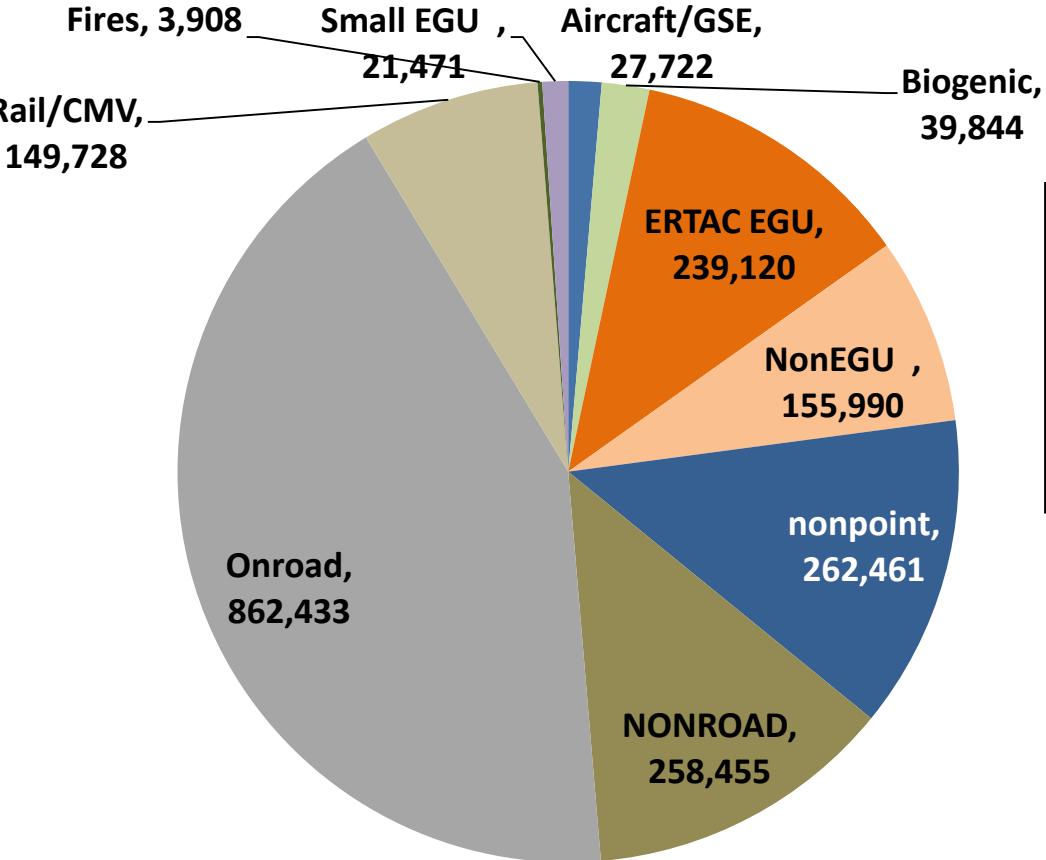
- Draft is Available and Covers both Ozone and Regional Haze
- Includes:
  - Evaluations
    - Meteorological Model (Ch. 2)
    - Biogenic Emission Model (Ch. 3)
  - Documentation of Emissions Processing (Chs. 4, 8)
  - Photochemical Model
    - Setup (Ch. 5)
    - 2011 Performance Evaluation for Ozone & Haze (Ch. 6)
  - Nested Gridding Work (Ch. 7)
  - RRF Calculations & Land-Water Interface Issues (Ch. 9)
  - Future Year Base Case Modeling Results (Ch. 10)
  - Episodic Modeling Protocol (Ch. 11)
- Comments Due 10/21 – email [jjakuta@otcair.org](mailto:jjakuta@otcair.org)

# OTC/MARAMA Emission Inventories



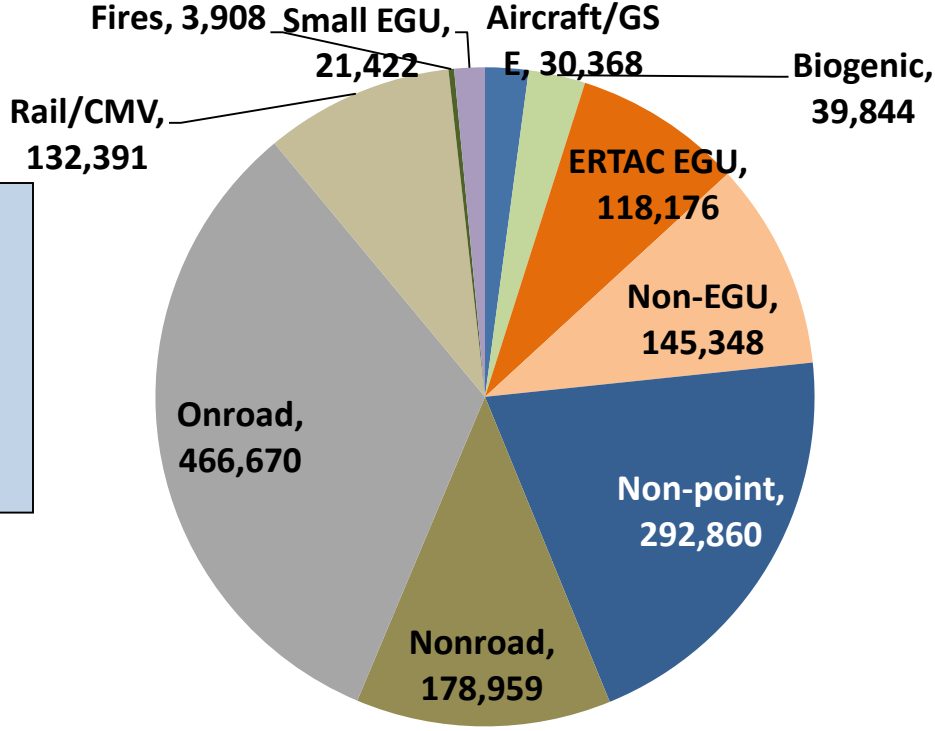
- **Beta Inventory Improvements are Complete**
  - Project future year to **2017**
  - Upgrade to **ERTAC v2.5**
  - MOVES2014a Emission Factors
  - Small EGU Temporalization
  - Include new rules (e.g. residential wood NSPS)
  - State Adjustments/Updates
  - BEIS 3.6.1 (from BEIS 3.6)
  - Include state banked emissions
  - EMF Growth
- **Review by States & Stakeholders Complete**

# OTR+VA Annual NO<sub>x</sub> Emissions Summary 2011 → 2017



~2,000,000 tons/year  
**2011**

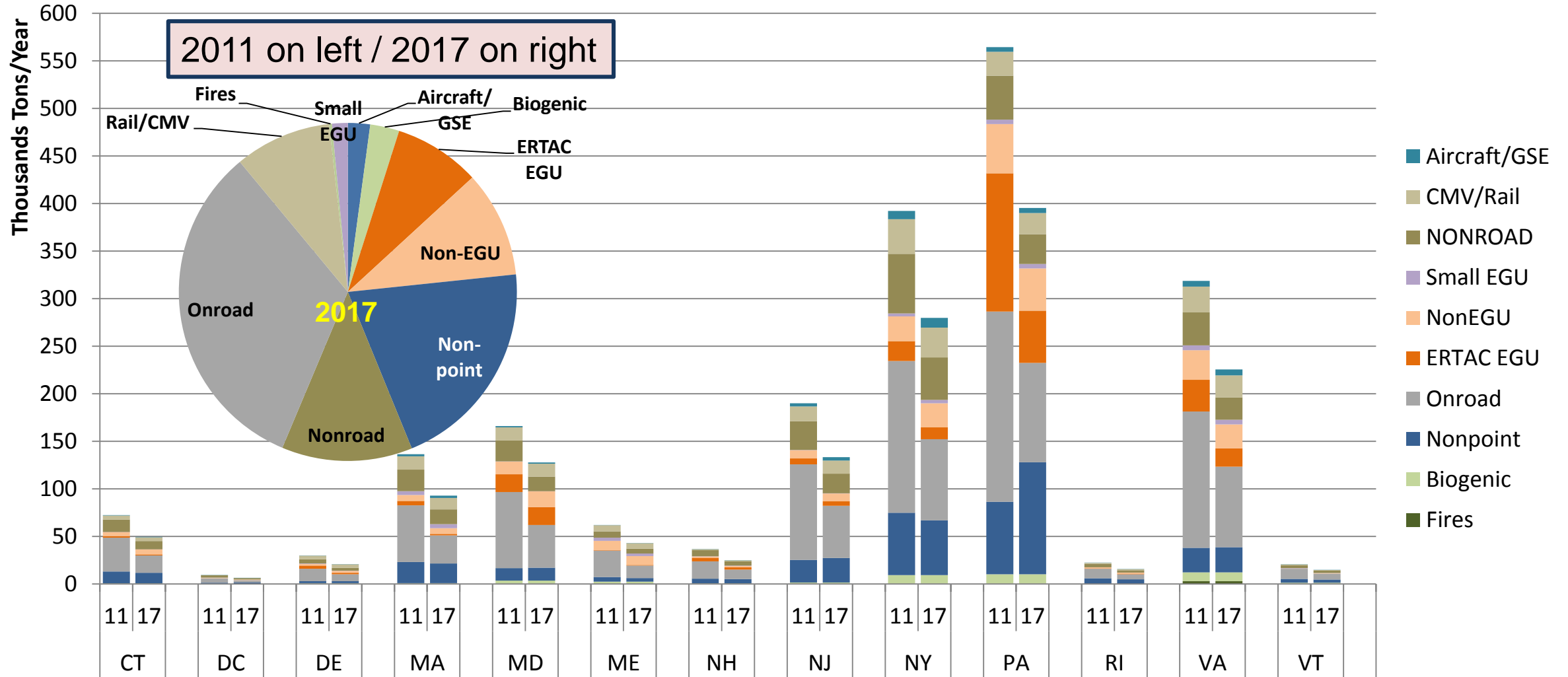
Overall NO<sub>x</sub> reduction from 2011 → 2017 ~ 29%



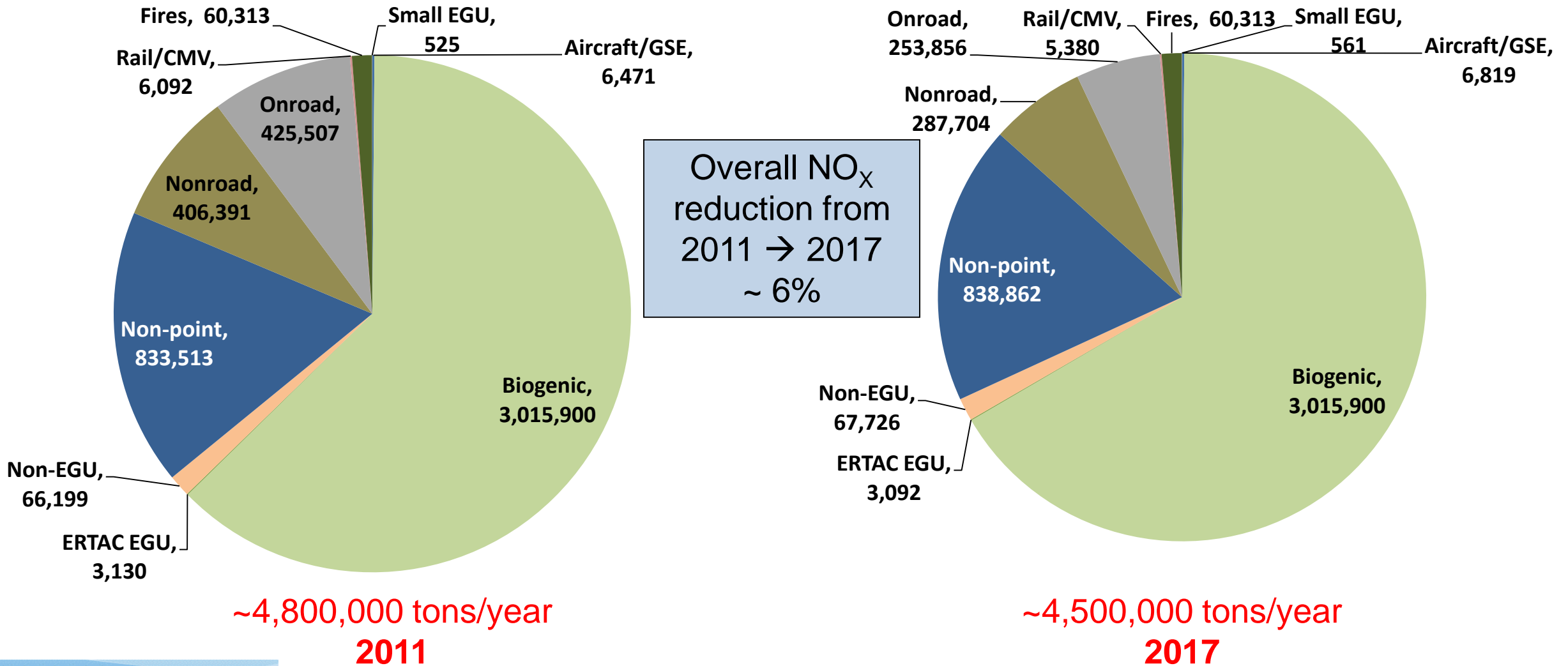
~1,400,000 tons/year  
**2017**



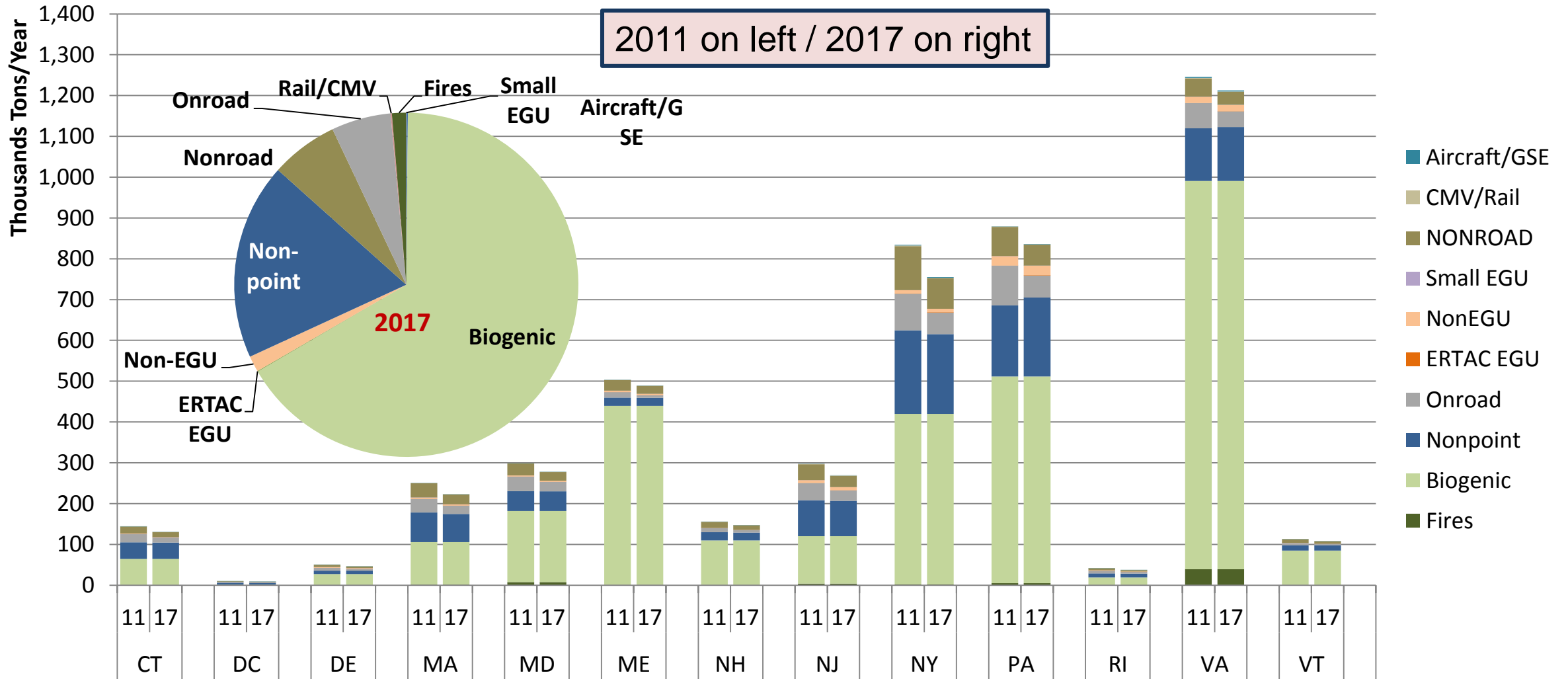
# Annual NO<sub>x</sub> Emissions Summary 2011 → 2017



# OTR+VA Annual VOC Emissions Summary 2011 → 2017



# Annual VOC Emissions Summary 2011 → 2017





# Photochemical Modeling

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- 2011 Beta Emission Inventory Base Case – Complete
  - Model performance meets applicable guidance
- 2017 Beta Emission Inventory Base Case – Nearing Completion
  - Results should be available at upcoming meetings
- 2028 Alpha2 emission Inventory Base Case – Being prepared
  - Results may be available at MANE-VU Fall Meeting
- A 2020 and/or 2023 interpolated screening run is under consideration for 2015 ozone NAAQS sensitivity modeling

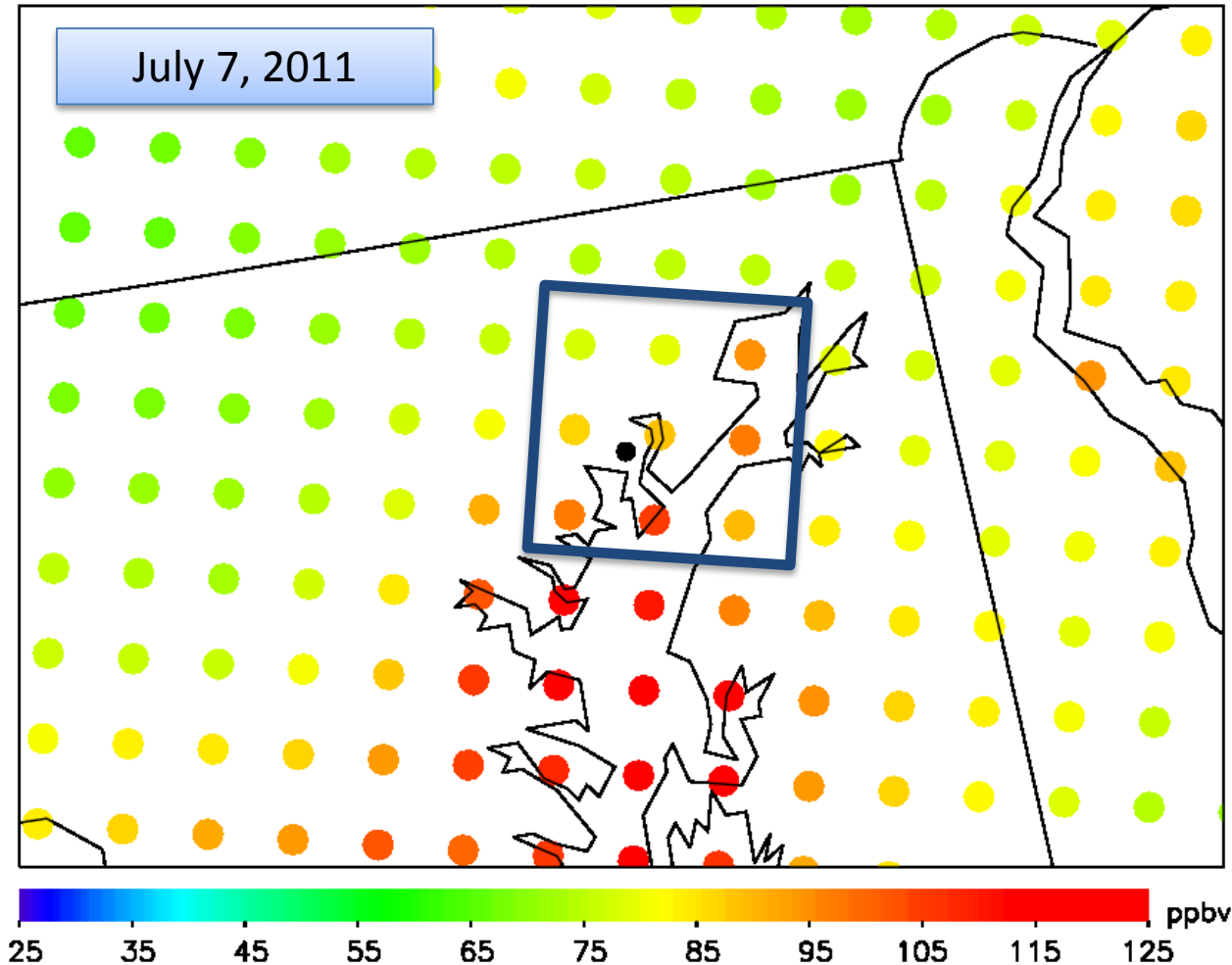
# Land-Water Interface Monitors

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- 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

# Design Values at Water/Land Interface

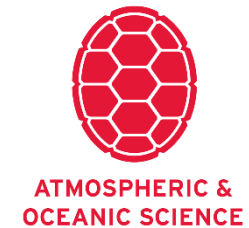
CAMx(Base) 8-hr Max Surface Ozone



Observed 8-hr Max:  
87 ppb

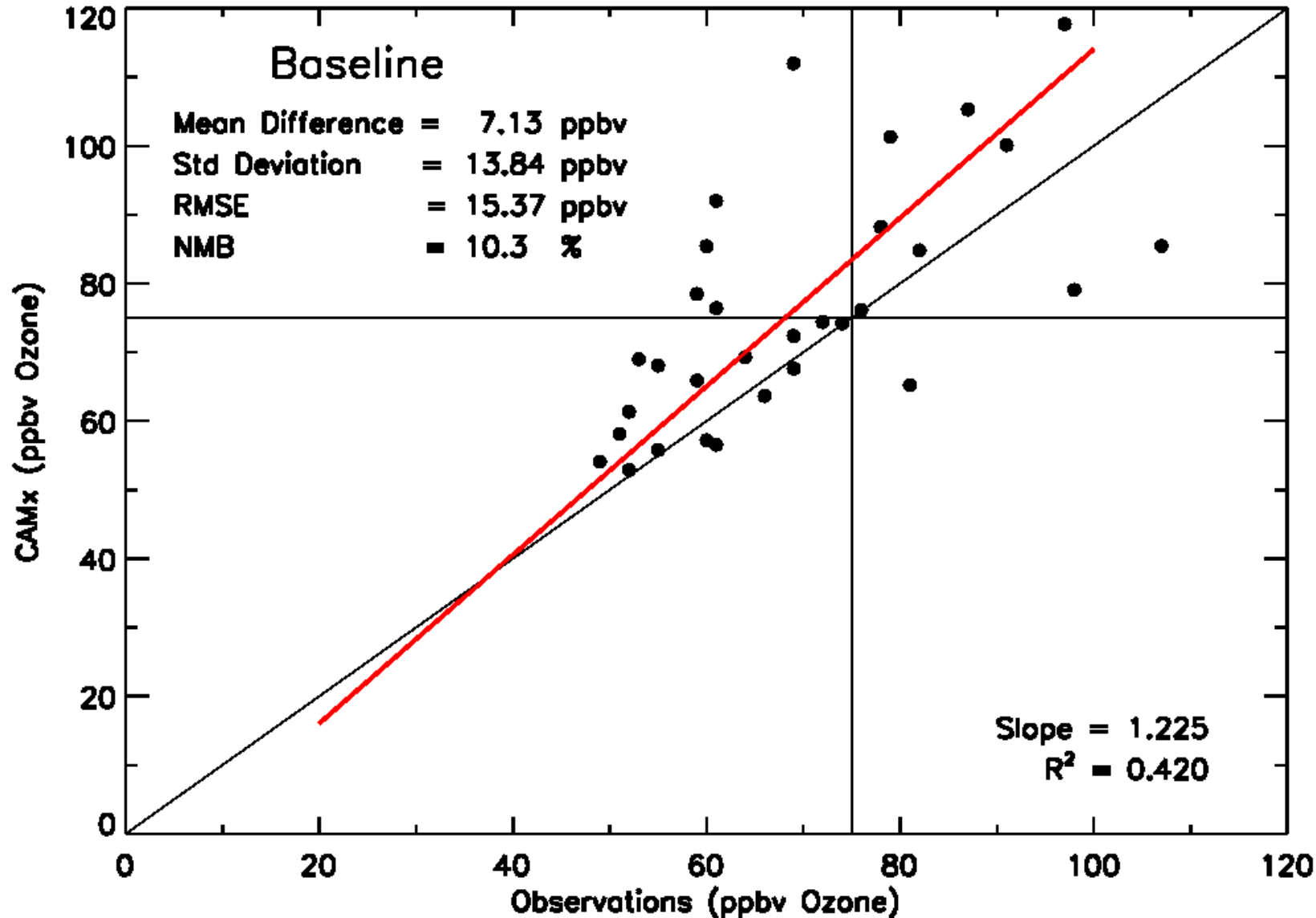
2011 8-hr Max Modeled O<sub>3</sub>

77.6	79.3	94.9
86.8	88.1	96.8
97.4	<b>105.3</b>	89.5

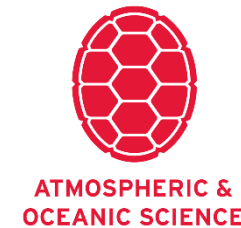


# Scatterplot of Ozone at Edgewood

Using the Maximum in the 3x3 Model Box

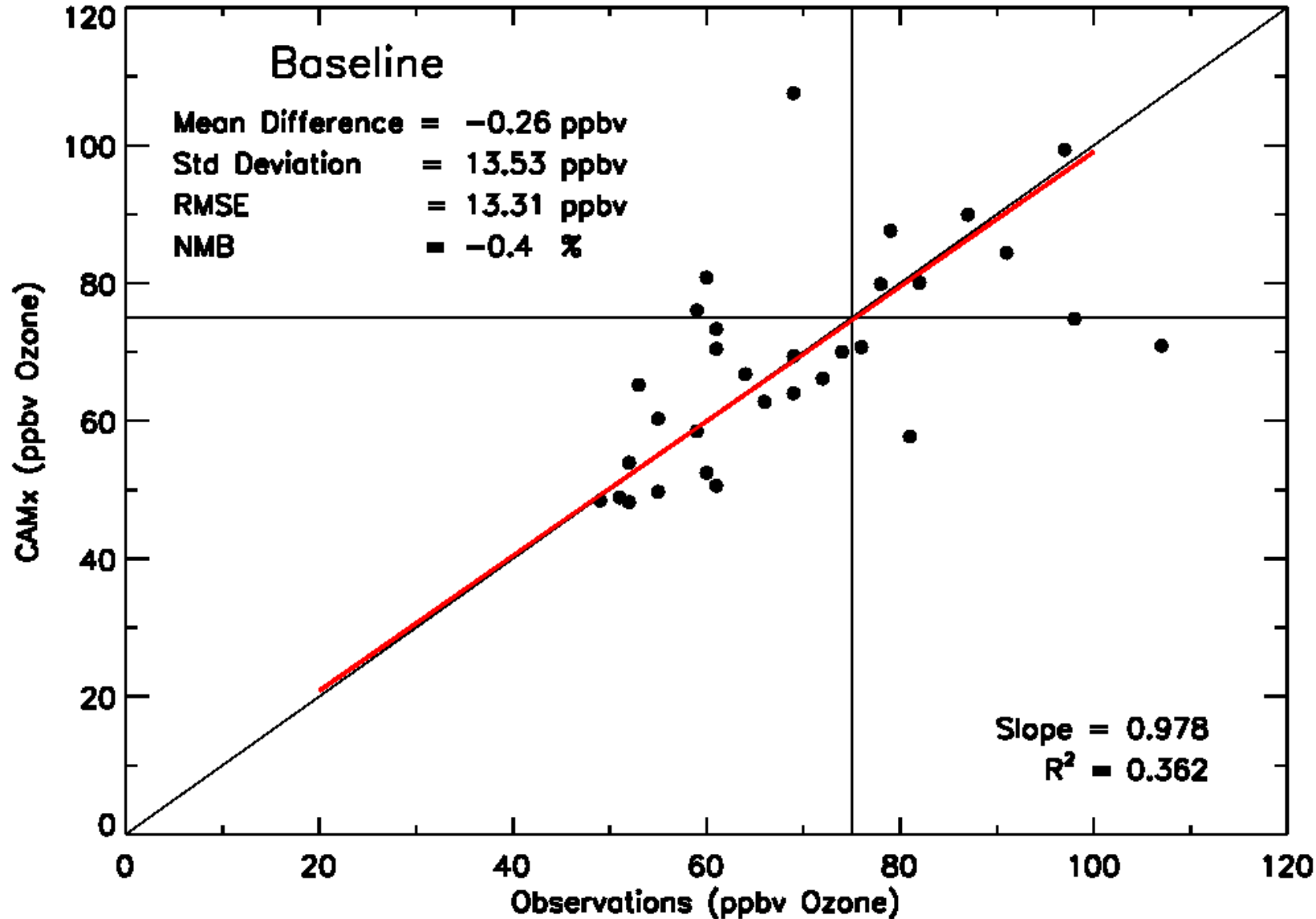


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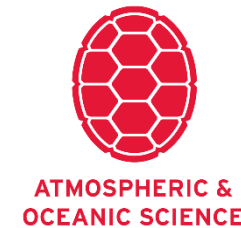


# Scatterplot of Ozone at Edgewood

Using the Closest Model Grid Point ONLY

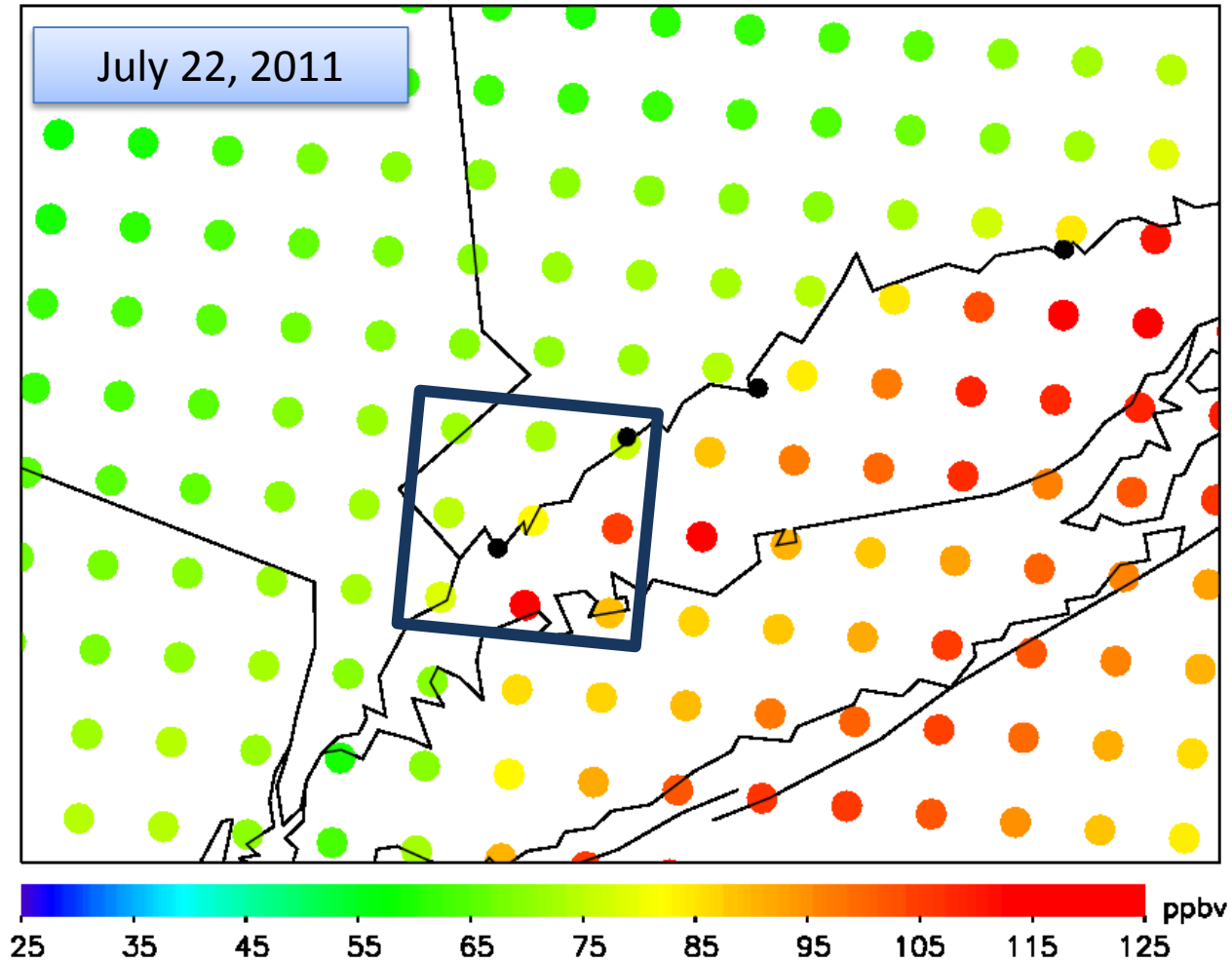


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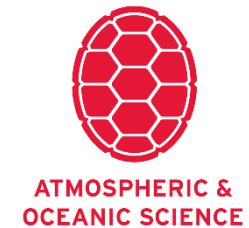


# Design Values at Water/Land Interface

CAMx(Base) 8-hr Max Surface Ozone



Same  
issues in  
Connecticut

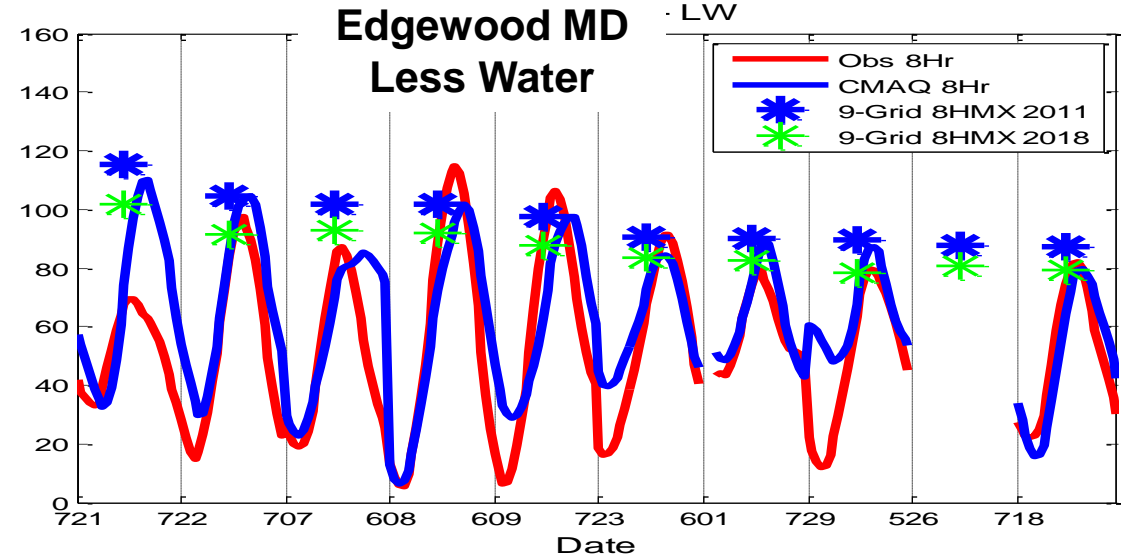
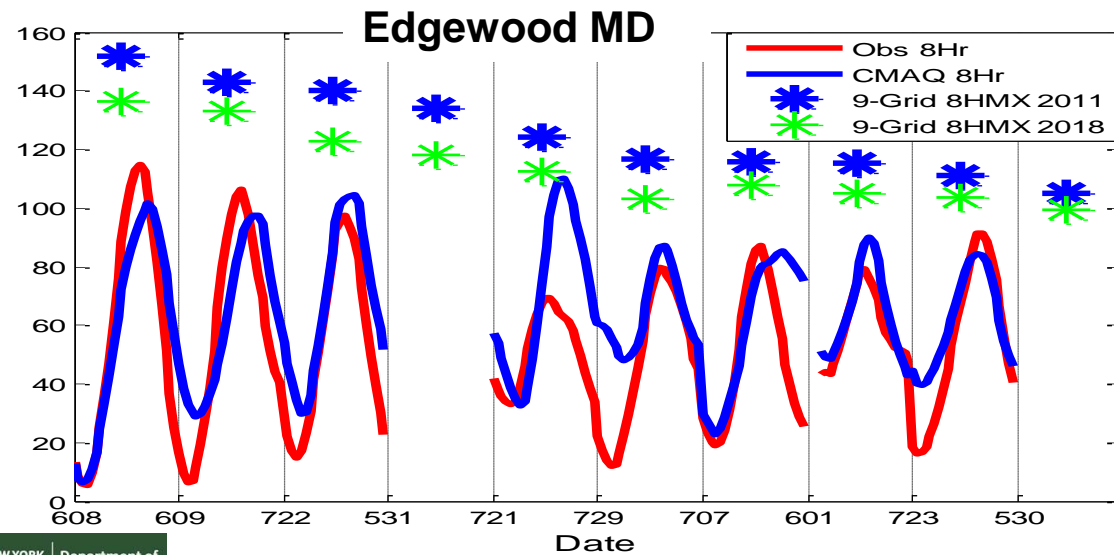
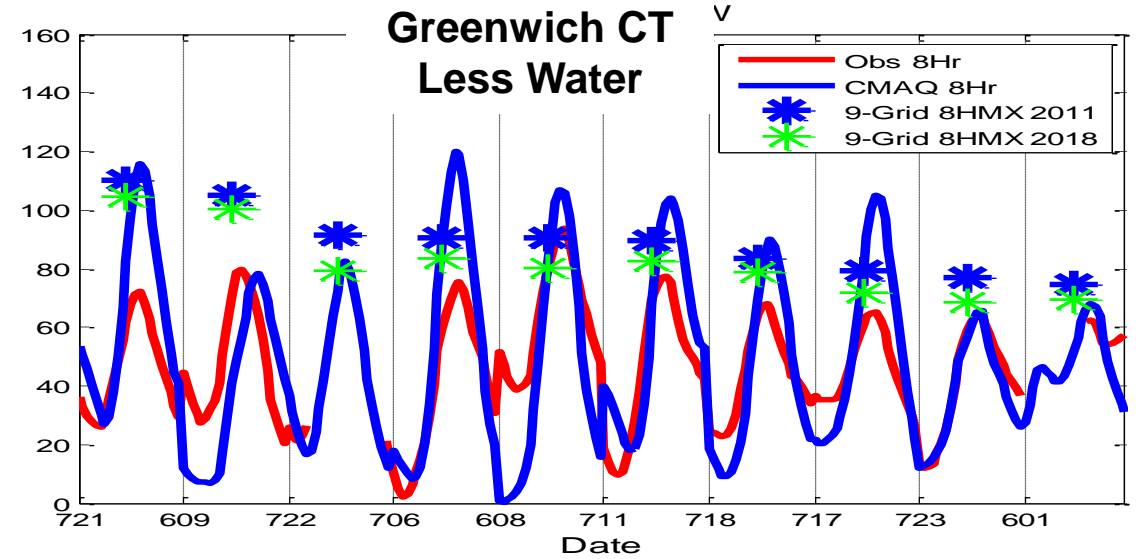
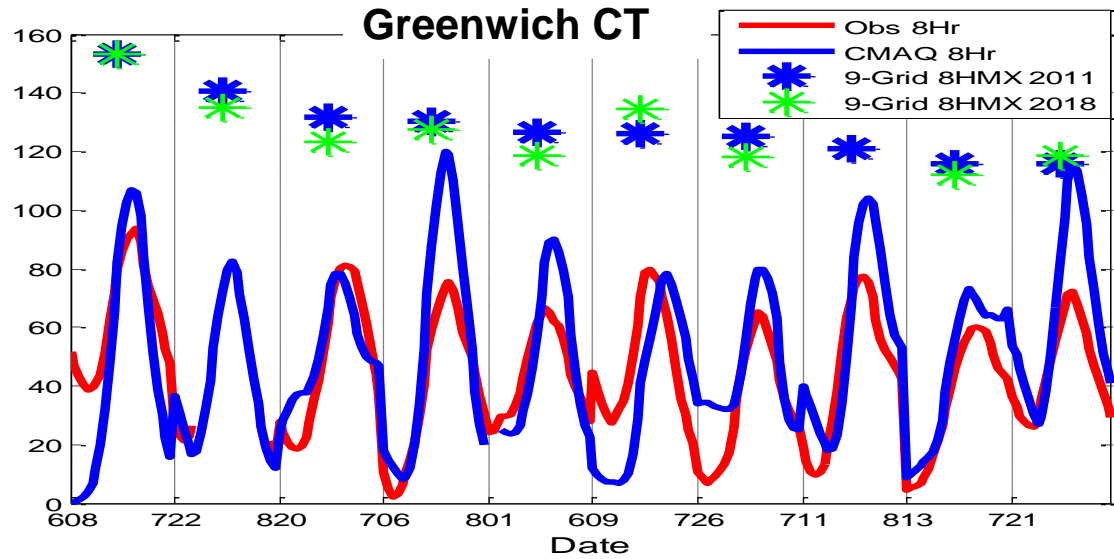


# A Different Approach: Removing Values Over Water

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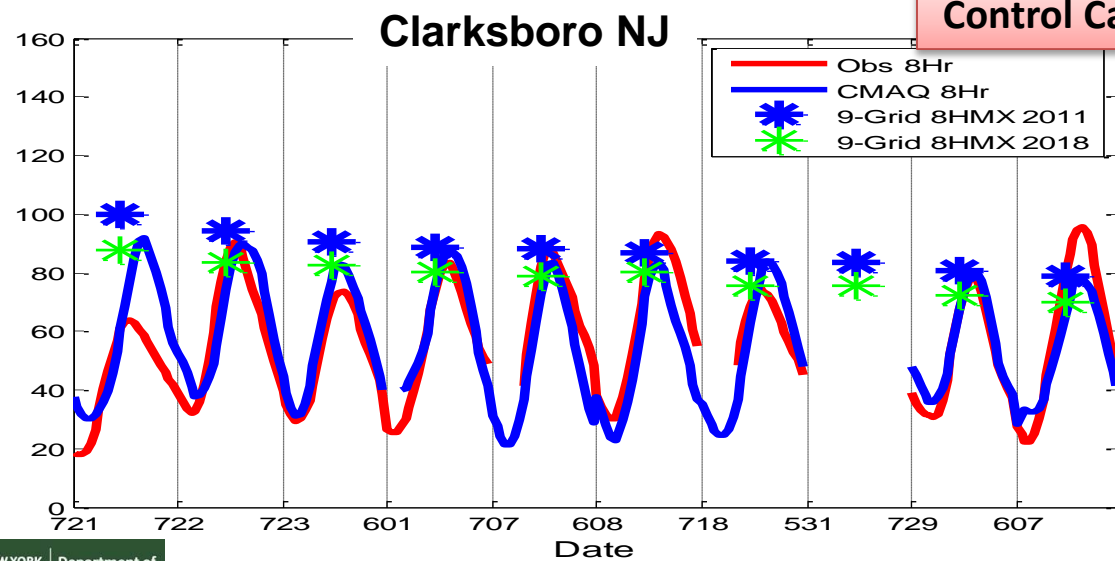
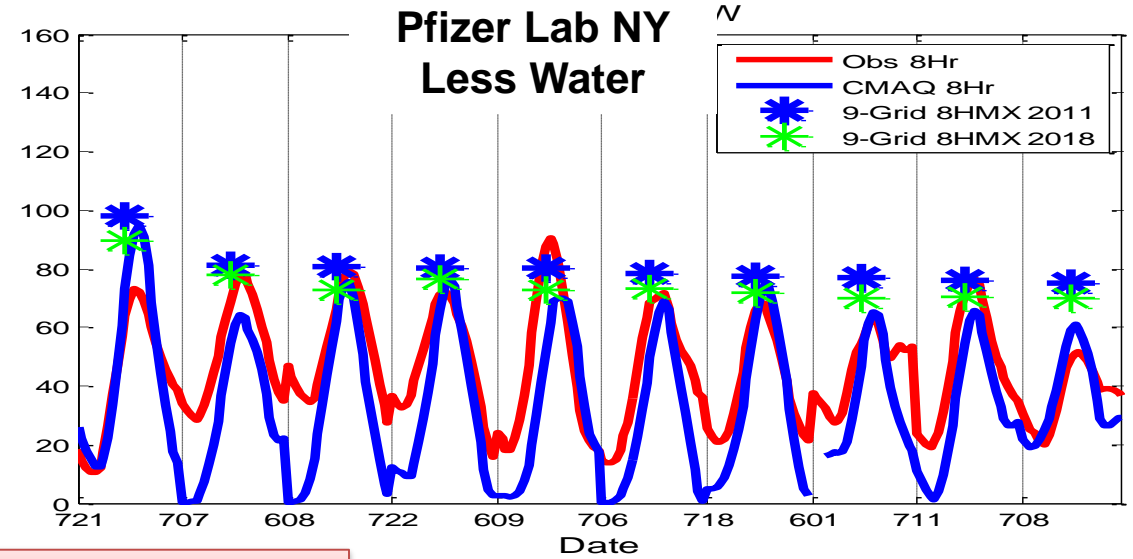
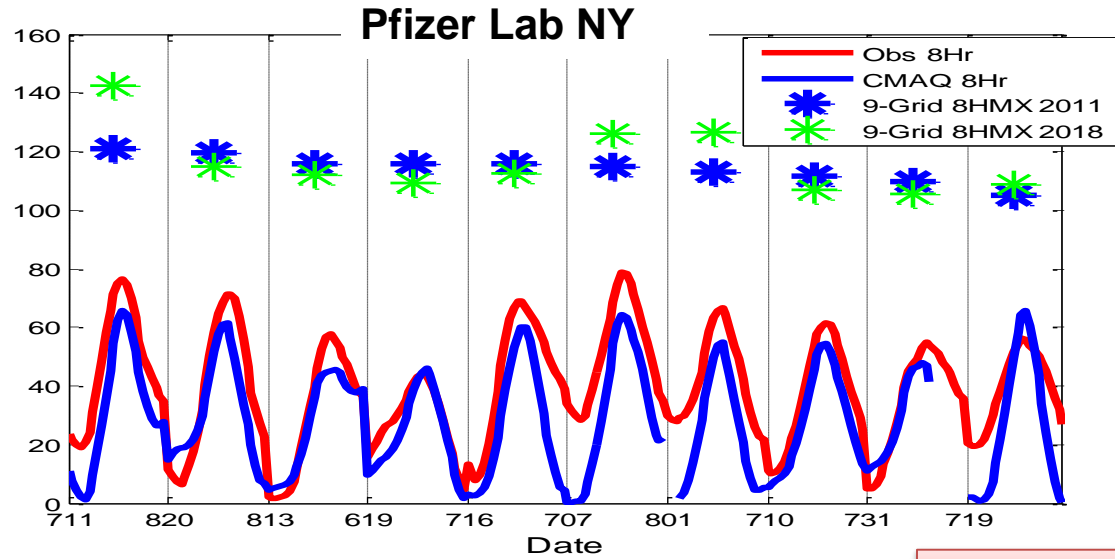
- CMAQ comes with a predefined grid cell mask for bodies of water
- Applying this mask, grid cells over water can be set to zero and thus do not influence design value calculation
- The same algorithm using the 3x3 grid cells can then be used to calculate values, while eliminating the overestimation due to water

# A Different Approach: Removing Values Over Water

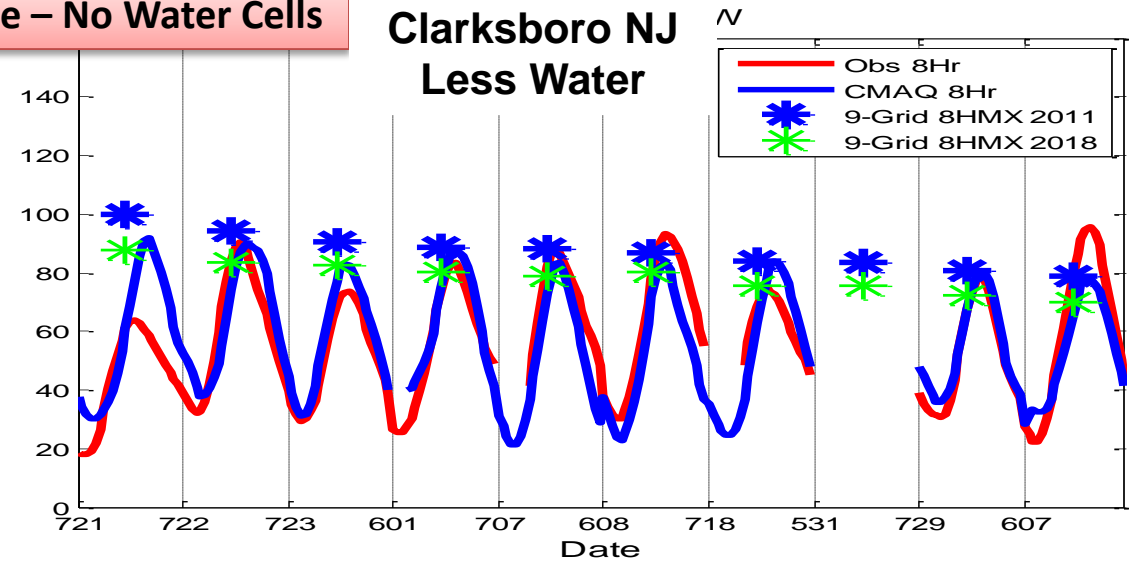




# A Different Approach: Removing Values Over Water



Control Case – No Water Cells



# Removing Values Over Water: Results at 10 Monitors

Monitor ID	State	2011 DVC	DVF 2018 (more water)	DVF 2018 (less water)
GREENWICH	CT	80.3	80	73
STRATFORD	CT	84.3	78	75
WESTPORT	CT	83.7	84	76
EDGEWOOD	MD	90	81	80
CLARKSBORO	NJ (control)	84.3	75	75
PFIZER LAB	NY	74	75	68
NYC-QUEENS	NY	78	78	73
NYC-SUSAN WAGNER HS	NY	81.3	77	73
BABYLON	NY	83.3	82	78
WHITE PLAINS	NY	75.3	78	68

# Near Water Monitor Conclusions

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- Location REALLY matters when near the coast!
  - Single 12 km grid cells may be more representative of shoreline locations than the 3x3 method suggested by EPA
- If we are to use the 3x3 method (recommended in EPA Guidance), it should be supplemented with Design Values calculated with a modified technique that consider topography
  - DVs can vary by >4 ppb between adjacent grid cells
- Removing water cells provides a sound alternative as well

# Conclusions/Next Steps

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- The 2016 ozone season has brought similar ozone exceedances as 2015 in the OTR
- The 2011 and 2017 MARAMA Beta emission inventories are complete and being modeled
- The 2017 MARAMA Beta NO<sub>x</sub> inventories are slightly lower than the 2018 MARAMA Alpha2 inventories
- Sensitivity modeling indicates that special care of relative reduction factor calculations needs to be taken for monitor locations near coastlines
- More modeling results coming this fall!

# Questions

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- Committee Chair:
  - Jeff Underhill (NH)  
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- Emissions Inventory Lead:
  - Julie McDill (MARAMA)  
[jmcdill@marama.org](mailto:jmcdill@marama.org) (443) 901-1882
- OTC Committee Lead:
  - Joseph Jakuta  
[jjakuta@otcair.org](mailto:jjakuta@otcair.org) (202) 508-3839