Modeling Committee

Annual Meeting

June 13, 2013

New Haven, CT

OZONE TRANSPORT COMMISSION

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Overview

1. Ozone Season Review
2. Level 3 Screening
    1. Emissions Inventory
    2. Model Performance
    3. Model Results

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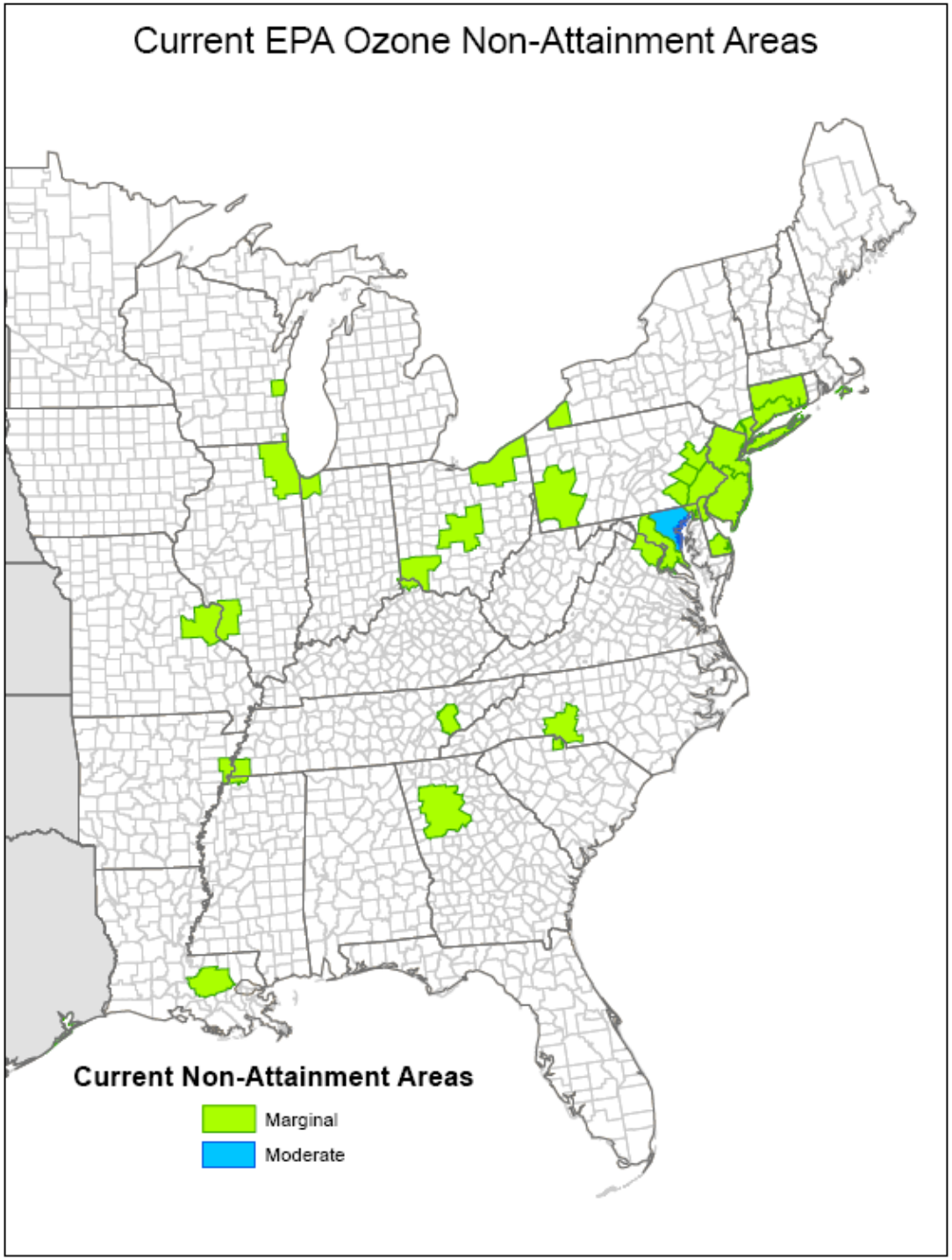
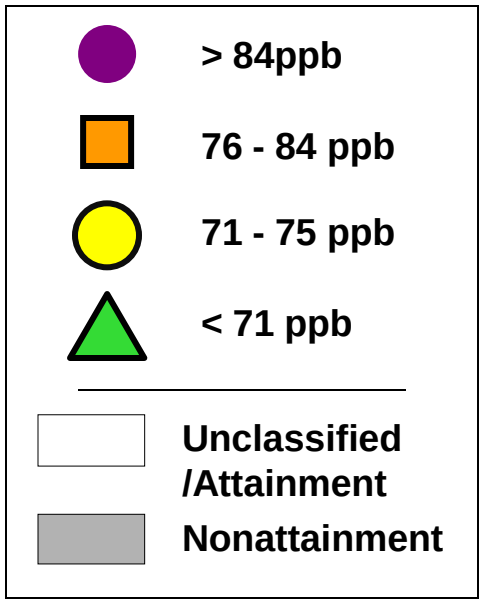
OZONE DESIGN VALUE UPDATE

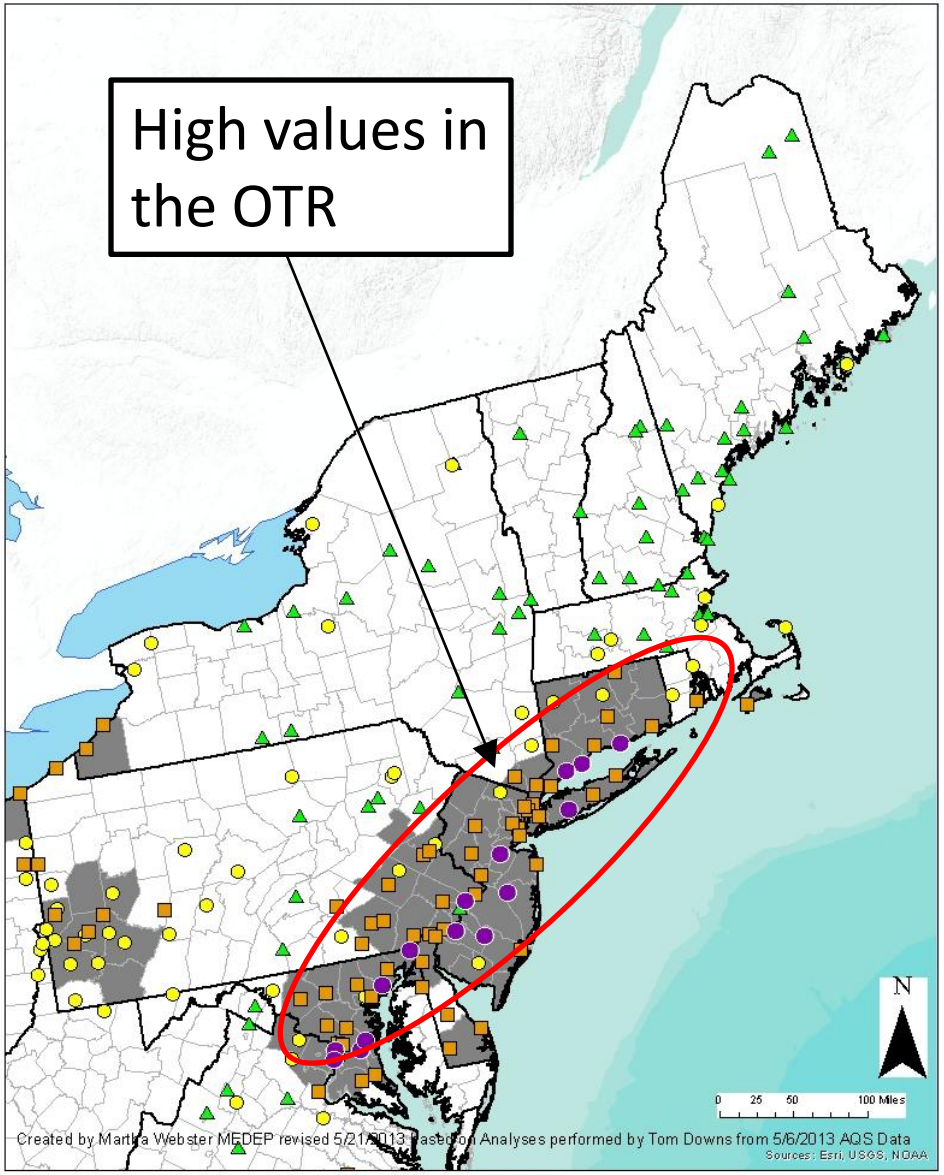
Ozone Nonattainment (2008 NAAQS)



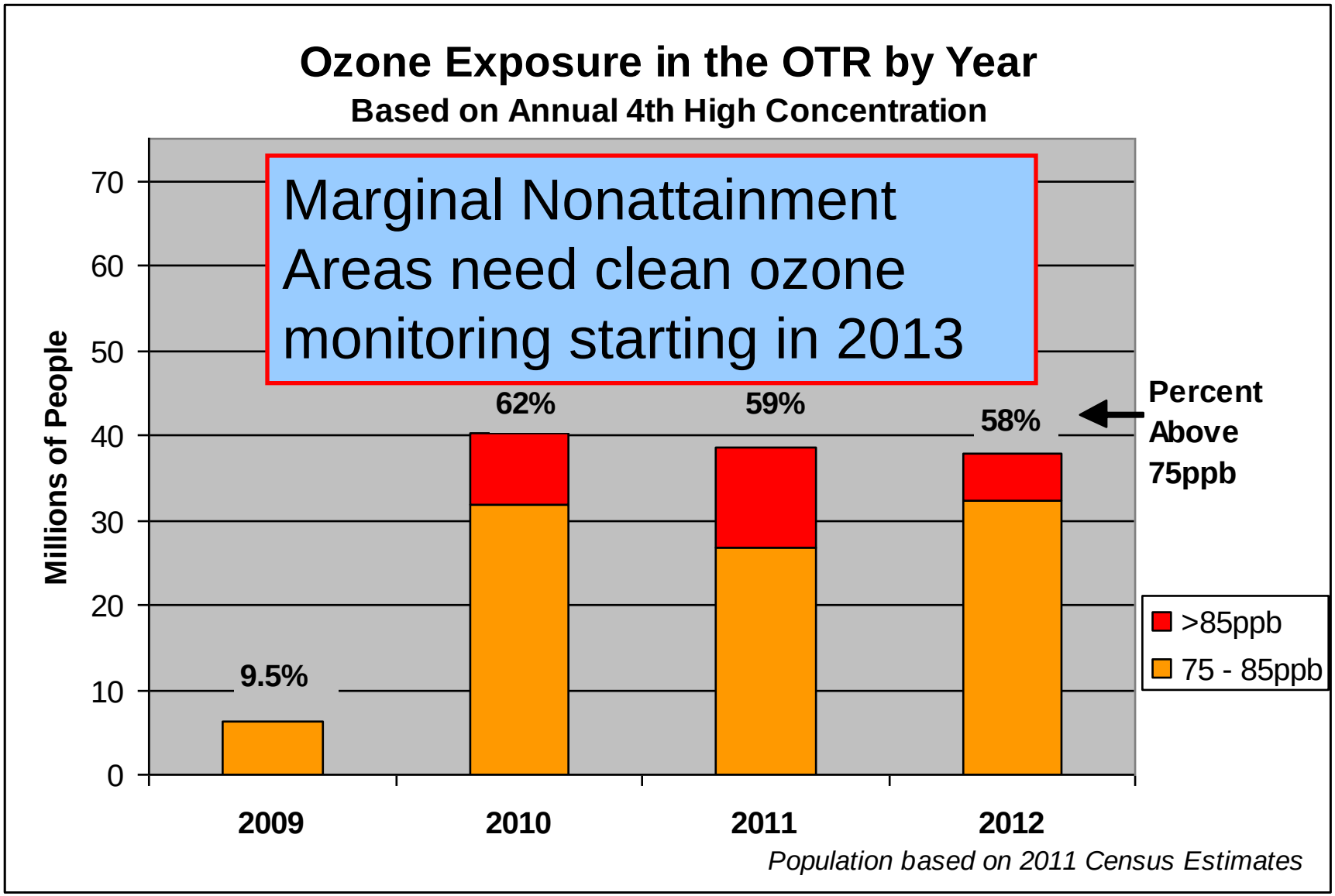
2012 Ozone Design Values

3-Year average of the 4th high concentration for 2010, 2011, 2012



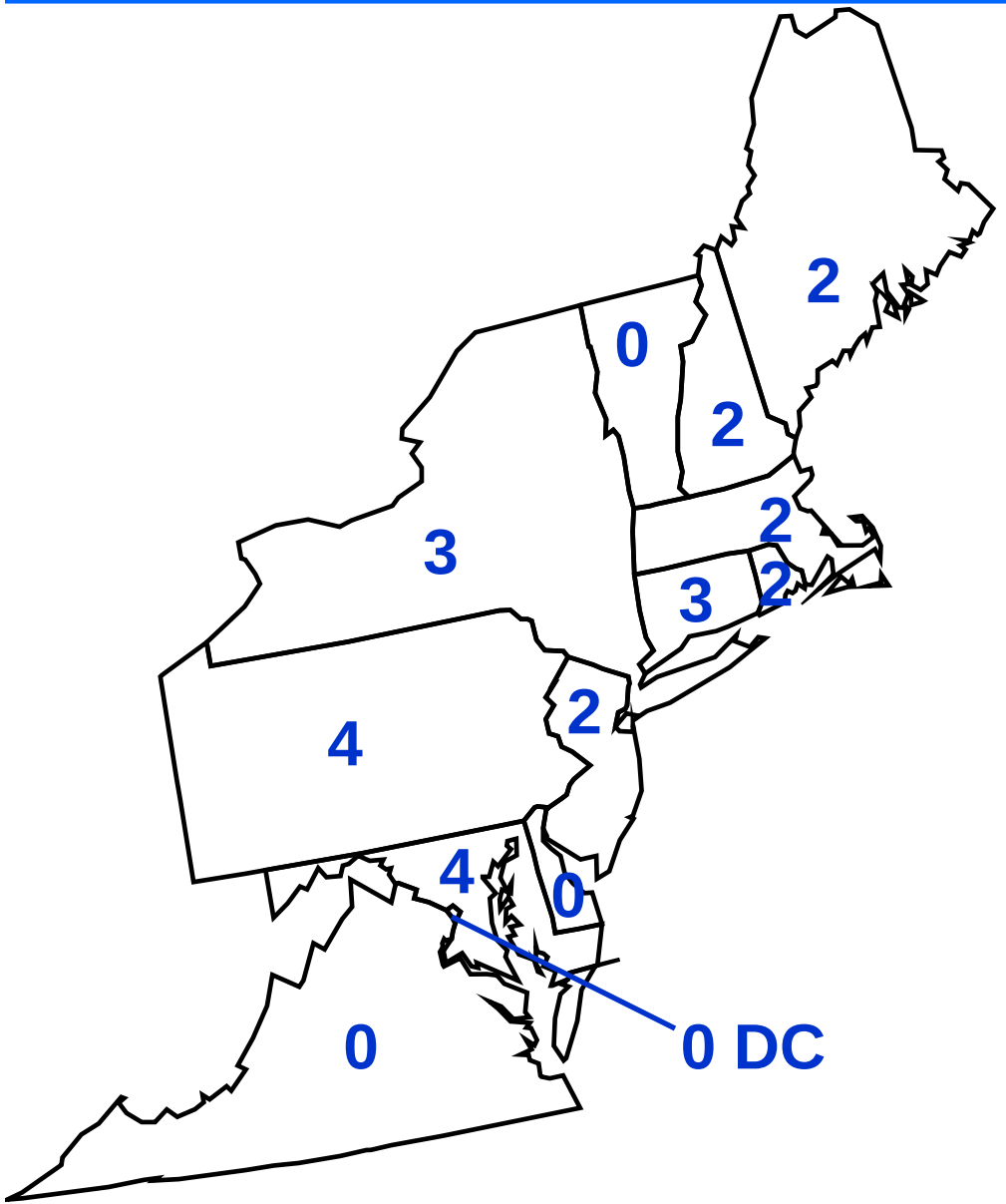


Ozone Exposure in the OTR

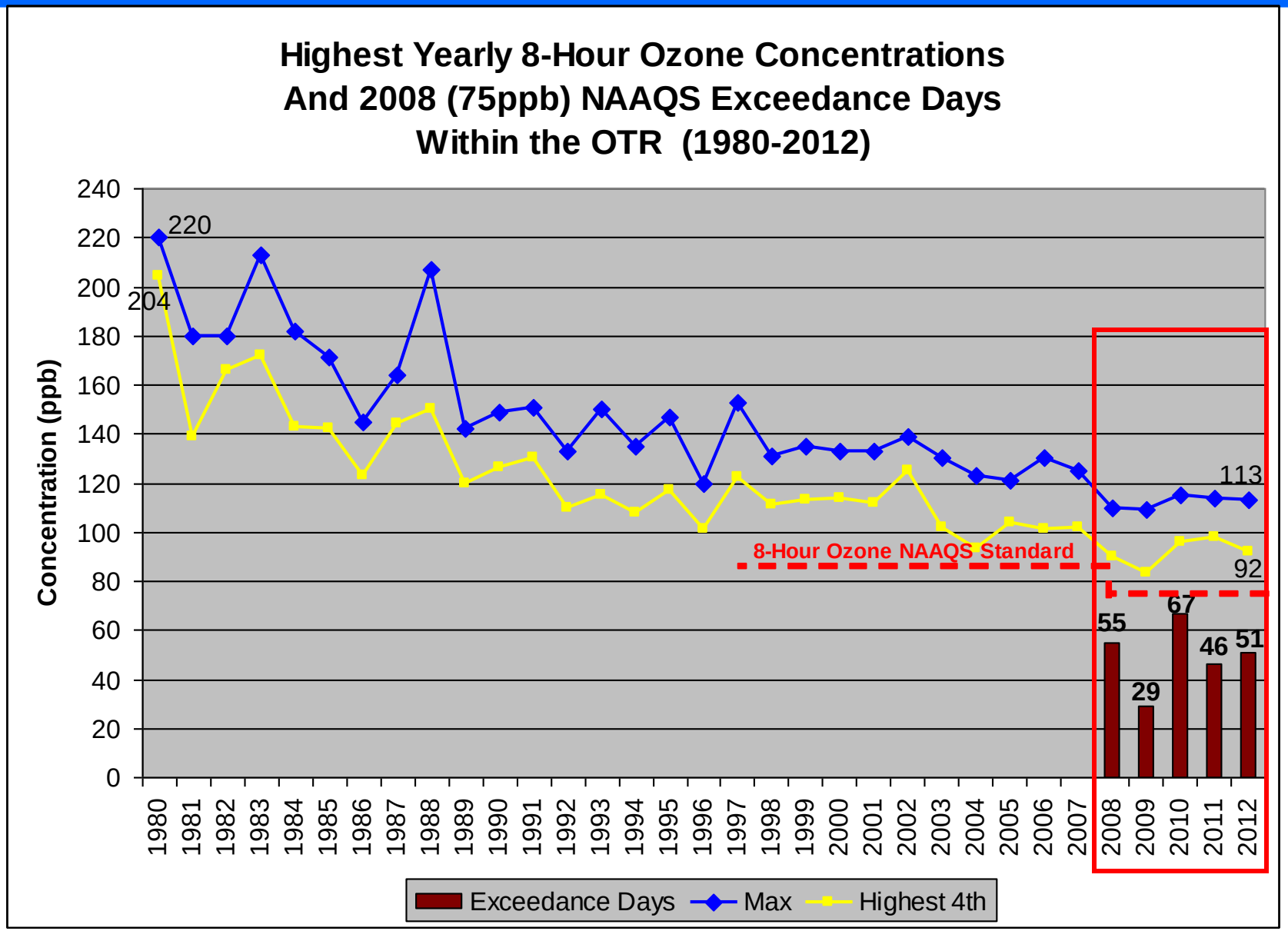


2013 Ozone Exceedances (2008 NAAQS)

As of June 9, 2013

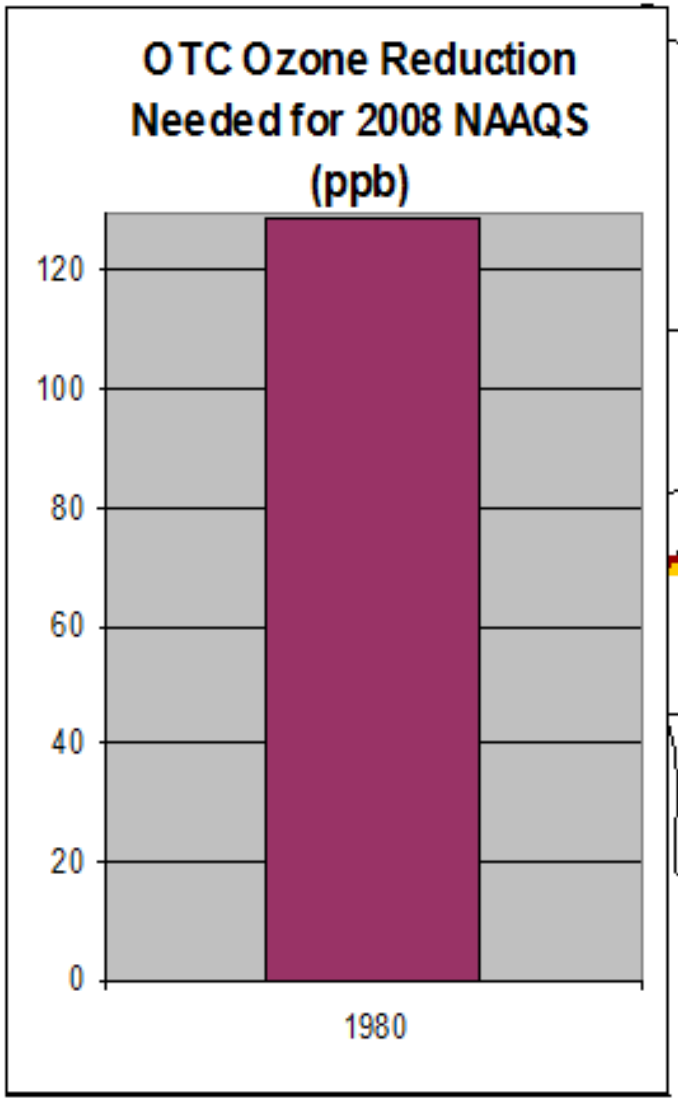


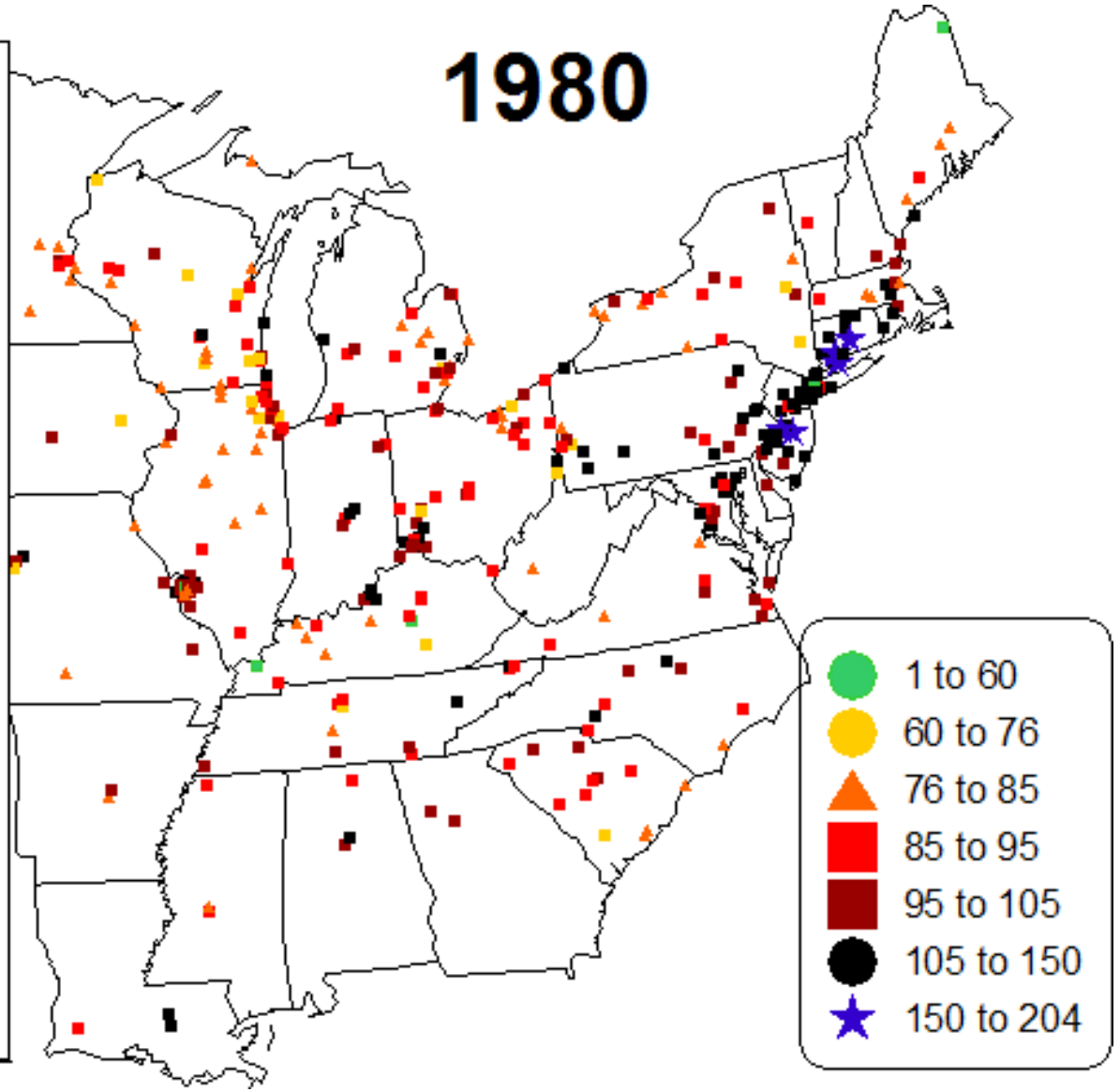
Ozone is Down About 50% Since 1980



Ozone Progress Since 1980

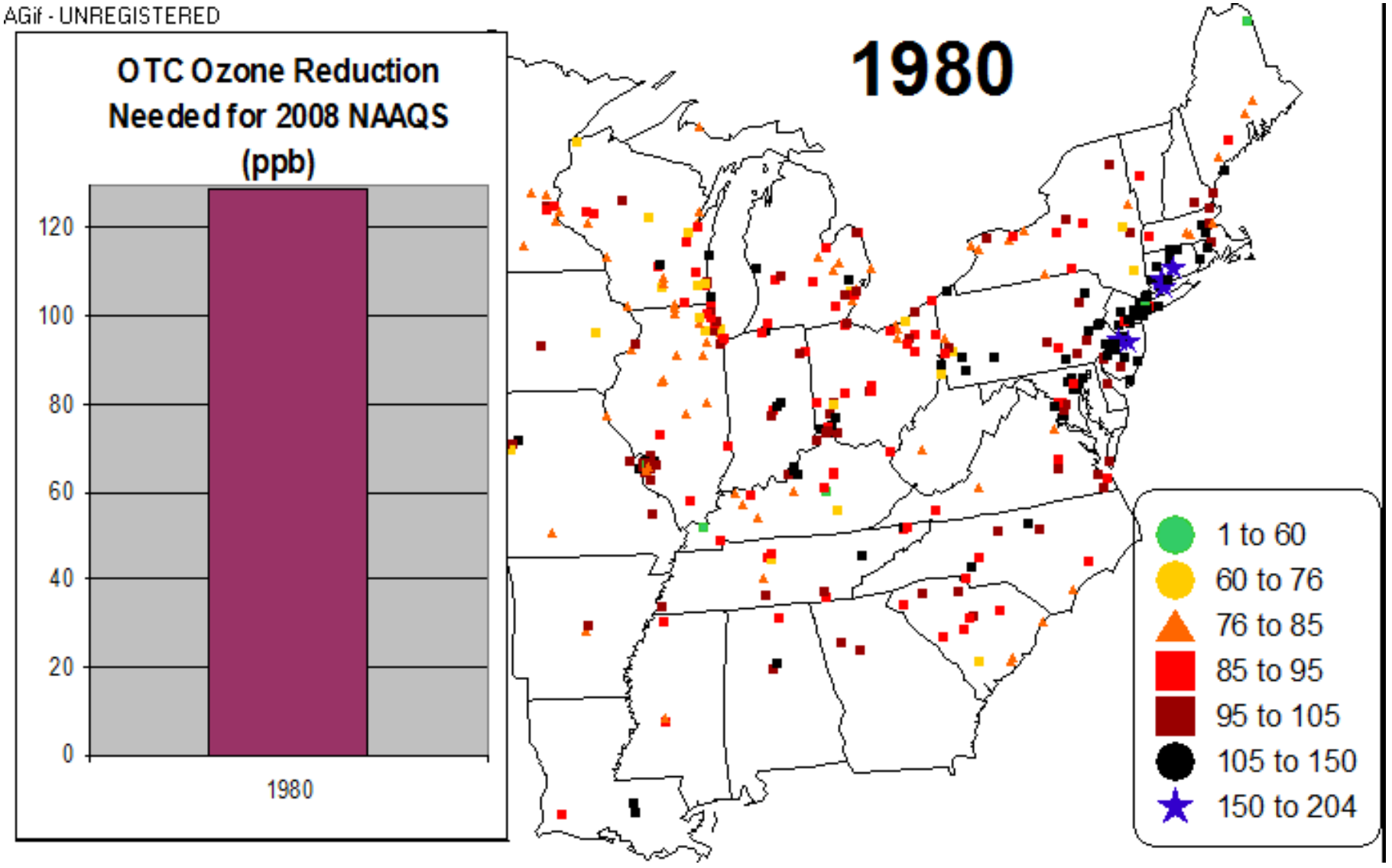
(4th Max 8-Hour)



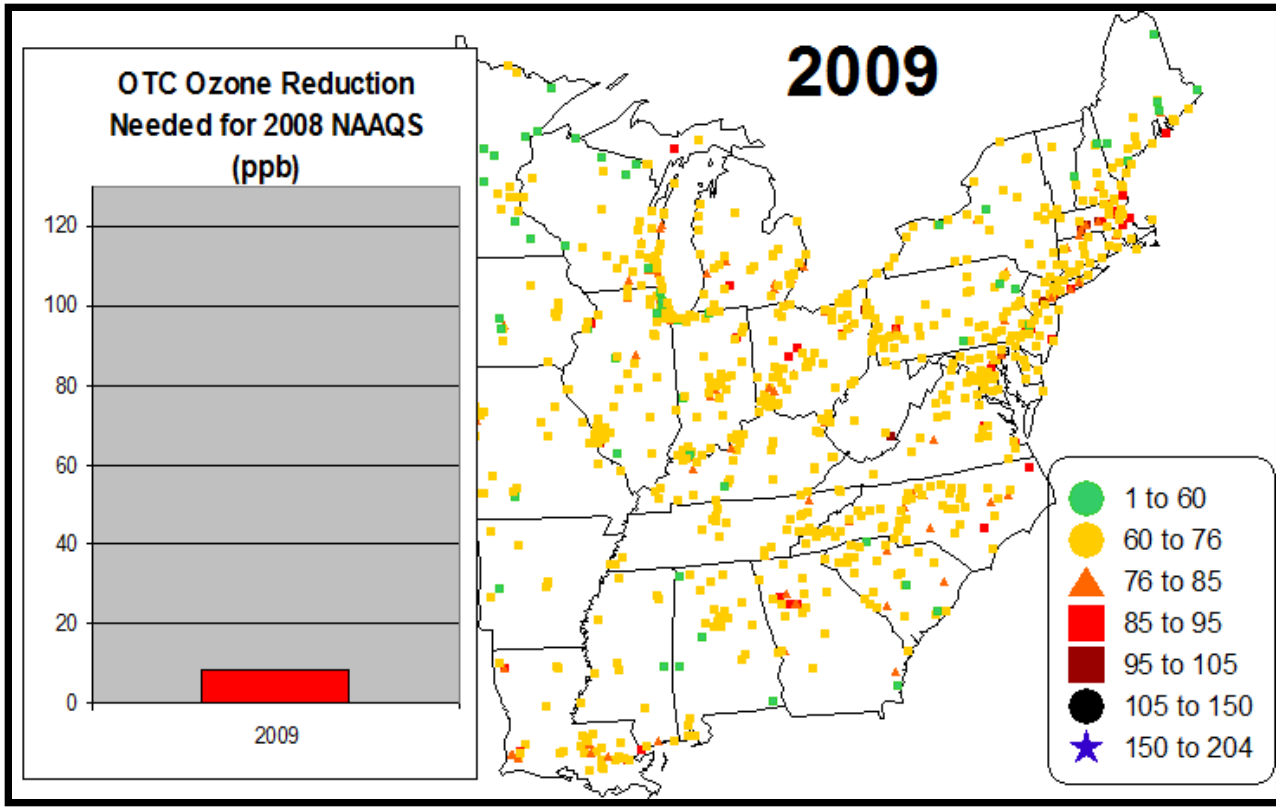


Ozone Progress Since 1980

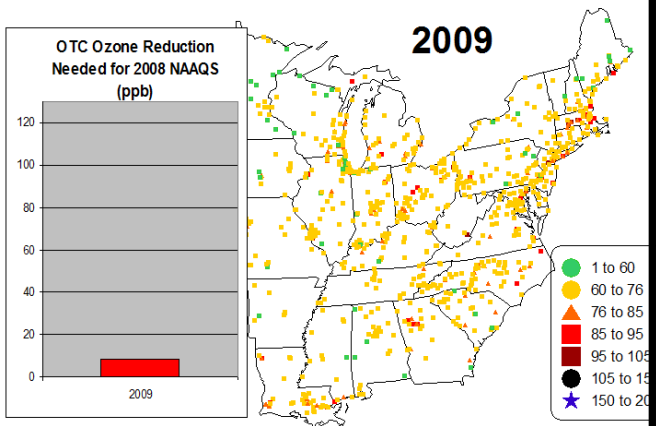
(4th Max 8-Hour)

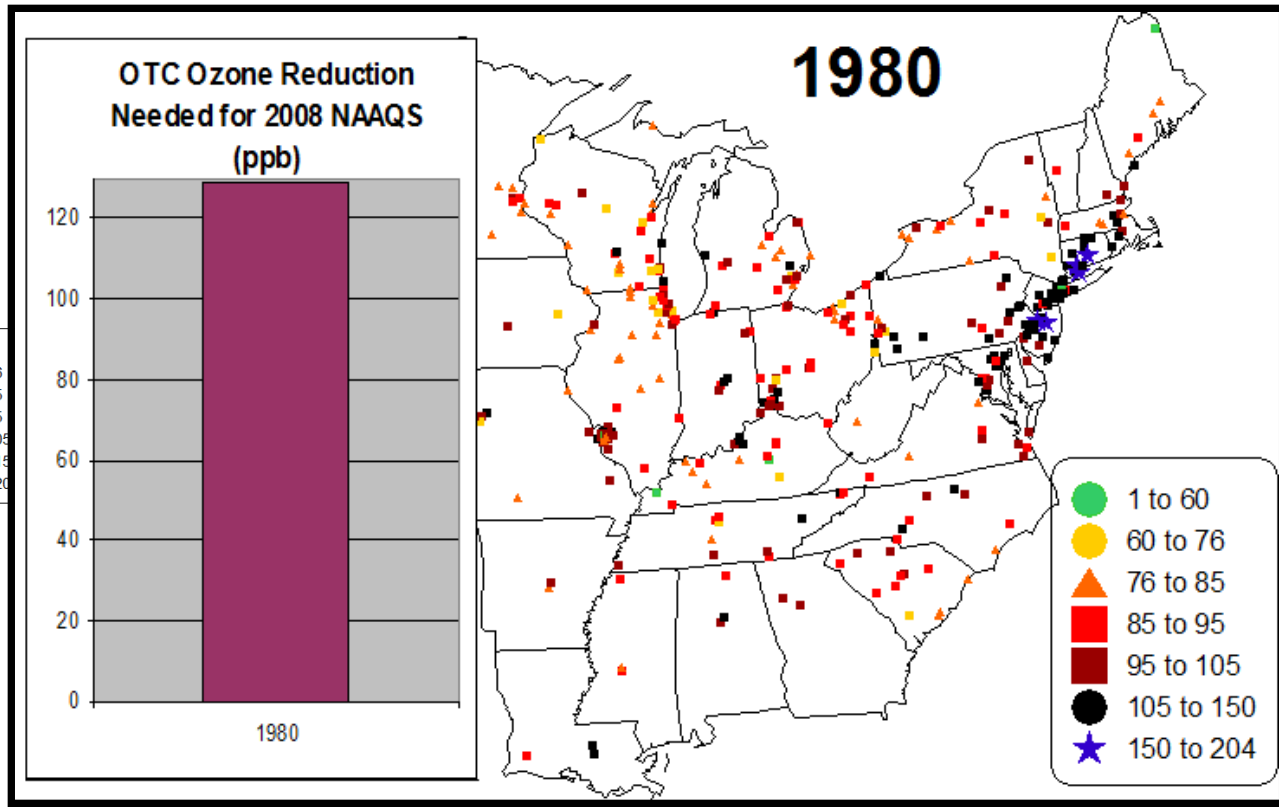


The Good! (2009)

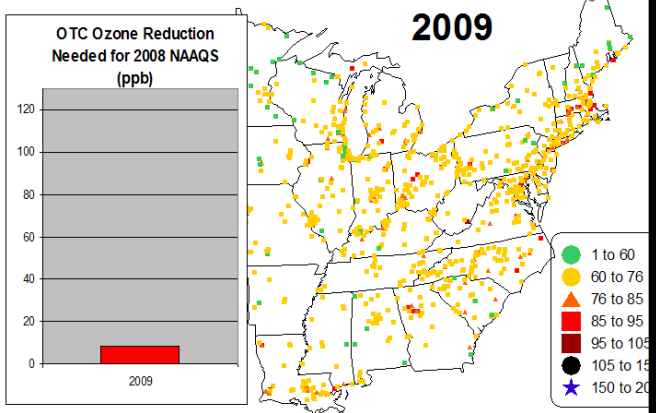


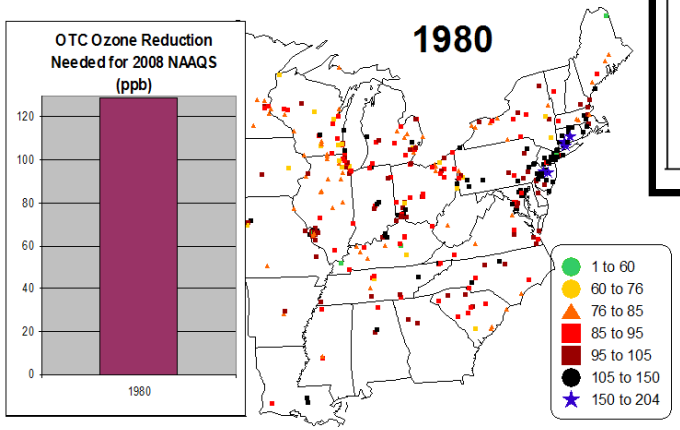
The Bad! (1980)

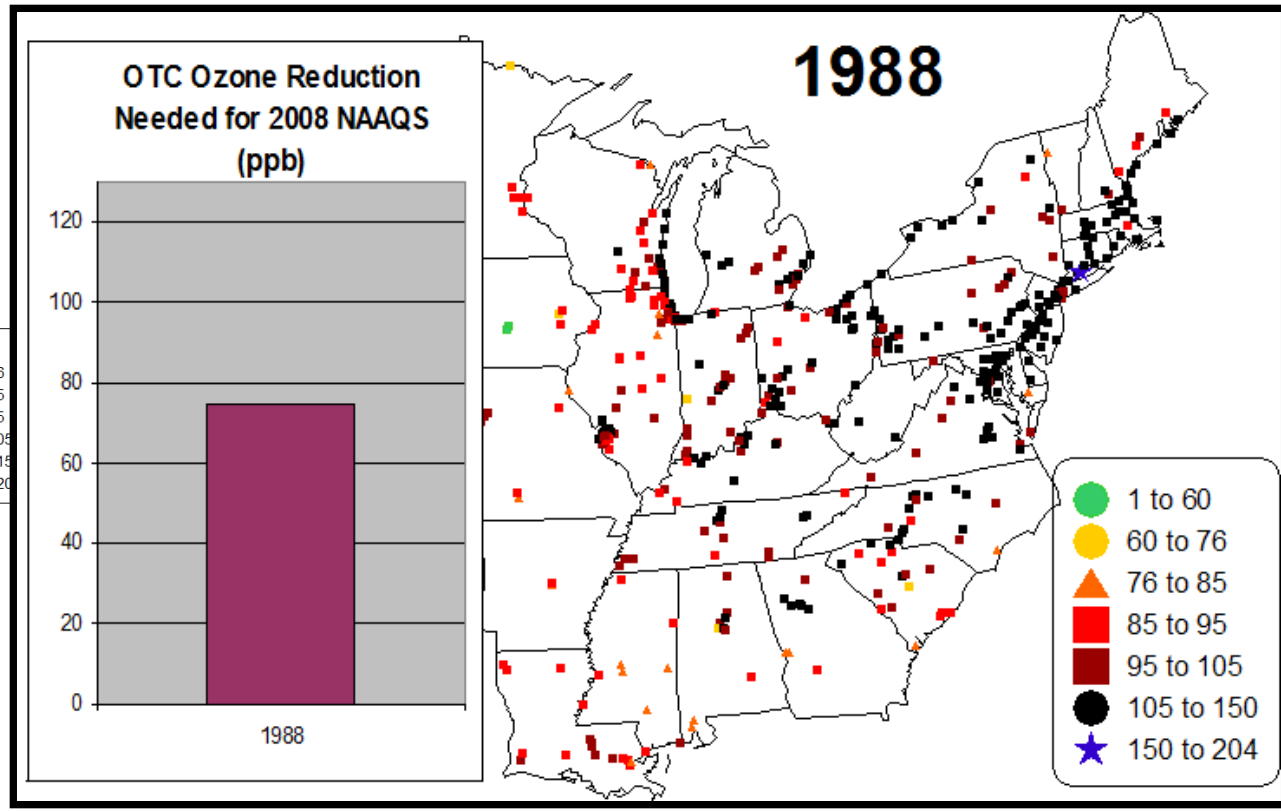

OTC Ozone Reduction Needed for 2008 NAAQS (ppb)
120
100
80
60
40
20
0
2009
2009
1 to 60
60 to 76
76 to 85
85 to 95
95 to 105
105 to 15
150 to 20


OTC Ozone Reduction Needed for 2008 NAAQS (ppb)
120
100
80
60
40
20
0
1980
1980
1 to 60
60 to 76
76 to 85
85 to 95
95 to 105
105 to 150
150 to 204

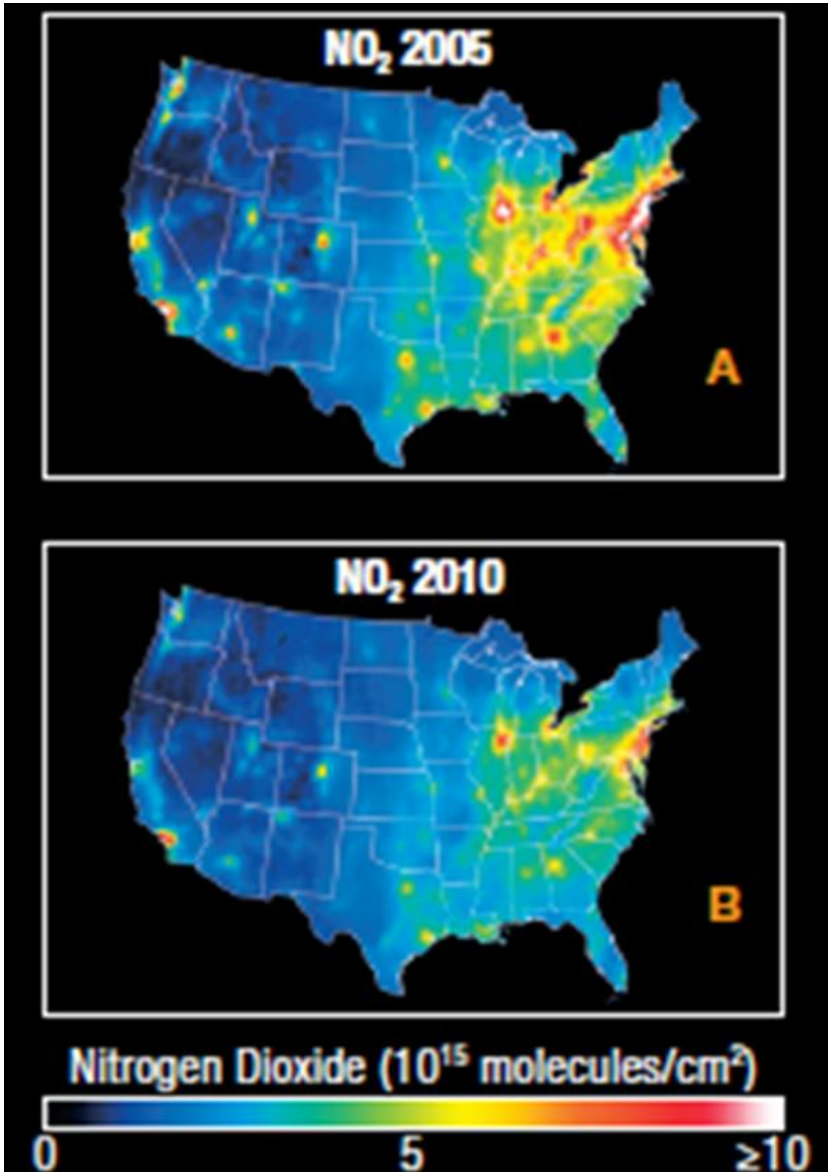
The Ugly! (1988)

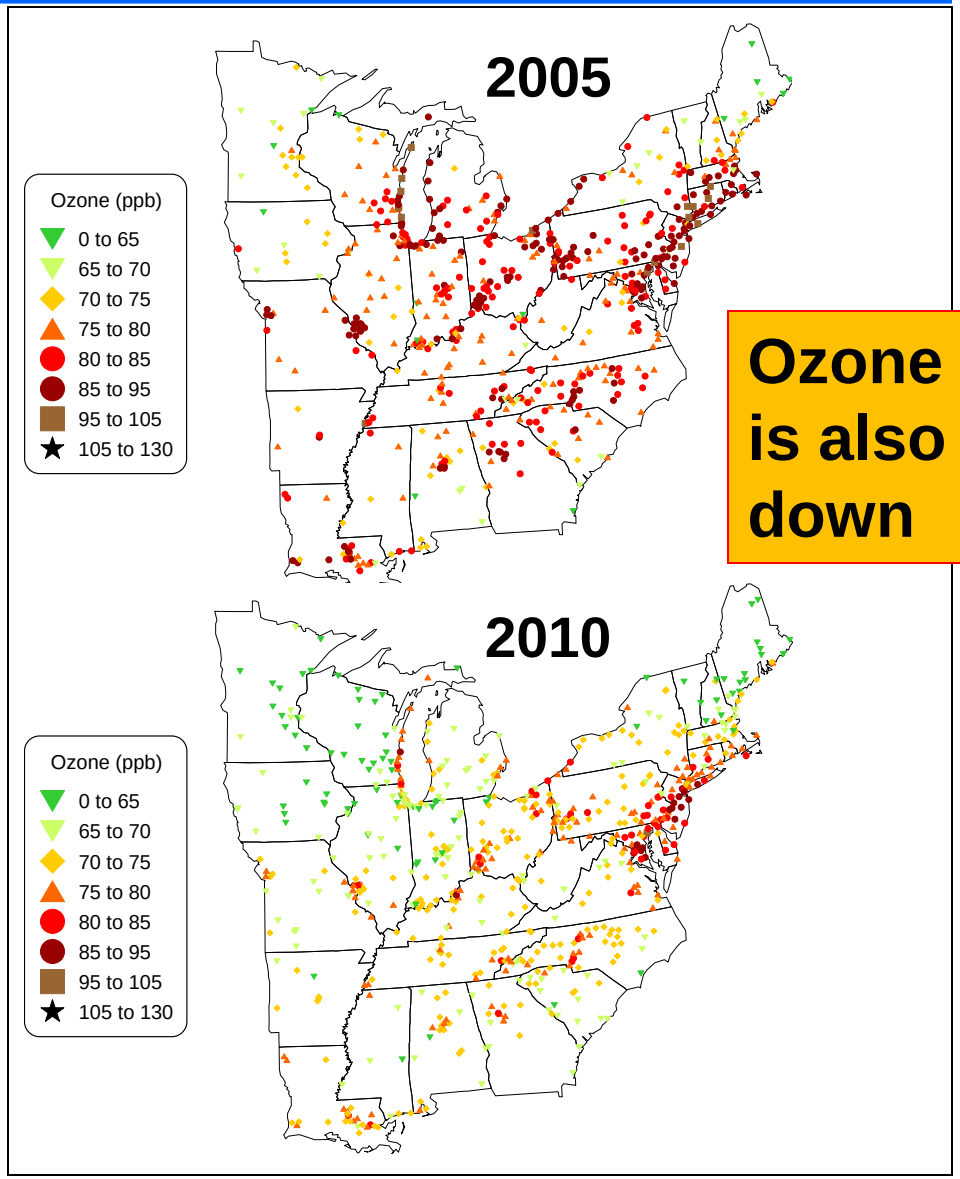






NO_2 Detected by Satellite





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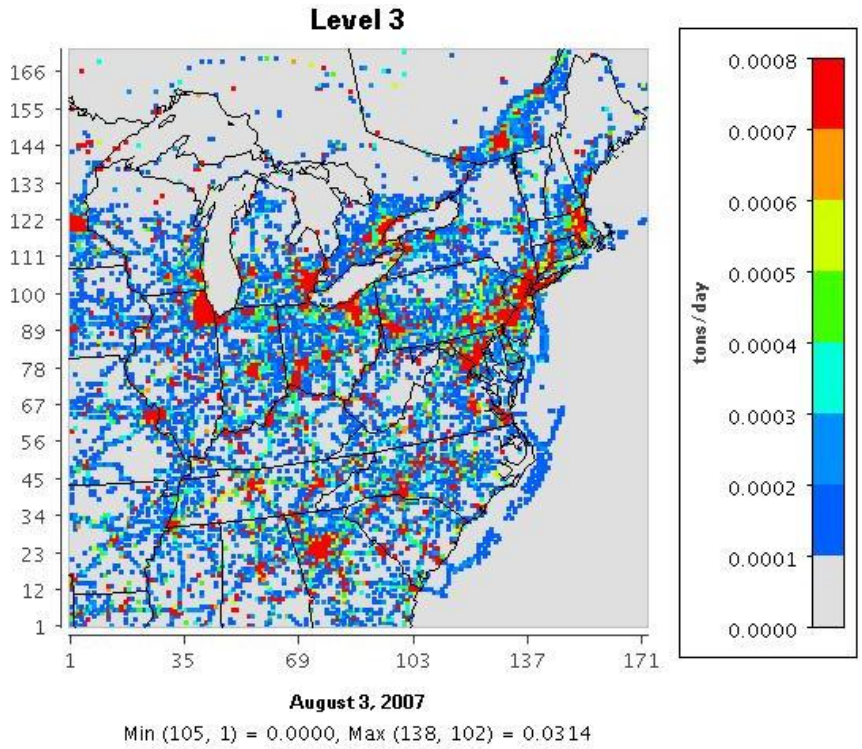
LEVEL 3 SCREENING

2007 Base Case
Emission Inventory Summaries

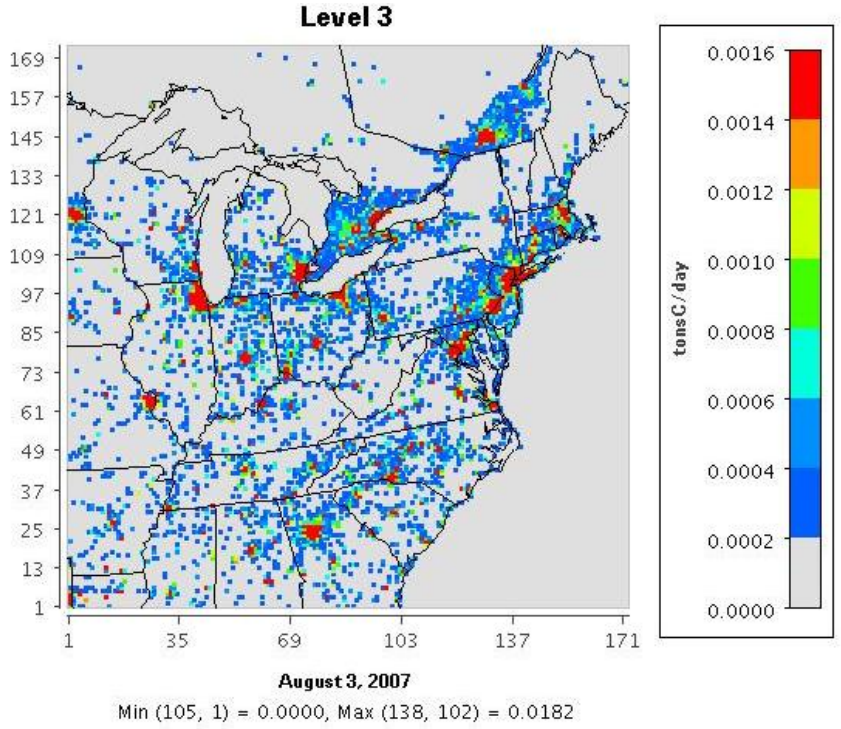
Level 3: Total Anthropogenic Emissions

August 3, 2007

NO_X



VOC



Emission Inventory Special Cases

- High Electricity Demand Days
  - Better account for emissions on worst days

- ERTAC EGU Projection Tool
  - Non-proprietary
  - Better management projection assumptions

- Oil and Gas Emissions
  - Potentially a significant sector in the future
  - Locations and magnitude of emissions to be developed

ERTAC EGU and IPM Models

ERTAC EGU Tool

- Open Source Code
- Inexpensive and Easy for States to Run
- Based on Today's Generation/State Feedback
- Conservative Predictions
- Projects Hourly Results – Gets the Peaks
- Inputs are Transparent

IPM Model

- Proprietary Model
- Expensive to Hire Consultant to Run
- Based on Cost Model
- Tends to Shut Down Must Run Units
- Projects Annual Results – Peaks are Missing
- Model is a Black Box

ERTAC Progress

Code Written and Tested

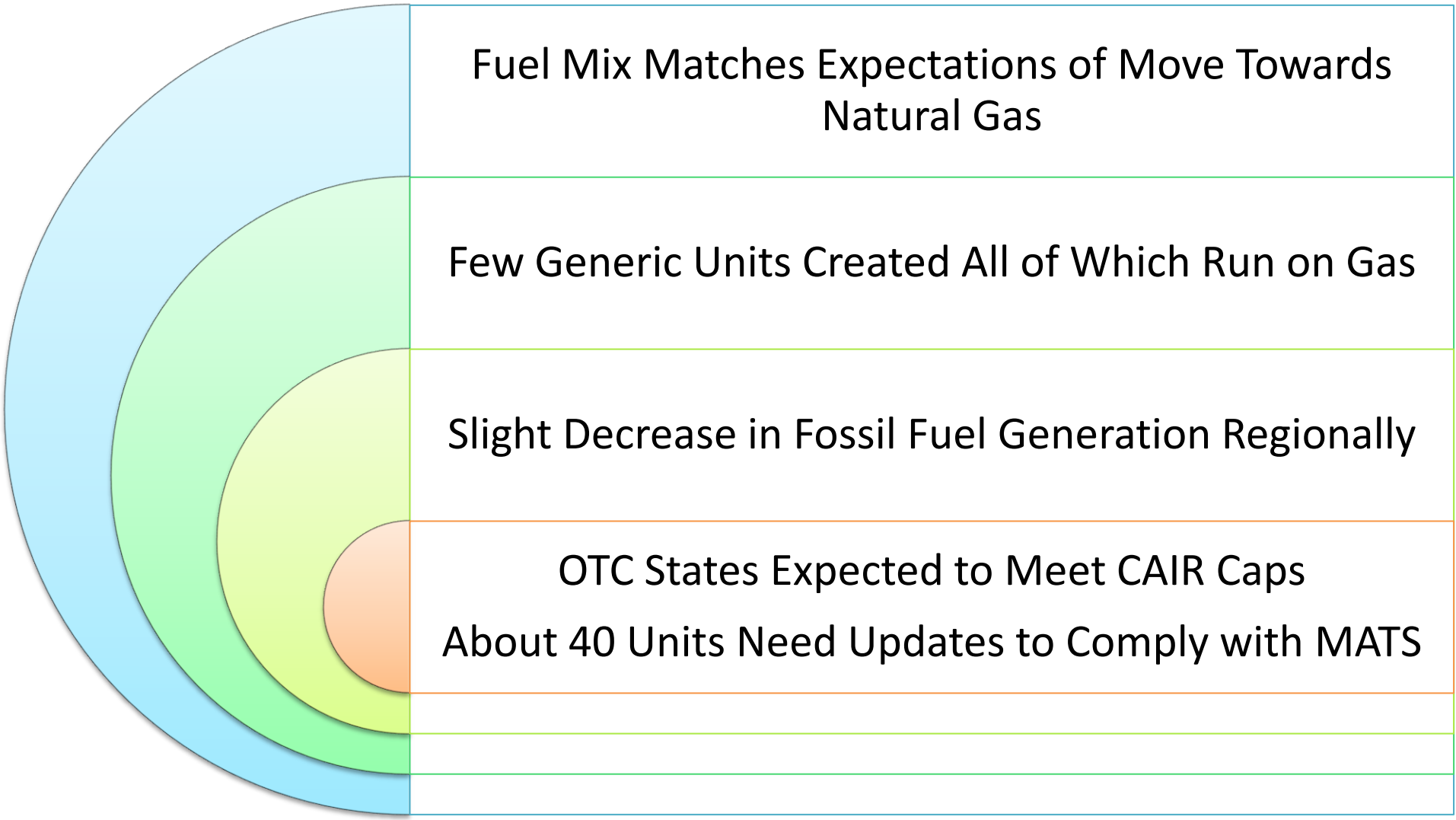
Multiple Runs Finished

- Incorporated State Inputs
- Updated Economic Assumptions

Stakeholder Outreach

- Met with EPA in December, 2012
- Showed Results to Industry and other May, 2013

ERTAC Current Results



Based on Version 1.65 CONUS 2020 Run and subsequent stakeholder feedback

ERTAC Next Steps

Use Results in Air Quality Model

Sensitivity Runs

- Demonstrate the Tool's Flexibility
- Examine the Effects of Policies

Incorporate Stakeholder Input

- Due June 28, 2013

2007 Base Case

CMAQ Model Performance Analyses

Modeled Ozone Performance Evaluation

Compare CMAQ modeled values against observed ozone concentrations

- OTR region plus all of VA
- 230 Monitors (EPA/AQS and CASTNet sites)
- Focus on 2007 ozone season (April-October)

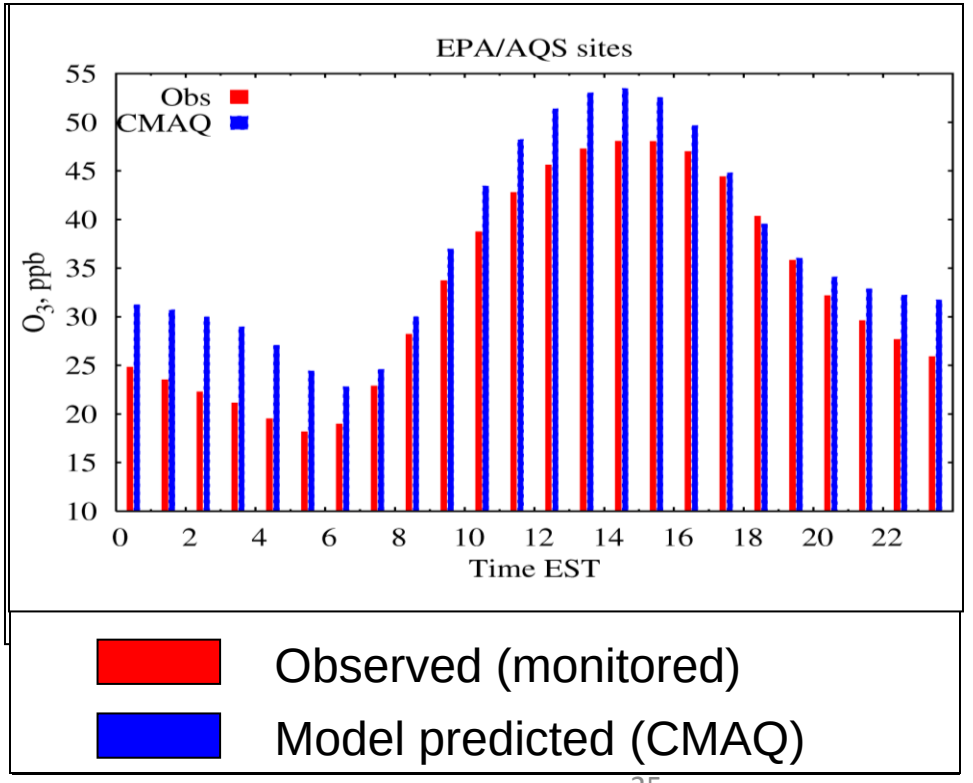
CMAQ Model Performance

Comparison of Modeled vs Monitored Values

Modeled ozone concentrations correlated well overall, but ran slightly high in some locations

Daily maximum observations were very well replicated

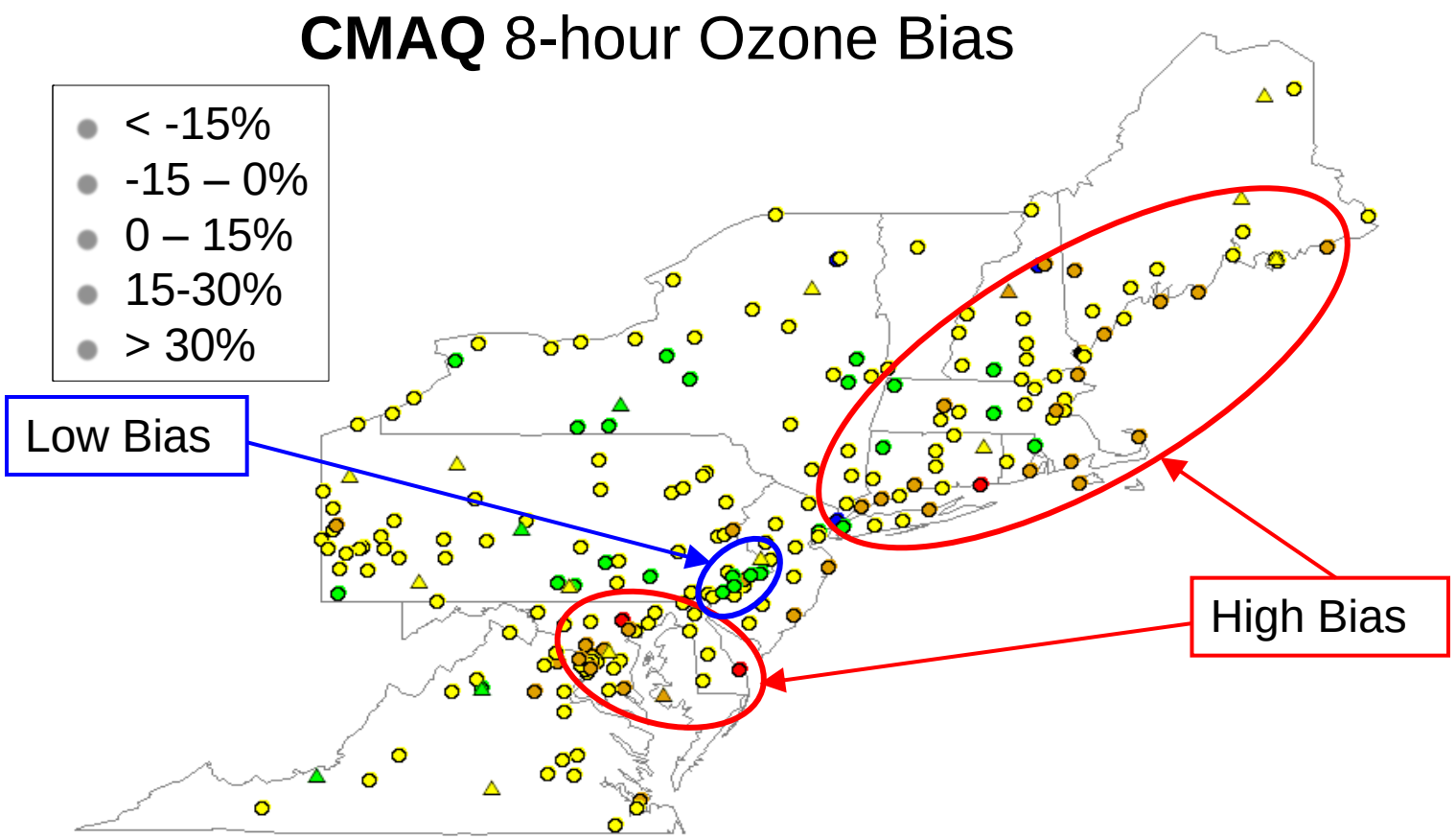
Diurnal ozone pattern was also well replicated, but ran a bit high overnight



2007 Base

CMAQ Model Performance

Seasonal Mean Fractional Bias

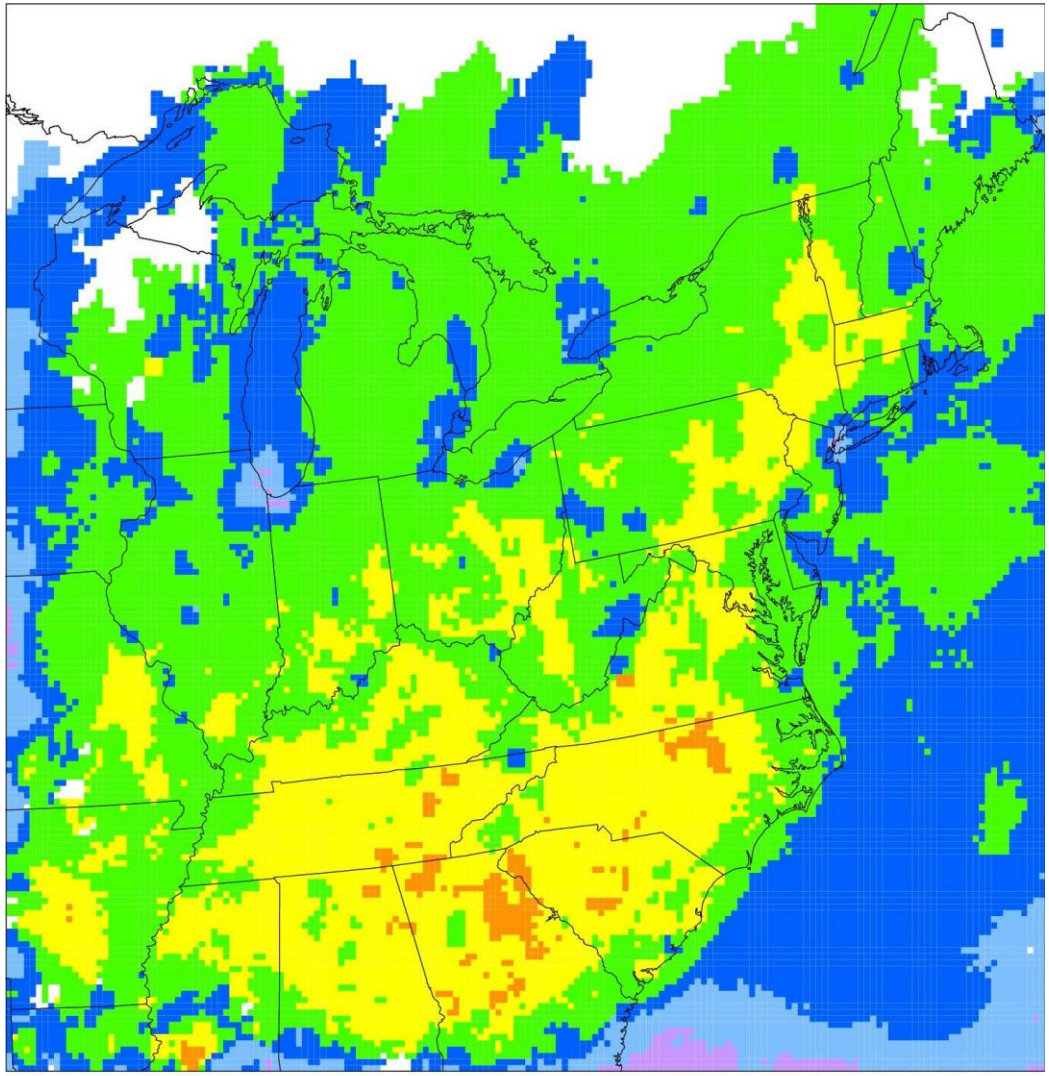


CMAQ Model Performance Summary

- CMAQ performed within EPA's criteria
  - Captured observed diurnal and temporal patterns
  - Some ozone over-prediction during overnight and mid-afternoon hours
  - Model performance was not as strong near coastal areas
- Because the model is applied in a relative sense, many of these uncertainties are effectively managed

CURRENT STATUS OF AIR QUALITY MODELING

Level 3A Screening
Relative Ozone Reduction from 2007 to 2020



Percent Ozone Decrease

- 9 to 15%
- 15 to 21%
- 21 to 27%
- 27 to 33%

Multiply these values by the monitored 2007 ozone design values = model predicted future ozone design values

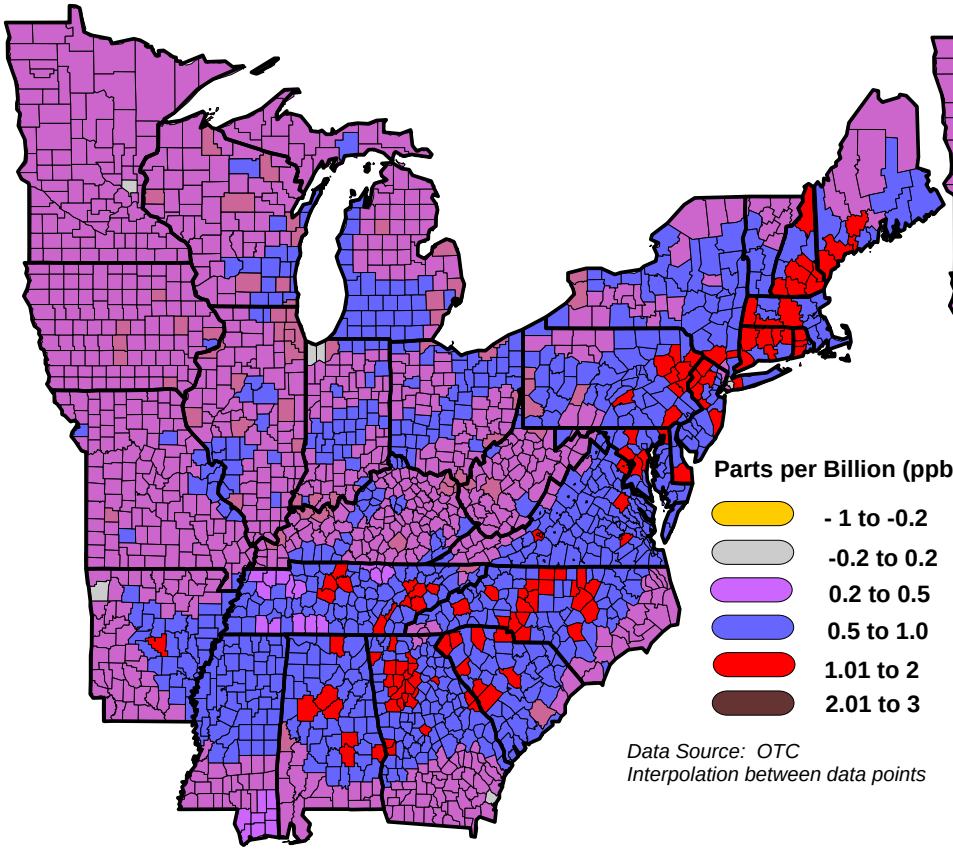
Tier 3 Program

- Includes the introduction of lower sulfur fuels and upgraded engine technology which reduce NOx emissions in addition to SO_2 emissions
- OTC modeling assumed across-the-board reductions to the Mobile Sector based on regional averages as determined by EPA (Tier 3 RIA)

NOx	11.1%	$PM_{2.5}$	1.3%
VOC	4.6%	CO	5.6%
SO_2	41.9%		

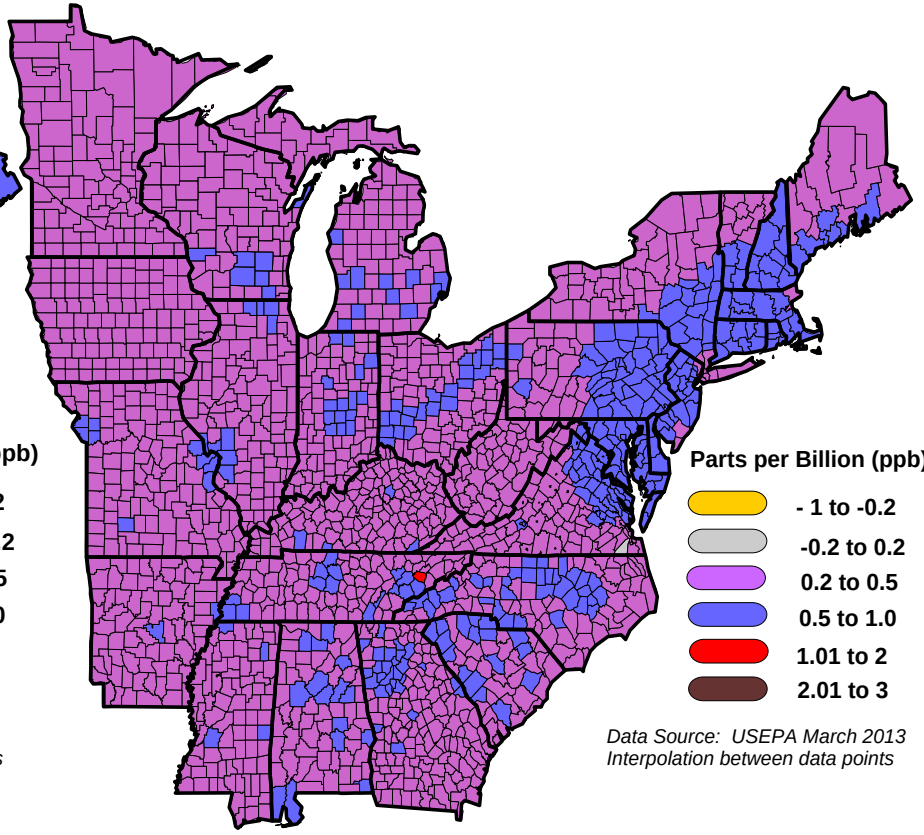
Tier 3 Program Ozone Benefits

OTC 2020



Data Source: OTC
Interpolation between data points

EPA 2017



Data Source: USEPA March 2013
Interpolation between data points

Next Steps

Goal: Improved 2020 Base for Performance Assessment

- Level 3B
- Include draft ERTAC EGU emission domain-wide
- Include draft Oil & Gas emissions

Goal: 2018 Base for Moderate Nonattainment Area Projection

- Level 3B
- Include draft ERTAC EGU emission domain-wide
- Include draft Oil & Gas emissions

Questions

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