Modeling Committee Update

OTC Fall Meeting

November 19, 2014

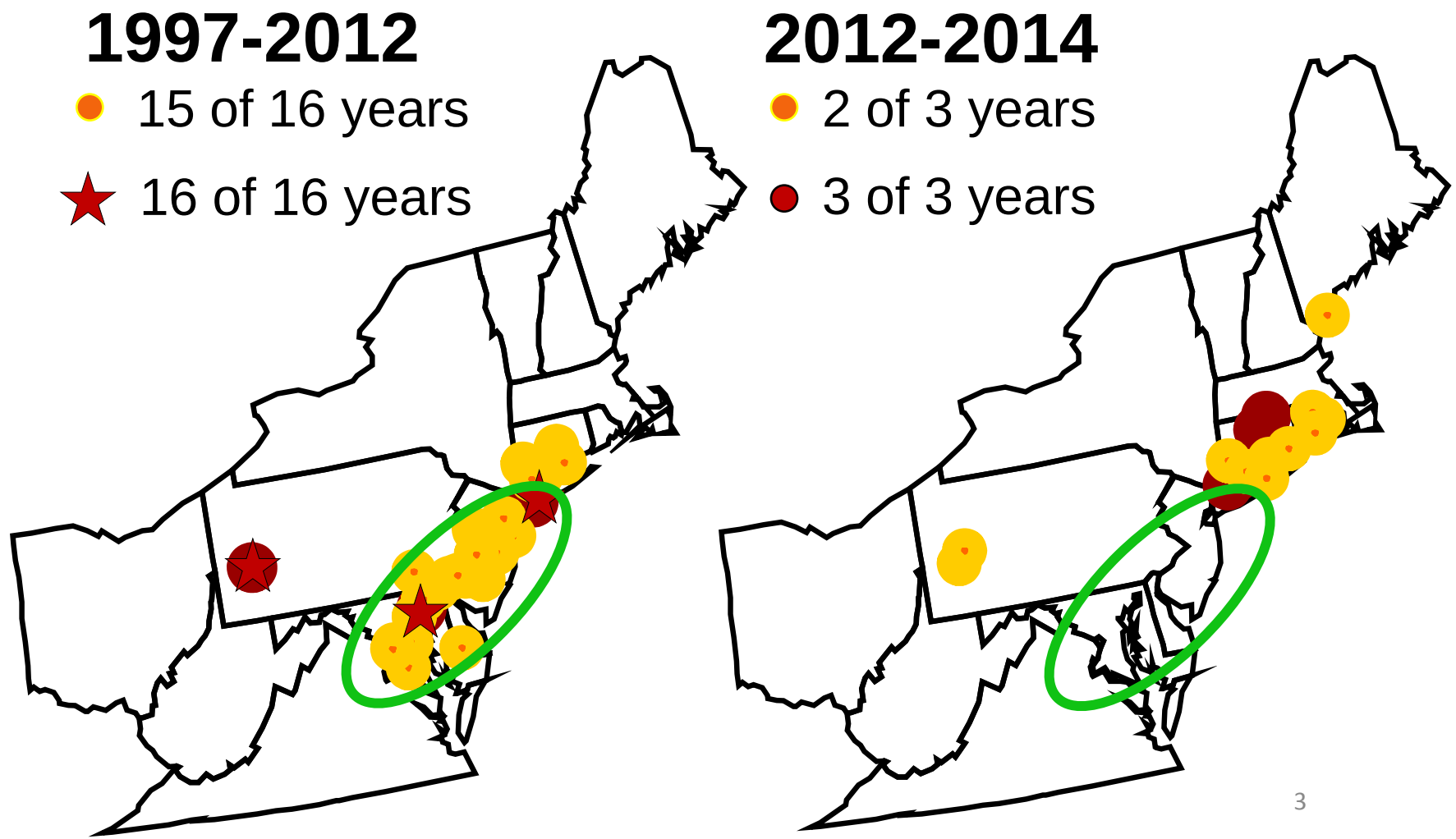
Crystal City, VA

Overview

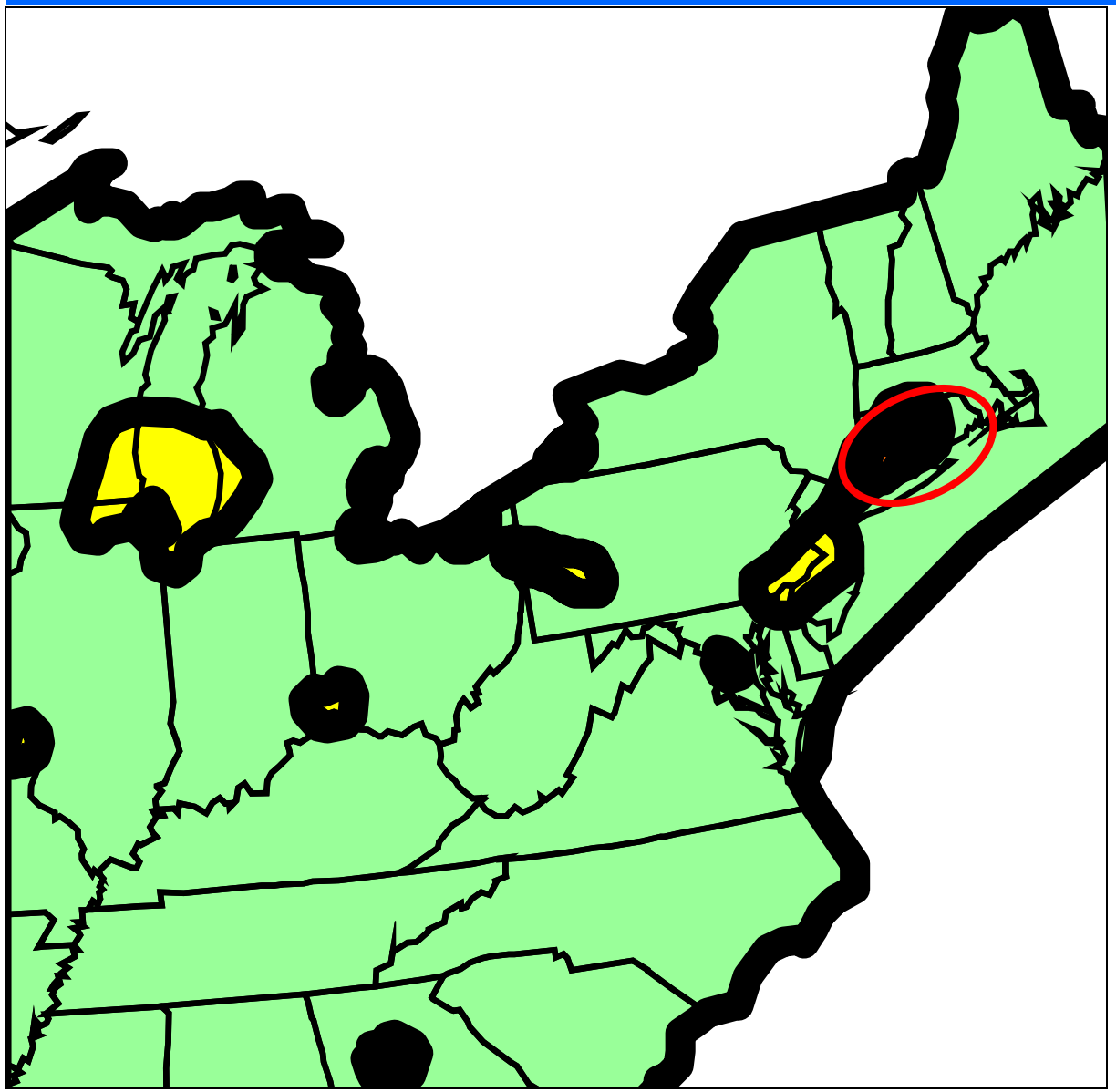
1. 2014 Ozone Season
2. Tagged Source Modeling
3. Boundary Conditions
4. 2011 Modeling Platform Update

OTR Problematic Locations

Number of Years the 4th High Ozone > 75ppb



2014 Ozone 4th Highest 8-hour Value



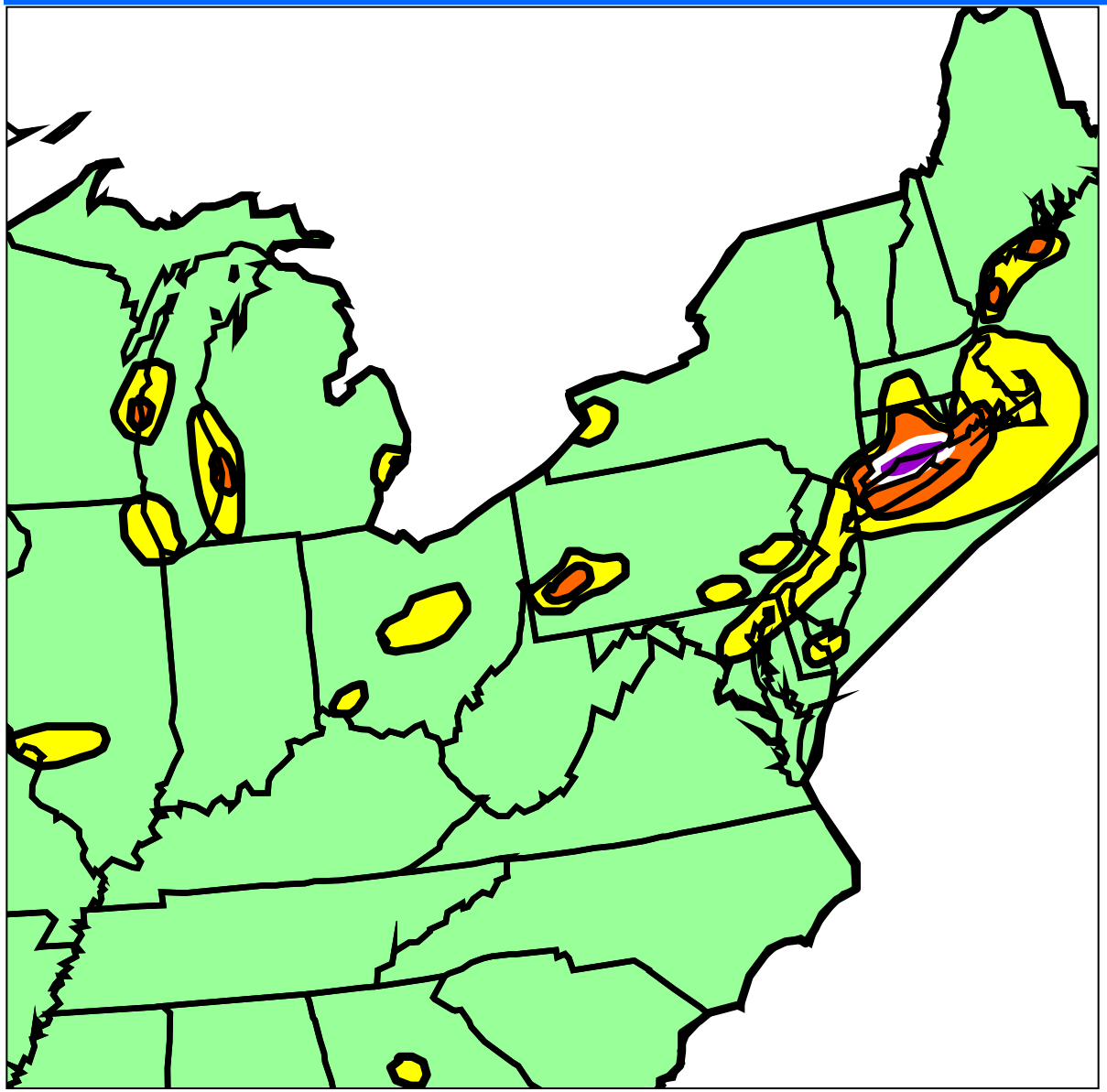
< 71 ppb

71 to 75 ppb

76 to 84 ppb

> 84 ppb

2013 Ozone 4th Highest 8-hour Value



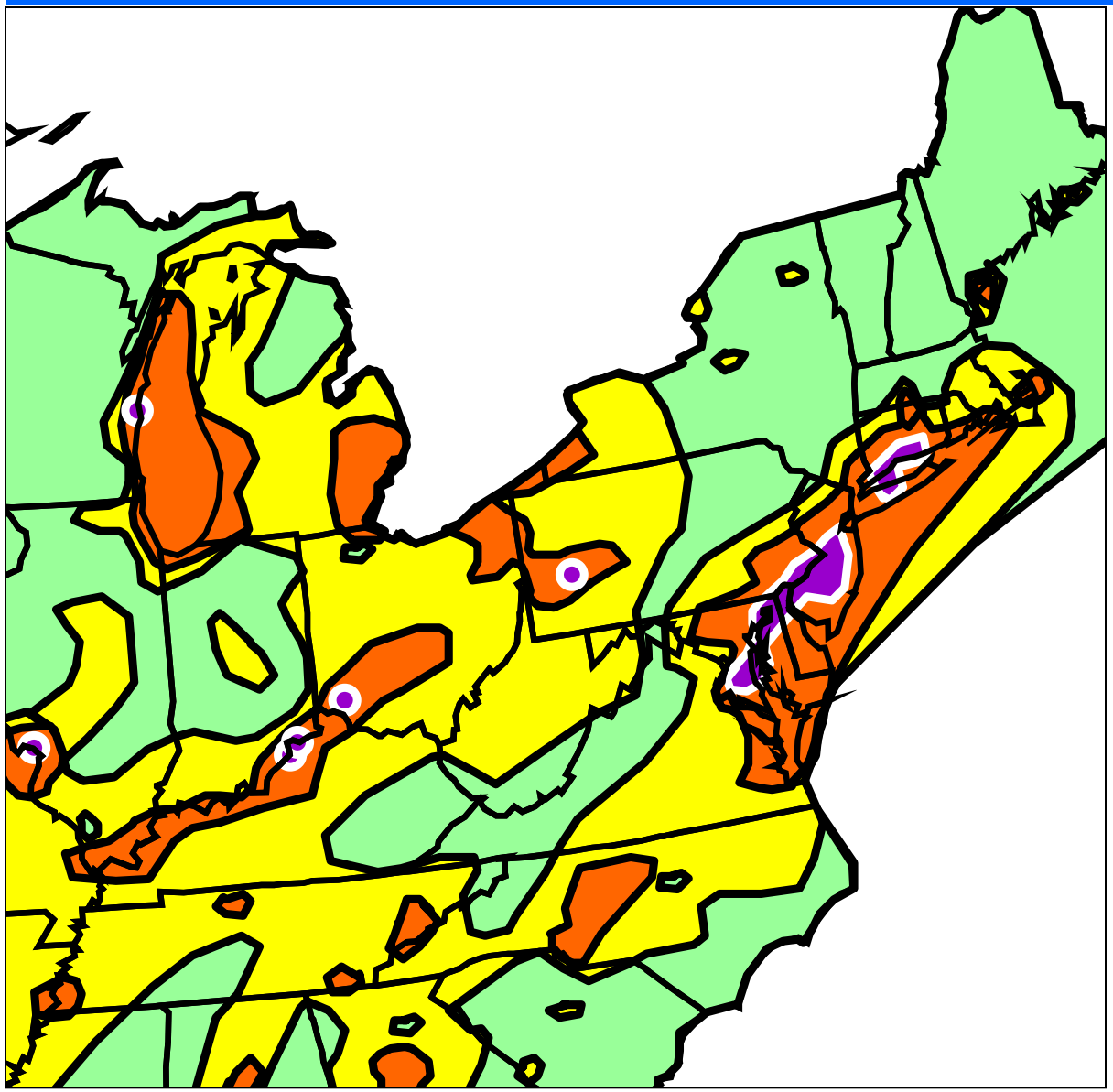
< 71 ppb

71 to 75 ppb

76 to 84 ppb

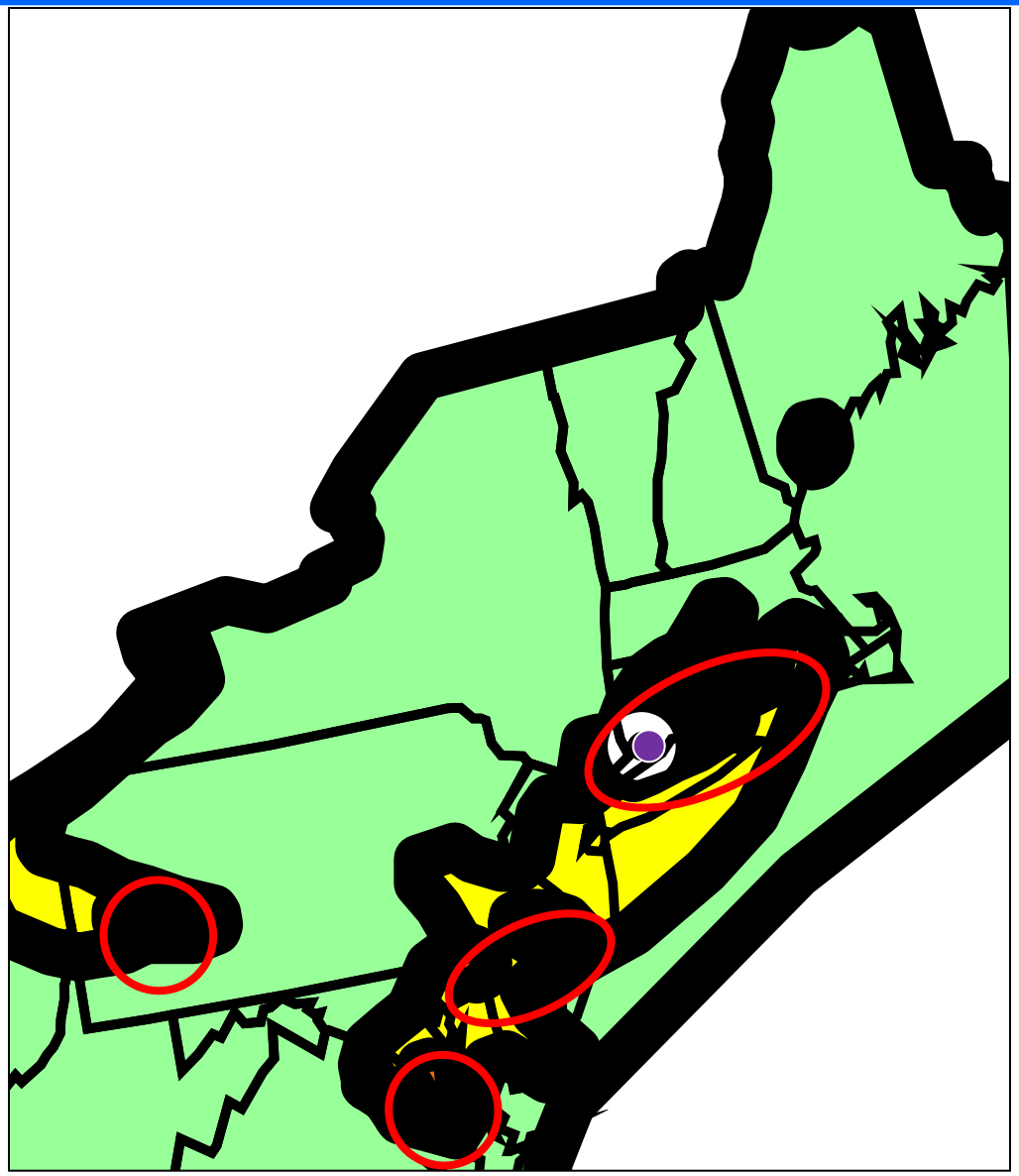
> 84 ppb

2012 Ozone 4th Highest 8-hour Value



< 71 ppb
71 to 75 ppb
76 to 84 ppb
> 84 ppb

2014 Ozone Design Values

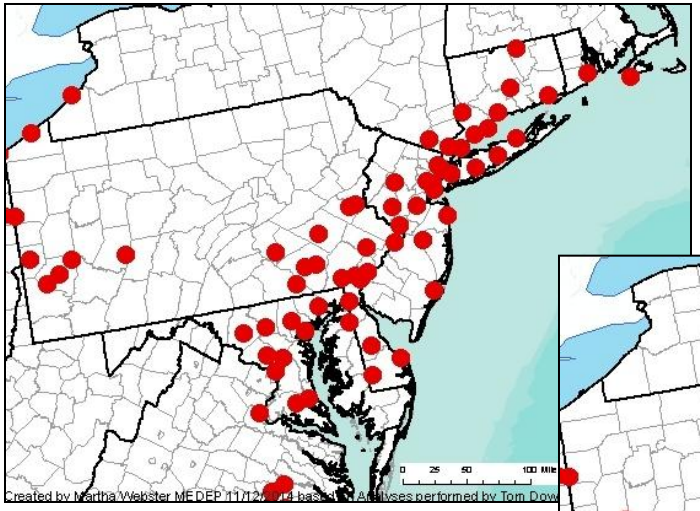


3-Year average of the 4th high concentration for 2012, 2013, 2014

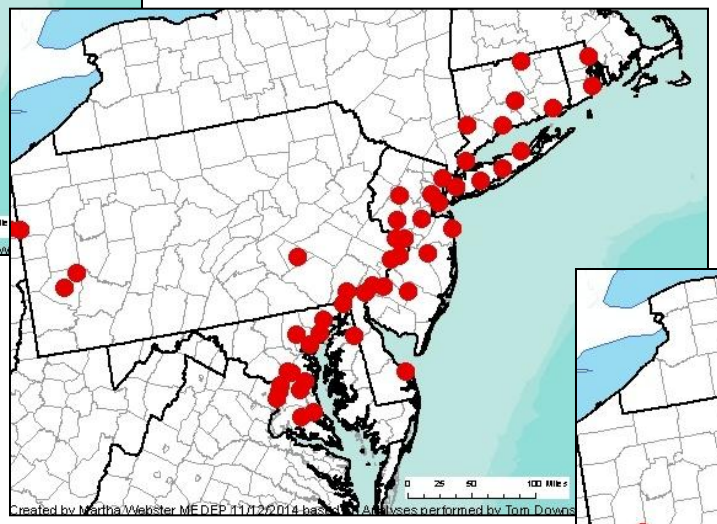
- < 71 ppb
- 71 to 75 ppb
- 76 to 84 ppb
- > 84 ppb

Change in OTR Violations 2012-14

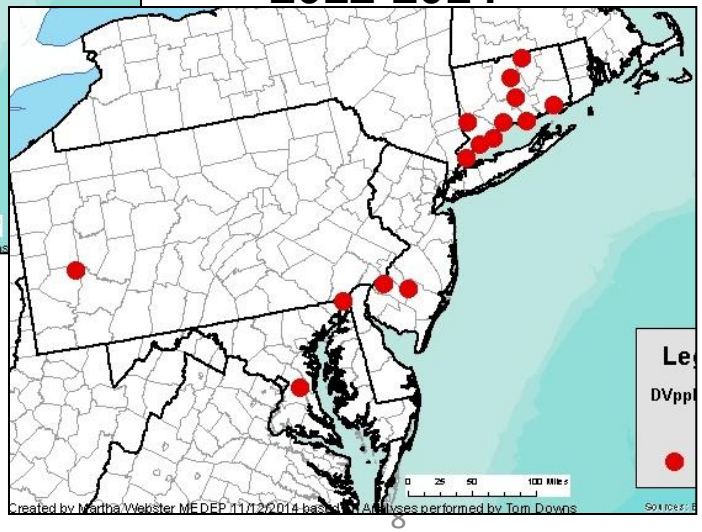
2010-2012



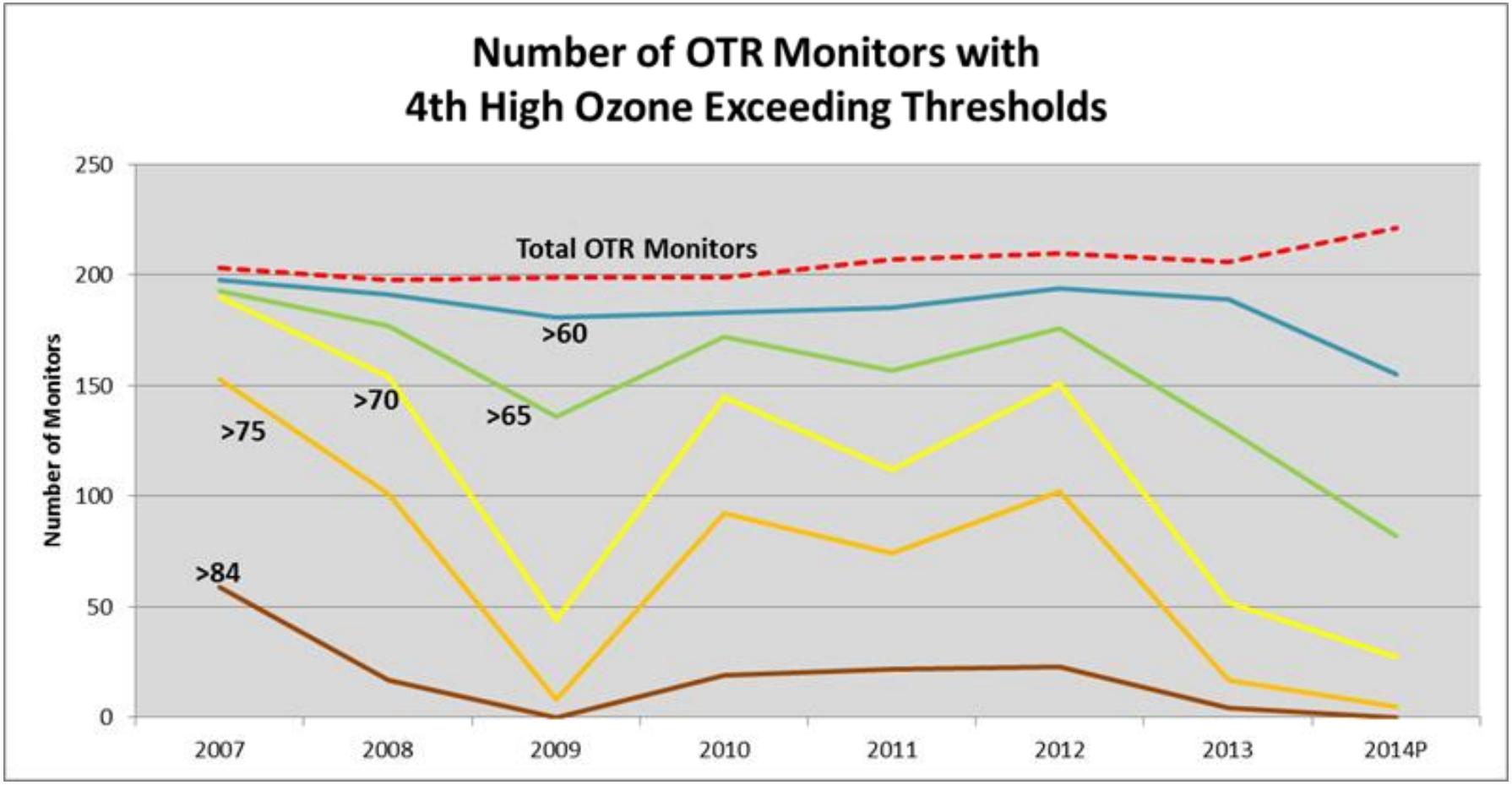
2011-2013



2012-2014

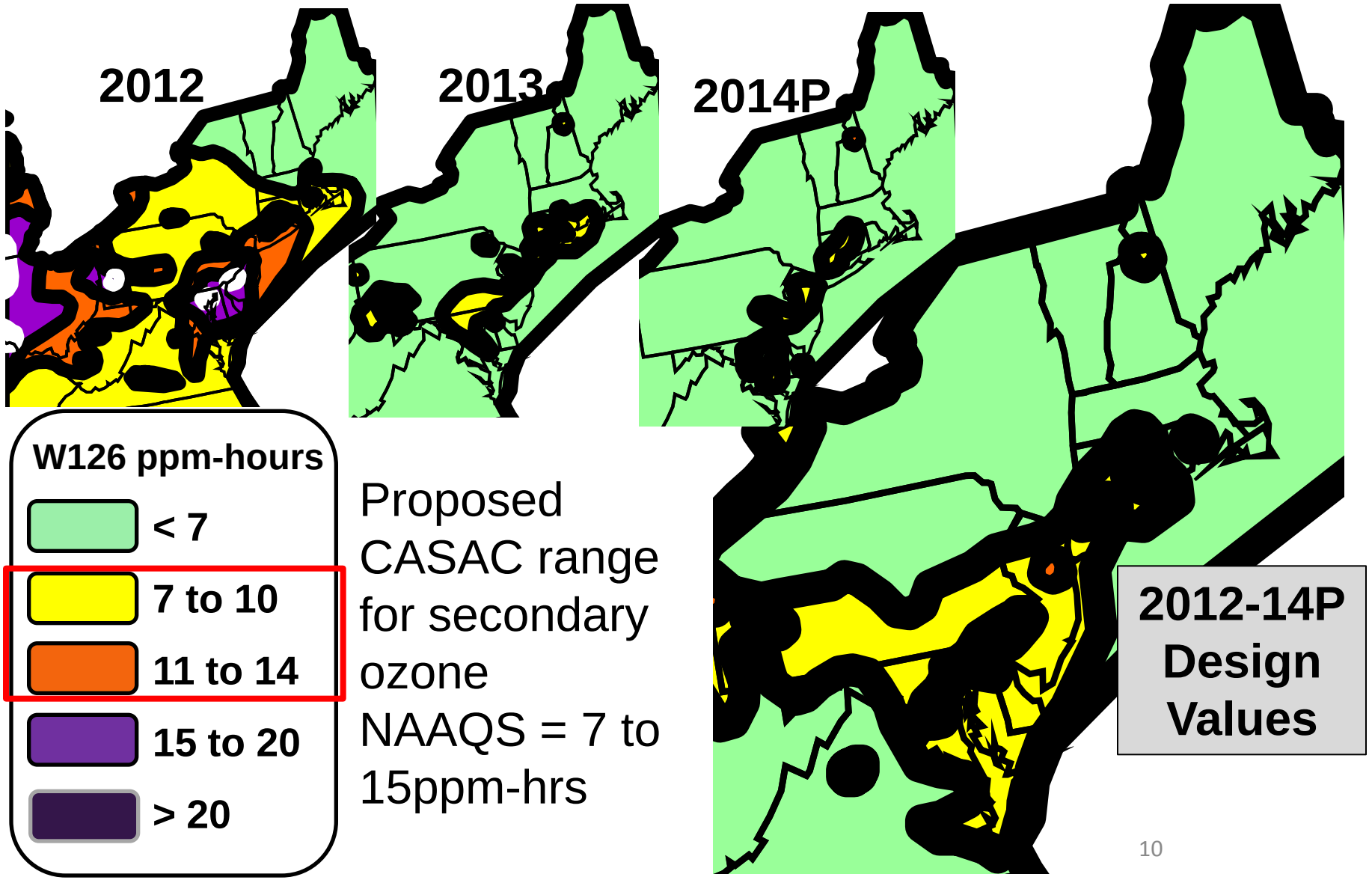


Potential Effect of New Standards



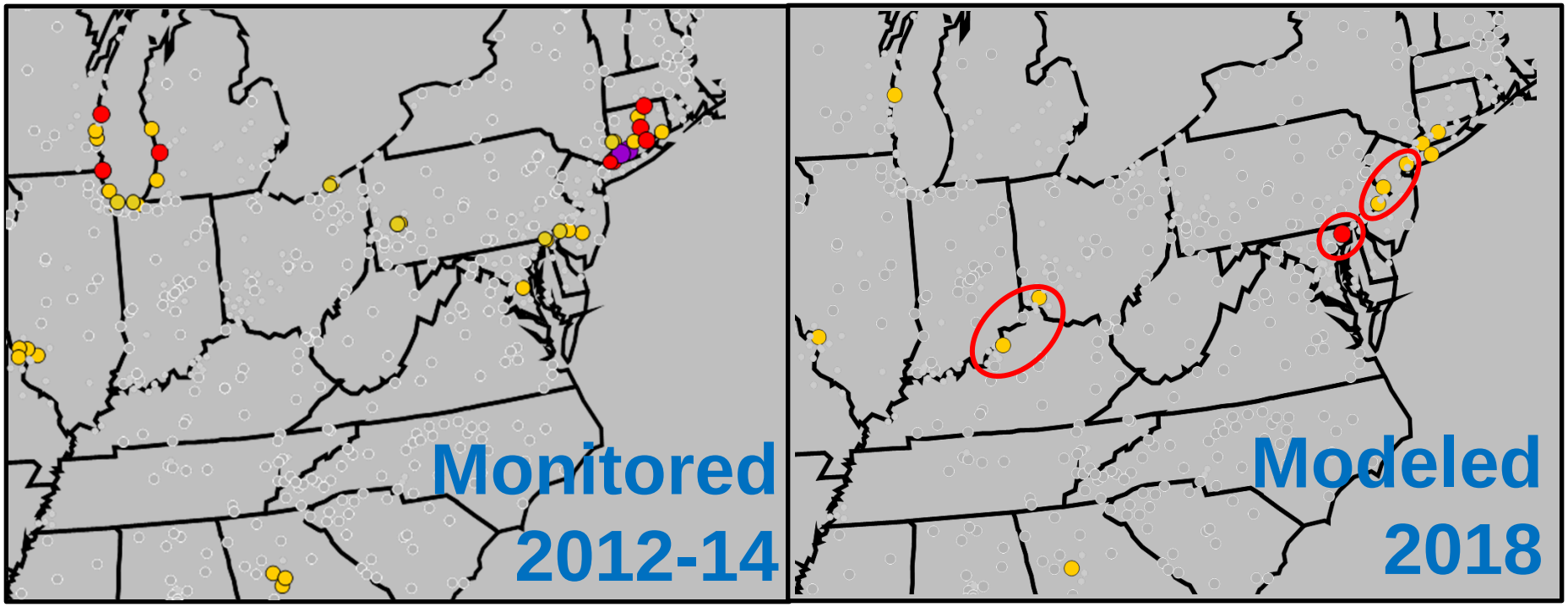
Note: The dashed red line represents the total # of monitors in the OTR

Preliminary W126 Design Values



Why Models Differ from Monitors

- **Are the models wrong?**
- Actually they are doing pretty well – but they don't predict variations in future weather
- Models use typical high-ozone weather & emissions



Why Models Differ from Monitors

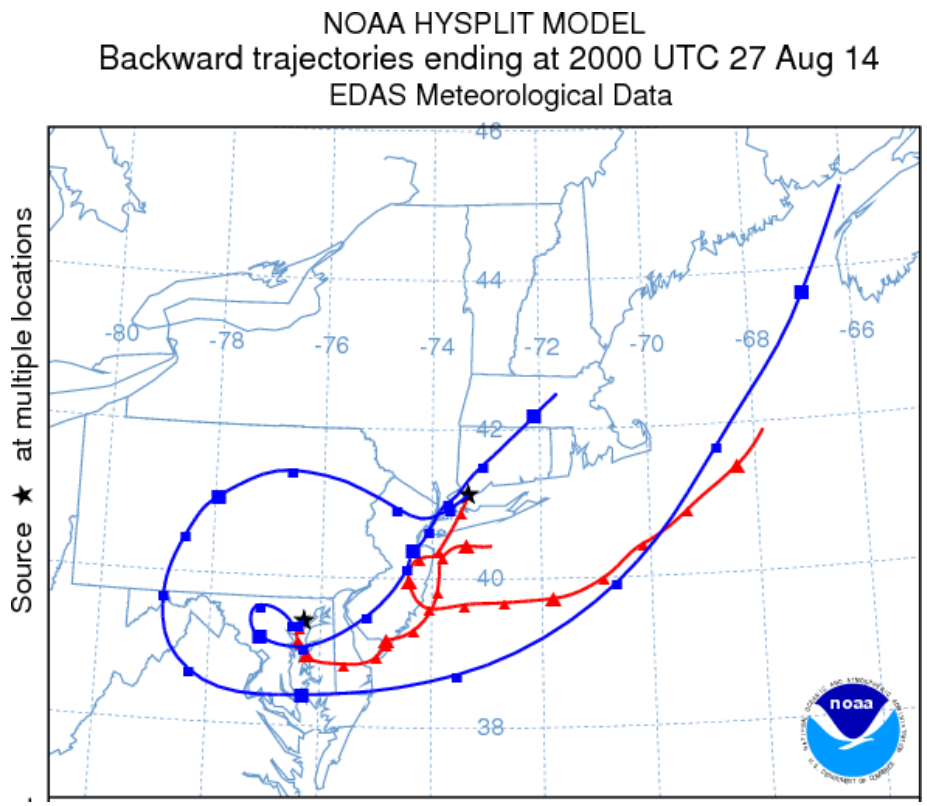
- Maryland's "clean" summer of 2014
  - Given the same weather (2007/2011) and currently committed to emissions, the models say "clean" data is not yet assured
  - Favorable weather patterns have lead to lower measured ozone in Maryland
- Notice Connecticut's recent summers of high ozone
  - Models say it shouldn't be this bad
  - Unfavorable weather patterns for its location

A Look at Weather Patterns

- Modeled trajectories during high ozone periods can produce insights on weather patterns
- Modeled trajectories show where the air came from over the 3 previous days
- Start at places with high ozone and go backward through time
- Consider what is at the ground and at a higher elevation

Common Trajectories

Corridor Flow

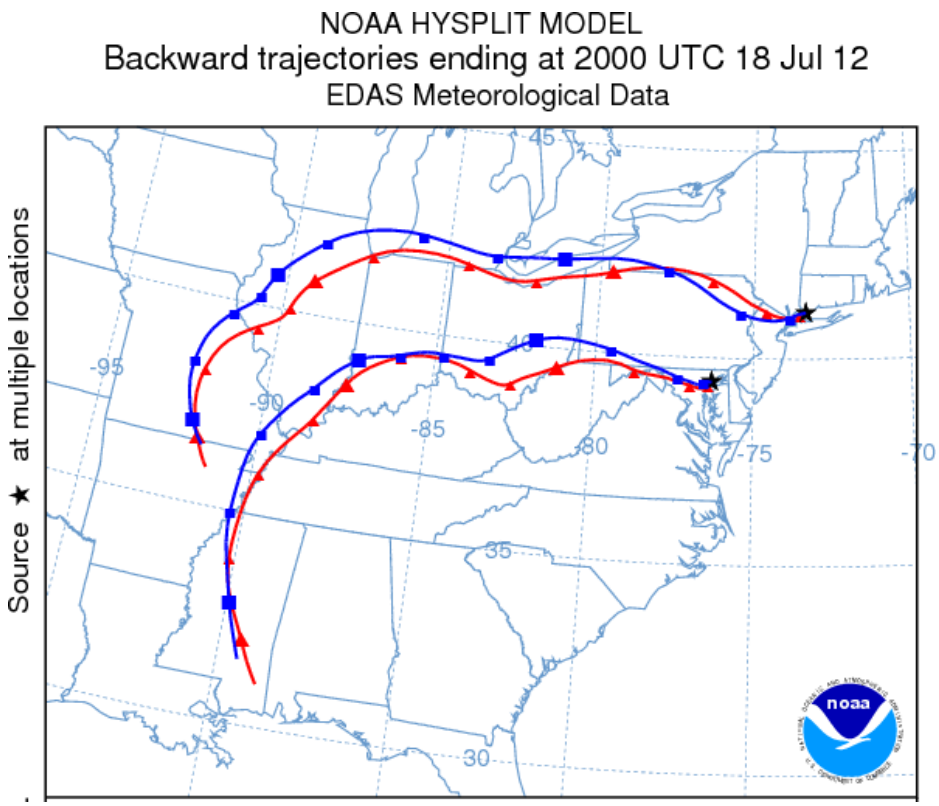


8/27/2014

Westport CT 88ppb

Edgewood MD 72ppb

Transport Flow



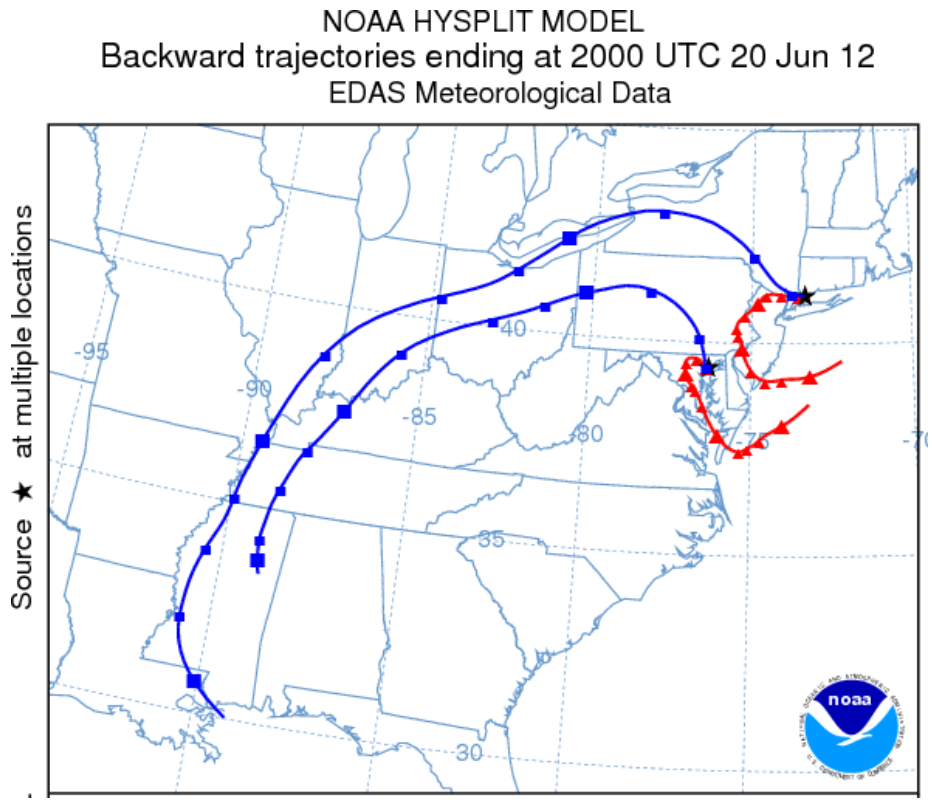
7/18/2012

Westport CT 83ppb

Edgewood MD 84ppb

Common Trajectories

Corridor & Transport

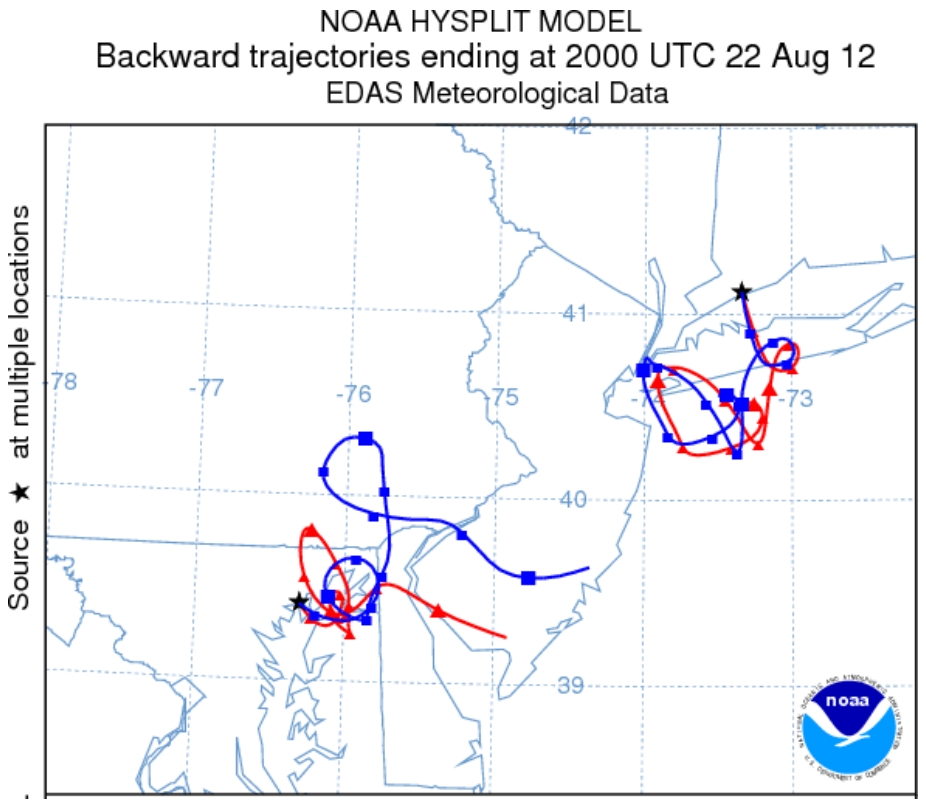


6/20/2012

Westport CT 89ppb

Edgewood MD 89ppb

Local Only



8/22/2012

Westport CT 72ppb Exceeded in CT

Edgewood MD 65ppb

A Look at Trajectories

Common Trajectories During High Ozone Days

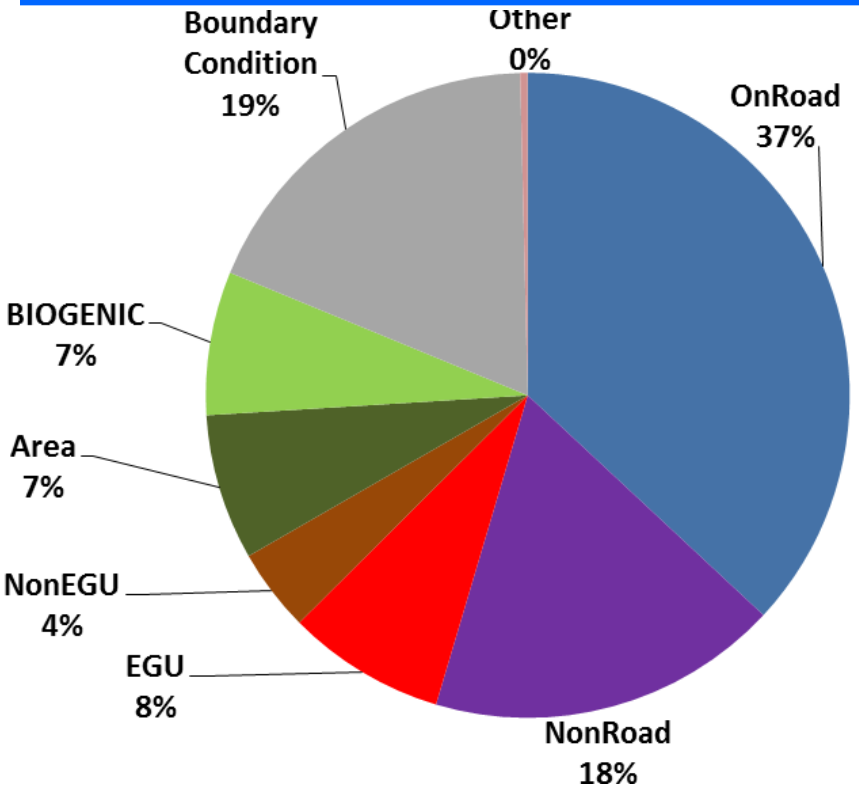
	Local	Corridor	Mixed Corridor & Transport	Transport
2012	**7**	**10**	**14**	**8**
2013	**1**	**7**	**10**	**2**
2014	**0**	**6**	**3**	**0**
High 8Hr Ozone	**82 / 76**	**88 / 78**	**99 / 106**	**86 / 86**

Westport CT Edgewood MD

CAMx/OSAT Contribution Modeling

- CAMx is a photochemical model similar to CMAQ
  - Currently being used by EPA and LADCO
- OSAT is a modeling tool associated with CAMx. (ISAM associated with CMAQ)
  - Allows source emission tagging
  - Calculates ozone contribution associated with each source tag
  - Common tags include:
    - Statewide emissions
    - Source sector emissions i.e., OnRoad

Fairfield CT 2007 Ozone Contributions

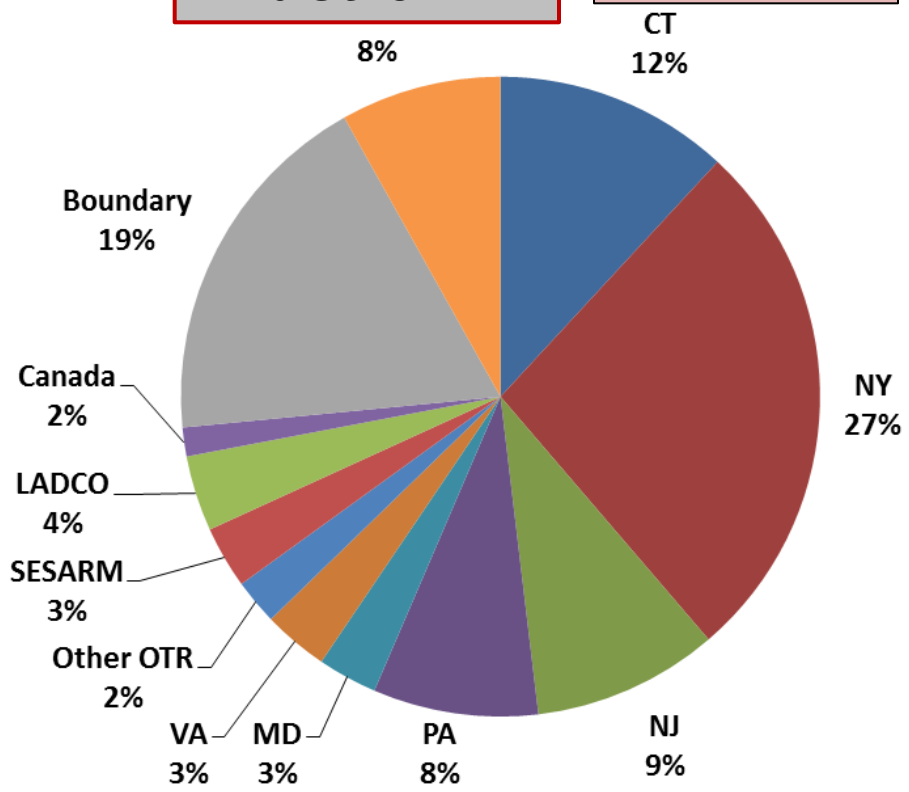


By Sector

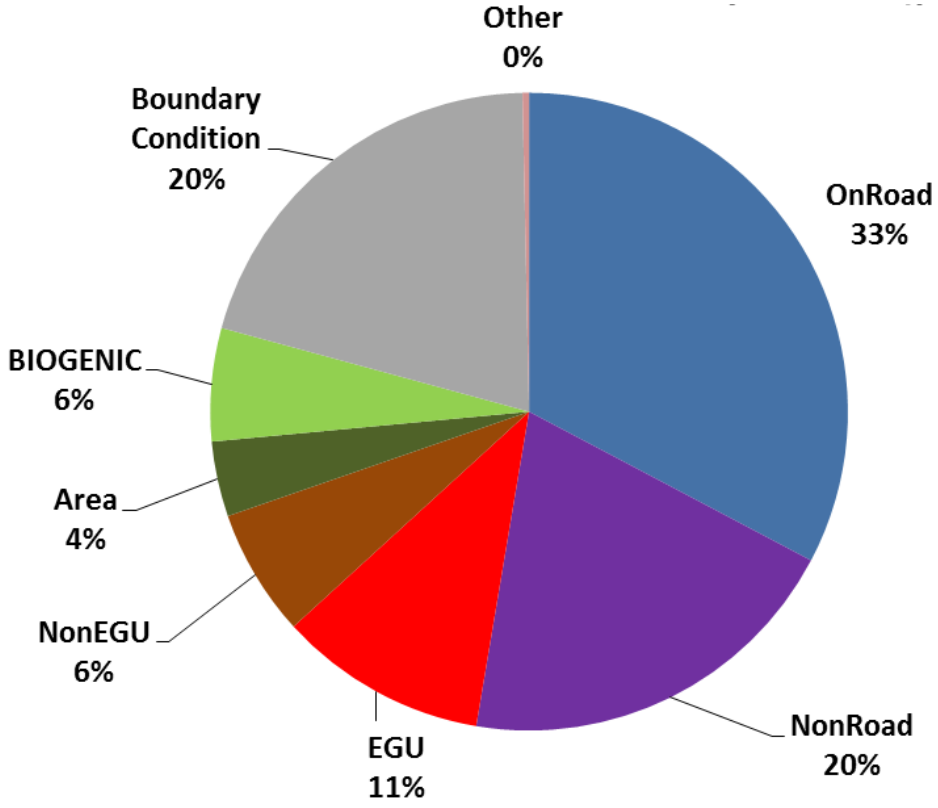
55% Mobile
8% EGU

64% OTR +VA
19% Boundary
17% Other

By State



Harford MD 2007 Ozone Contributions

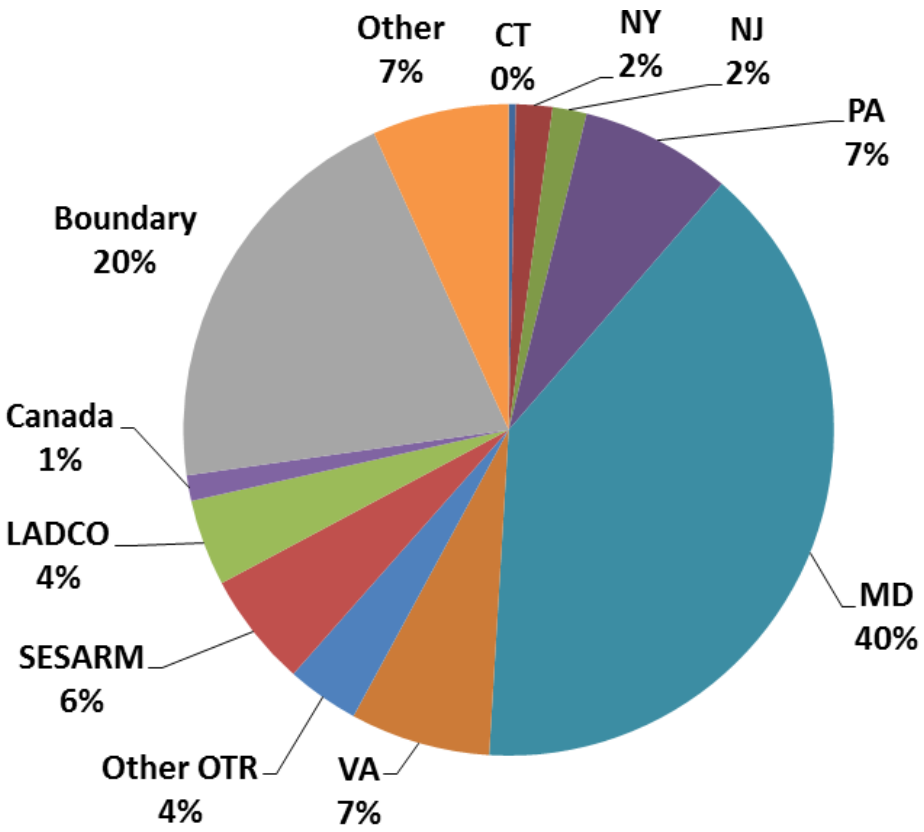


By Sector

53% Mobile
11% EGU

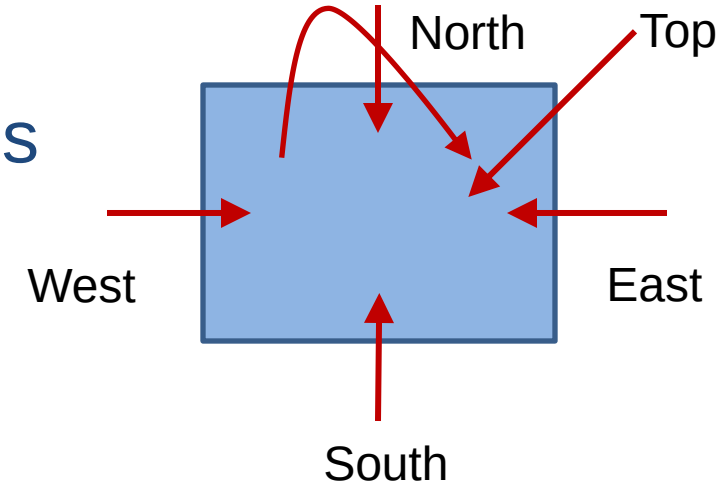
62% OTR +VA
20% Boundary
18% Other

By State



What are Boundary Conditions?

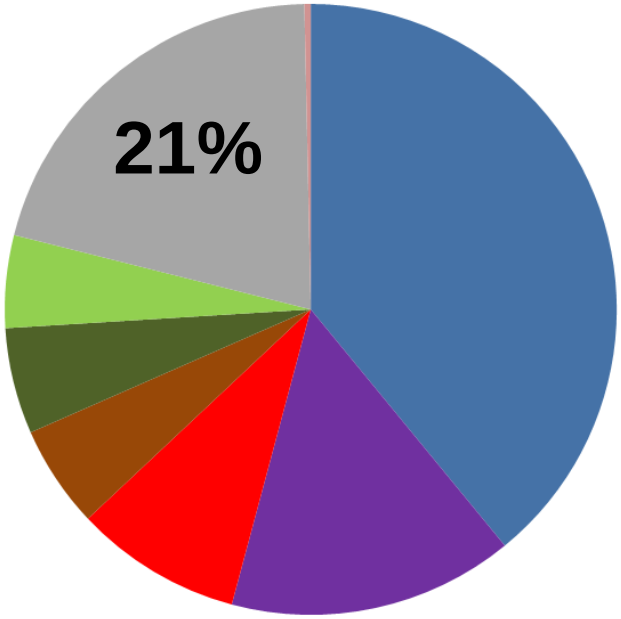
- **Boundary Conditions** are what transports across the edges of the modeling domain
  - Western US and portions of Canada
  - Inter-continental transport
  - In-domain emissions that leave the domain and re-enter
  - Stratospheric intrusions



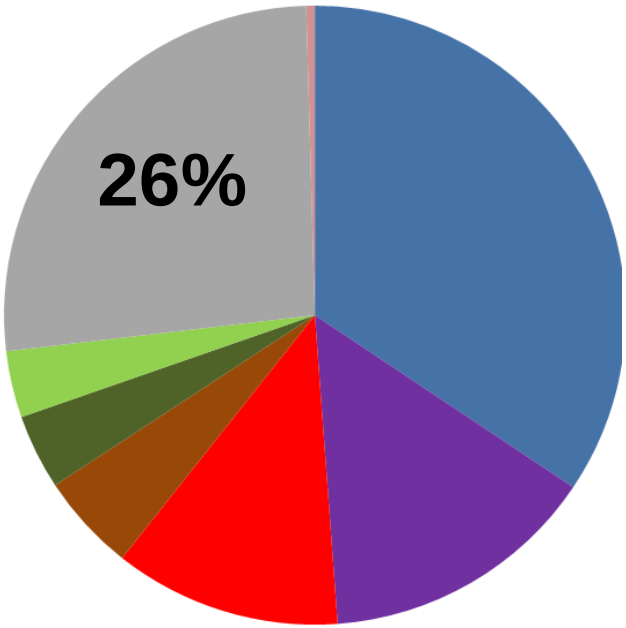
Boundary Conditions

- Boundary conditions represent a large portion of ozone contribution in the OTR
- Generally outside of our ability to control
- Becomes more important with lower ozone levels

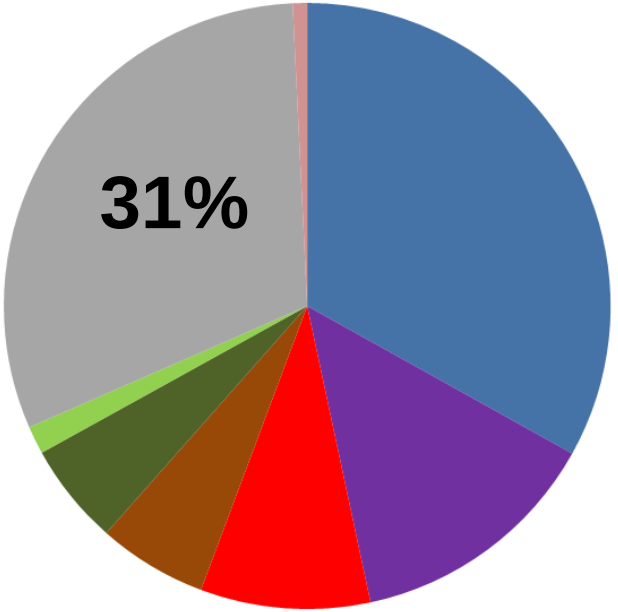
Bucks PA



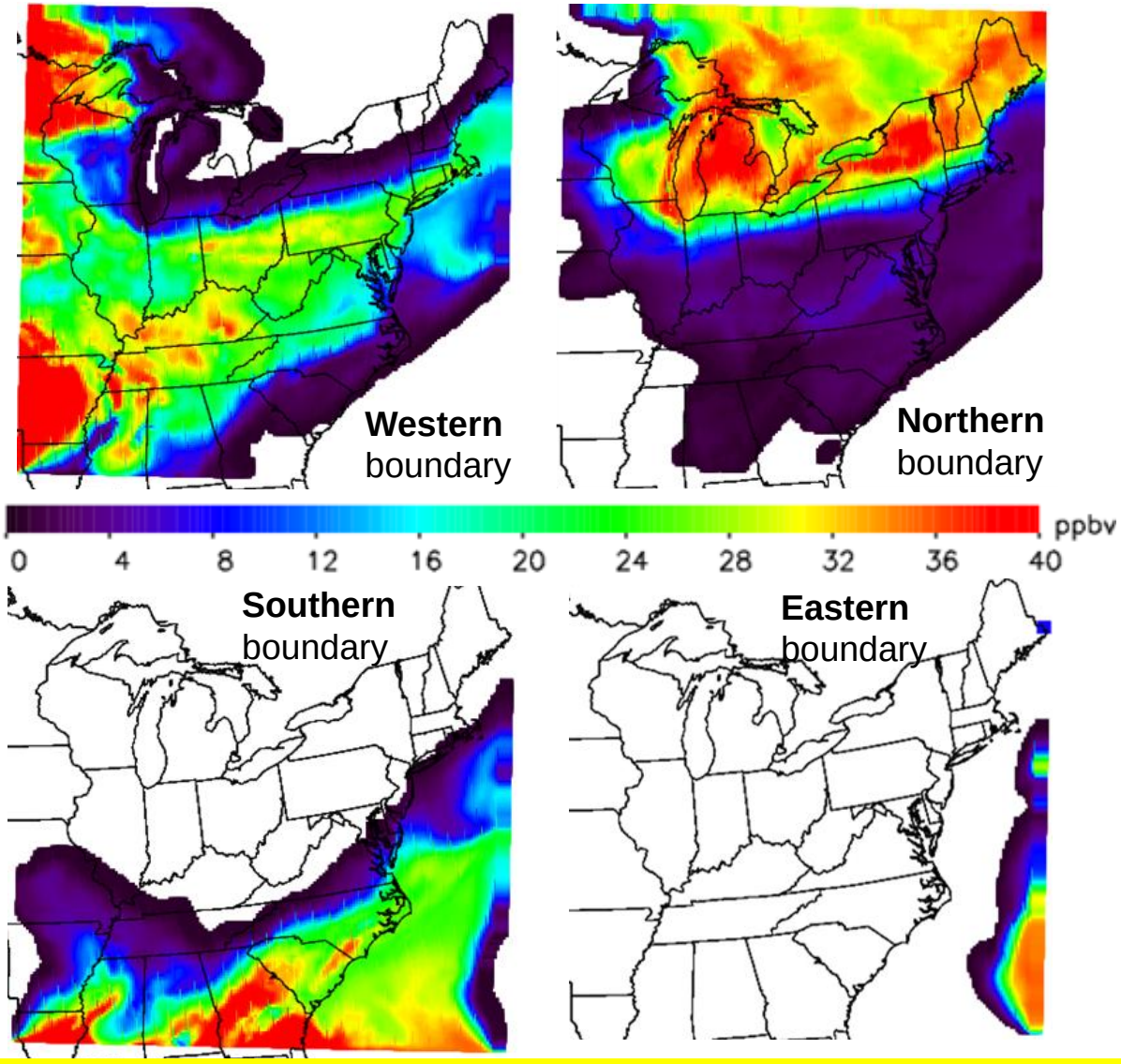
Fairfax VA



Mt Washington NH



2011 Platform: July 7 Boundary Conditions



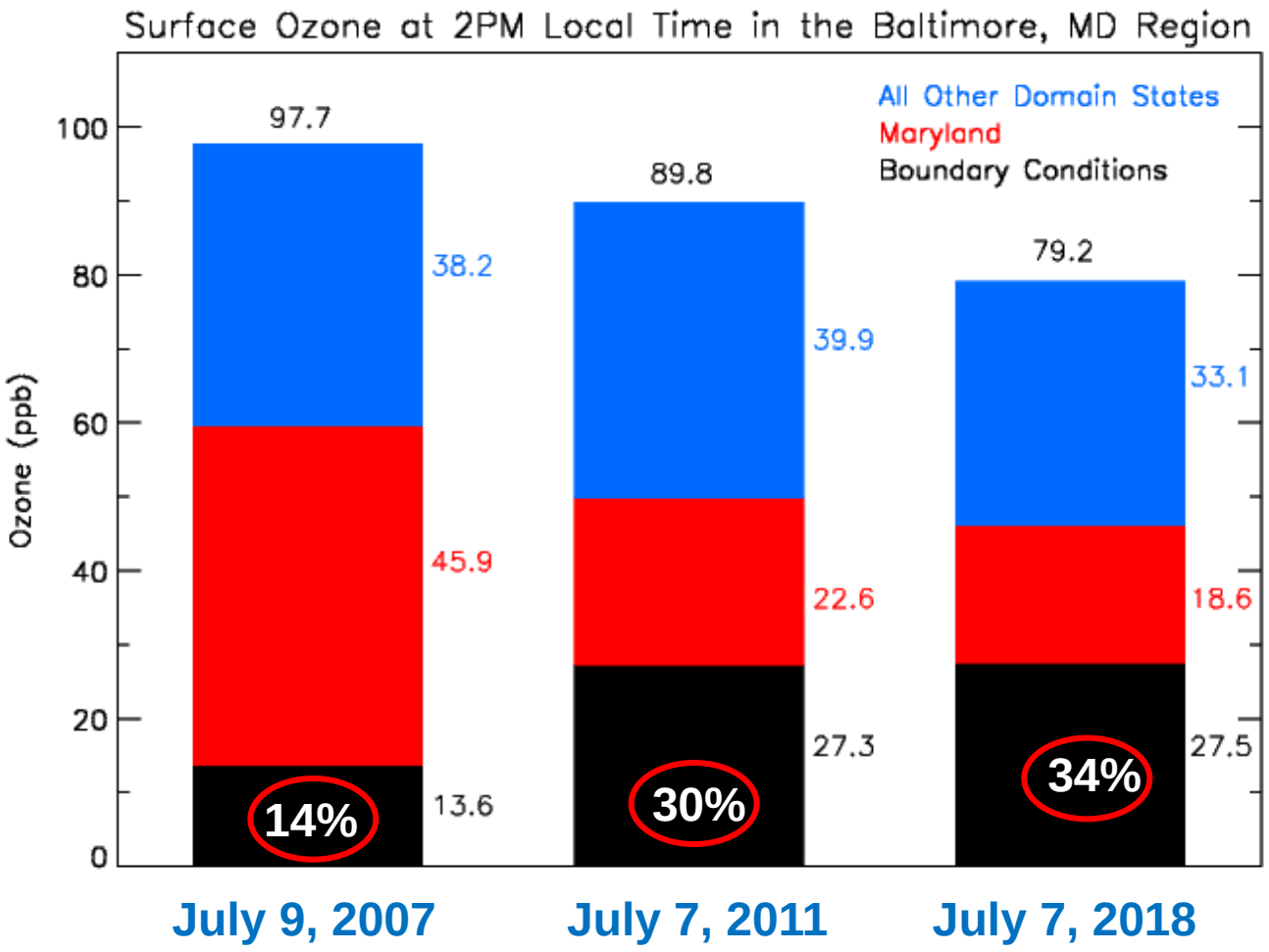
On July 7th, 2011, generally had westerly winds

Boundary conditions affect the entire modeling domain

Plots showing ozone attributed to each boundary at 2 PM local time

Preliminary CAMx v6.10 (University of Maryland, Dan Goldberg)

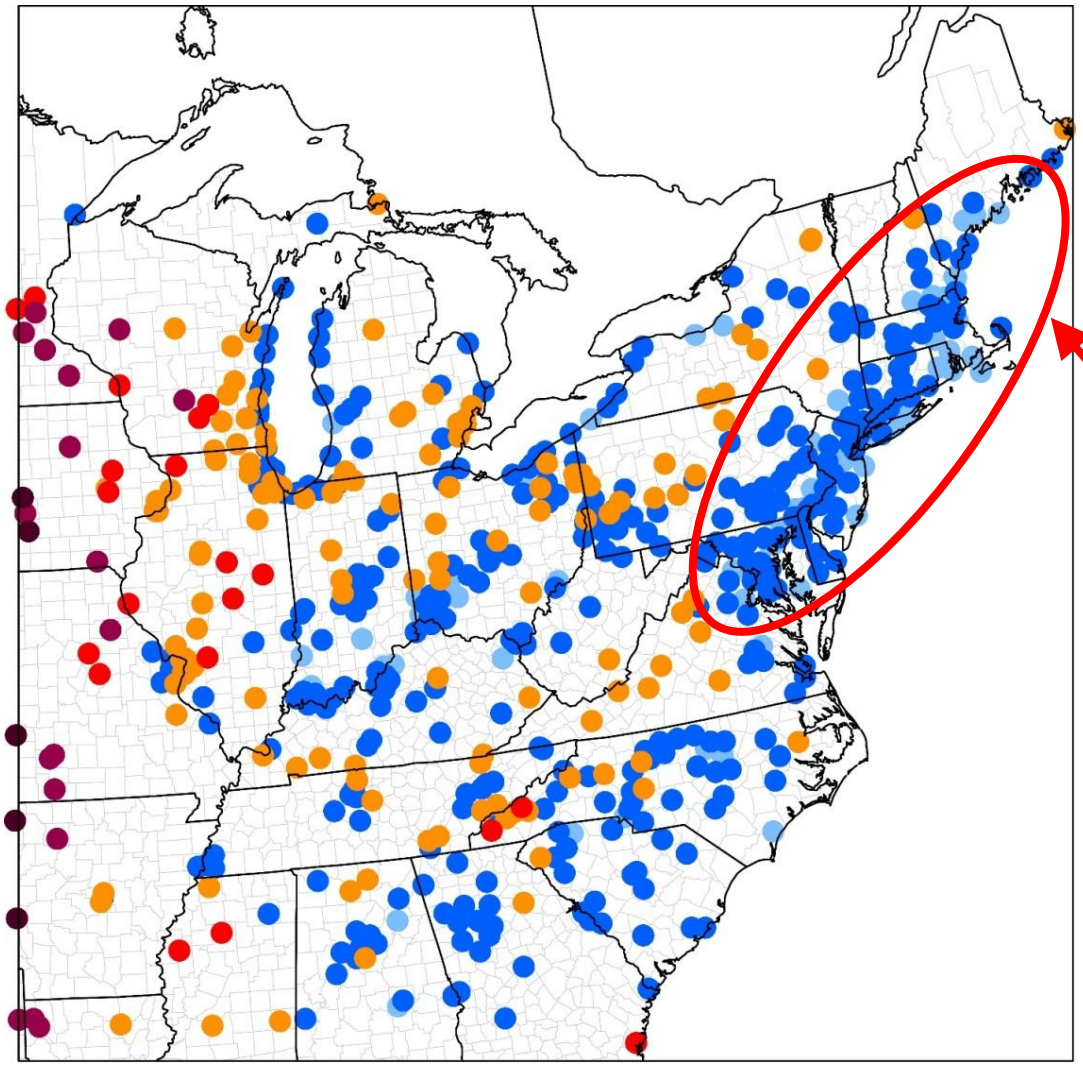
Importance of Boundary Conditions

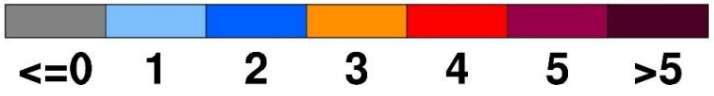


Emissions at the model domain boundaries, are becoming more important when trying to show future attainment

Preliminary results from CAMx v6.10 installed at the University of Maryland, Dan Goldberg

Boundary Condition Effect on OTR





8-Hour Ozone Reduction (ppb)

Reducing boundary conditions by 10% translates into 1-2ppb ozone lower along Northeast corridor

2011 Modeling Platform Plan

Level 1A (Testing):

- EPA modeling data for 2011 & 2018 (v1)
  - Tier 3 Mobile Standards,
  - State/Federal On-the-books for other sectors

Level 1B (Initial 2018 Screening):

- Upgrade EGUs with ERTAC
- Other sectors upgraded with improved growth factors using EMF (MARAMA)
- OnRoad will use EPA 2018 v1

Levels 2 and 3 will reflect platform improvements

Modeling Timeline

Fall 2014 – Nearing Completion

- **Level 1A Screening/Testing** with;
  - 2011 EPA Modeling Meteorology and Inventory (v2)
  - Research Boundary Conditions and Biogenics
- **Level 1B preparation**
  - ERTAC 2018 Integration

Winter 2014-2015

- **Level 1B preparation**
  - Emission Projection using EMF (for OTR)
  - Nested Grids in OTR

Spring 2015

- **Level 1B preparation**
  - 2018 EPA v2 Modeling Inventory (for outside OTR)
- **Level 1B Screening Modeling** begins for Base Cases

Questions

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