Trajectory and Transport Assessment to Delaware in 2008-2015

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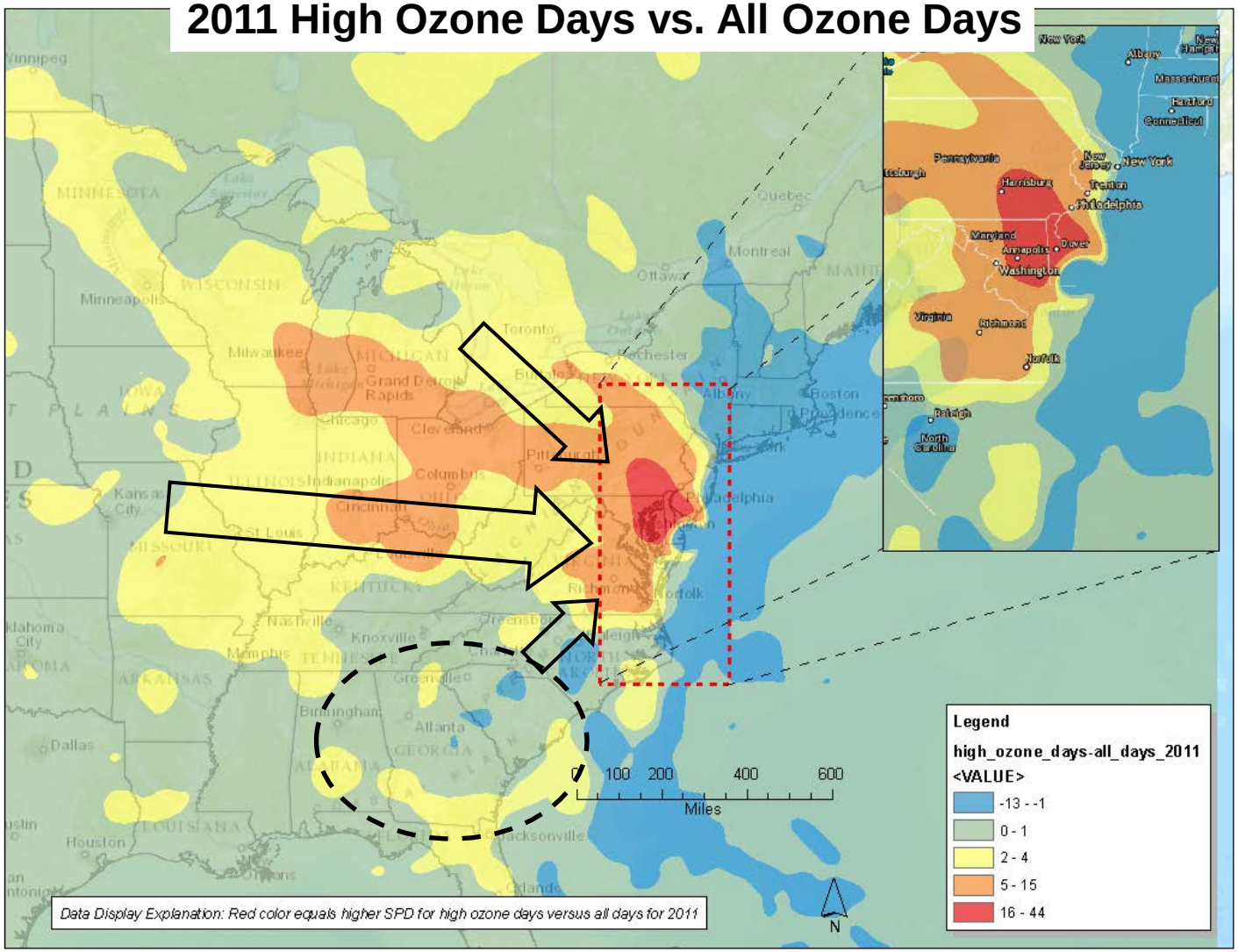
Overview

- EPA's 2011-based air quality modeling platform was used to model base year (2011) and future year (2017) air quality
- There is concern that 2011 meteorological data may not represent typical ozone season (or ozone event) air flow patterns in the Northeast
- Determine if 2011 is representative of typical air mass transport patterns in the Northeast
  - For the ozone season in general
  - For high ozone days
  - Compared to 2008-2015

Approach

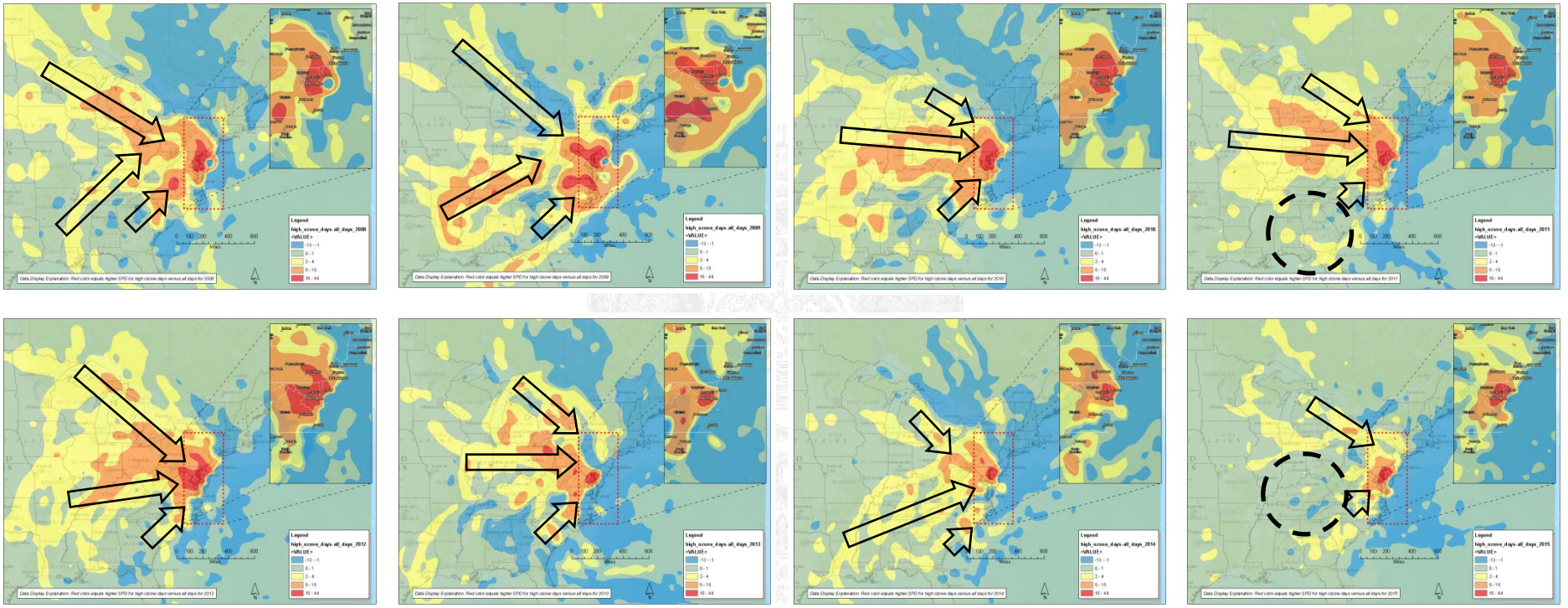
- For 2008-2015 ozone season, model air mass back trajectories from Lewes and Brandywine:
  - 50, 300, and 500 m AGL with HYSPLIT
  - Initiated once per day (noon, max length 96 hours)
  - NAM 12 km meteorological data
  - Approximately 3,600 total trajectories
- Develop density maps of trajectories for each year and for high O_3 days each year, then compare among years.

Example Difference Comparison Map



Difference Comparisons
(high ozone days vs all days)

2008 2009 2010 2011



2012 2013 2014 2015

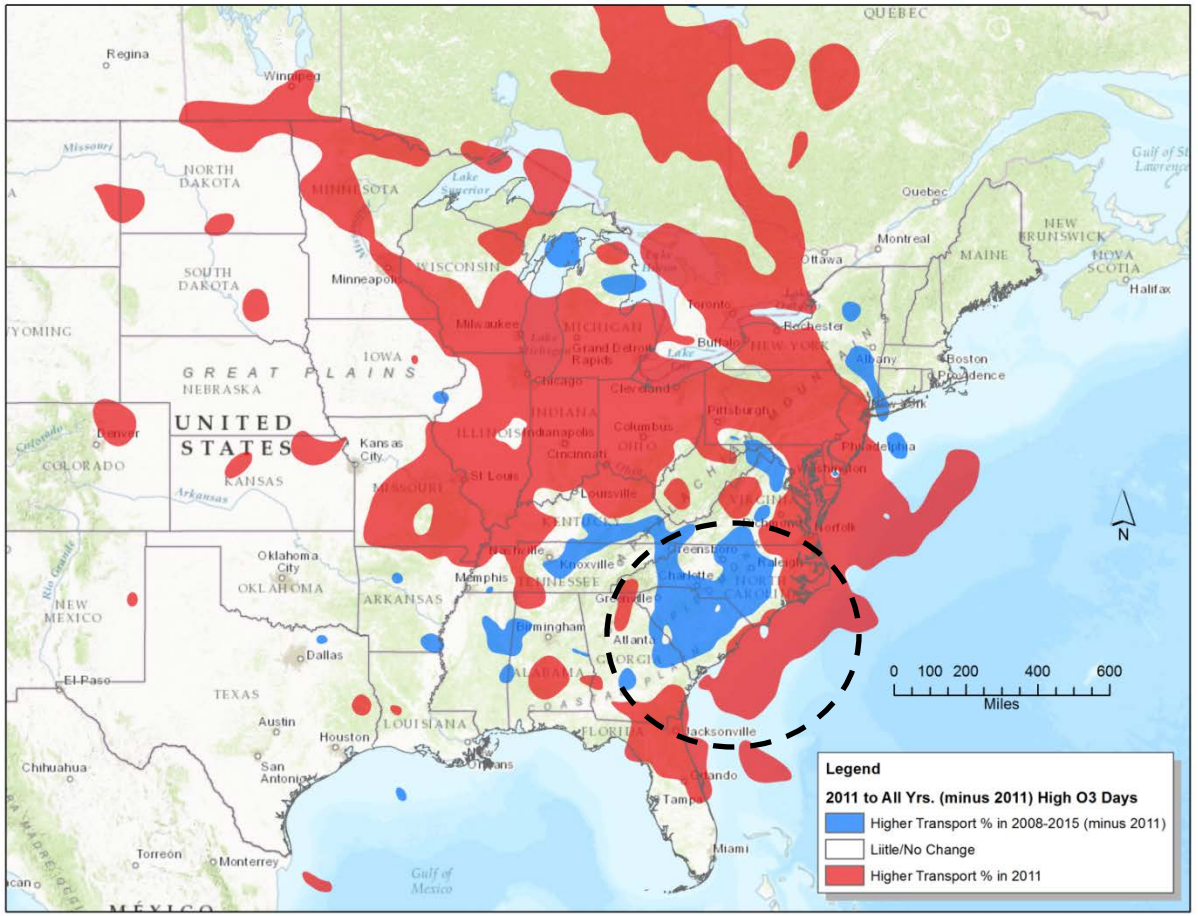
There are discernable trajectory patterns between high ozone days and all days. There are differences in transport patterns in 2011 and 2015 compared to all other years.

Difference Comparison Composite

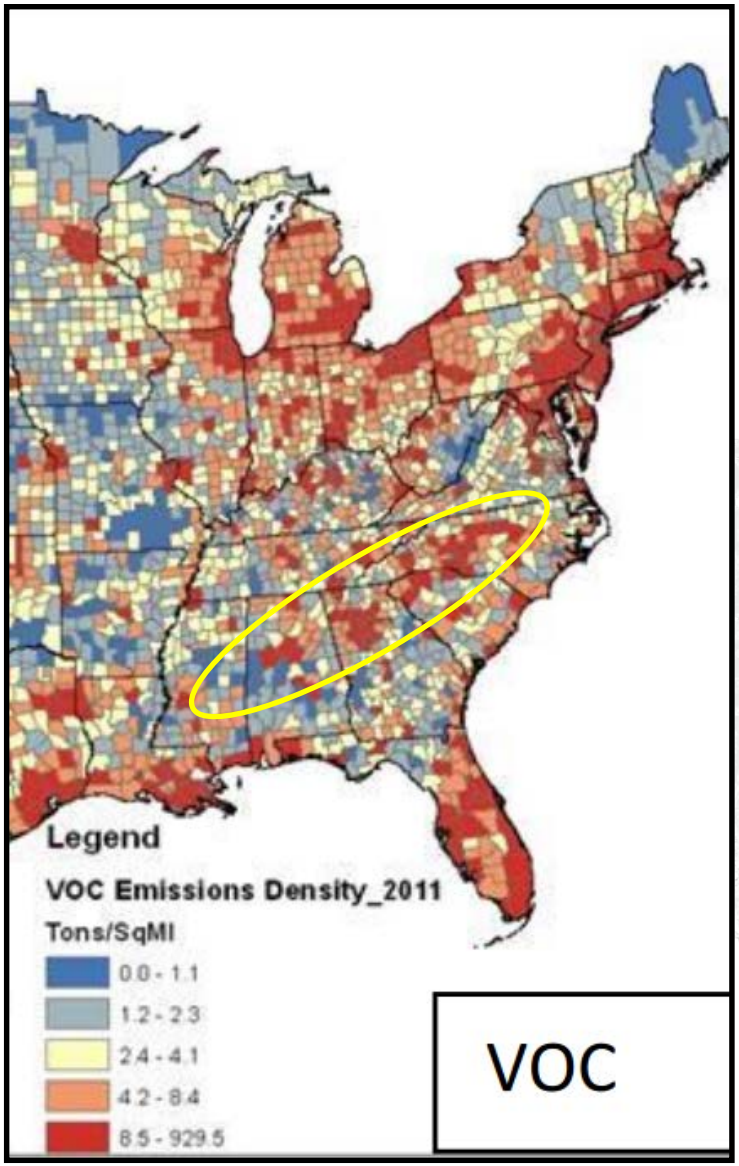
(high ozone days for 2011 vs. all other years combined)

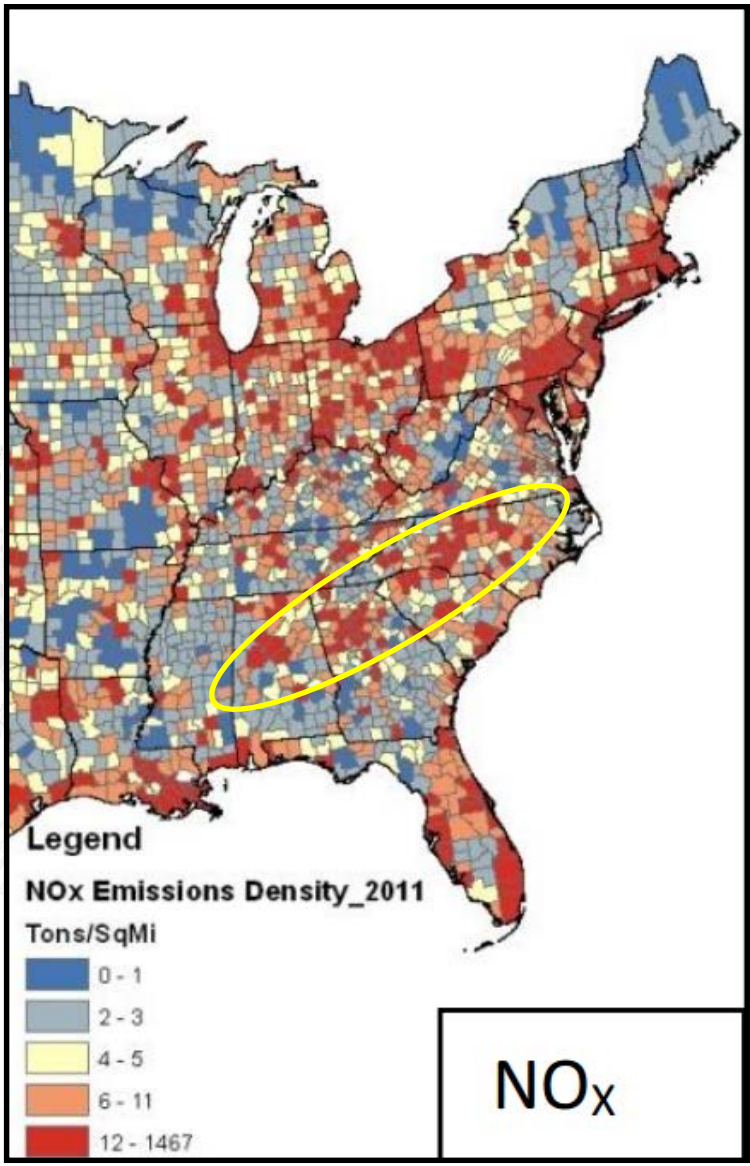
In 2011 transport patterns:

- were different than 2008-2015
- more westerly and northwesterly flow
- less southwesterly flow



The areas in the Southeast that had unusually low transport to Delaware in 2011 are areas with relatively high VOC & NOx emissions





Summary of Results

- Transport patterns in 2011 and 2015 when compared with 2008 through 2015 show key differences
  - More westerly and northwesterly flow patterns and very little if any southwesterly flow
- The southwesterly flow pattern is a phenomena that contributes to high ozone and ozone events
- There are significant emissions sources and in the Southeastern U.S. that are likely to be missed