

# Sources Contribution to Ozone in Connecticut

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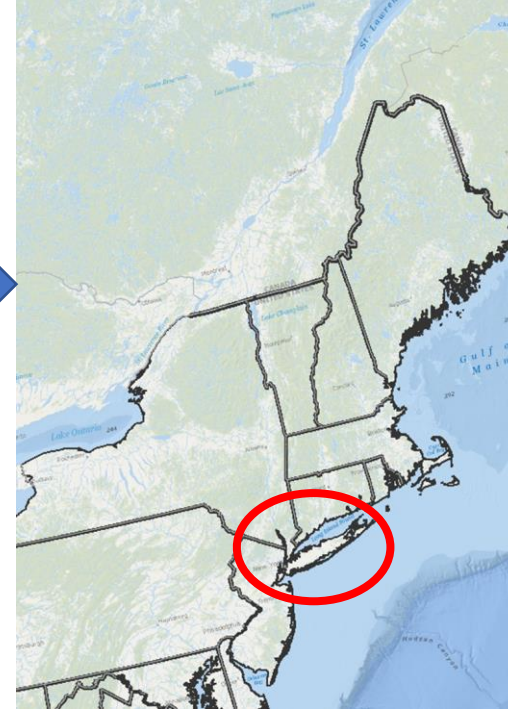
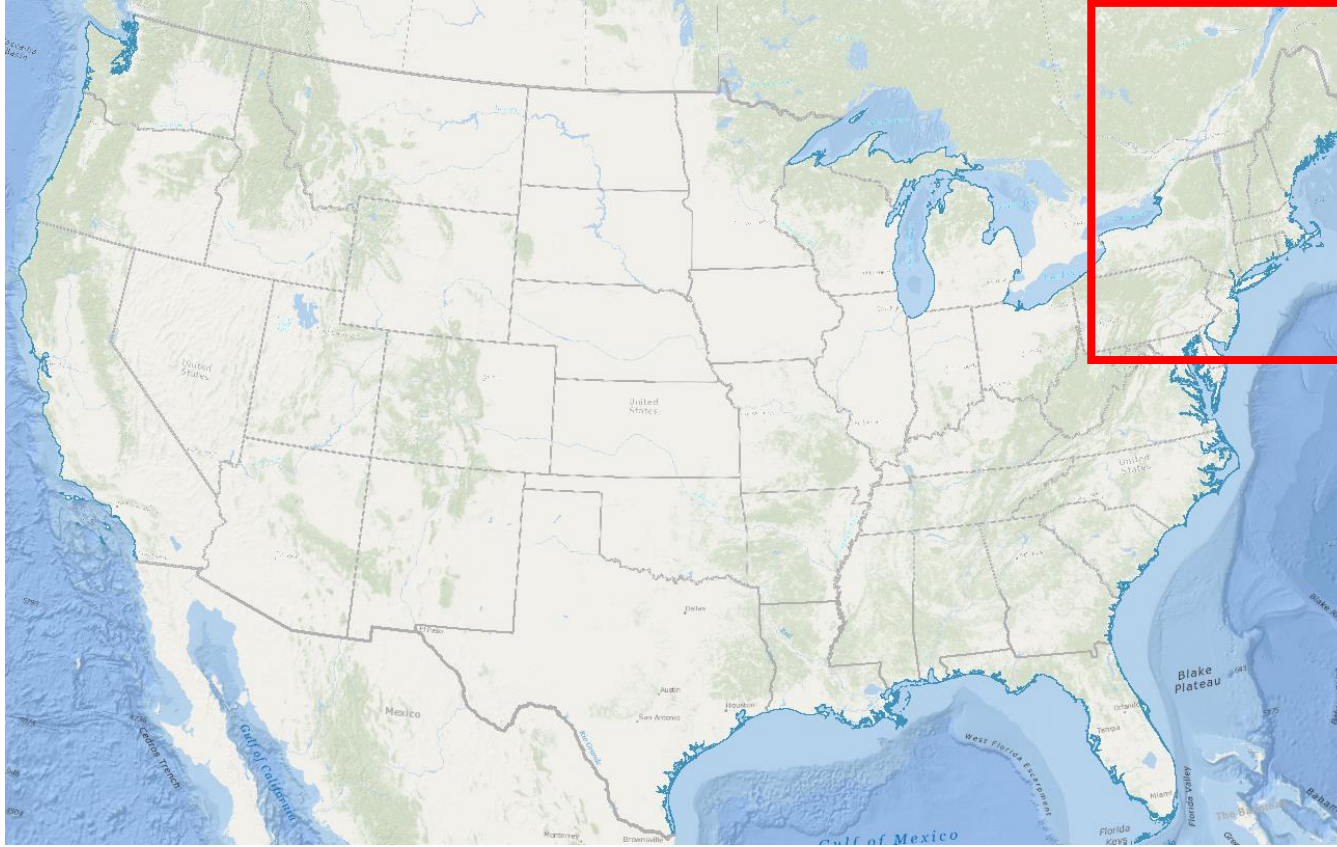
- Yukui Li, Kristina Wagstrom
- Department of Chemical & Biomolecular Engineering, University of Connecticut

# Objective

All Connecticut Counties receive "F" for ozone pollution (American Lung Association 2020 *State of the Air*)

County	Total Unhealthy Days	Orange Days	Red Days
Fairfield	60	42	18
Hartford	11	10	1
Litchfield	13	12	1
Middlesex	29	26	3
New haven	40	31	9
New London	24	21	3
Tolland	12	12	0
Windham	14	13	1

# Modeling Tools and Settings



**Analysis Domain:**  
Northeastern US,  
67X102 grid cells

**CAMx v6.50**

**OSAT:** Ozone Source Apportionment  
Technology

**DDM:** The Decoupled Direct Method

**CMAQ v5.3.1**

**ISAM:** The Integrated Source  
Apportionment Method

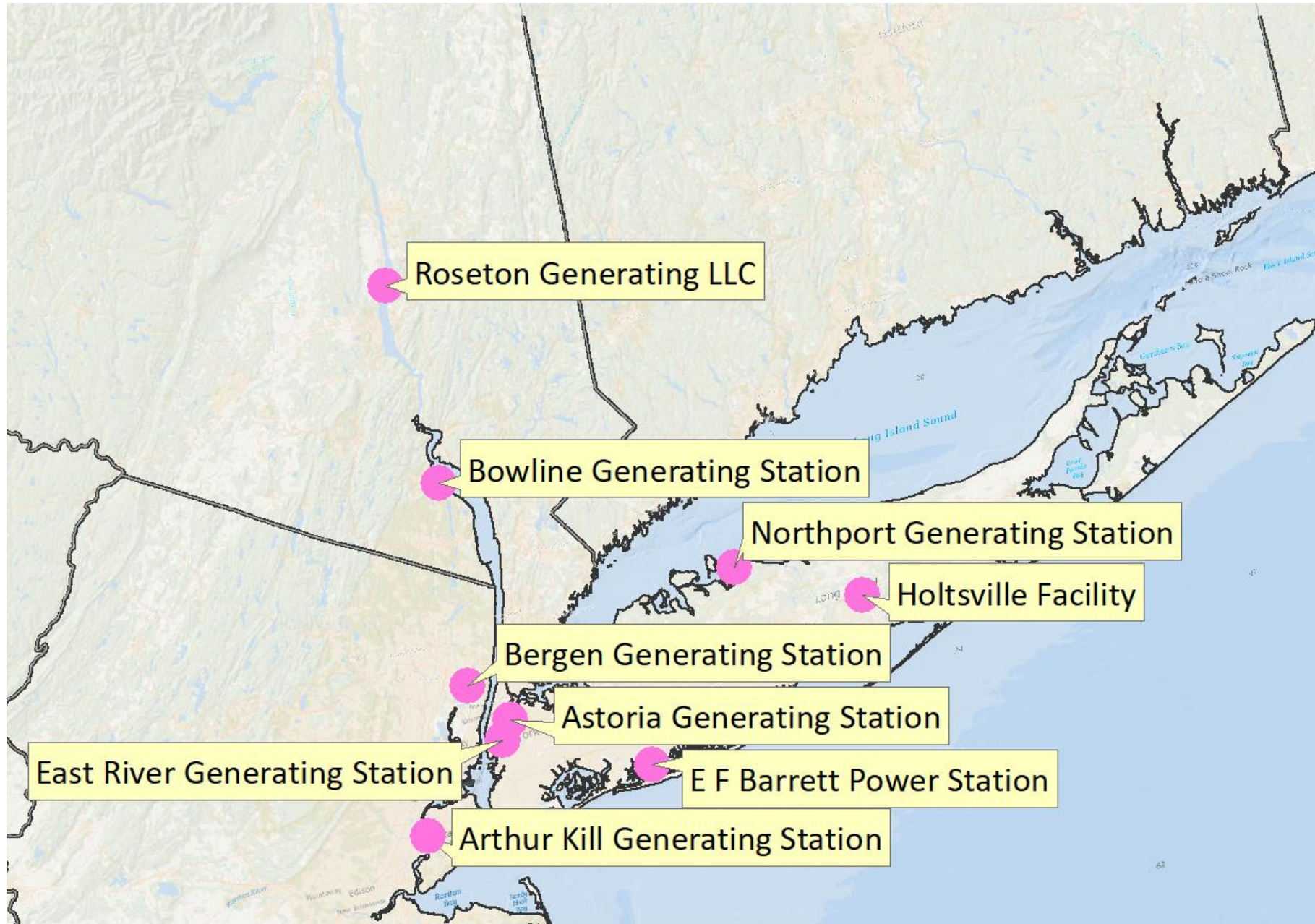
**Spatial Domain & Resolution:** 12US2, 396X246 grid cells; 12 x 12 *km*

**Temporal Domain & Resolution:** 2016; *Hourly*

**Inputs:** NEIC 2016 beta (2016ff) - Beta version of the National  
Emission Inventory Collaborative's 2016 modeling platform.



# Selected Sources

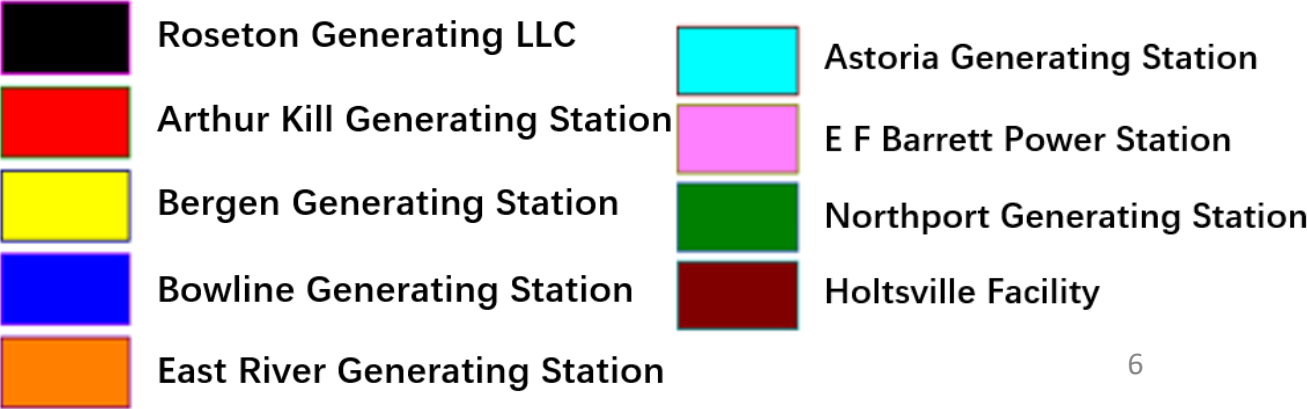
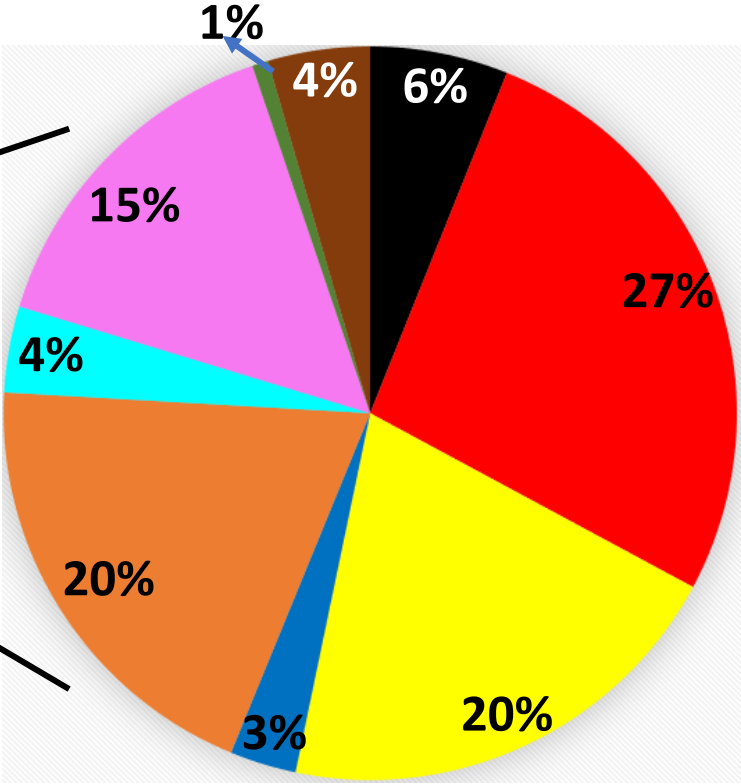
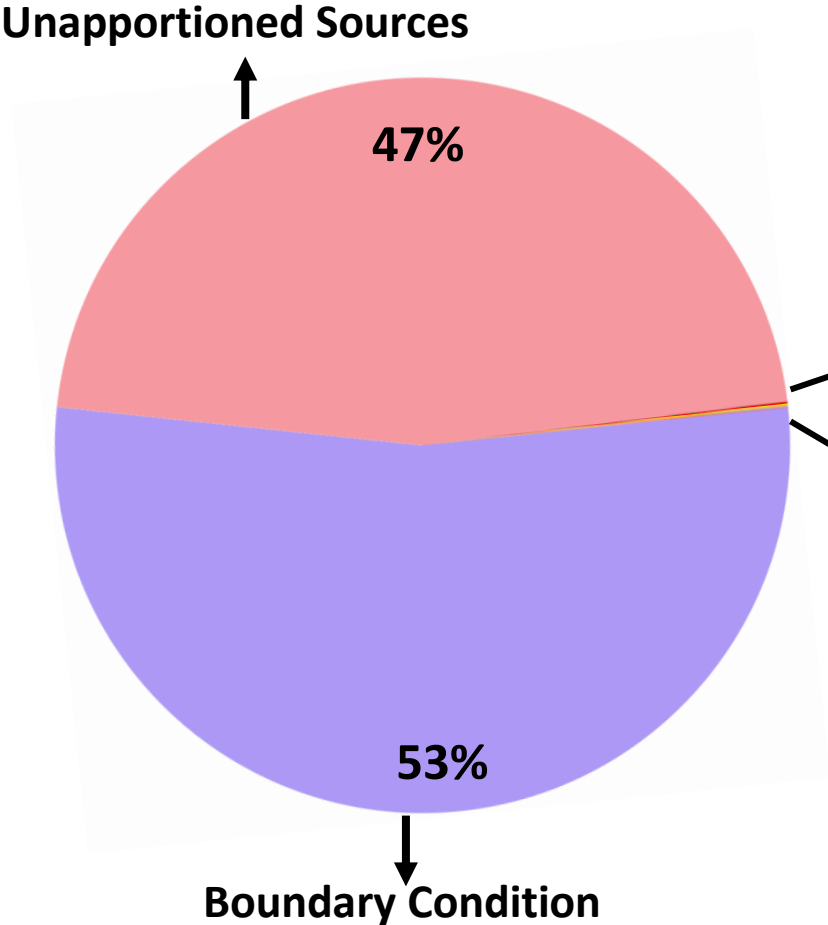


# Model evaluation

	CAMx		CMAQ	
	April to October	June to August	April to October	June to August
MB (ppb)	1.81	4.43	2.86	6.09
ME (ppb)	9.06	9.00	9.84	10.84
MFB	0.12	0.19	0.11	0.19
MFE	0.37	0.34	0.39	0.38

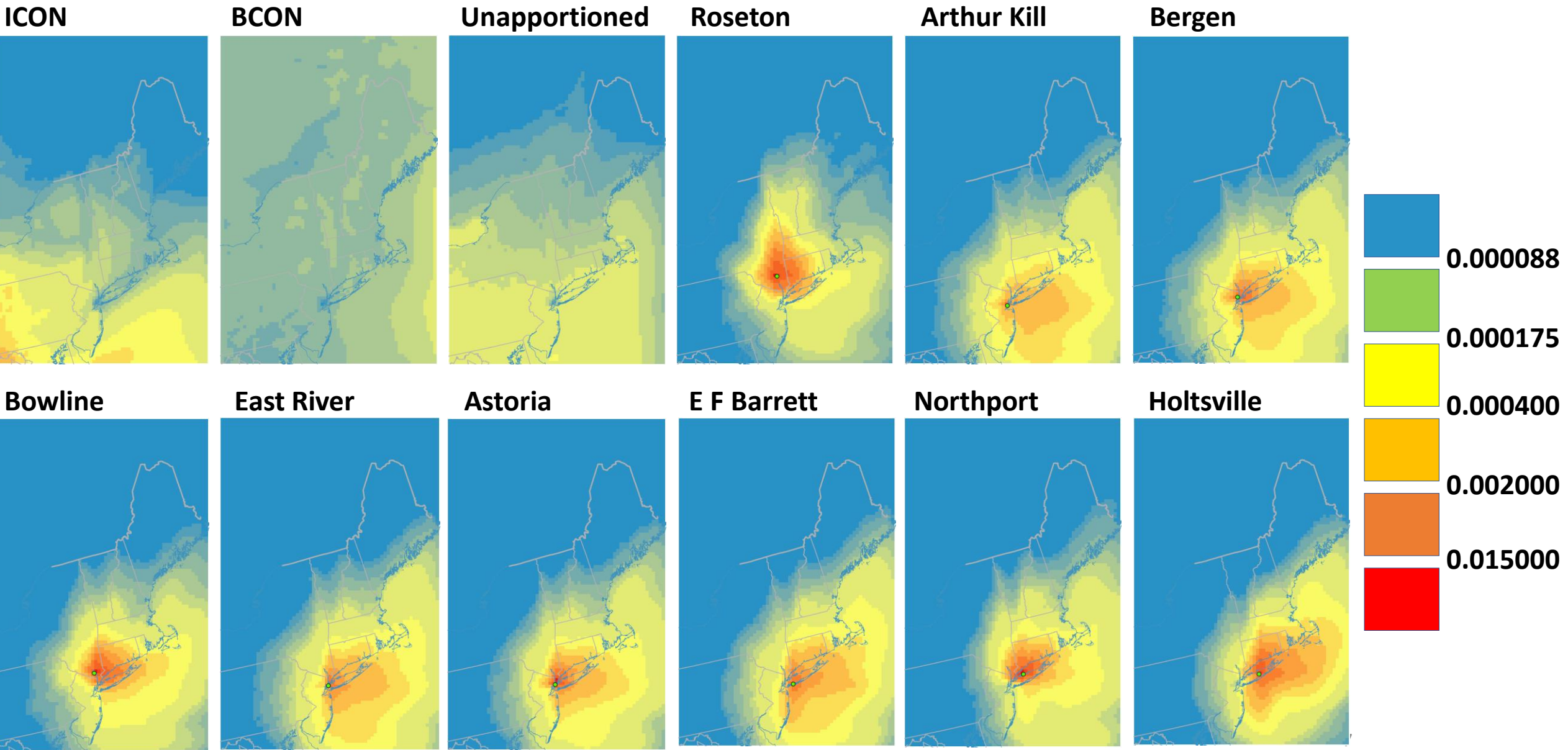
Observed ozone data for model evaluation is from U.S. EPA (AQS Data, 2016)

# CAMx OSAT Summertime Average Source Apportionment

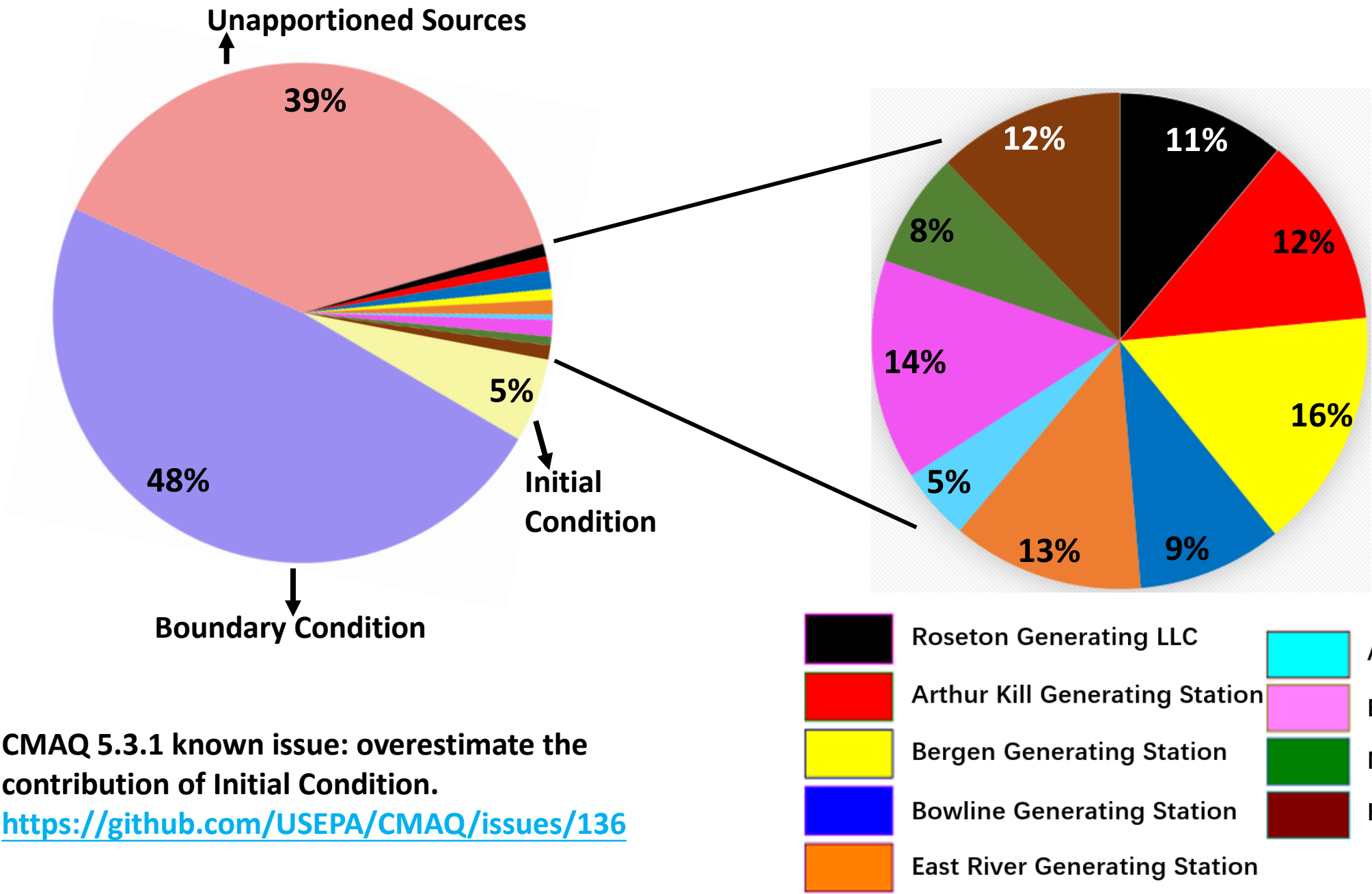




# CAMx OSAT Summertime Average Fractional Source Apportionment



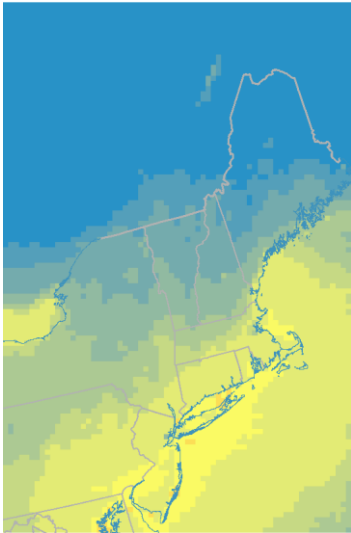
# CMAQ ISAM Summertime Average Source Apportionment





# CMAQ ISAM Summertime Average Fractional Source Apportionment

ICON



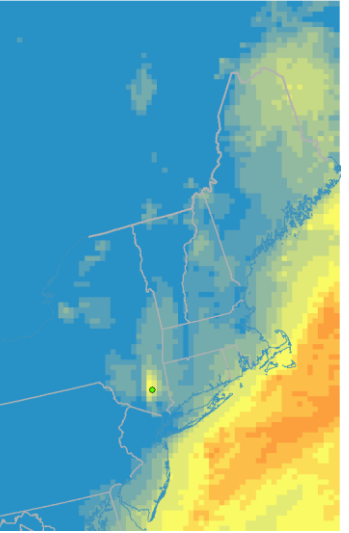
BCON



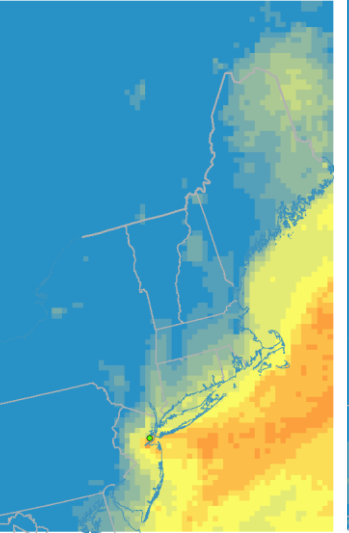
Unapportioned



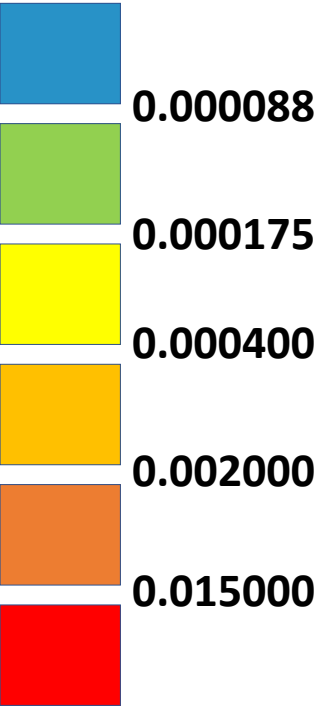
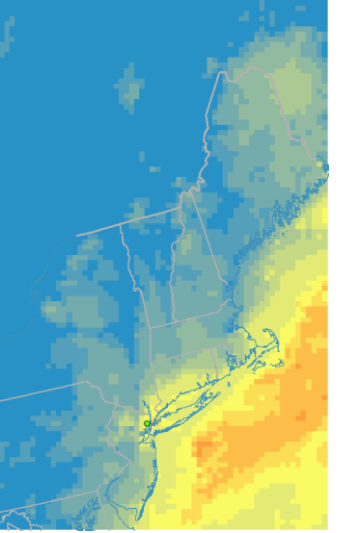
Roseton



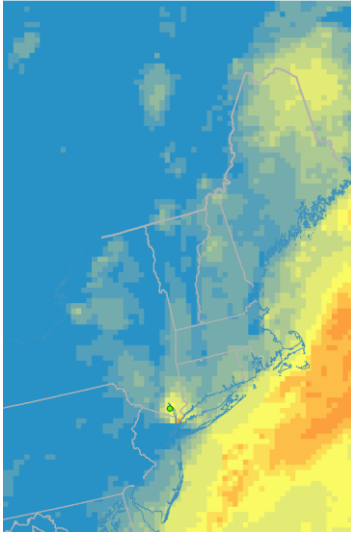
Arthur Kill



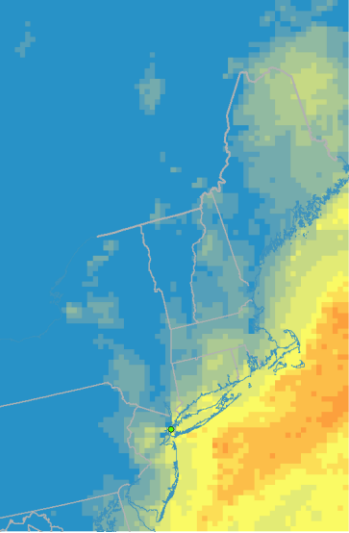
Bergen



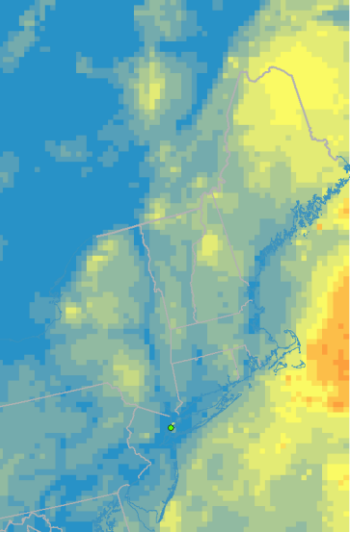
Bowline



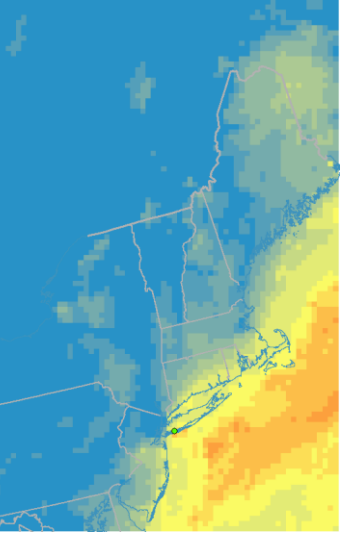
East River



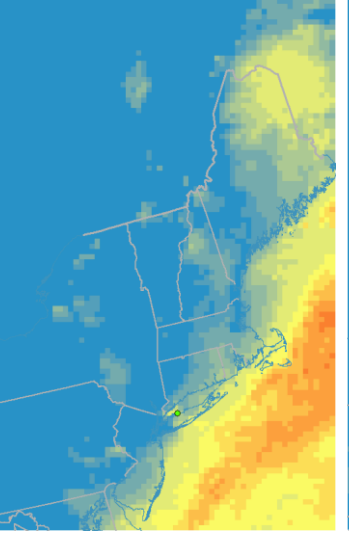
Astoria



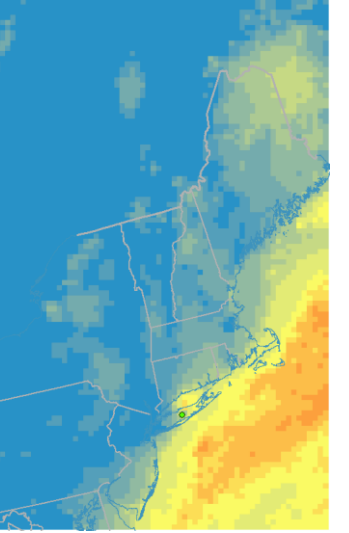
E F Barrett



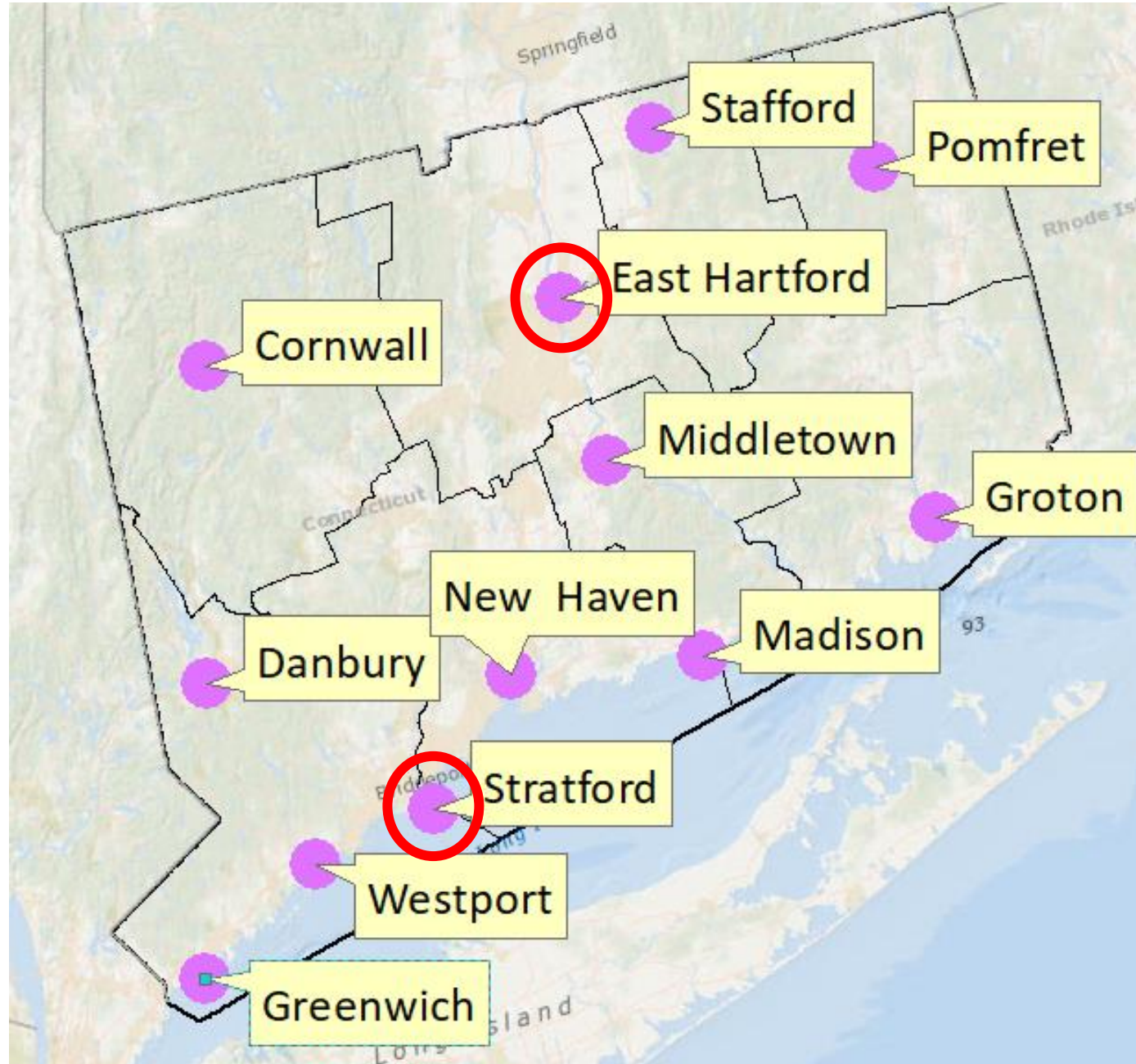
Northport



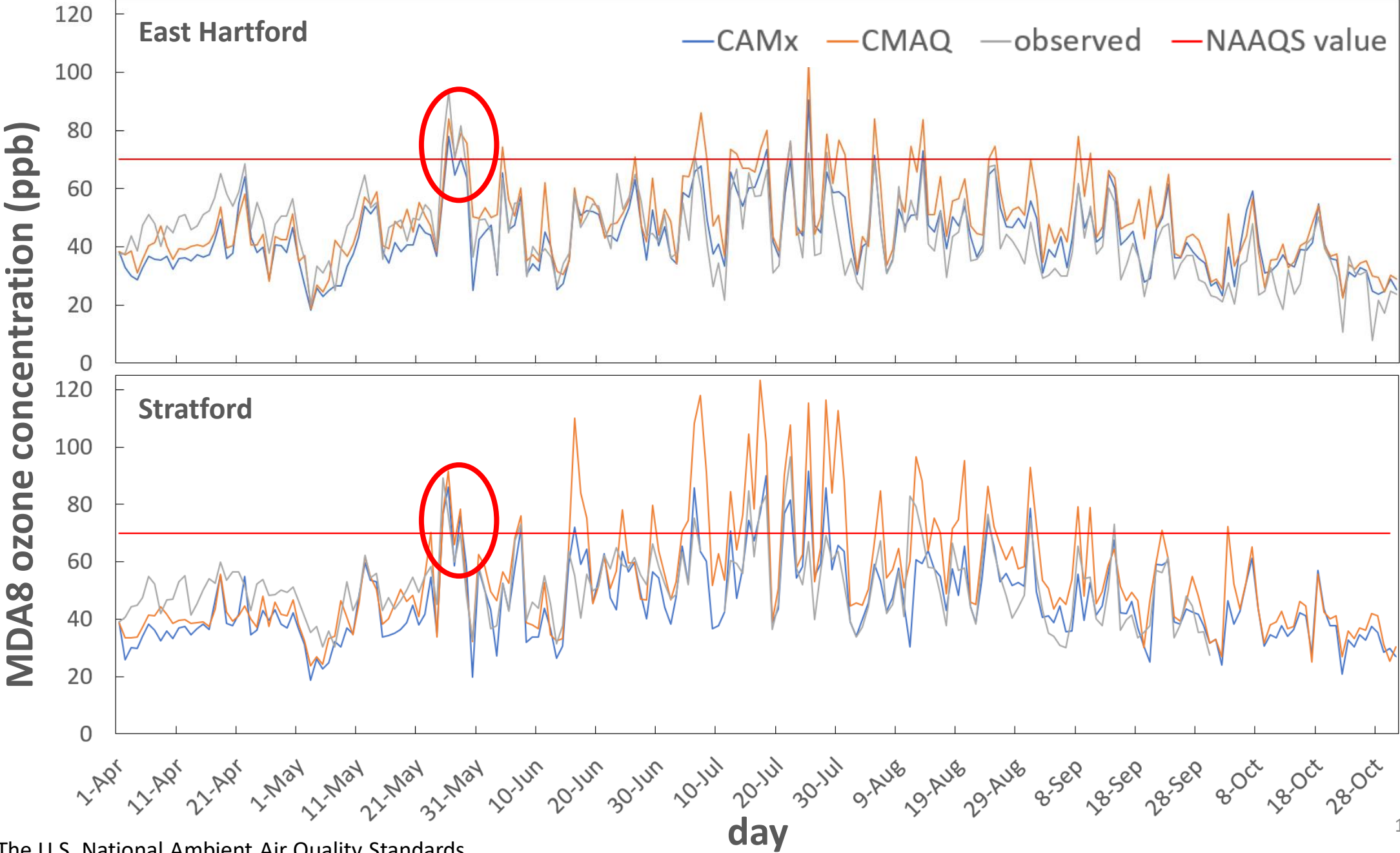
Holtsville



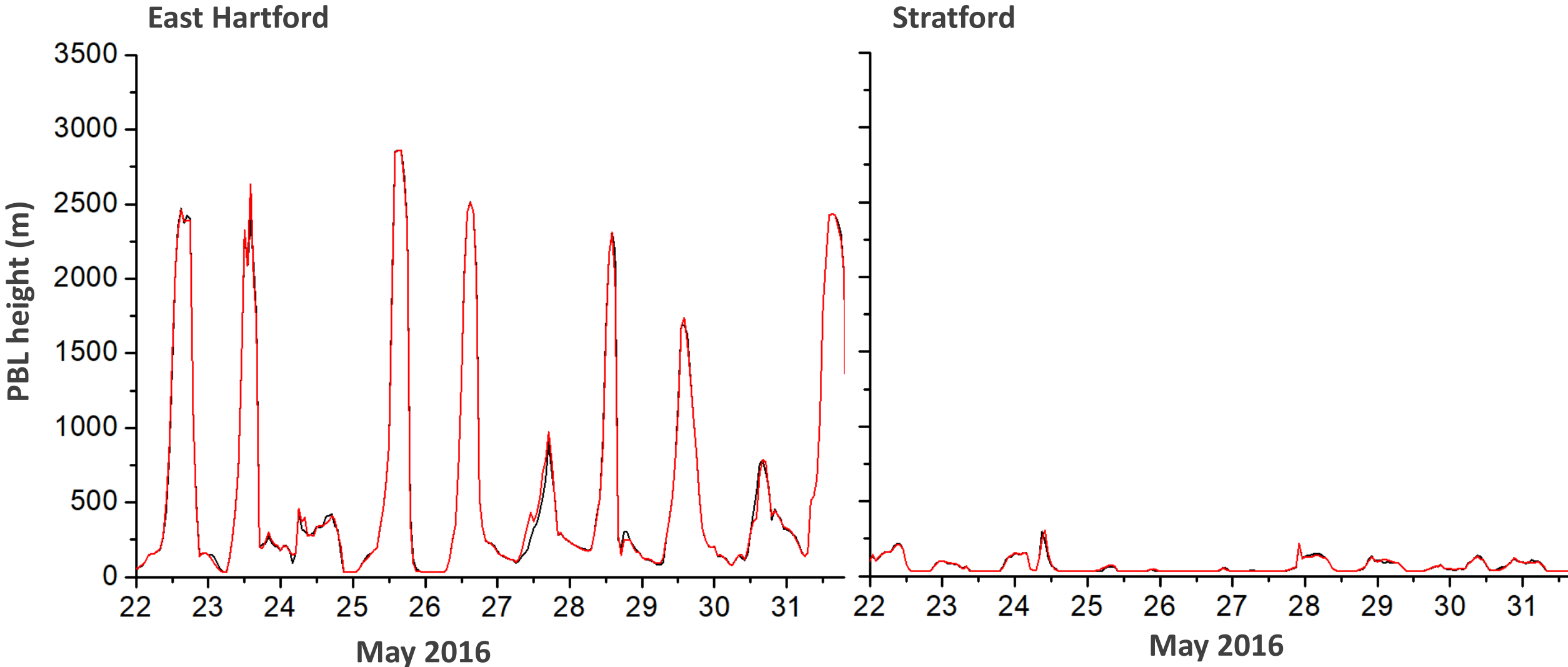
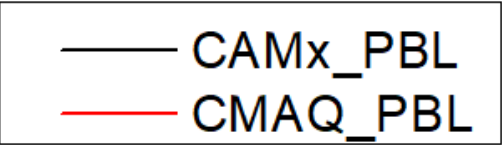
# Ozone Monitoring Sites in CT



# Time Series Plots of MDA8 ozone for April through October 2016



# May High Ozone PBL Analysis

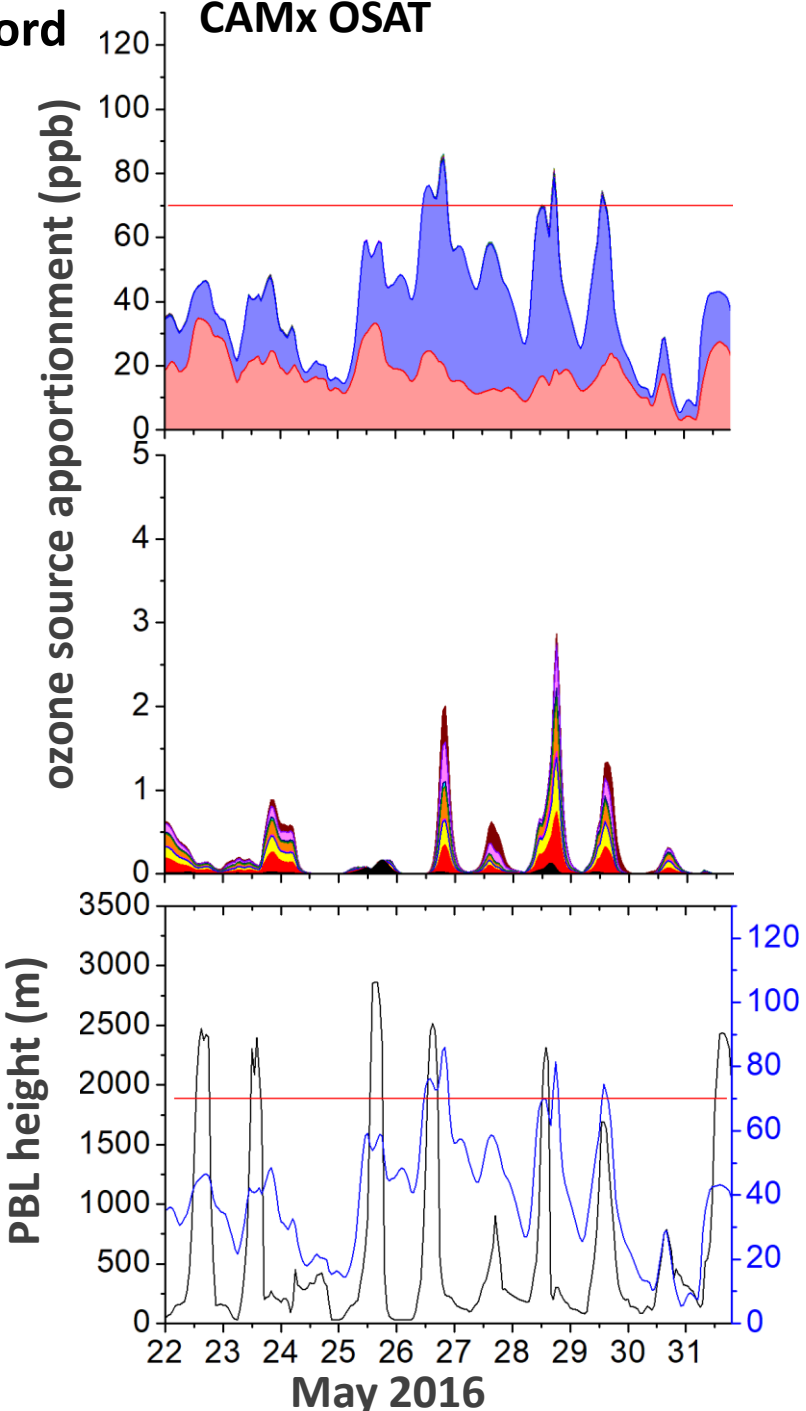


PBL height: Planetary Boundary Layer height

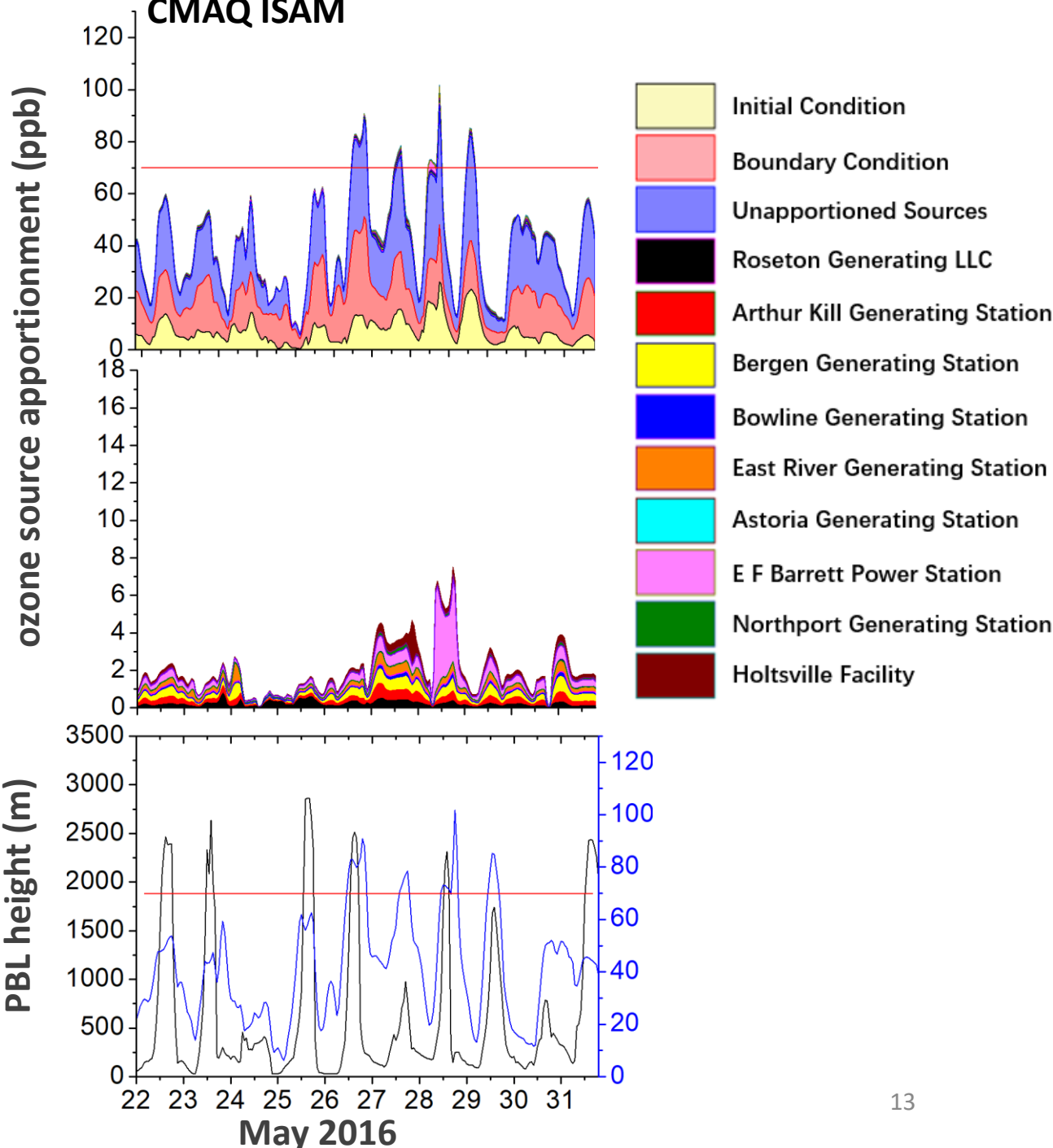


East Hartford

CAMx OSAT

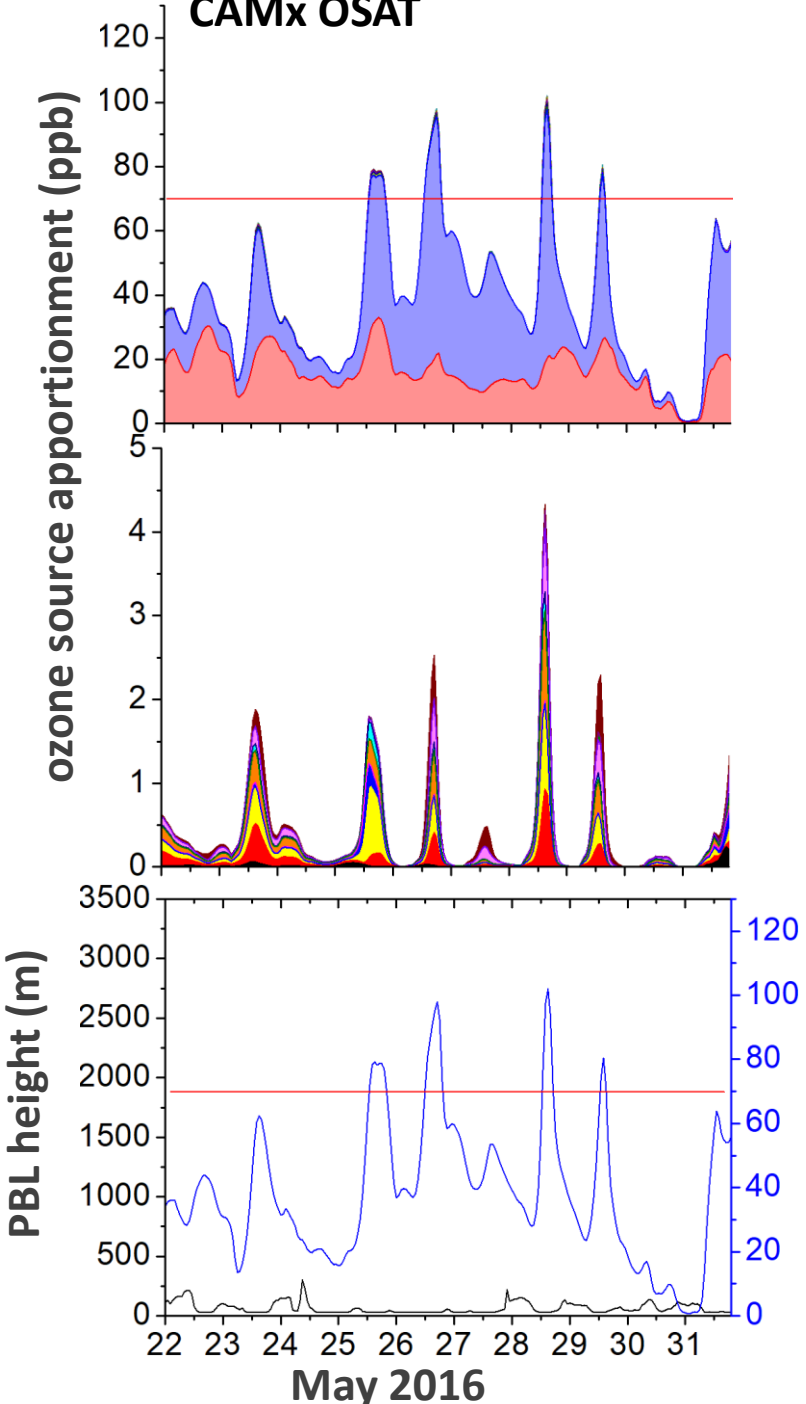


CMAQ ISAM

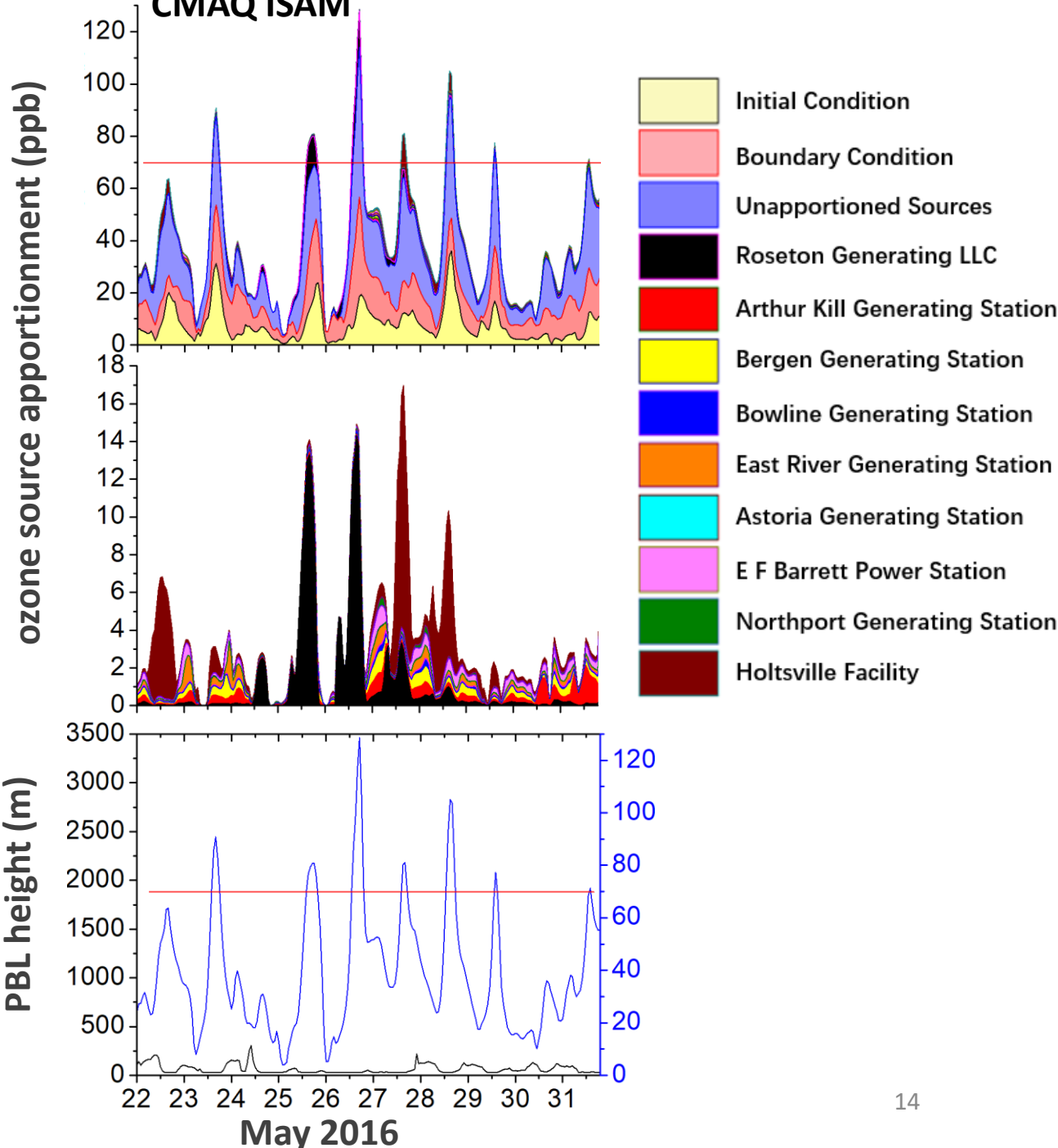


Stratford

CAMx OSAT

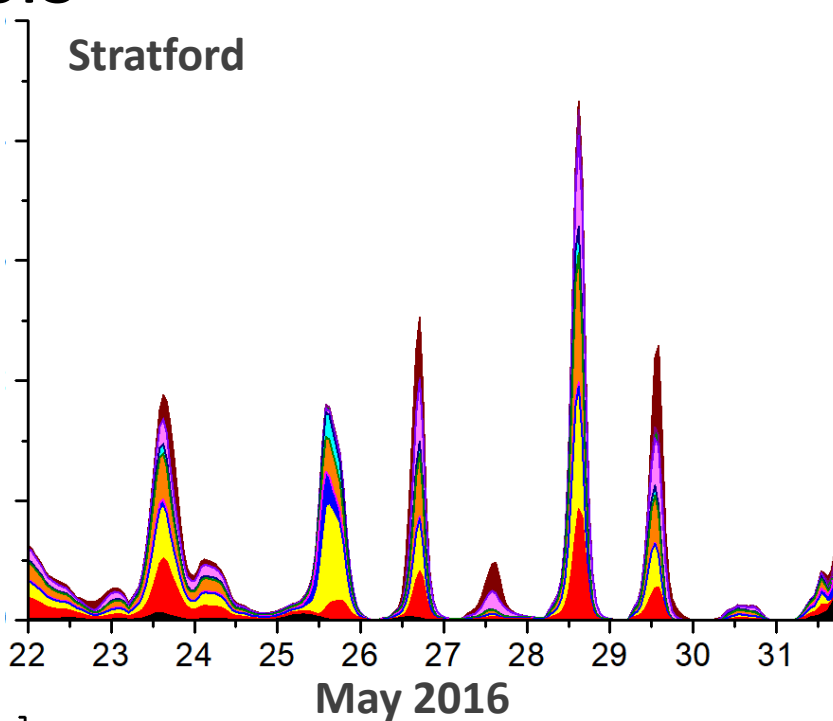
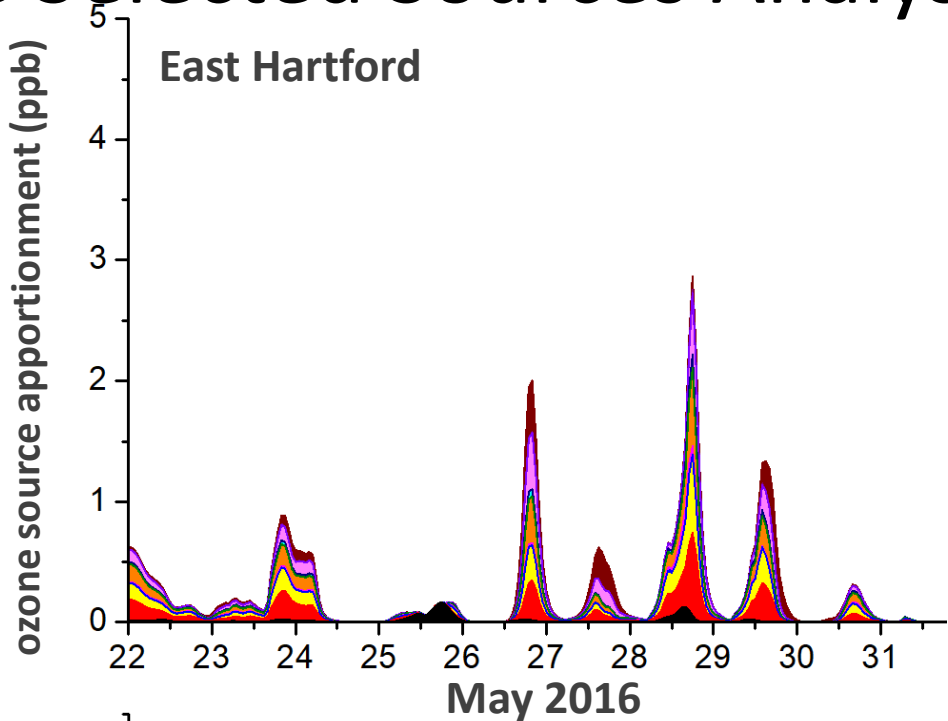


CMAQ ISAM



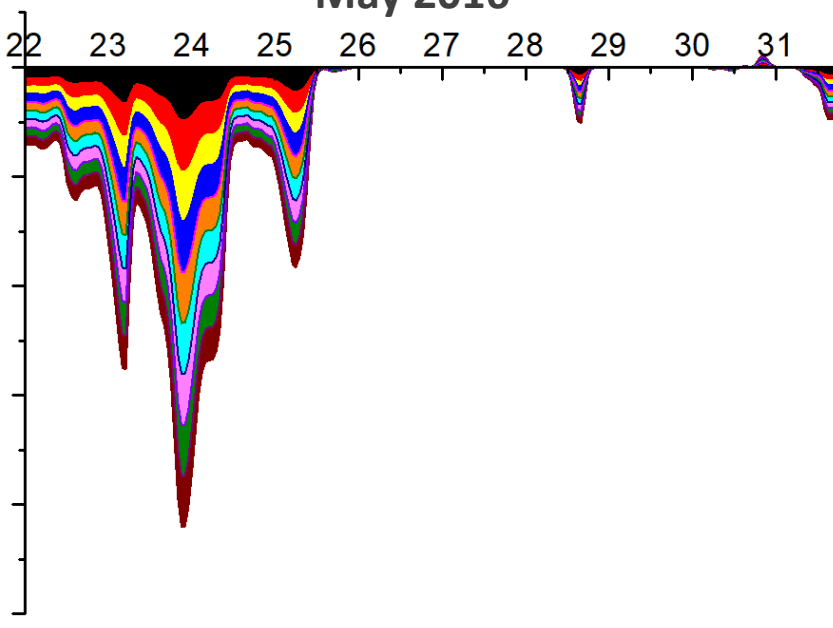
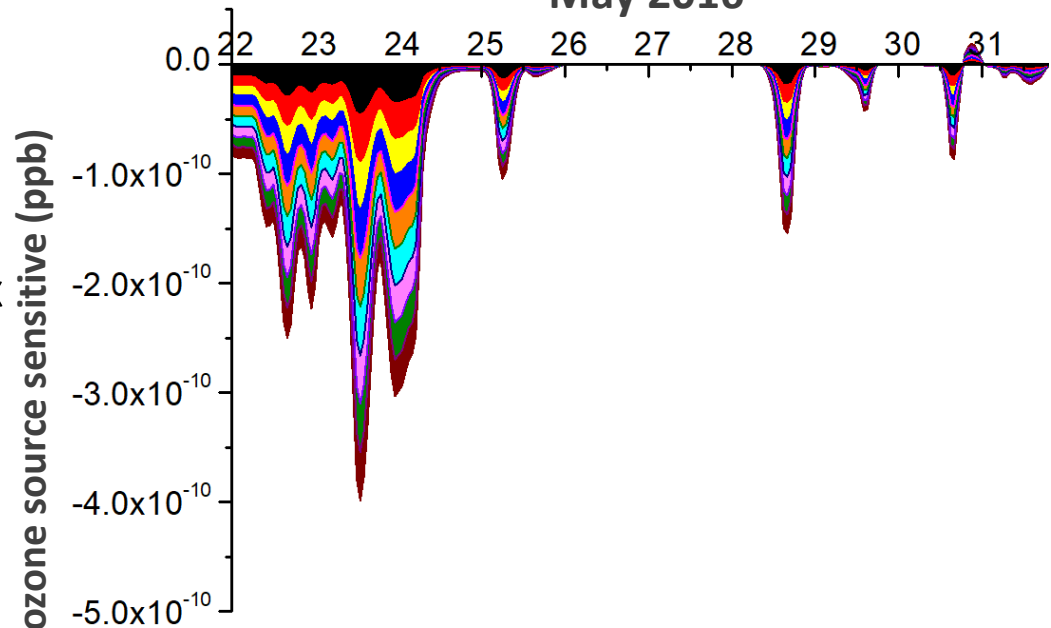
# Ozone Selected Sources Analysis

CAMx  
OSAT



- Roseton Generating LLC
- Arthur Kill Generating Station
- Bergen Generating Station
- Bowline Generating Station
- East River Generating Station
- Astoria Generating Station
- E F Barrett Power Station
- Northport Generating Station
- Holtsville Facility

CAMx  
DDM



# Conclusion

- BCON and Unapportioned Sources contribute the most to ozone concentration.
- Nine selected sources add up contribute to very less ozone concentration in CT.
- The contribution of BCON to ozone remains constant. But Unapportioned Sources and Selected Sources contribute a lot more when ozone concentration is in a very high level.
- Sources contribution and PBL height peaks of all the sources follow the total ozone peak.



# Acknowledgements

## **Computing Resources:**

University of Connecticut High Performance Computing  
Resources

## **Funding:**

Connecticut Department of Energy and Environmental  
Protection

**End**

**Thank you**