Connecticut Department of Energy and Environmental Protection

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

July 6, 2016 OTR Ozone Exceedances

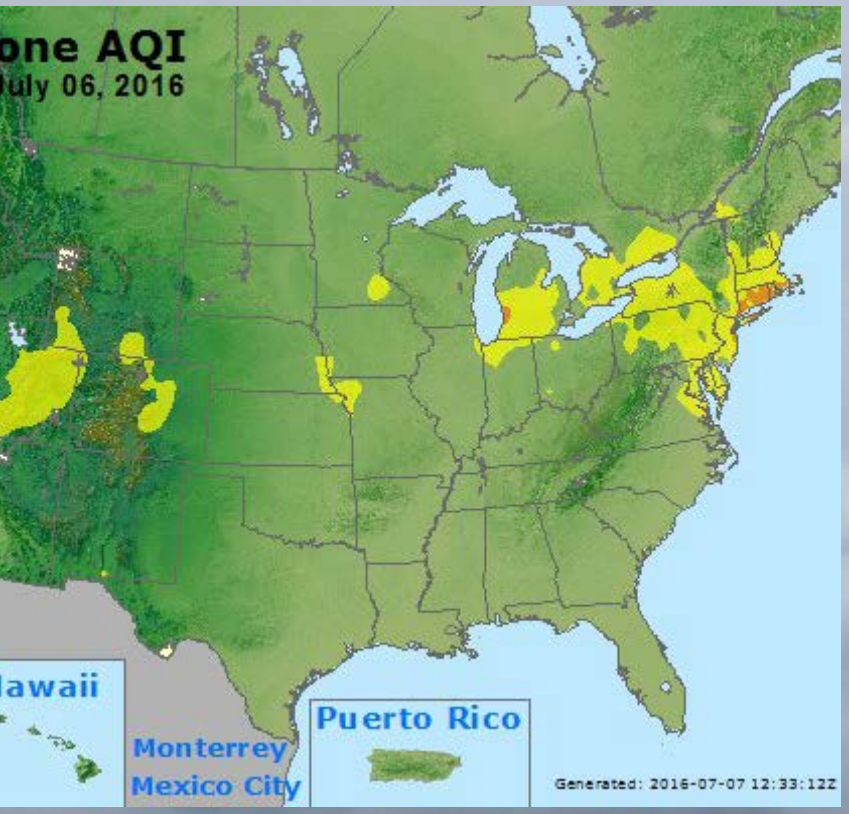
By Michael Geigert

Connecticut Department of Energy and Environmental Protection

Summary

- Widespread Moderate throughout the OTR, with USG centered around CT;
- 21 sites in OTR reached USG:
  1. 21 sites above 70 ppb ozone NAAQS, 8 sites in CT
  2. 6 sites above (2008) 75 ppb ozone NAAQS, 4 sites in CT
  3. 1 sites above (1997) 84 ppb ozone NAAQS, 1 site in CT

National and Regional AQI Maps



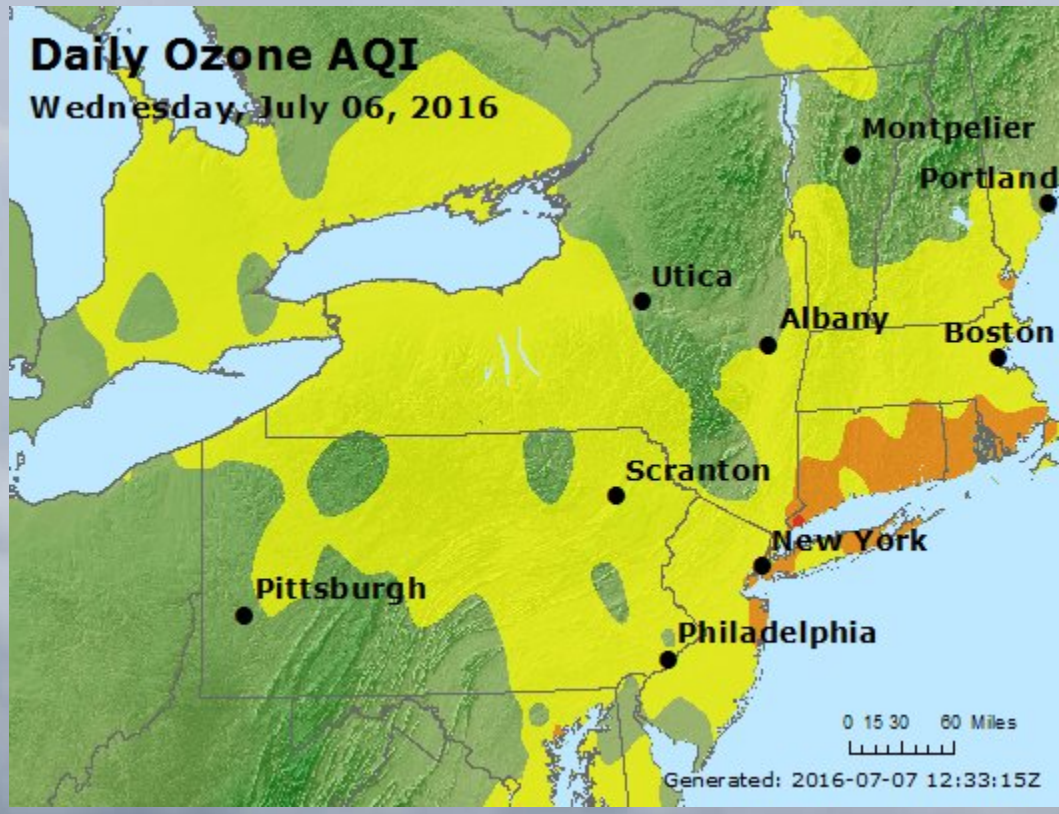


Table of OTR Monitoring Sites

- Widespread Moderate across the OTR with 21 exceedances

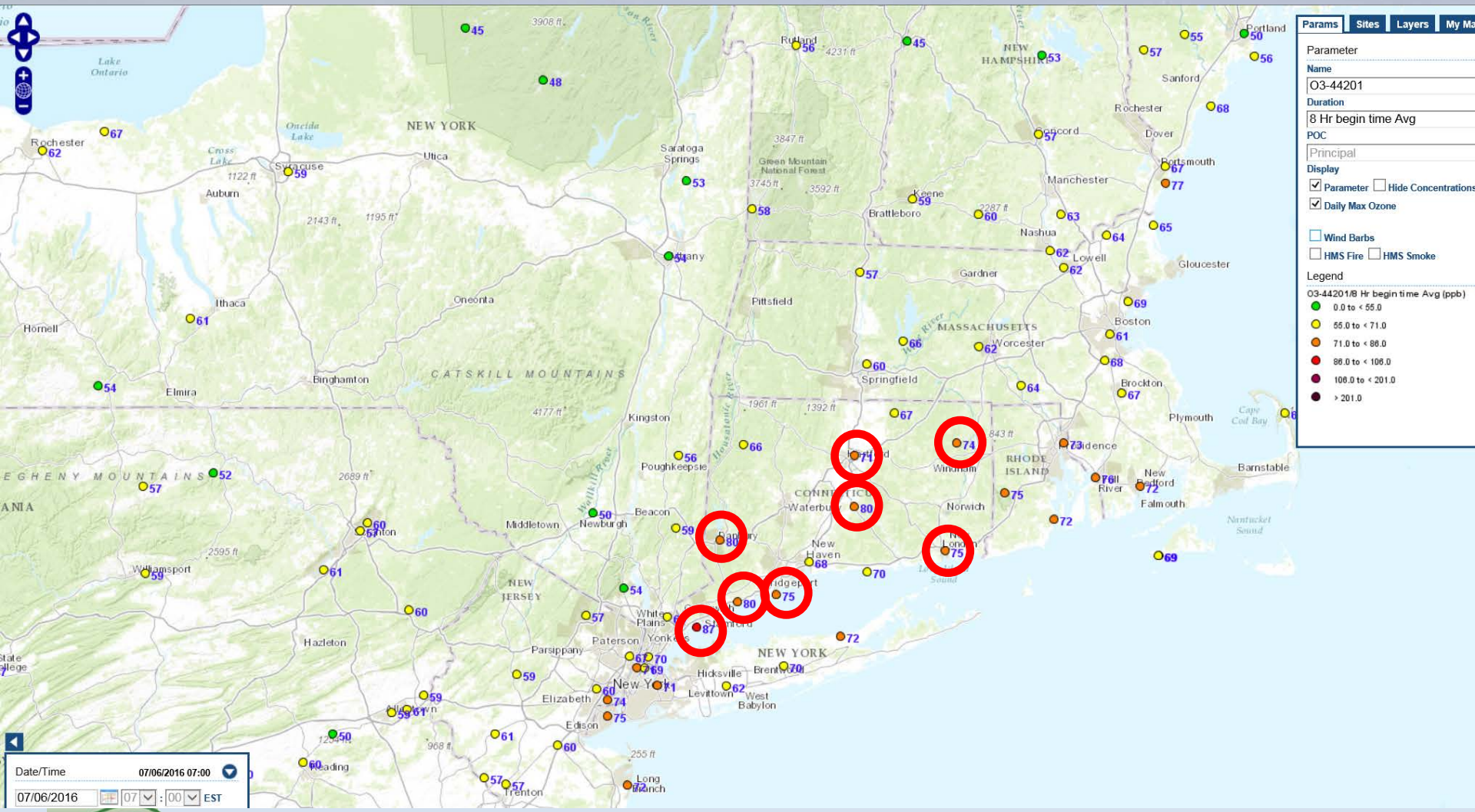
Date (LST)	Site	Site AQS	Param	Max 8-hr ppb
7/6/2016	Greenwich	090010017	O3	87
7/6/2016	Danbury	090011123	O3	80
7/6/2016	Middletown	090070007	O3	80
7/6/2016	Westport	090019003	O3	80
7/6/2016	Odiorne State P	330150016	O3	77
7/6/2016	Fall River	250051004	O3	76
7/6/2016	Groton Fort Gri	090110124	O3	75
7/6/2016	Stratford	090013007	O3	75
7/6/2016	Susan Wagner	360850067	O3	75
7/6/2016	W Greenwich	440030002	O3	75
7/6/2016	Abington	090159991	O3	74
7/6/2016	Bayonne	340170006	O3	74
7/6/2016	Essex	240053001	O3	74
7/6/2016	E Providence	440071010	O3	73
7/6/2016	Fairhaven2	250051006	O3	72
7/6/2016	Monmouth Univer	340250005	O3	72
7/6/2016	Narragansett	440090007	O3	72
7/6/2016	Riverhead	361030004	O3	72
7/6/2016	CCNY	360610135	O3	71
7/6/2016	East Hartford	090031003	O3	71
7/6/2016	Queens	360810124	O3	71
7/6/2016	Holtsville	361030009	O3	70
7/6/2016	Madison-Beach R	090099002	O3	70
7/6/2016	Pfizer Lab	360050133	O3	70
7/6/2016	IS52	360050110	O3	69
7/6/2016	LYNN	250092006	O3	69
7/6/2016	PG Equestrian C	240338003	O3	69
7/6/2016	TRURO	250010002	O3	69
7/6/2016	Wampanoag Labor	250070001	O3	69
7/6/2016	Wampanoag Labor	TT0300001	O3	69
7/6/2016	White Plains	361192004	O3	69
7/6/2016	E. Milton - Blu	250213003	O3	68
7/6/2016	Kennebunkport	230312002	O3	68
7/6/2016	New Haven - Cri	090090027	O3	68
7/6/2016	Brockton	250230005	O3	67
7/6/2016	Edgewood	240251001	O3	67
7/6/2016	Furley	245100054	O3	67
7/6/2016	Leonia	340030006	O3	67
7/6/2016	Portsmouth	330150014	O3	67
7/6/2016	Stafford	090131001	O3	67

CT Monitoring Site Design Value Update

	Site Name	To Date: 2016 DV	To Date 2016 Compliance Status x = Violating NAAQS: 2015 NAAQS	2008 NAAQS	1997 NAAQS	
SWCT Portion of NYC Area	Danbury	78	x	x		Four more 102+ ppb days violates 1997 NAAQS
	Greenwich	81	x	x		Four more 93+ ppb days violates 1997 NAAQS
	Madison	73	x			One more 78+ ppb day violates 2008 NAAQS
	Middletown	79	x	x		Four more 97+ ppb days violates 1997 NAAQS
	New Haven - Criscuolo Park	74	x			Two more 75+ ppb days violates 2008 NAAQS
	Stratford	77	x	x		Four more 95+ ppb days violates 1997 NAAQS
	Westport	82	x	x		**Two more 87+ ppb days violates 1997 NAAQS**
Greater CT	Cornwall	72	x			Three more 86+ ppb days violates 2008 NAAQS
	East Hartford	74	x			**Two more 76+ ppb days violates 2008 NAAQS**
	Groton Fort Griswold	72	x			Three more 86+ ppb days violates 2008 NAAQS
	Stafford	73	x			Three more 79+ ppb days violates 2008 NAAQS
	Abington (CASTNET)	68				Two more 76+ ppb days violates 2015 NAAQS

July 6, 2016 Peak Northeast Ozone

- Exceedances for 8 Connecticut Sites



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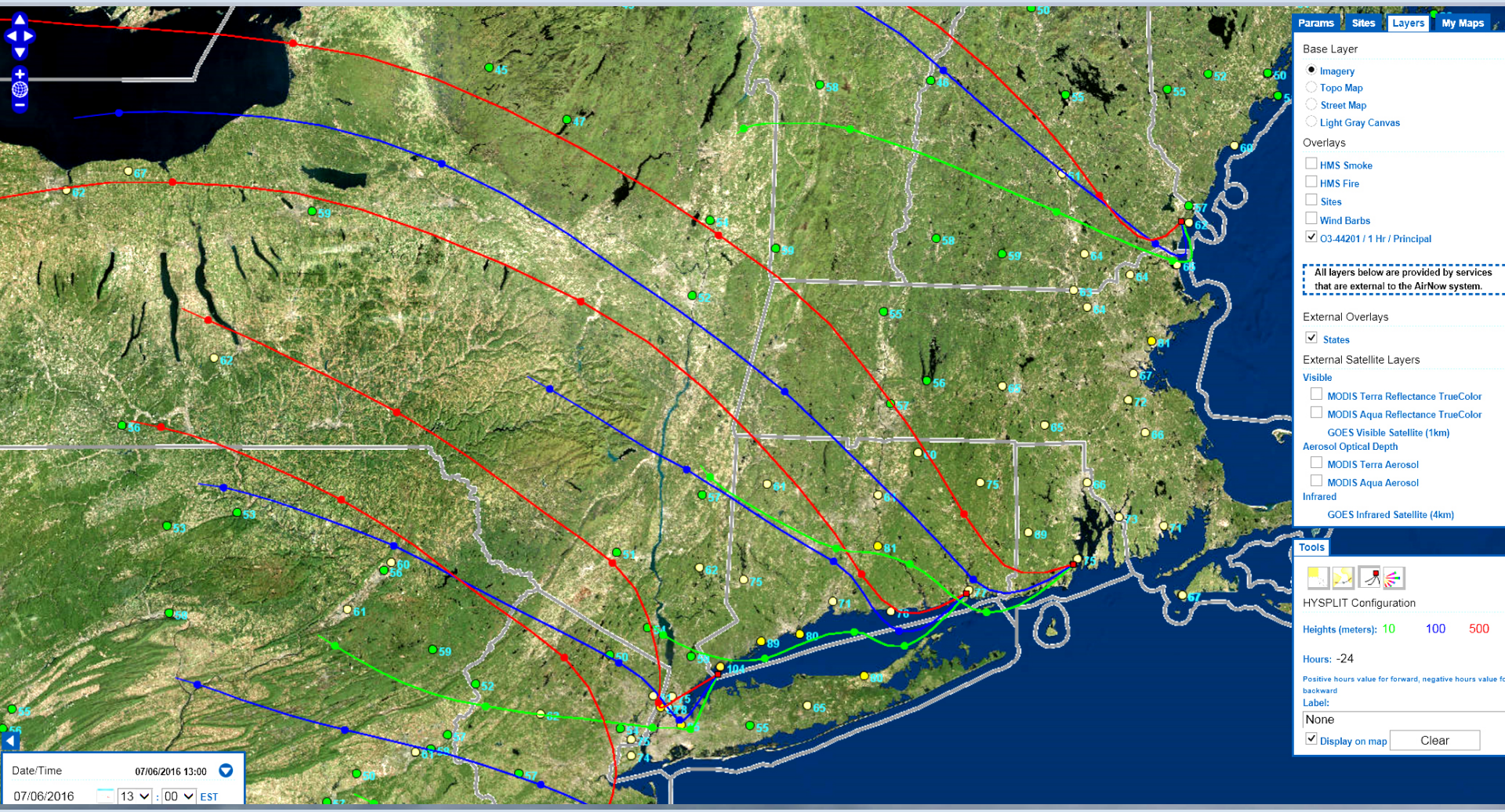
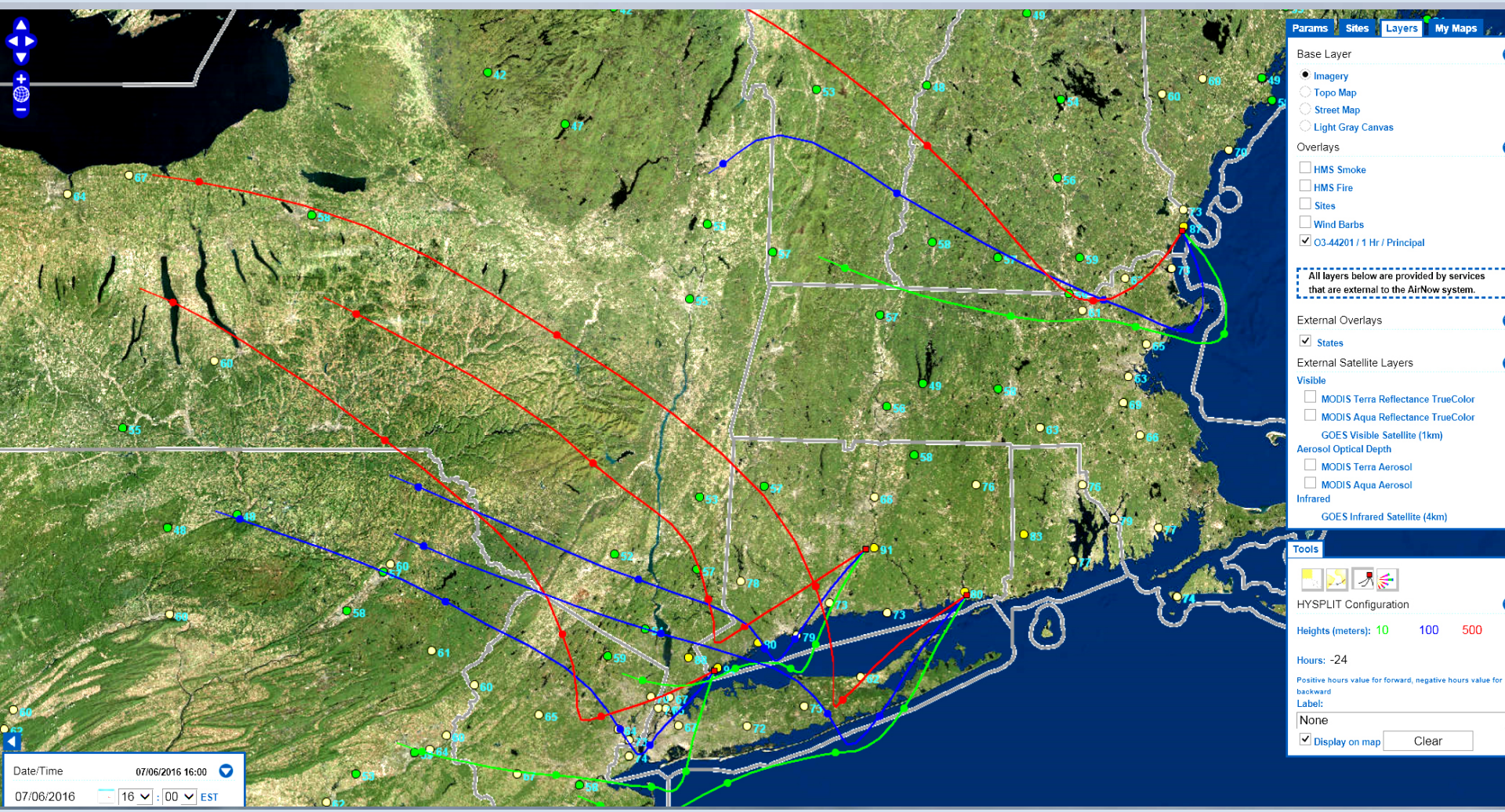
24-hr Back Trajectories 1:00 pm EST



When the Greenwich monitor peaked at 104 ppb, the 10/100/500 meters back trajectories showed contribution from the NYC metro area, as the lower boundary layer winds turned to the southwest. The exceeding monitor on the NH coast had southerly winds.

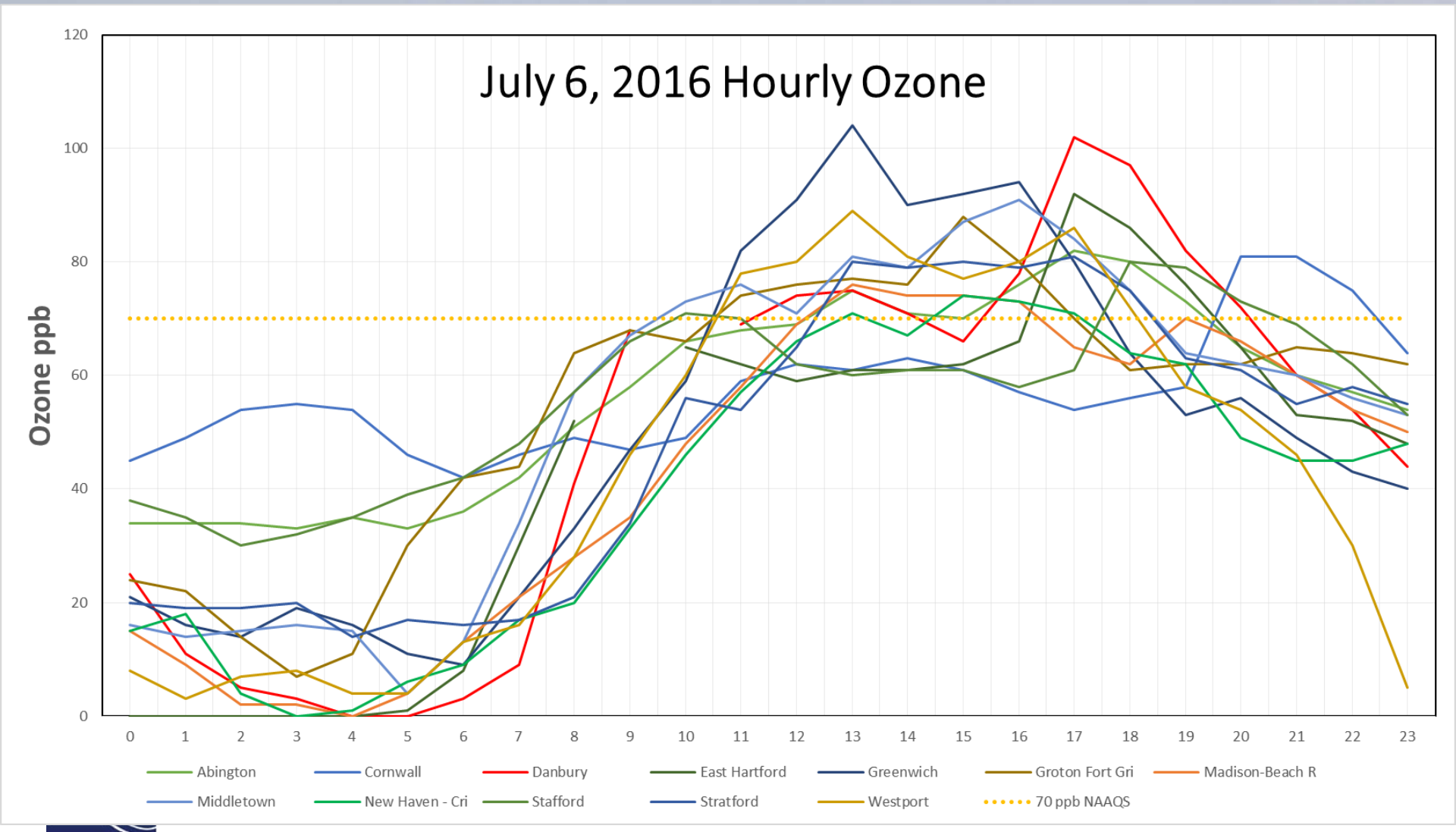
24-hr Back Trajectories 4:00 pm EST



A few hours later, the Connecticut monitors were being fed ozone off of Long Island Sound. Low level southerly winds into the NH coast were being fed ozone from the Boston plume.

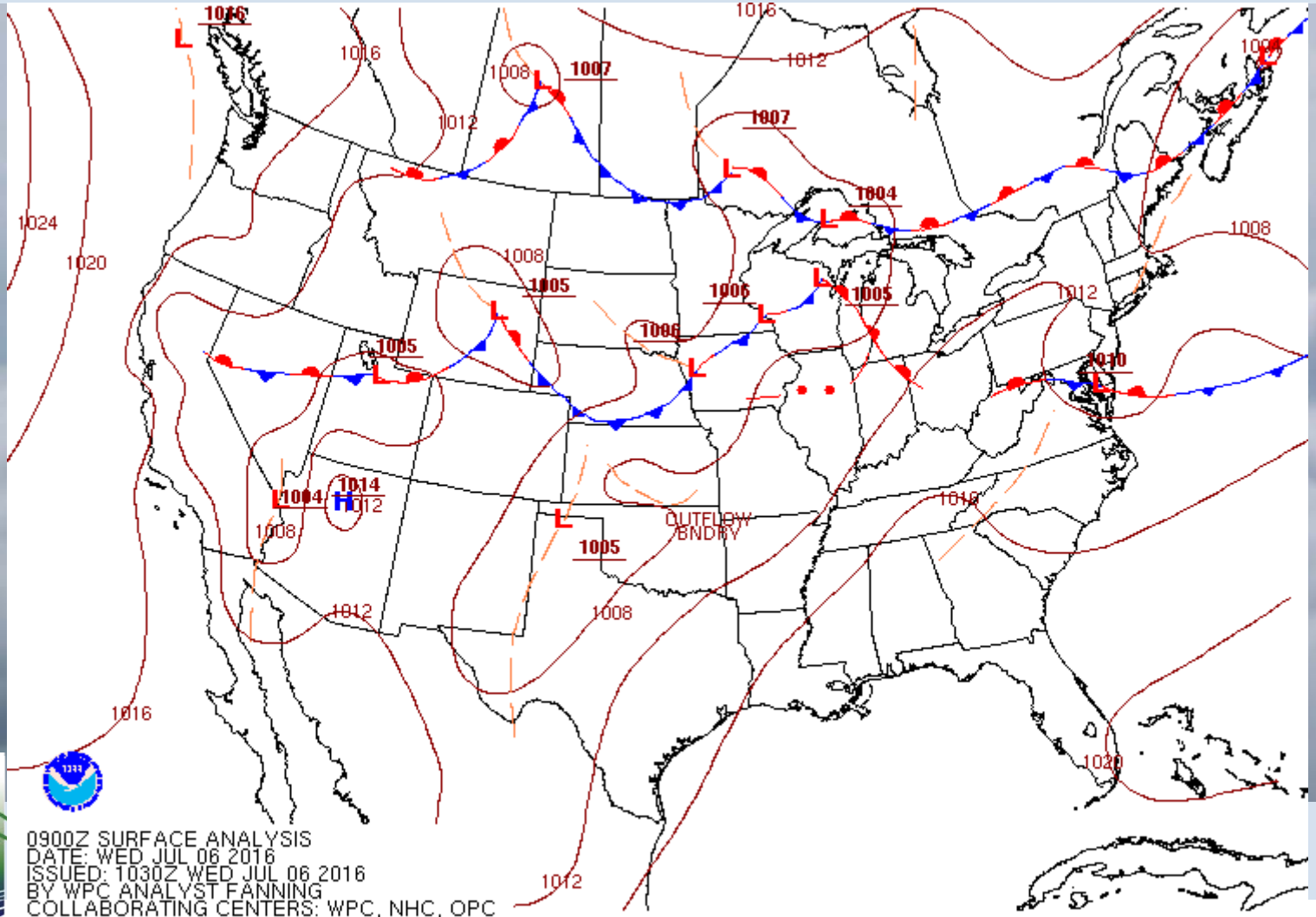
July 6, 2016 CT Ozone Monitors

Most CT sites had USG ozone levels from 11:00 am to 11:00 pm with Greenwich peaking at 104 ppb. Cornwall peaked after 8:00 pm as ozone plume moved northward and dissipated.



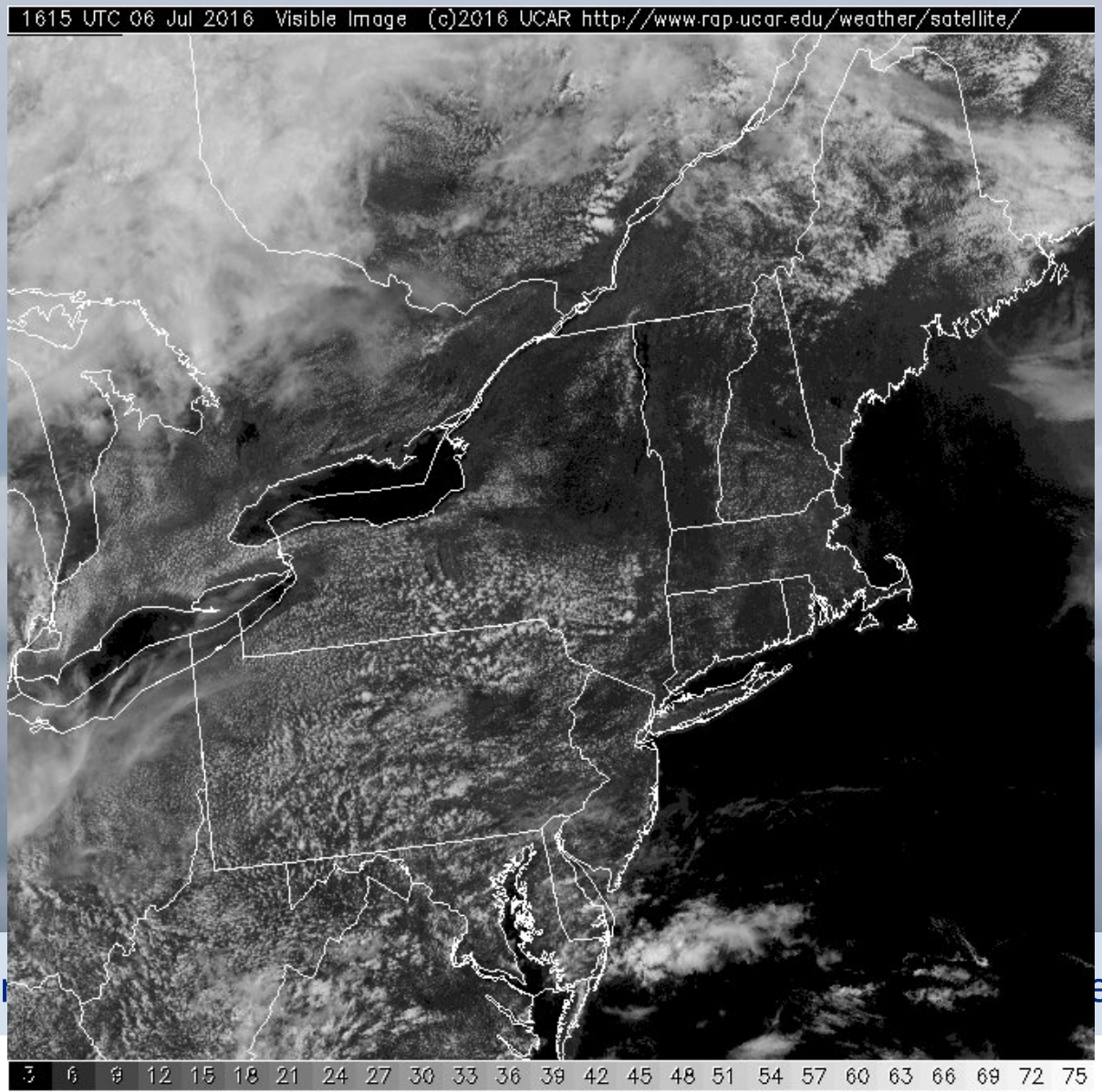
July 6, 2016 Surface Analysis (5:00am -11:00pm) Animation

- Weak low pressure to our south dissipated as back-door cold front approached from the north. Southwest winds developed by late morning, allowing NYC metro plume to form and move into Long Island Sound and Connecticut.



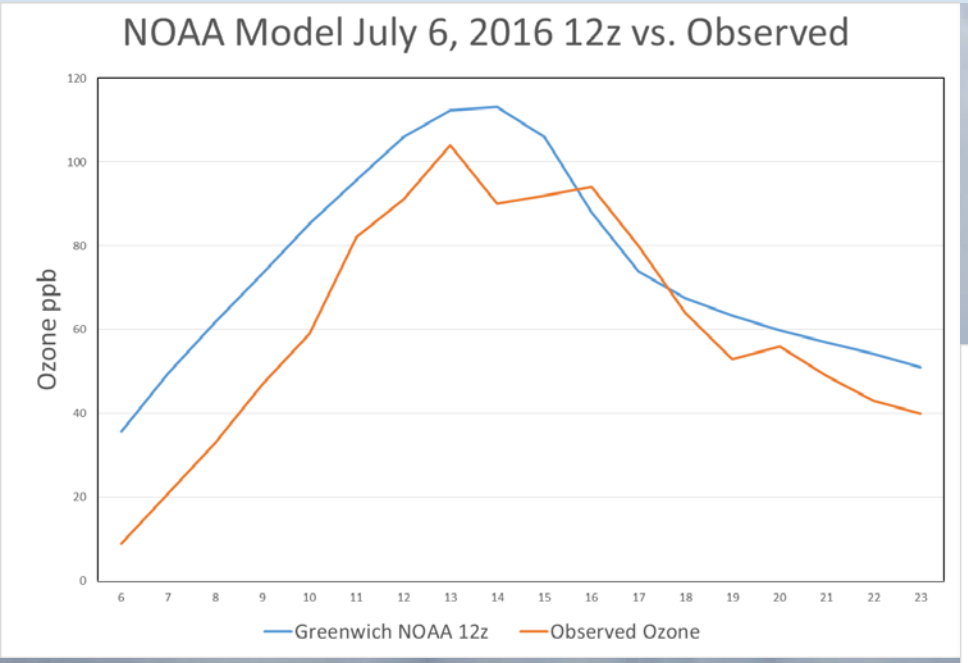
July 6, 2016 Satellite Animation

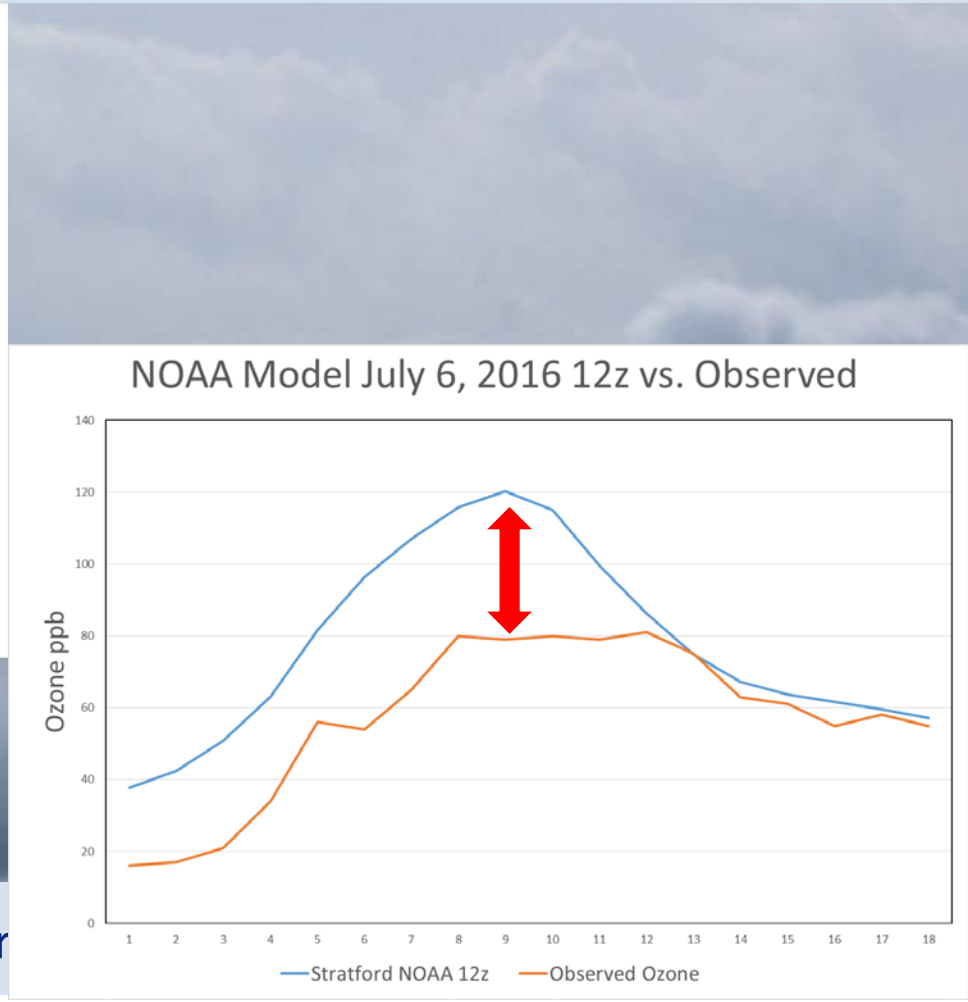
- Sunny skies, with only scattered clouds. Note the sea-breeze front that transported ozone inland from Long Island Sound.



NOAA Ozone Model Over-Prediction

The NOAA model has entered its July over-prediction state. It had been predicting unrealistically high values the day before and the morning update, although lower, showed some hourly values at Stratford > 30 ppb too high. The model tends to produce a monolithic LIS plume with very high values, but it appears that this plume is actually diluted with mixing.





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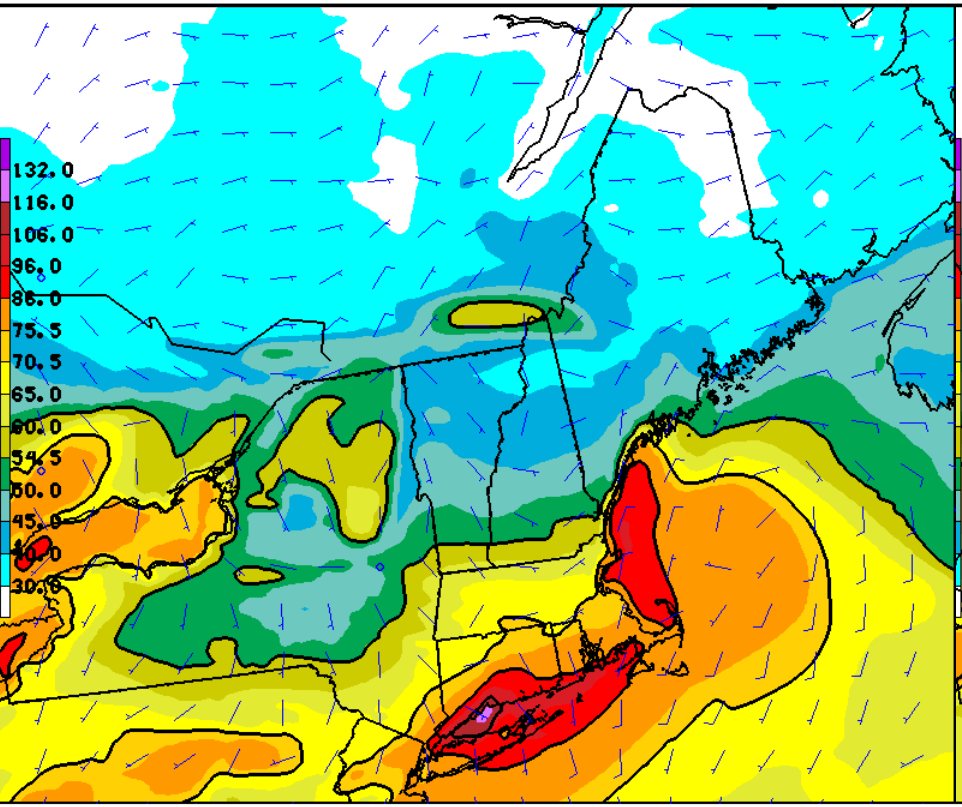
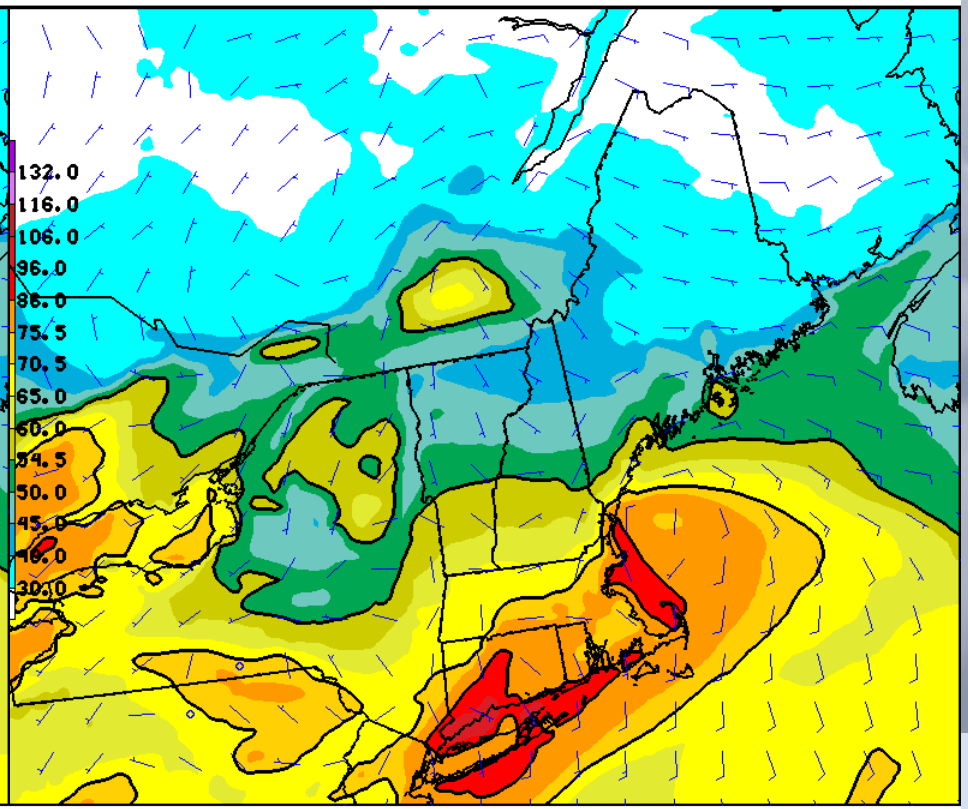
NOAA Ozone Model

The NOAA model extreme over-prediction was diminished by 20 ppb on the same day run, but Stratford observed **75 ppb vs. 103 ppb** modeled by NOAA for the maximum 8-hour ozone.

NOAA Model day before 12z run

NOAA Model same day before 12z run





Conclusion

- Although the NOAA showed 8-hour ozone maximums exceeding 100 ppb at several sites, the highest observed exceedance was 87 ppb at Greenwich CT;
- The pressure gradients were weak, but southwest winds did develop and along with the 90+ degree temperatures, ozone quickly developed around metro NYC and moved into CT.
- The CT forecasters realized that the ozone models were unrealistically high, so predicted all monitors to remain USG.
- Because the ozone models tend to change between runs, it shows that the meteorology is having issues resolving the boundary layer conditions the day before around LIS.