SIPRAC Ozone Update

Summer 2020

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

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Bureau of Air Management

CONNECTICUT
WORKING TOGETHER
FOR
CLEAN AIR

Ozone Exceedance Days

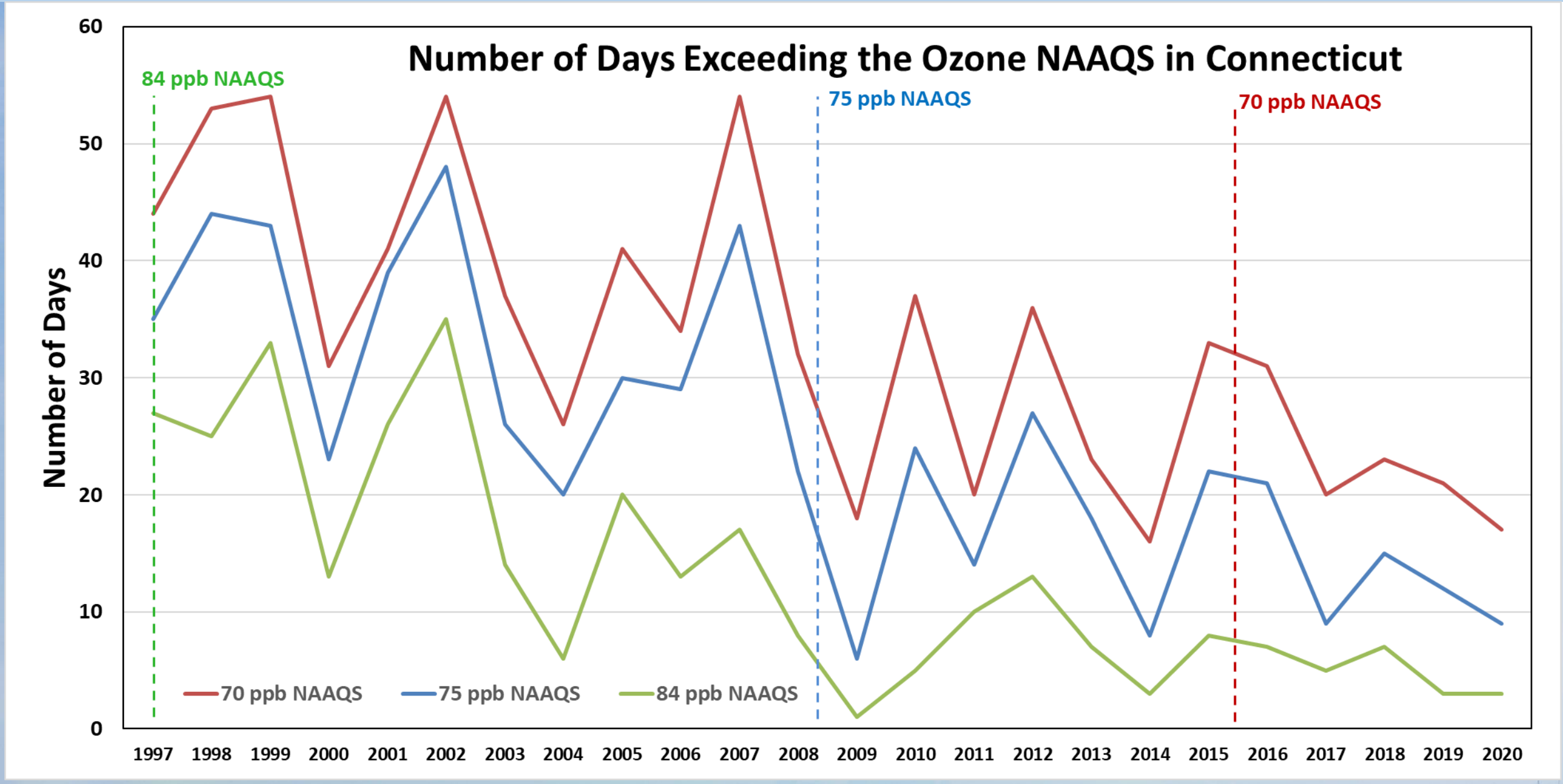
2020	June		July									August					
Site	4	9	13	19	20	21	25	26	27	28	30	3	5	10	21	22	24
Abington	62	58	48	65	46	42	45	44	60	47	55	49	M	M	65	49	45
Cornwall	63	65	39	60	44	43	44	47	57	43	53	46	M	53	59	48	49
Danbury	63	71	43	67	46	46	59	48	53	47	54	46	48	68	57	50	52
East Hartford	68	65	50	69	46	45	48	47	53	44	55	44	48	54	62	52	48
Greenwich	75	83	58	81	61	77	M	55	68	59	90	64	67	M	63	64	74
Groton	60	57	71	66	65	55	60	65	76	70	94	65	77	65	63	66	50
Madison	67	71	75	71	75	66	71	71	88	80	95	72	85	M	68	71	65
Middletown	69	68	61	79	52	51	56	50	60	52	59	52	57	69	71	57	55
New Haven	67	60	63	82	59	65	59	52	58	48	76	47	66	52	42	62	78
Stafford	68	M	50	66	43	40	42	44	52	44	53	44	50	54	59	49	52
Stratford	69	73	69	83	66	65	67	65	80	66	87	74	76	71	68	68	73
Westport	69	73	58	83	60	72	77	56	73	60	77	70	M	M	61	59	68
# days > Federal Standard	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Only 2 days in July reached ‘code red’ ozone

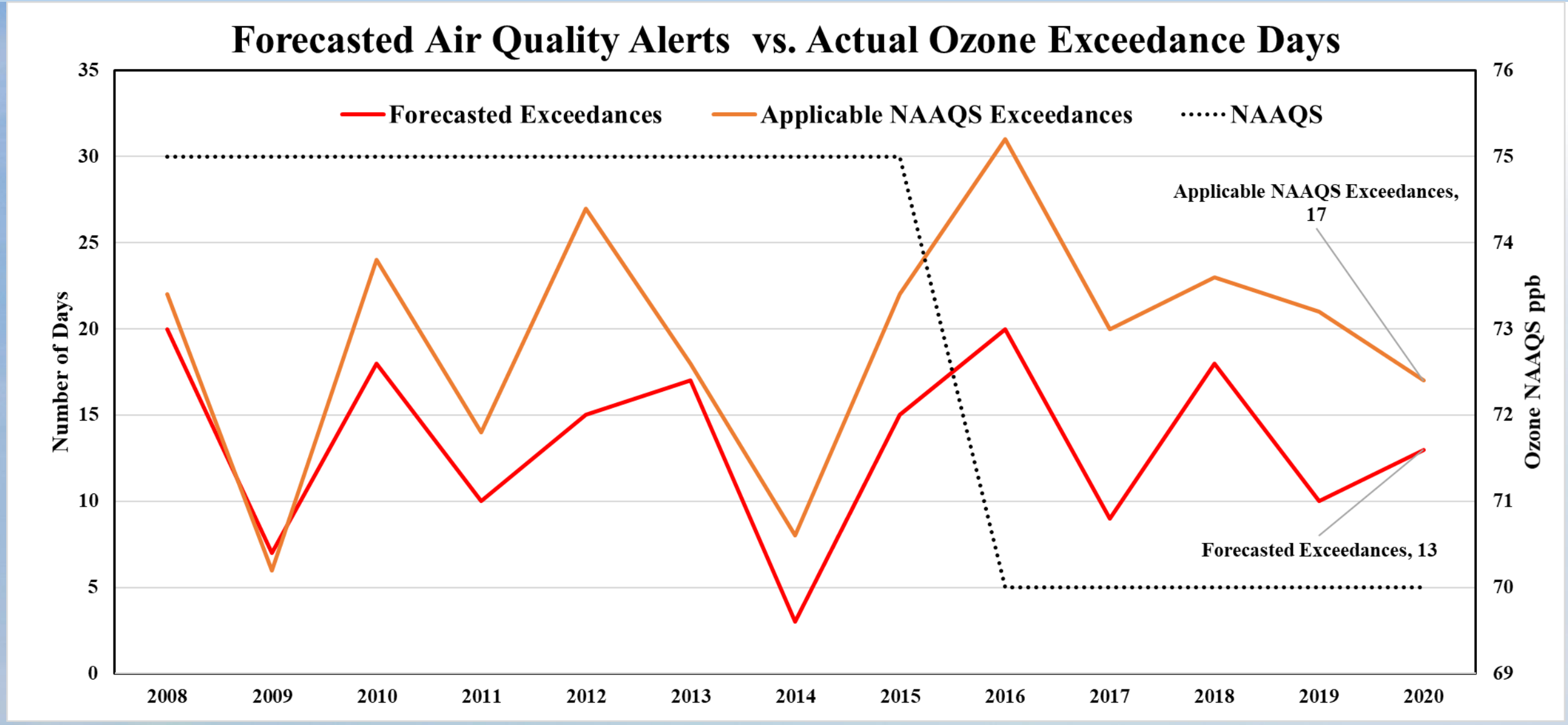
Design Value Update

	Site Name	To Date: Prelim 2020 DV	2015 NAAQS	2008 NAAQS	1997 NAAQS	# Needed to Next NAAQS in Violation (key monitors in each NA are highlighted in RED)				
SWCT Portion of NYC Area	Danbury	71	X			4	more days >	80	ppb day(s) violate the	2008 NAAQS
	Greenwich	82	X	X		3	more days >	84	ppb day(s) violate the	1997 NAAQS
	Madison	80	X	X		3	more days >	93	ppb day(s) violate the	1997 NAAQS
	Middletown	74	X			3	more days >	74	ppb day(s) violate the	2008 NAAQS
	New Haven	72	X			2	more days >	77	ppb day(s) violate the	2008 NAAQS
	Stratford	80	X	X		4	more days >	89	ppb day(s) violate the	1997 NAAQS
	Westport	79	X	X		4	more days >	89	ppb day(s) violate the	1997 NAAQS
Greater CT	Cornwall	65				4	more days >	79	ppb day(s) violate the	2015 NAAQS
	East Hartford	67				4	more days >	73	ppb day(s) violate the	2015 NAAQS
	Groton	73	X			3	more days >	78	ppb day(s) violate the	2008 NAAQS
	Stafford	69				4	more days >	68	ppb day(s) violate the	2015 NAAQS
	Abington	66				4	more days >	75	ppb day(s) violate the	2015 NAAQS
Number of Exceedance Days to Date			17			The 1997 standard was repealed with the 2008 Implementation rule. Effective April 6, 2015				

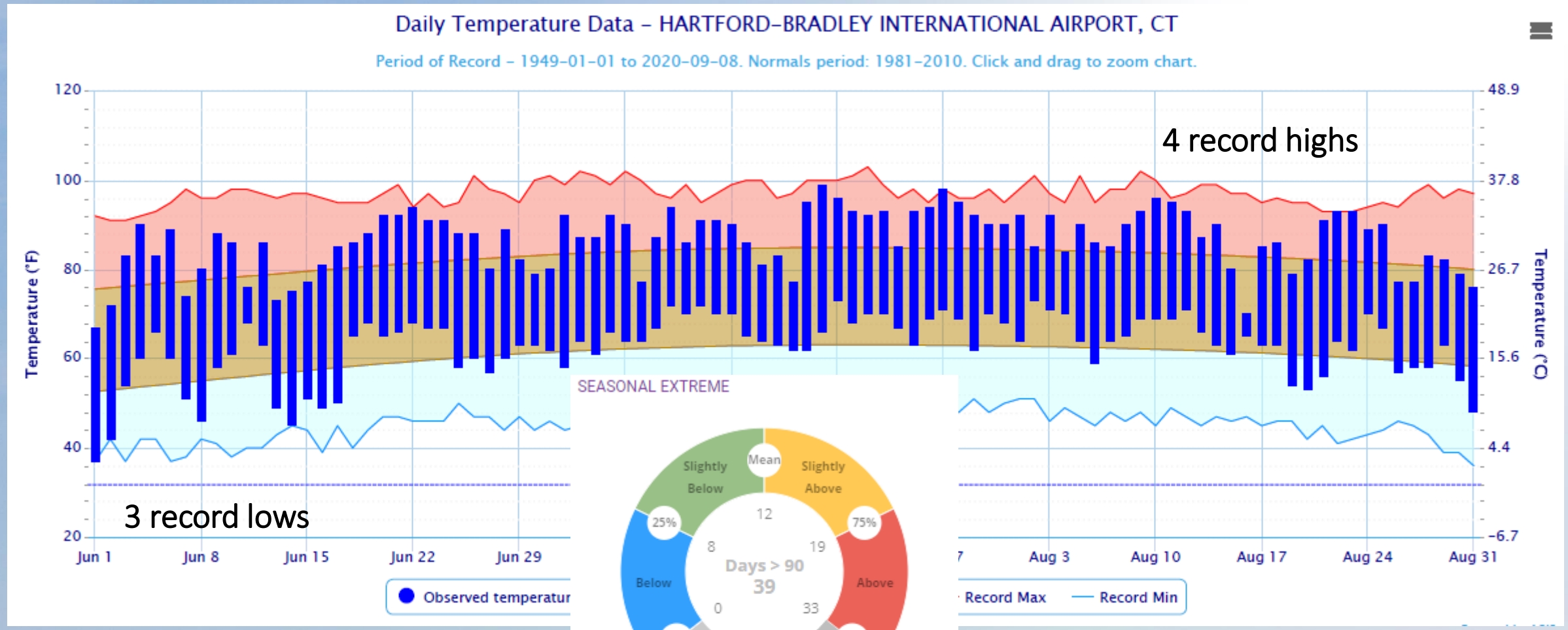
Exceedance Day Trend Chart



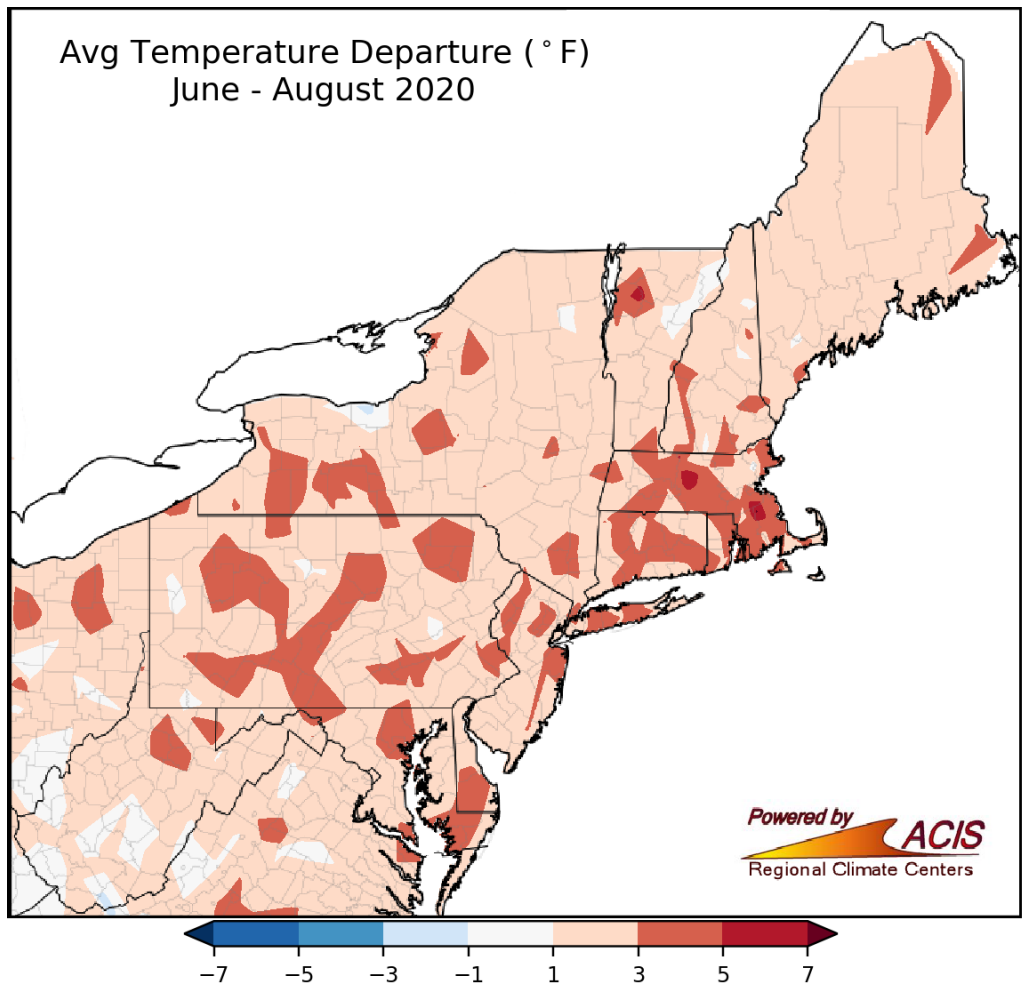
Forecasted Exceedance Days

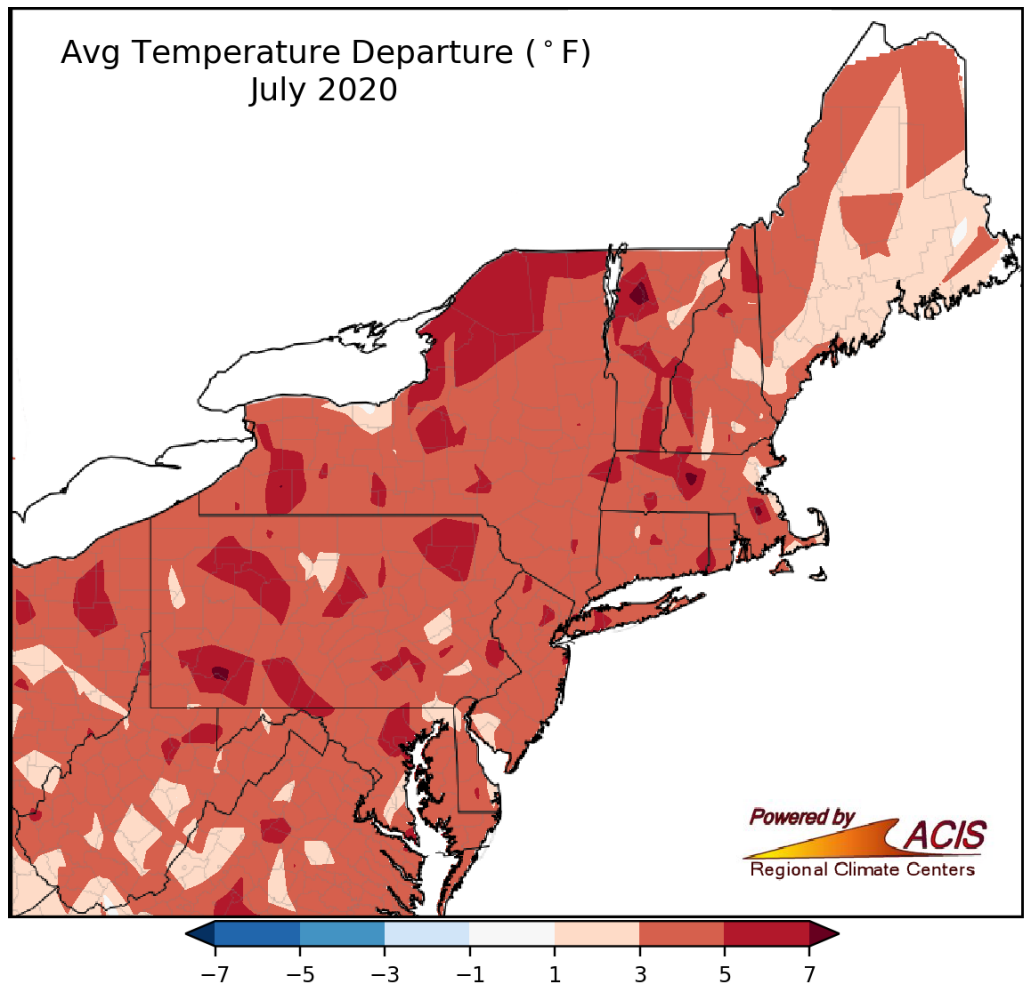


Bradley Airport Temperature Chart

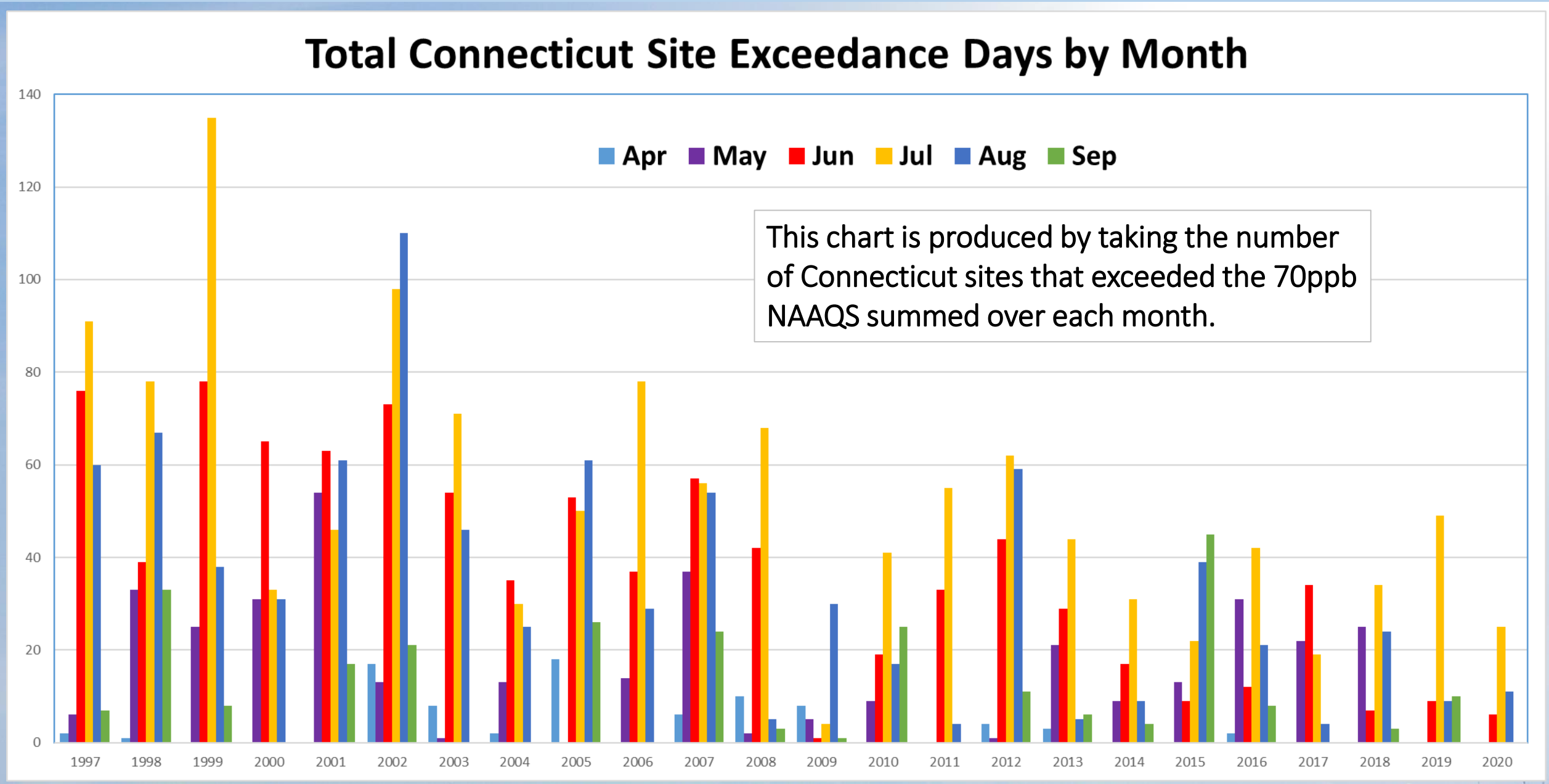


Northeast Temperature Departures

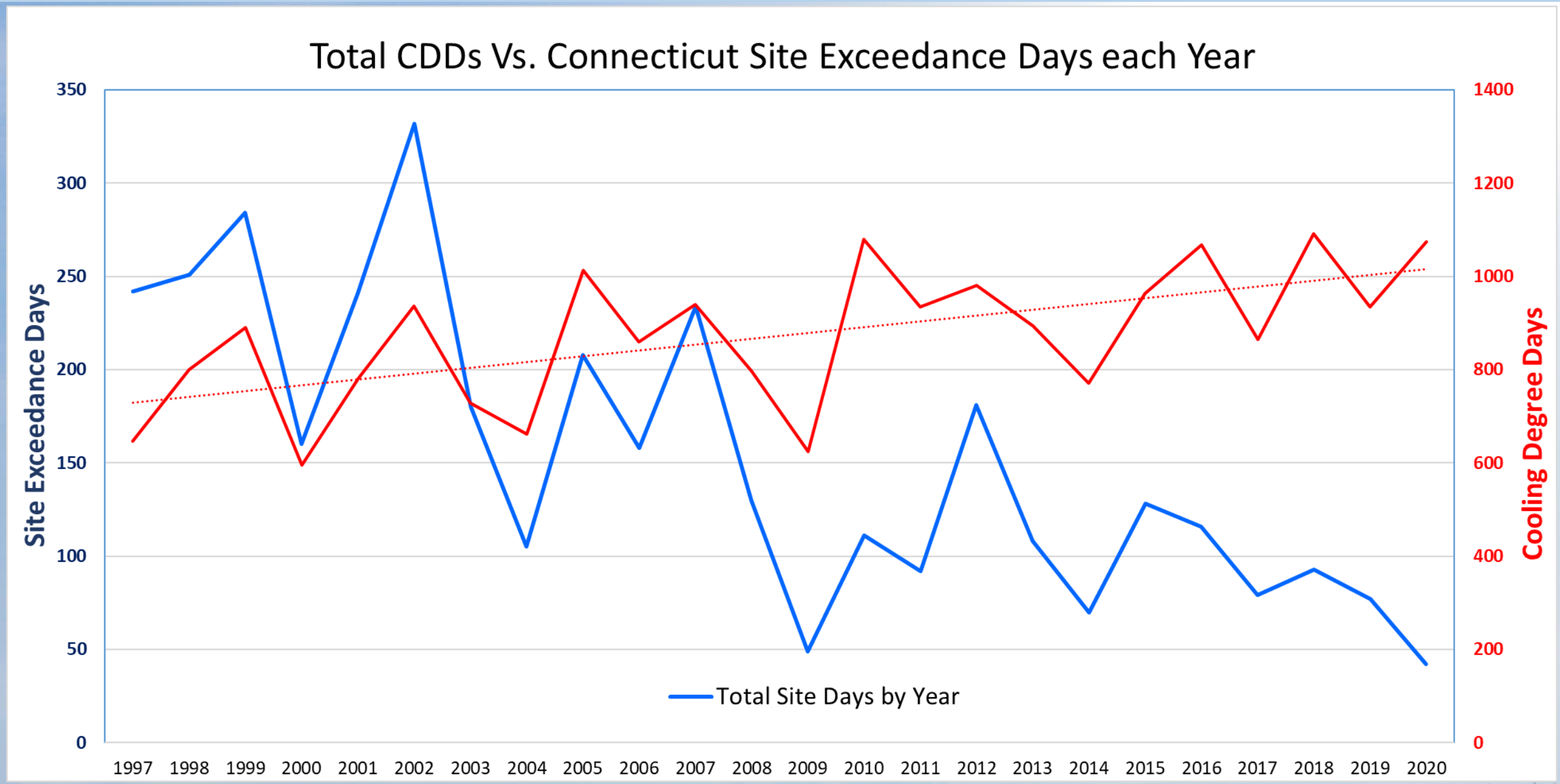




Monthly Site Exceedance Days 1997-2020

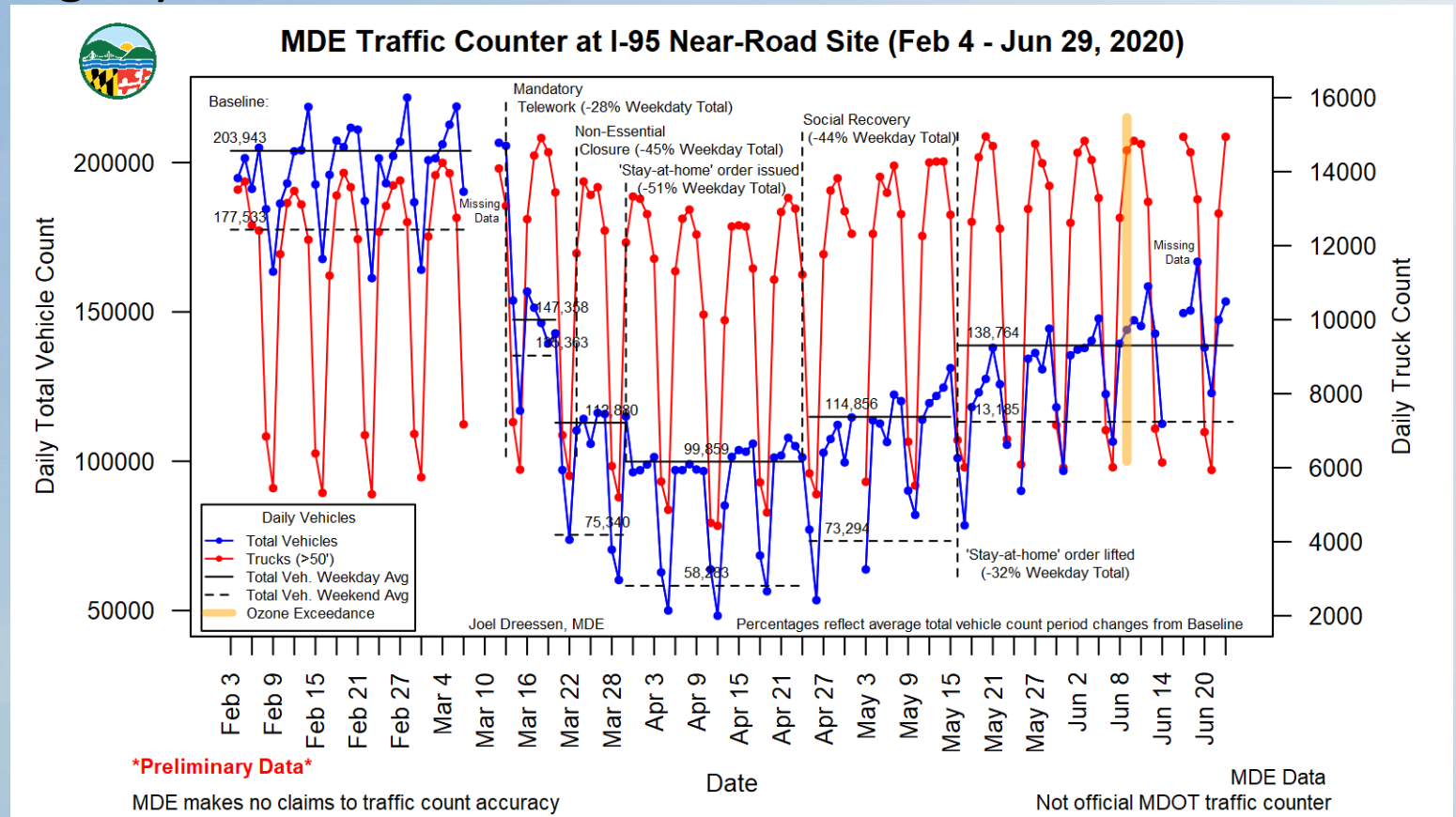


Annual Cooling Degree days vs. Site Exceedance Days

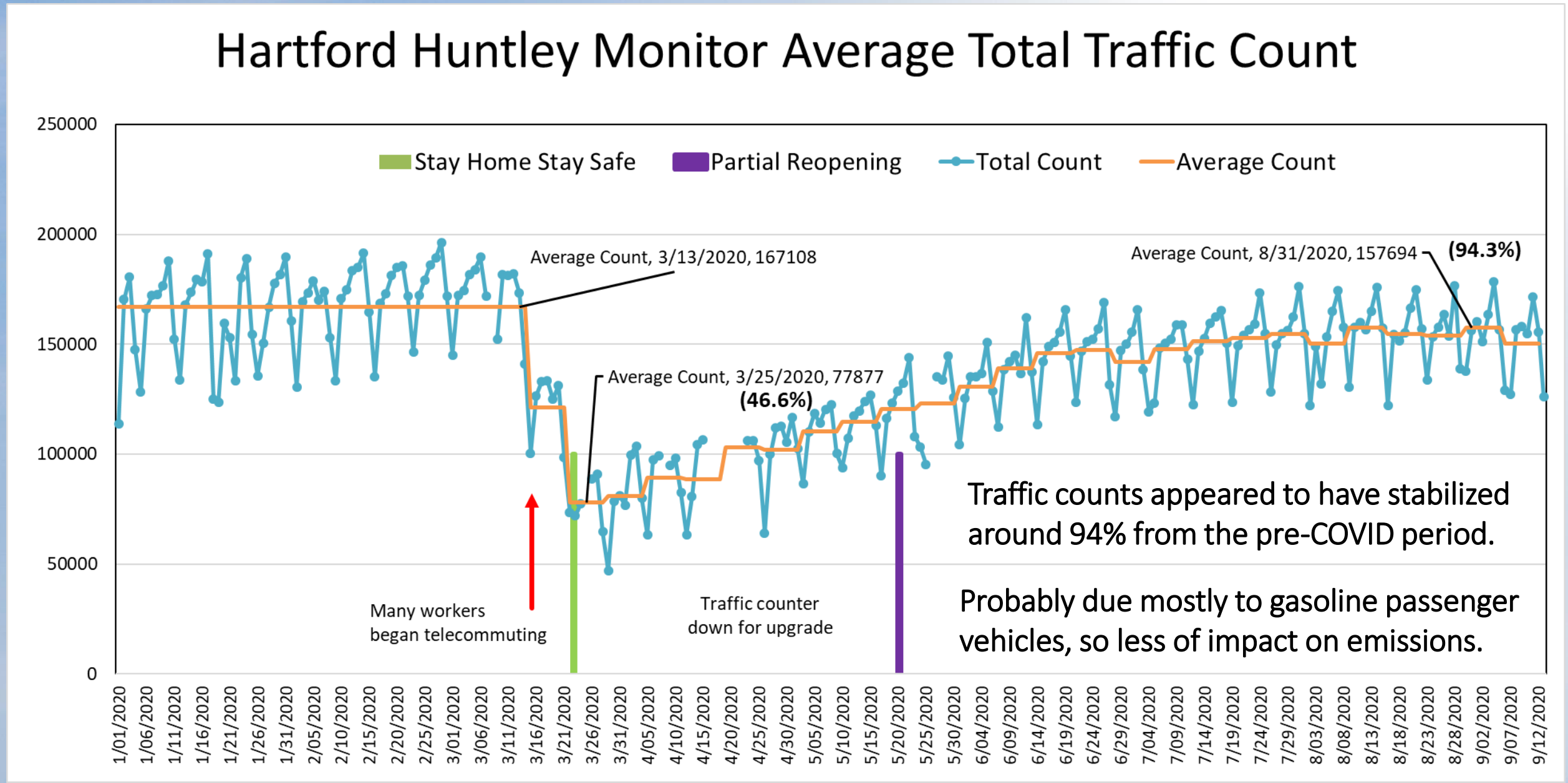


Did COVID-19 Shutdowns Impact the Ozone?

- During the spring, economic activity slowed down, including vehicular traffic.
- The economy revived somewhat during the summer, and traffic counts approached pre-COVID levels.
- A study done along I-95 in Maryland determined that total traffic declined nearly by 50%, but truck traffic only slightly decreased.



Hartford Traffic Trends

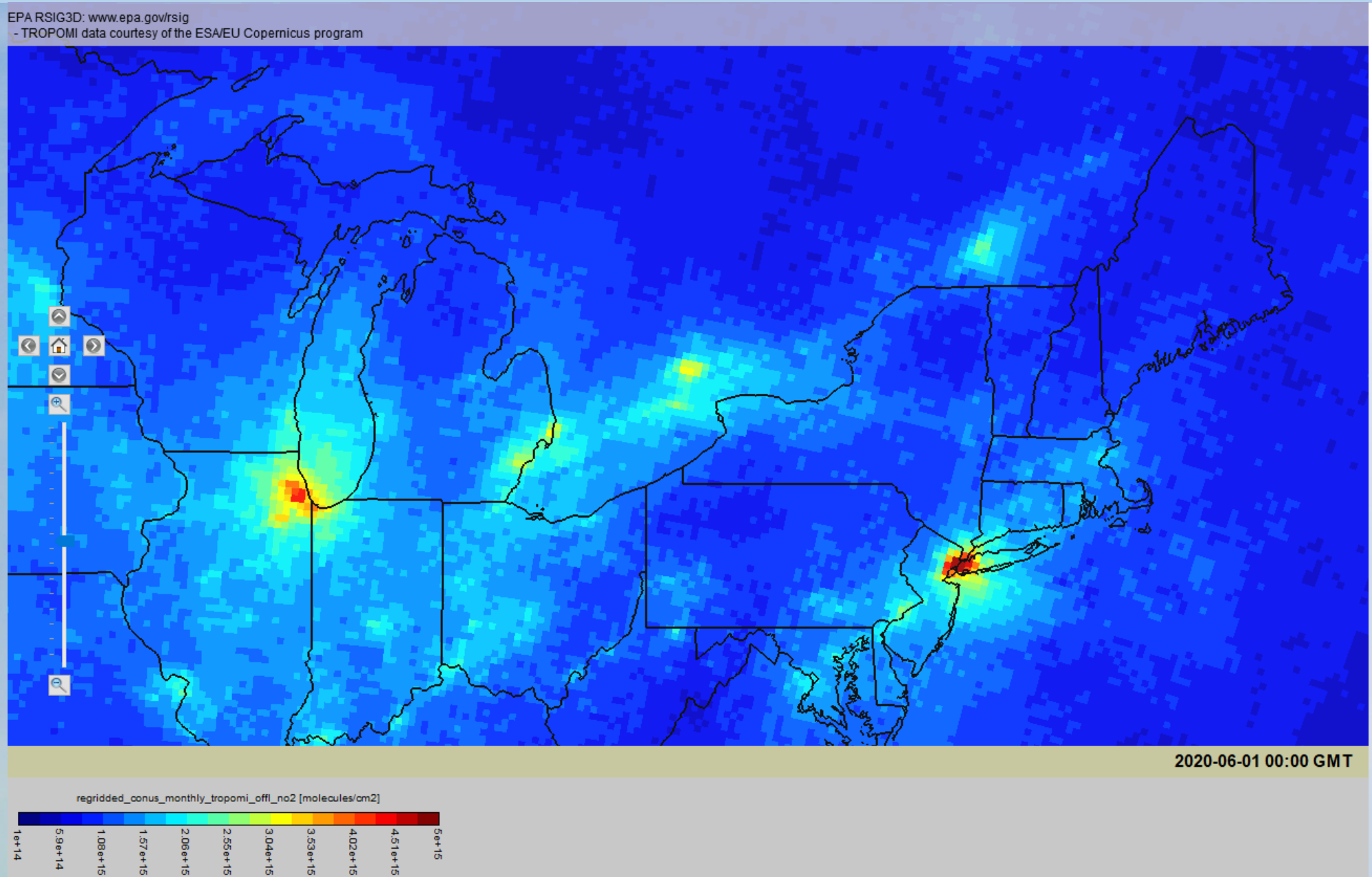


TROPOMI NO2 Column Summer 2019/ 2020

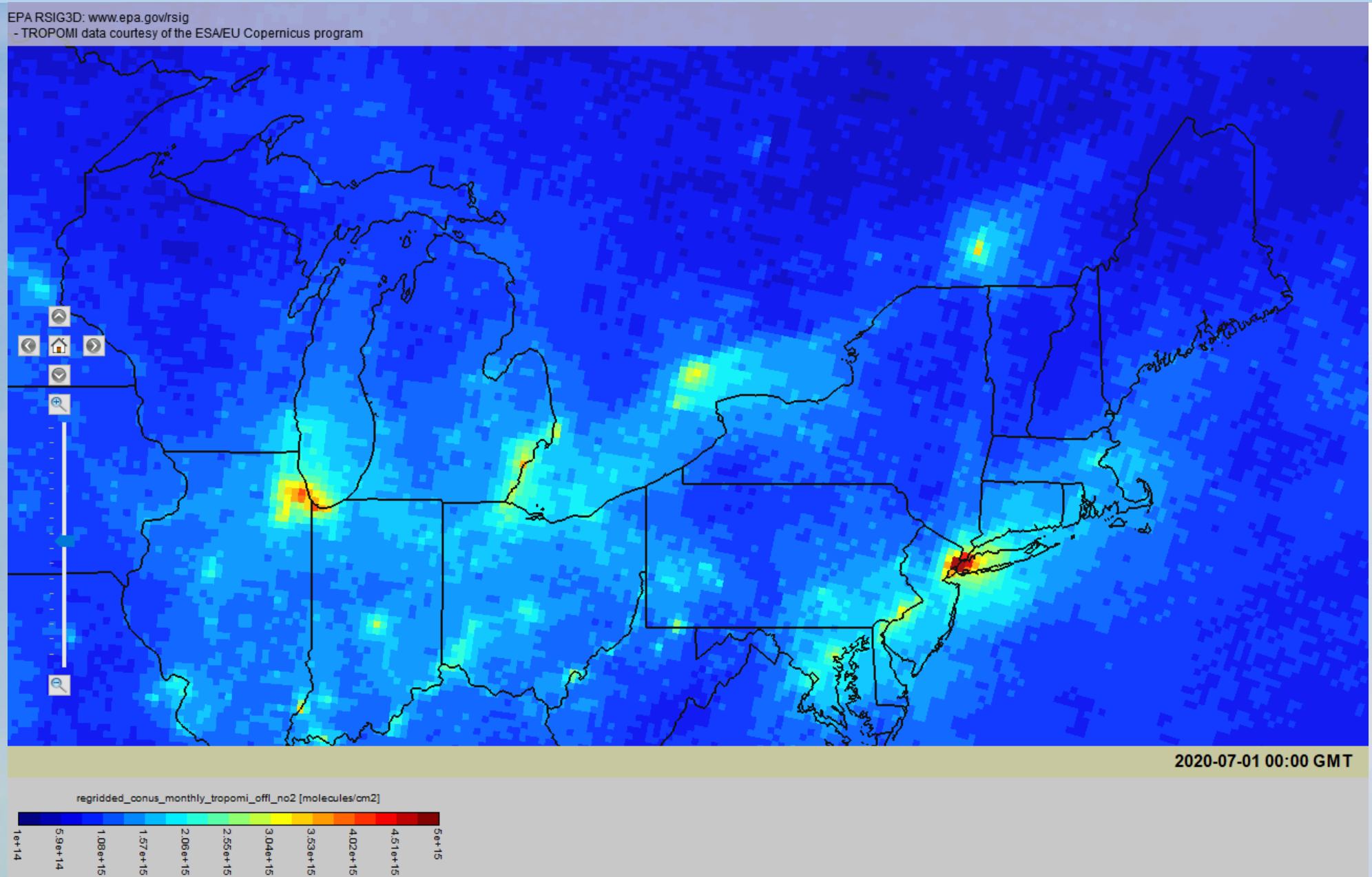
Satellite NO2 retrievals can be used to determine whether emissions decreased.

- I used monthly regridded averaging for TROPOMI NO2;
- 2019 and 2020 NO2 images are the same slide. Just click to change the year for comparison.
- NO2 is generally higher during the cold weather due to higher residency times and temperature inversions. But can be variable year to year anyway, due to the weather;
- Nevertheless, during summer 2020 , NO2 levels appeared lower early in the summer, but more or less equalized with 2019 by August.

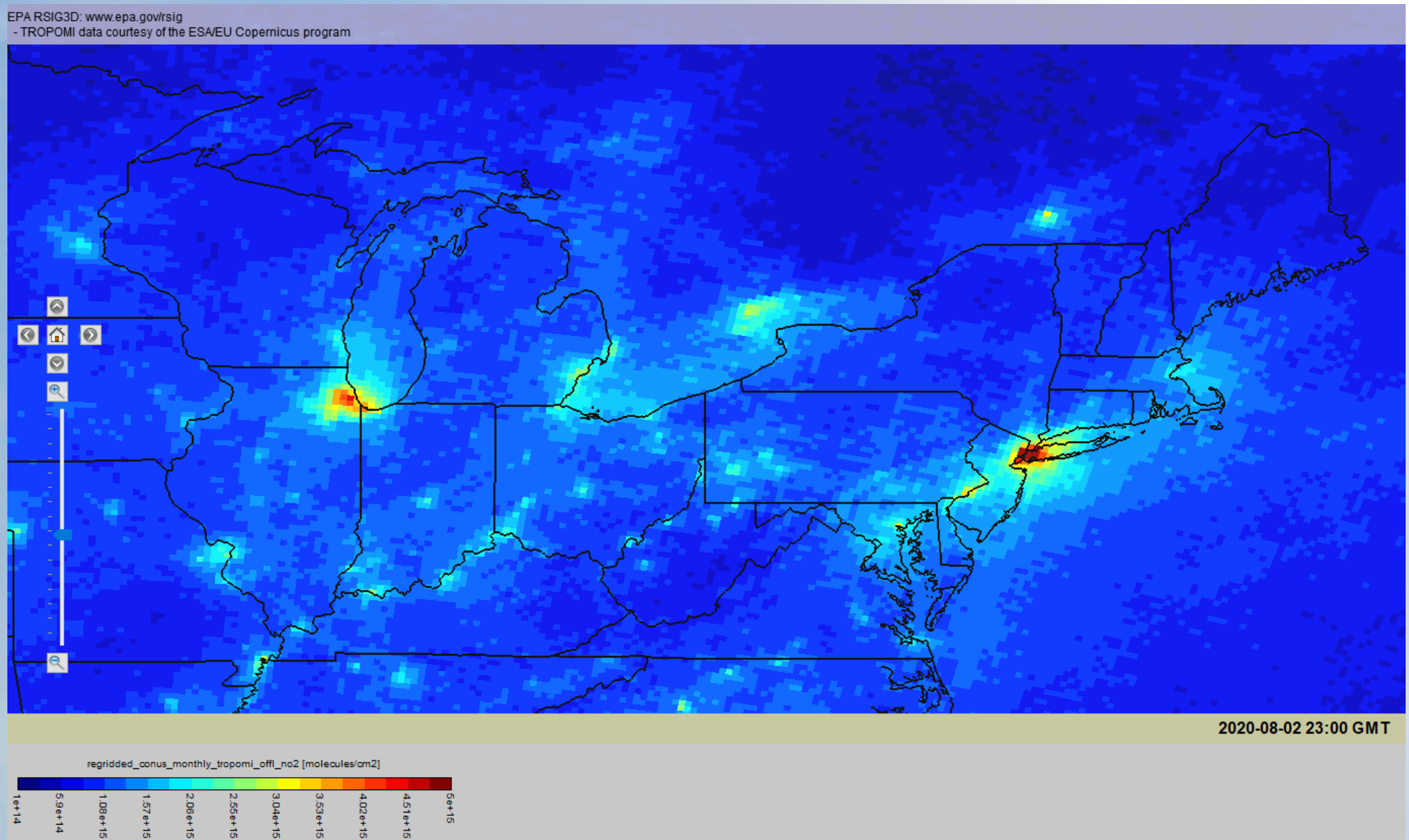
June 2019 and June 2020



July 2019 and July 2020



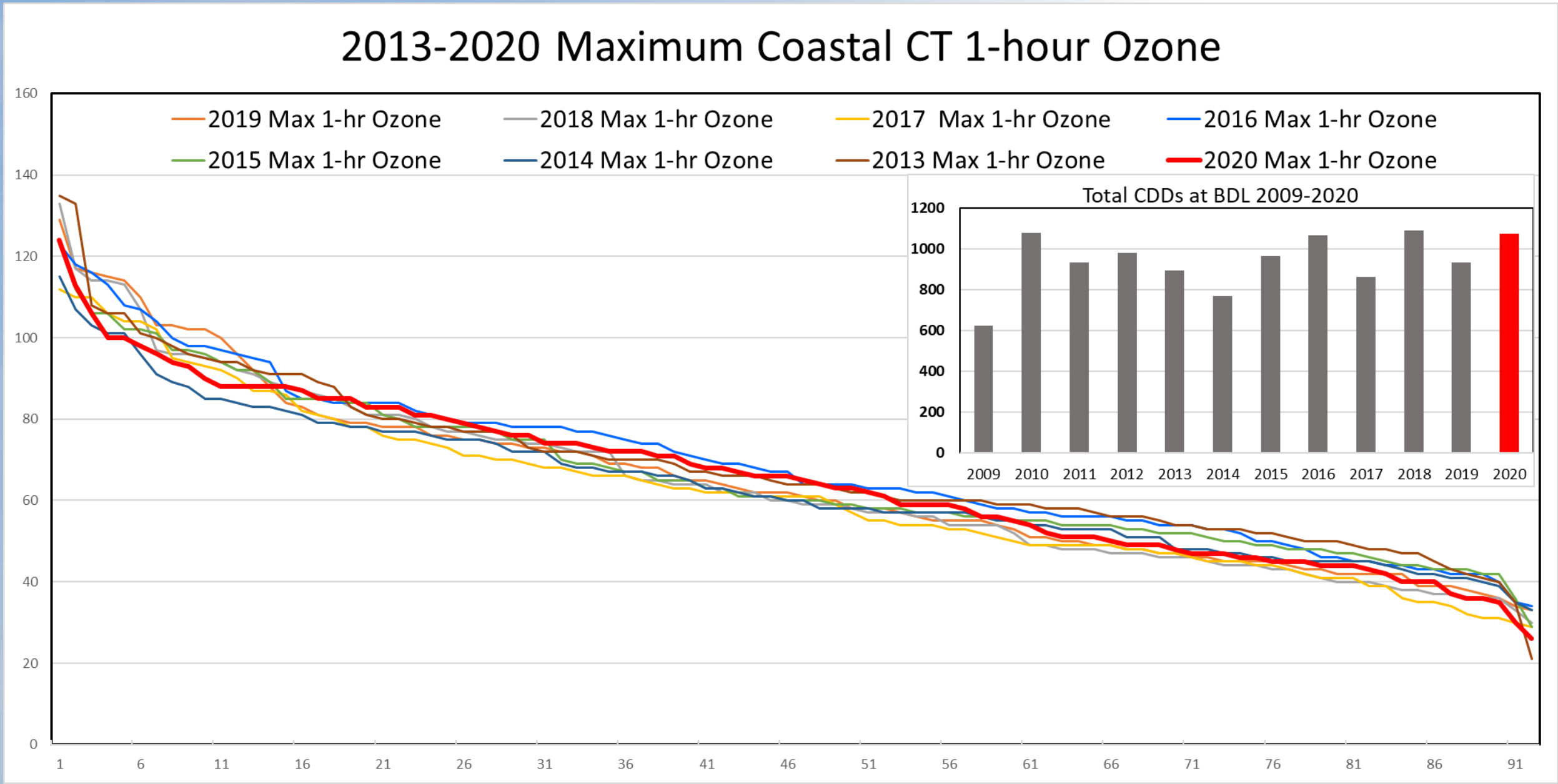
August 2019 and August 2020



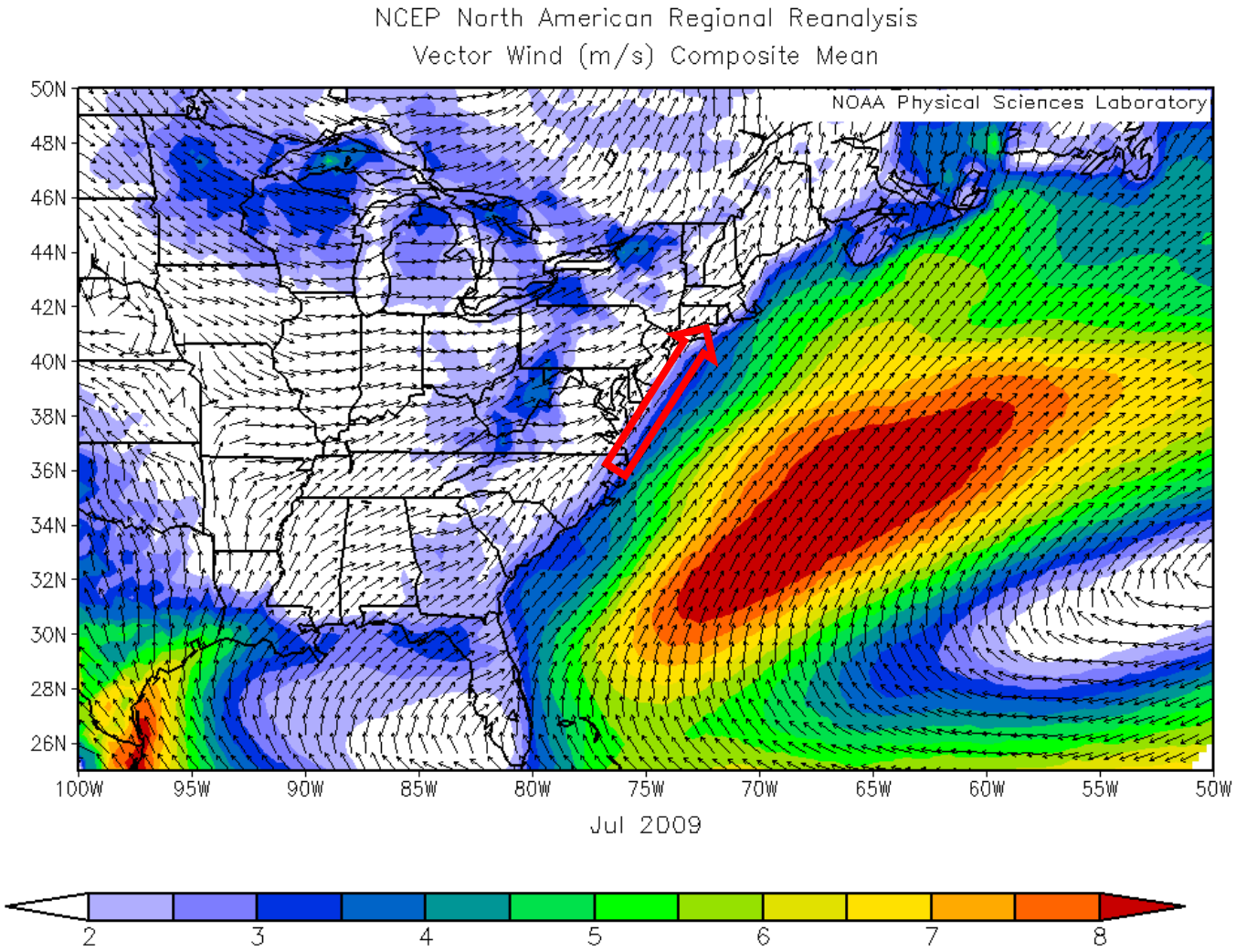
The LIS Ozone Plume

- Were 2020 ozone levels over LIS lower than previous years?
- To help determine that, I looked at daily peak 1-hour for the six CT coastal monitors and plotted the maximum for each day since 2009.
- This will be useful to determine the relative levels of ozone production over LIS.

2013-2020 Maximum Coastal 1-hour Ozone

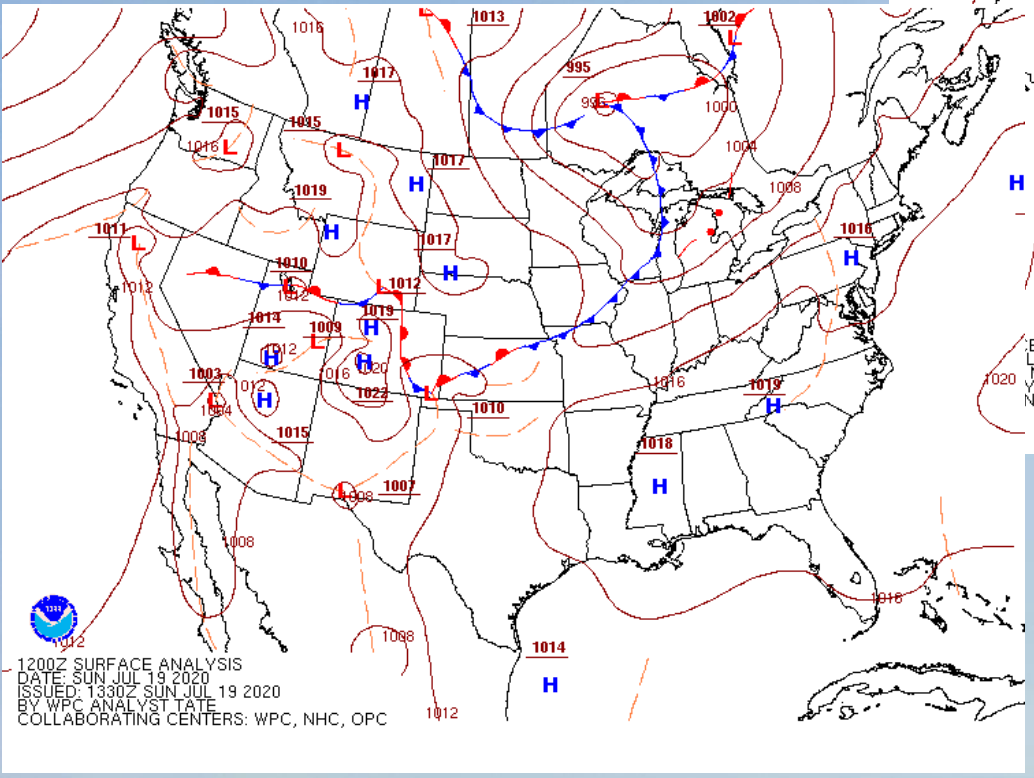


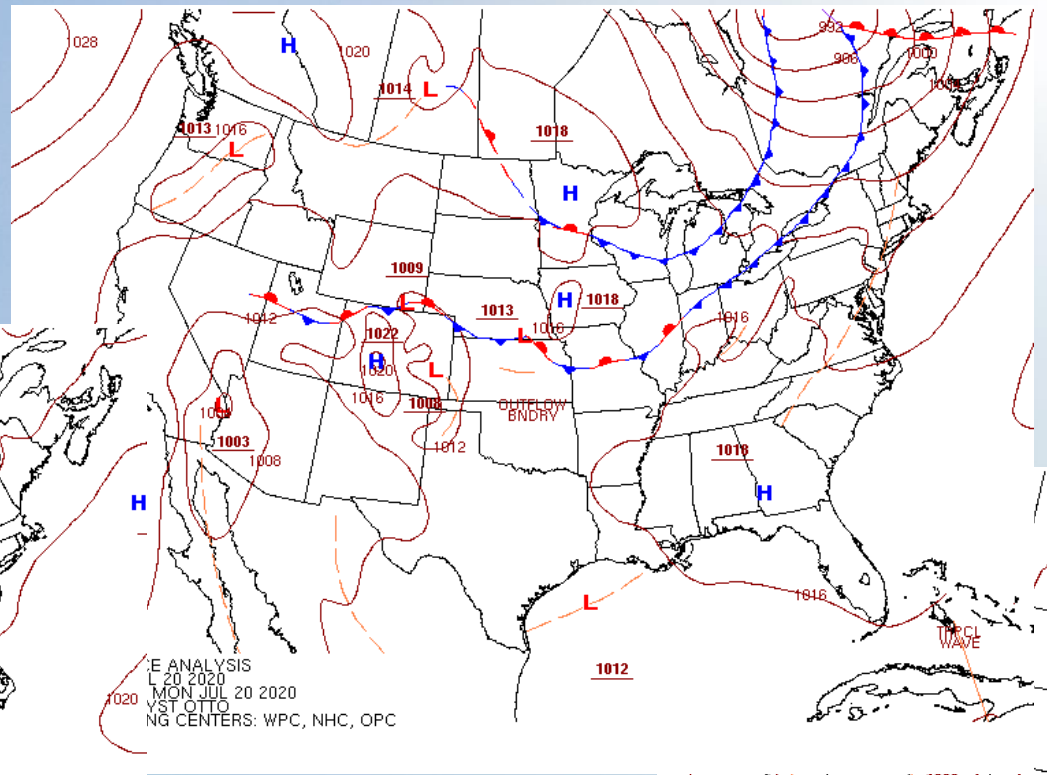
The Big Picture- 1000mb Wind Vectors

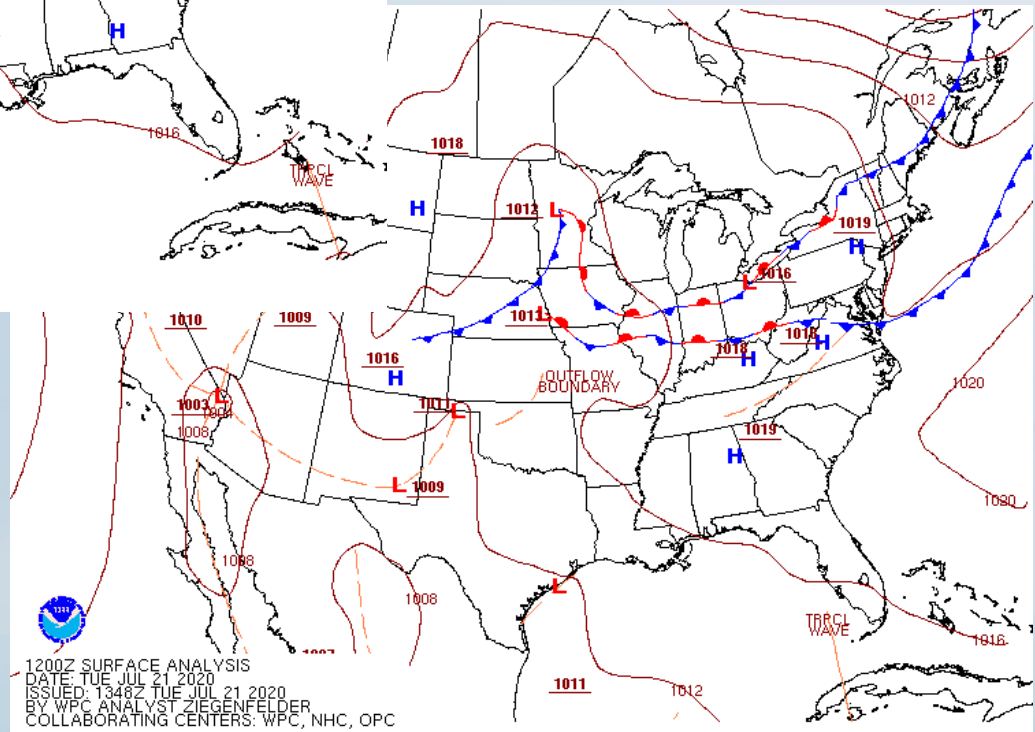


Note the stronger wind field just off shore in 2020.

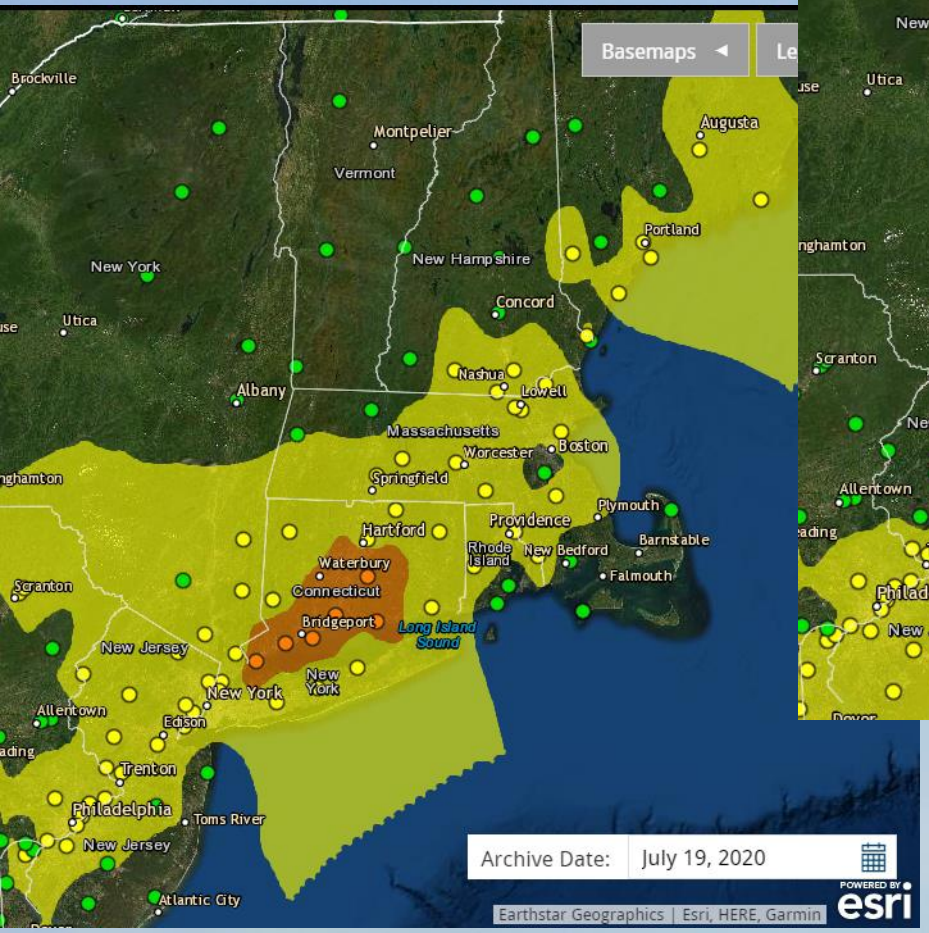
July 19-21, 2020 Ozone Event

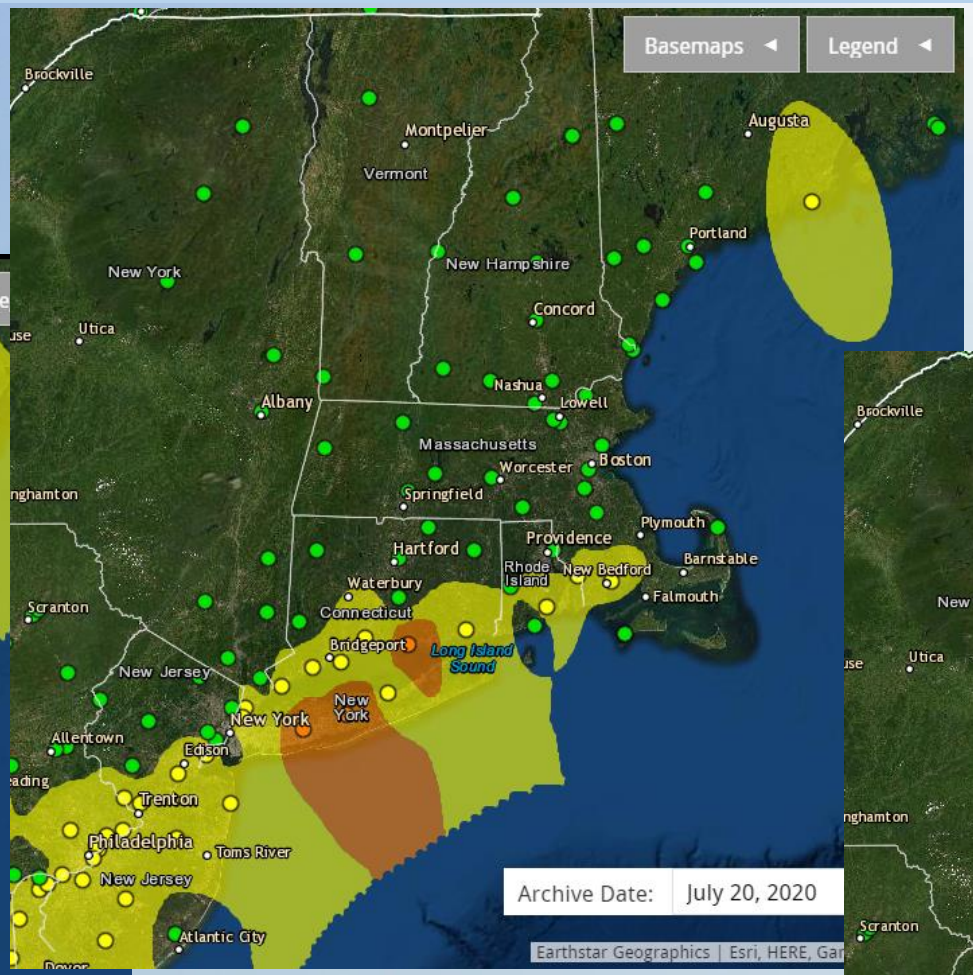


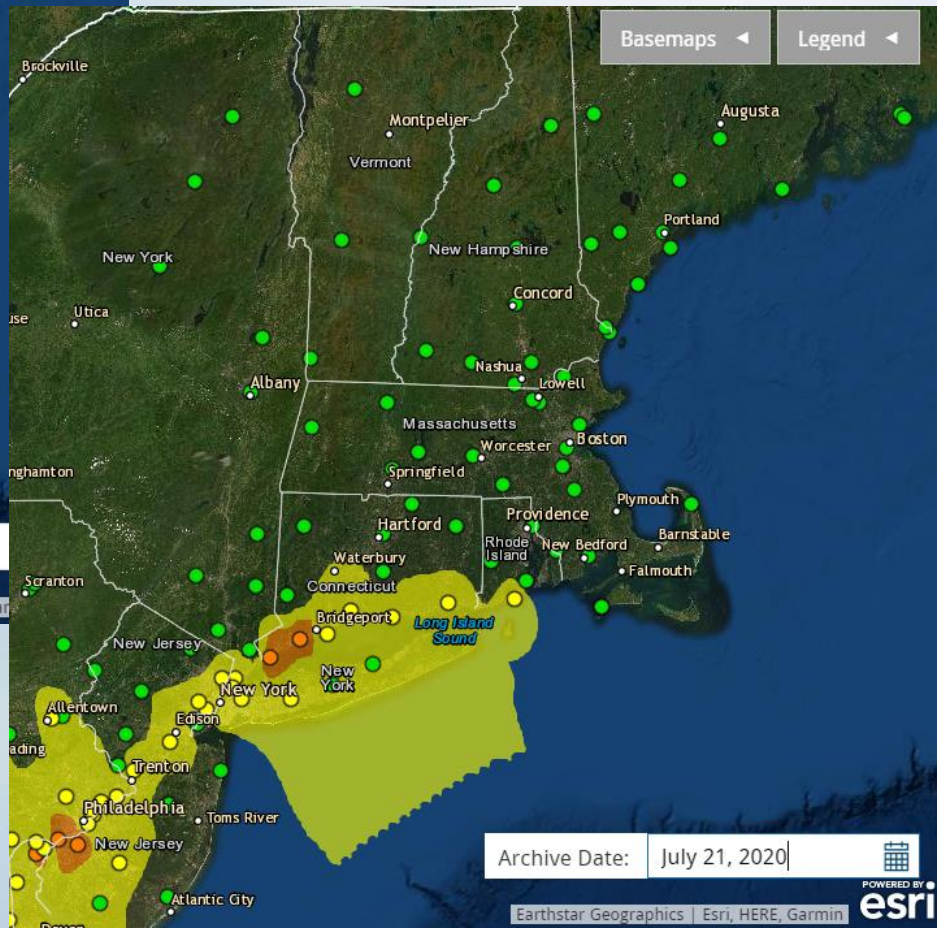




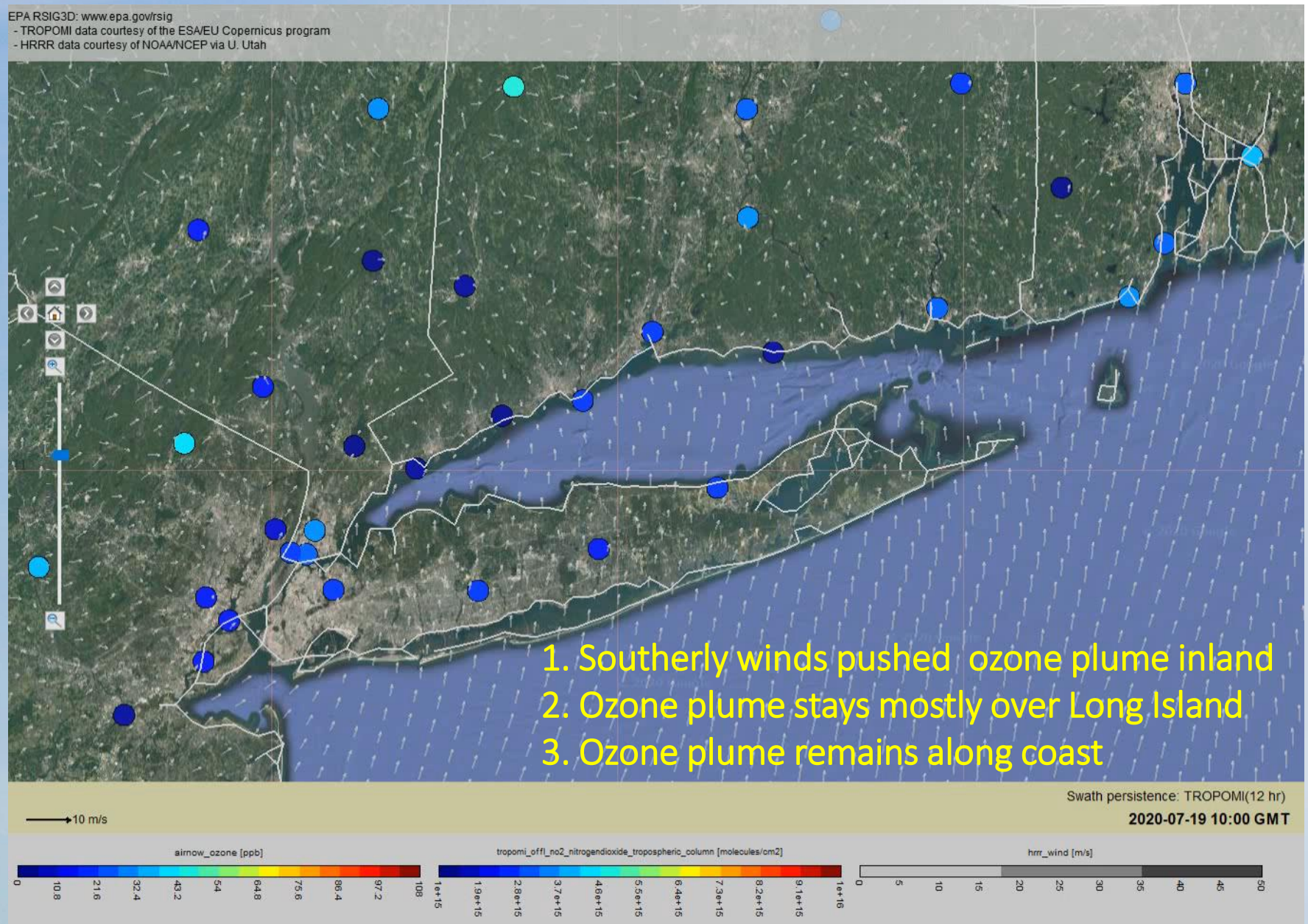
July 19-21, 2020 Ozone Event



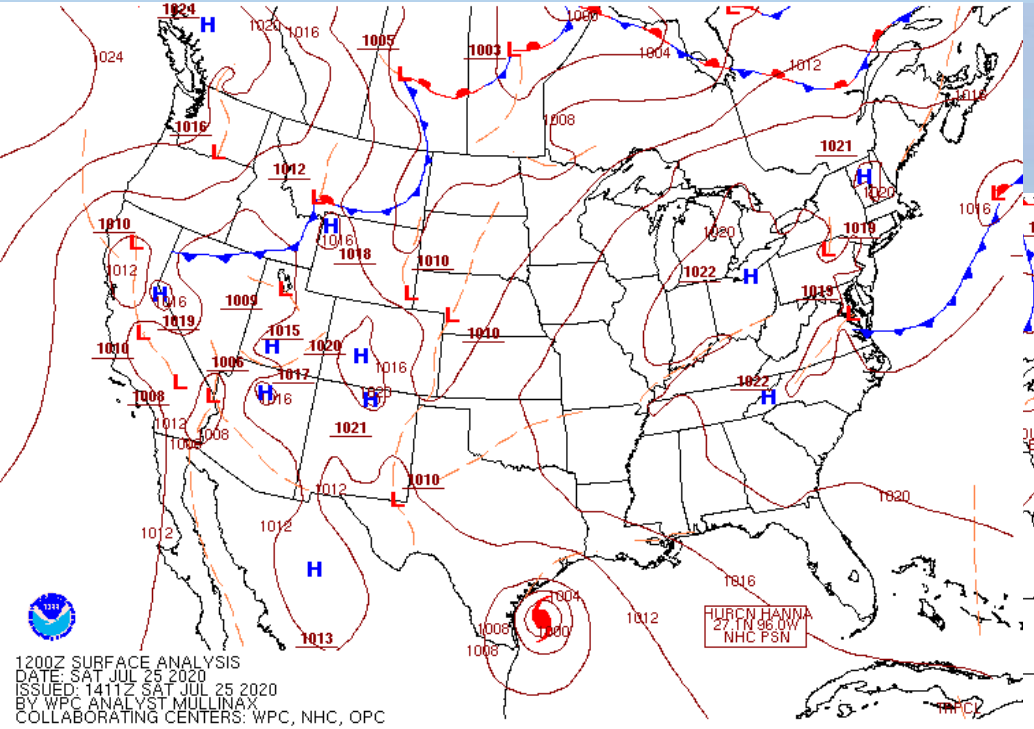


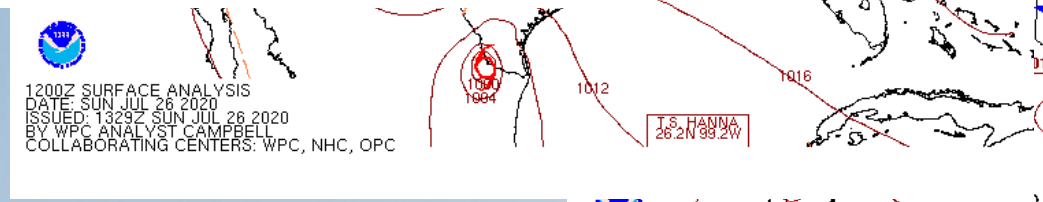


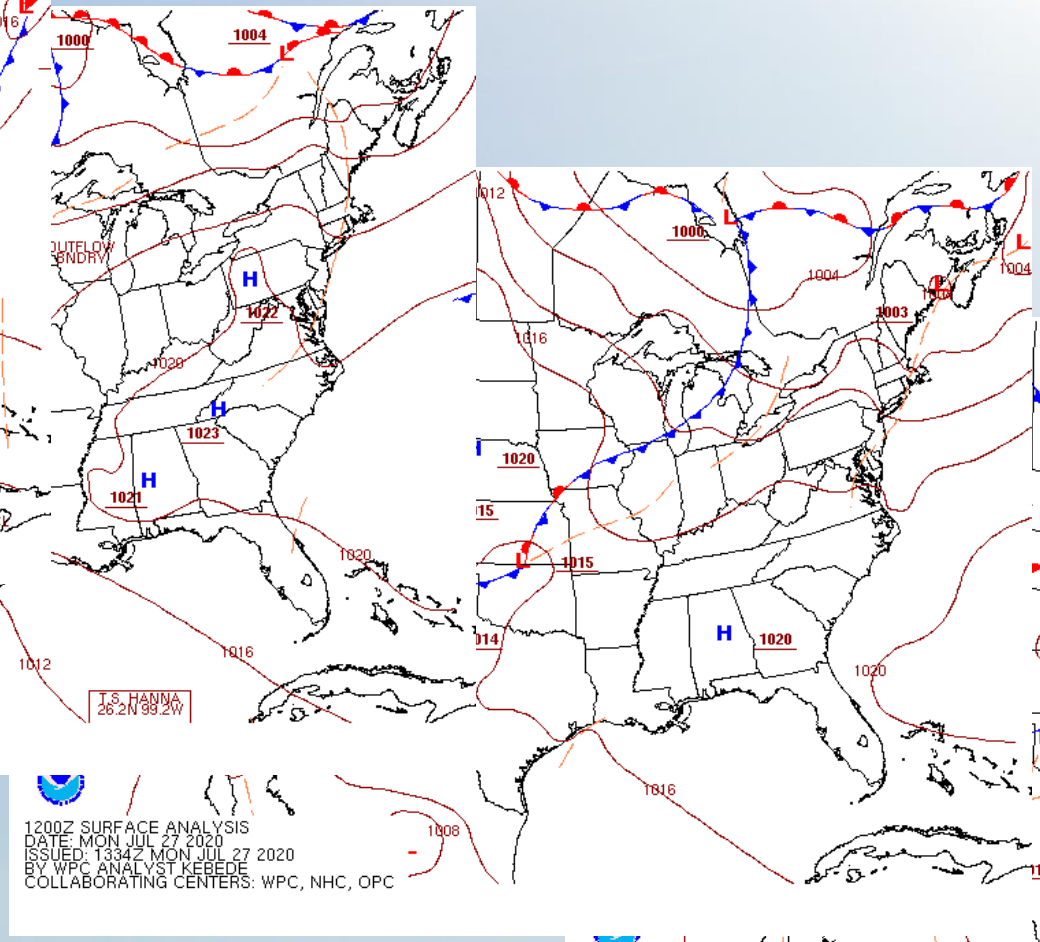
July 19-21, 2020 HRRR Winds

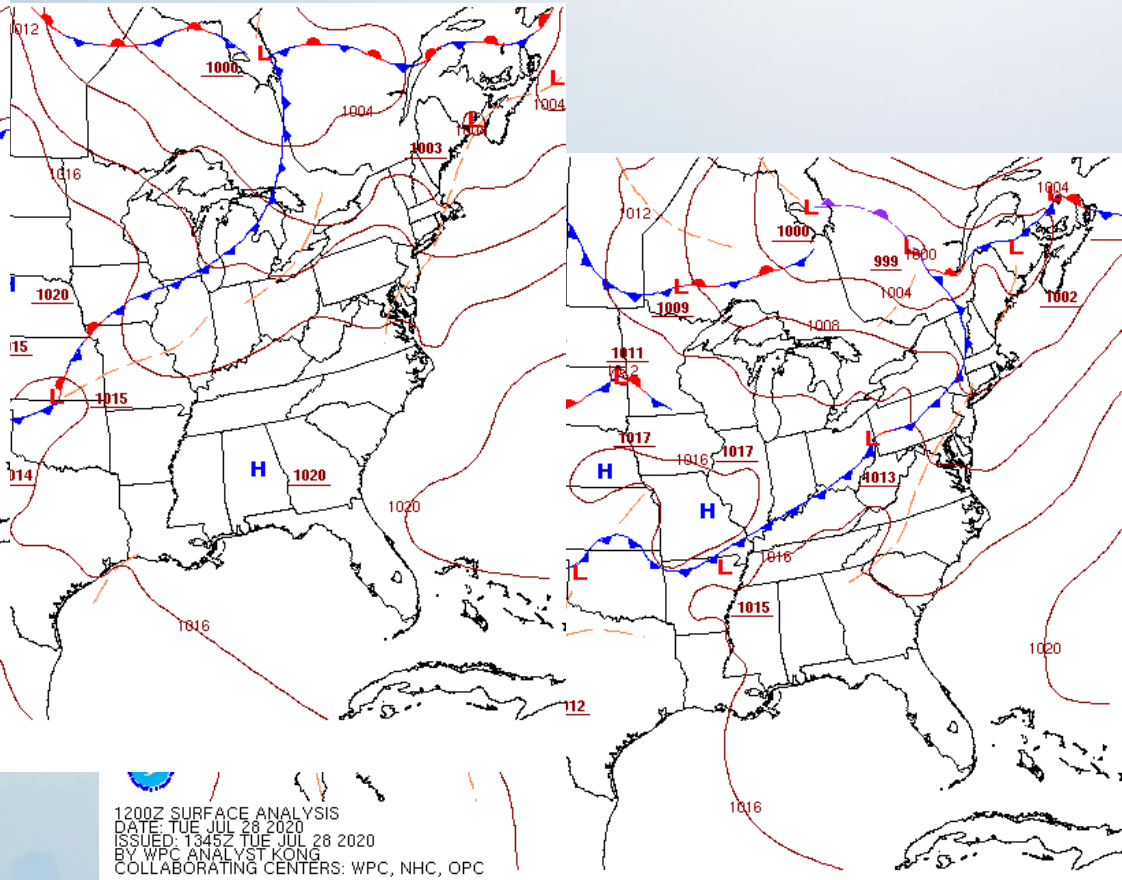


July 25-28, 2020 Ozone Event

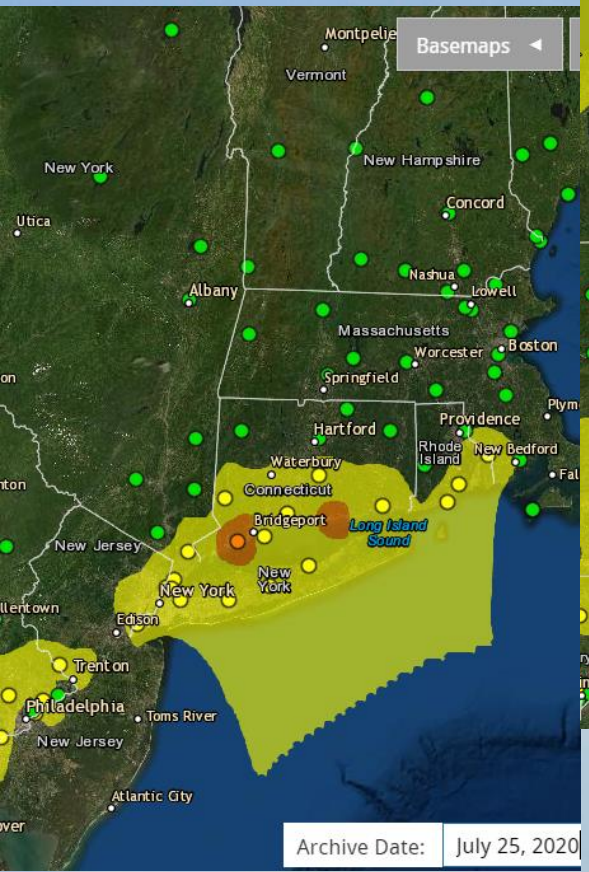


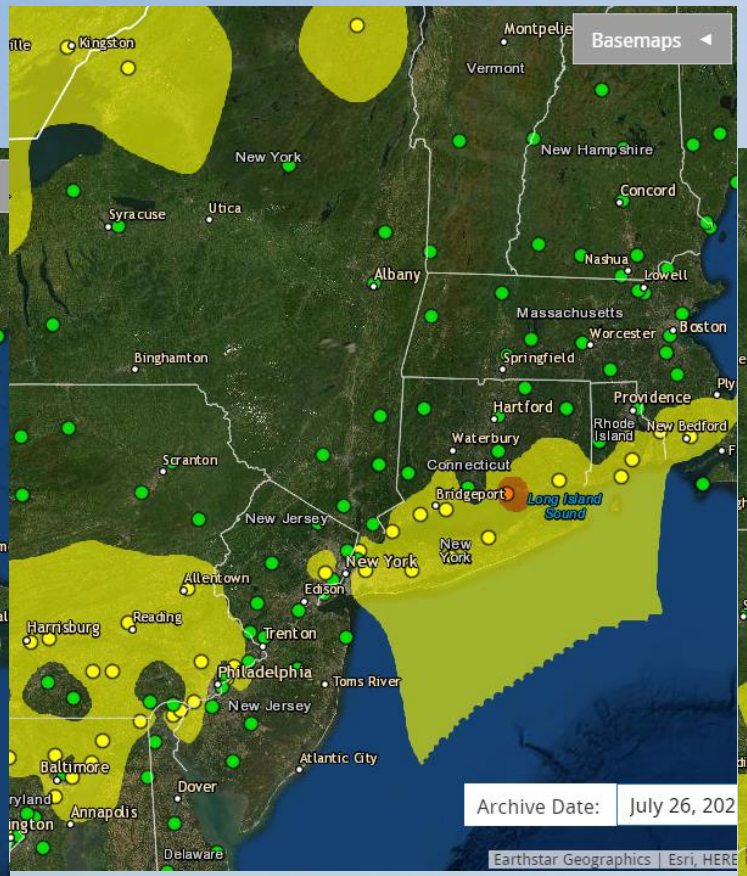


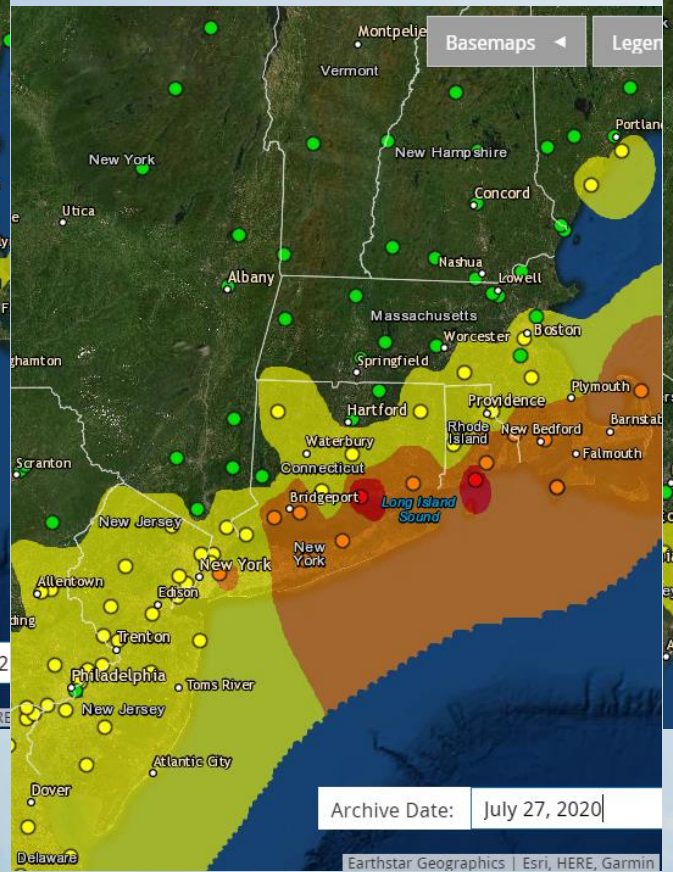


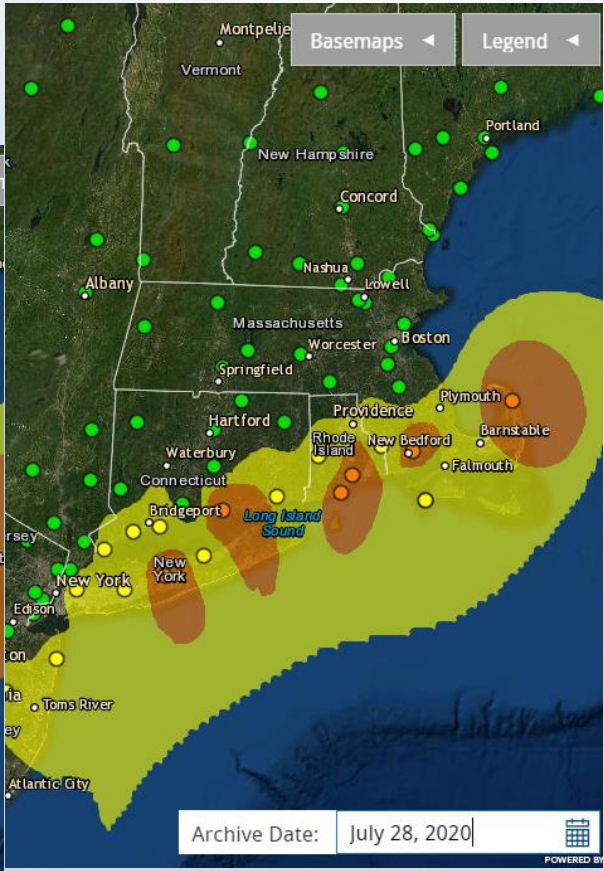


July 25-28, 2020 Ozone Event

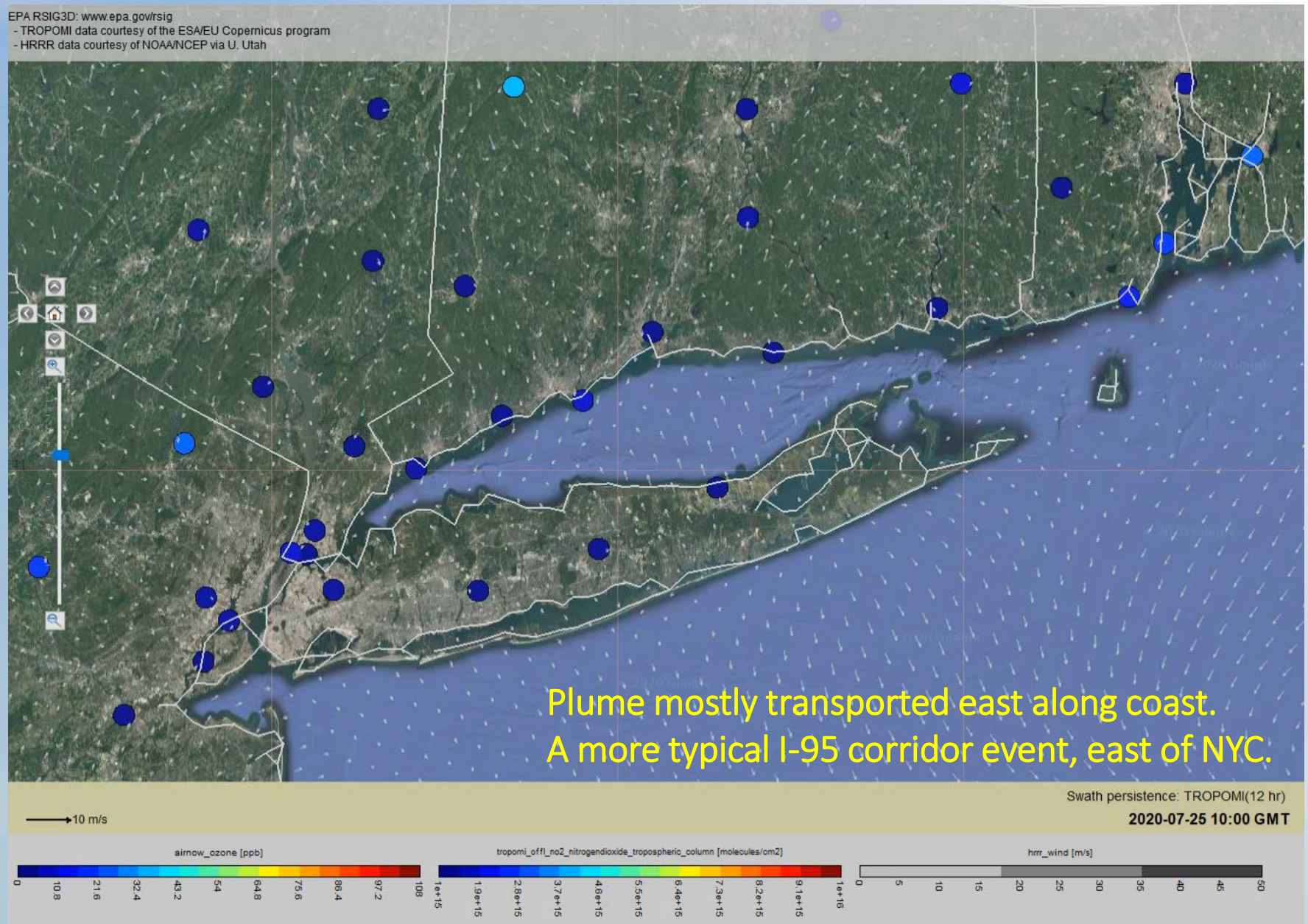




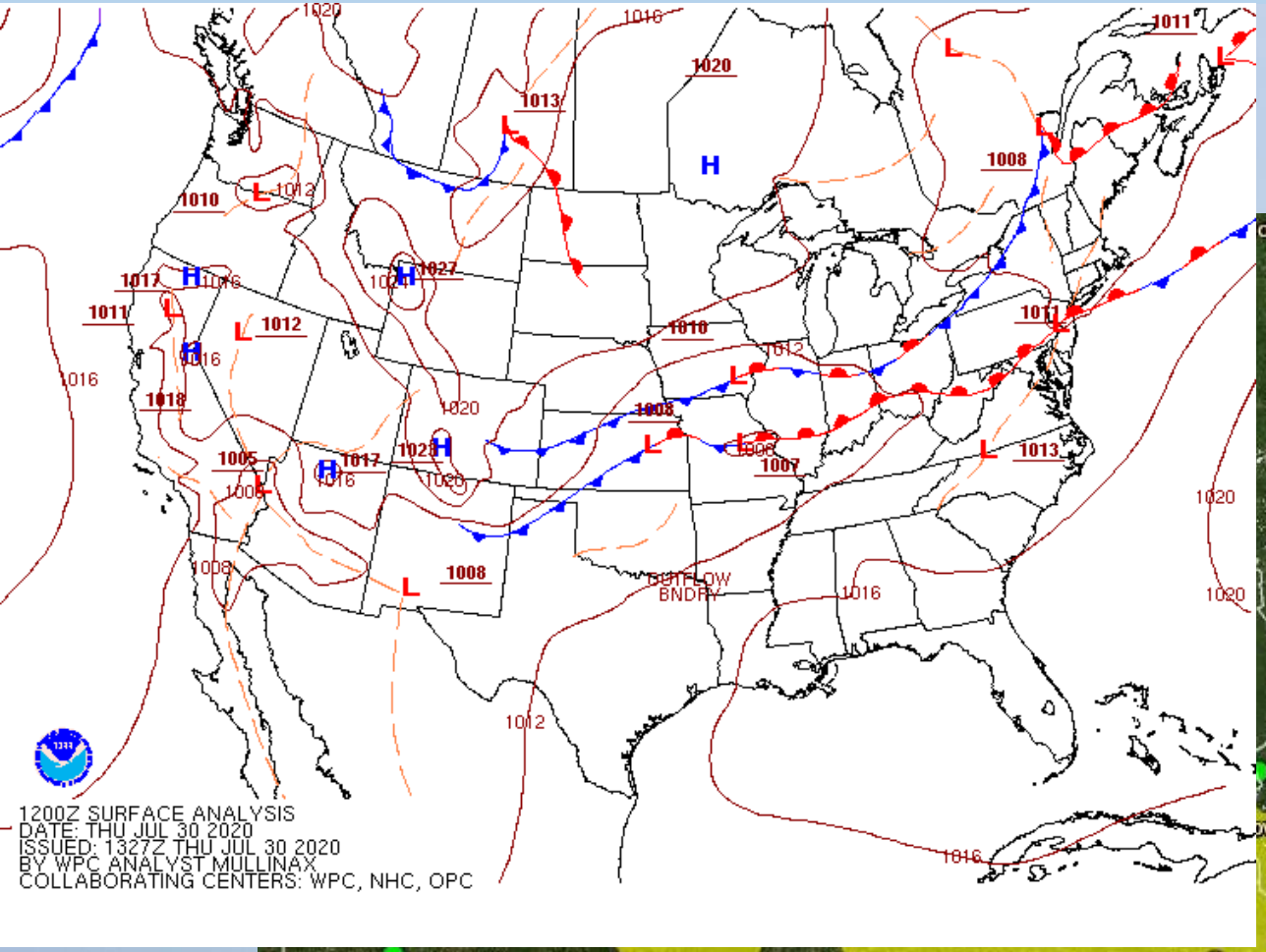




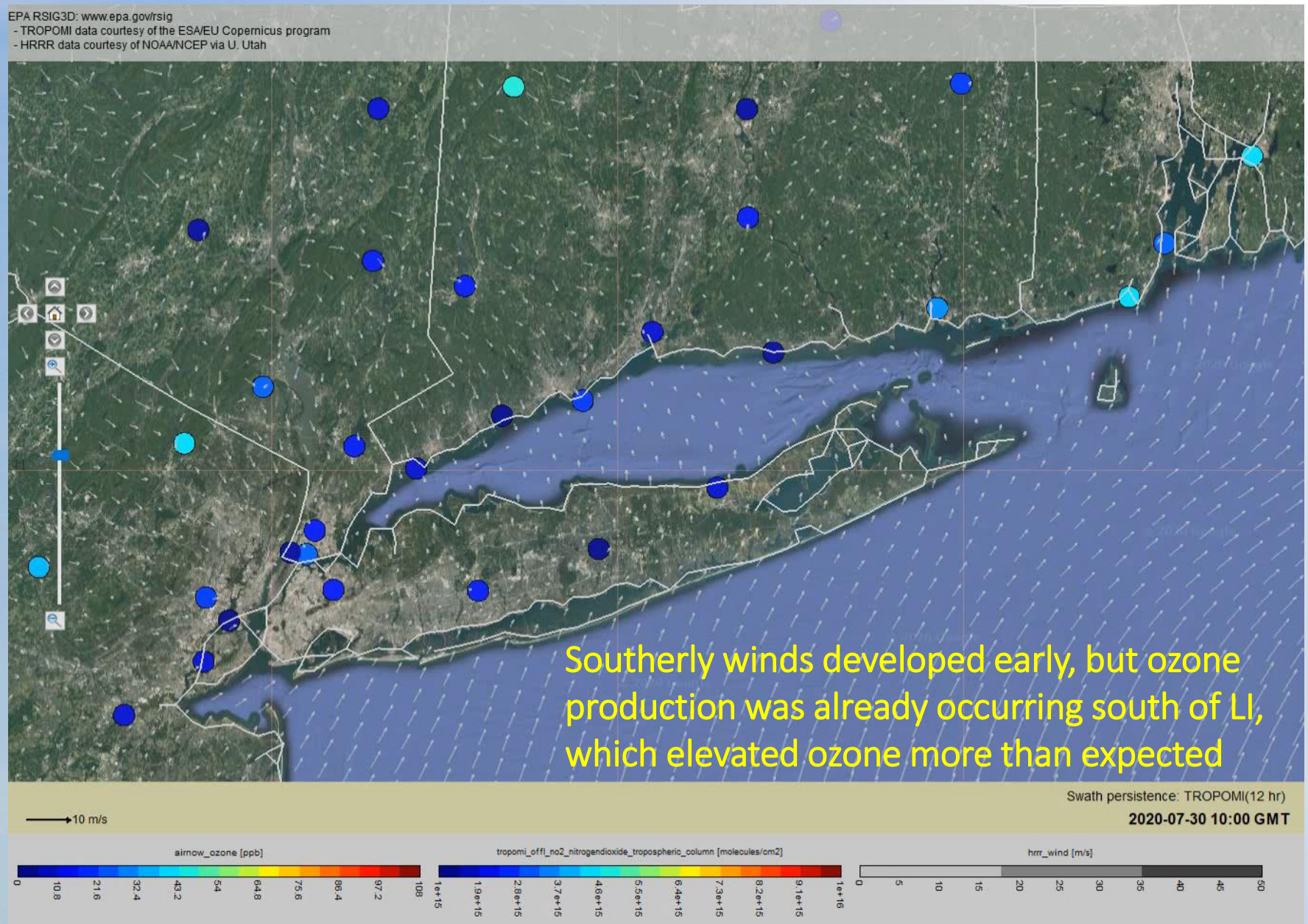
July 25-28, 2020 HRRR Winds



July 30, 2020 Ozone Event



July 30, 2020 HRRR Winds



Conclusions

- It was a record hot summer at BDL;
- Number of exceedance days were lower than one would expect for the warm temperatures;
- Southerly winds developed on a number of days that mixed the boundary layer and lowered the ozone levels;
- Ozone design values mostly held steady for this year.