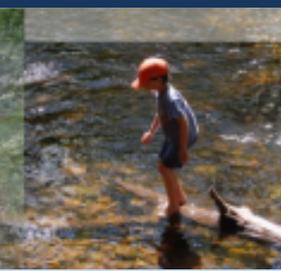
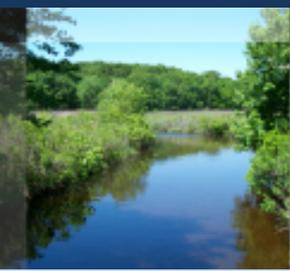
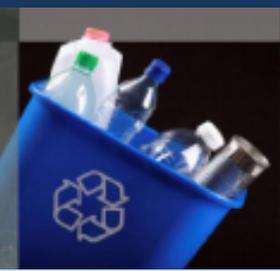




Connecticut Department of Energy and Environmental Protection



Connecticut Department of
**ENERGY &
ENVIRONMENTAL
PROTECTION**

2016 Ozone Season Update



September 8, 2016
Michael Geigert



Connecticut Department of Energy and Environmental Protection

Ozone in Connecticut 2016

- Currently have 29 exceedance days in 2016.

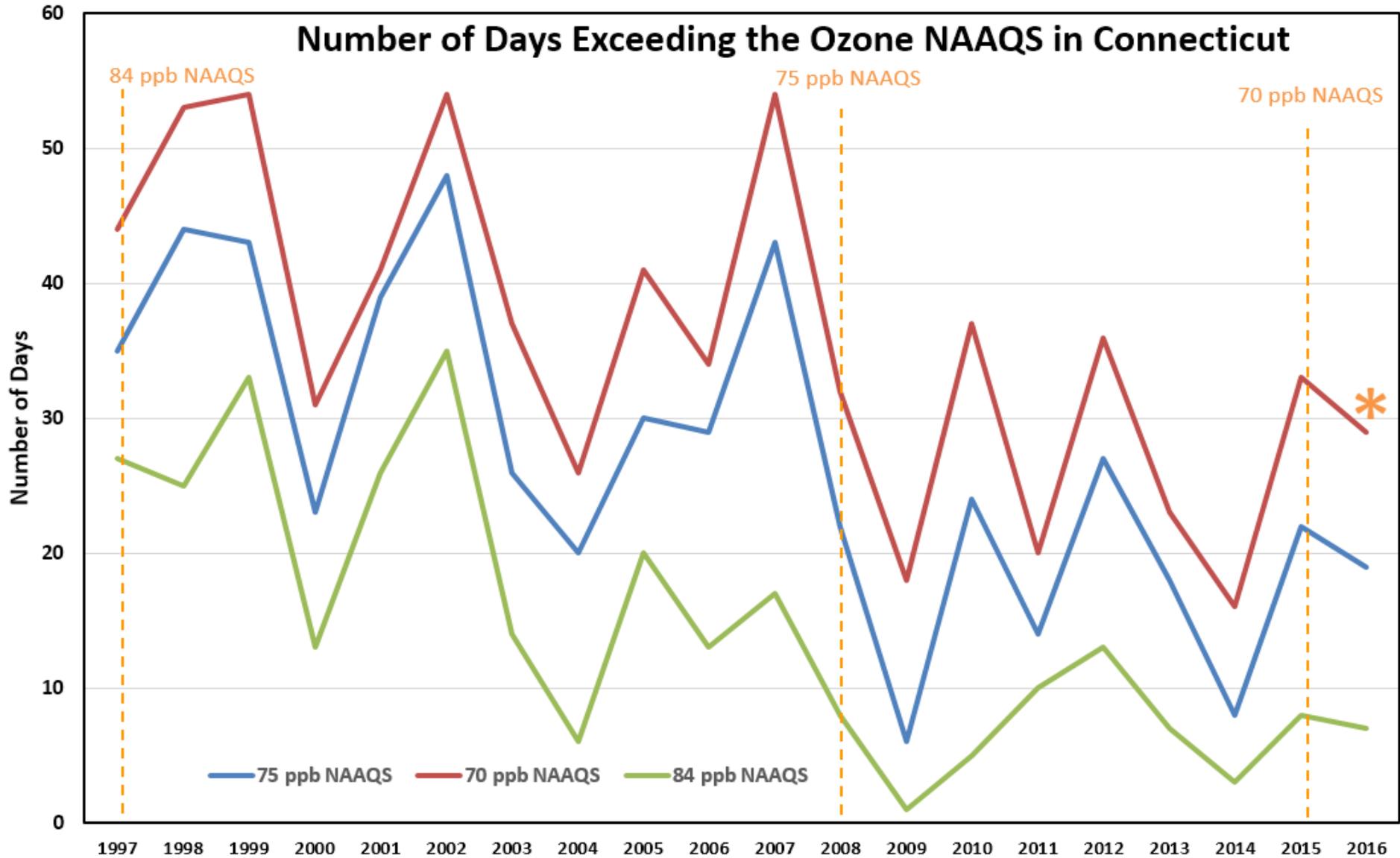
20 Forecasted Unhealthy Ozone Days for 2016

Shaded dates did not verify

Month	Day	Day of the Week
May	25	Wednesday
May	26	Thursday
May	27	Friday
May	28	Saturday
June	19	Sunday
June	20	Monday
June	29	Wednesday
July	6	Wednesday
July	7	Thursday
July	8	Friday
July	15	Friday
July	16	Saturday
July	18	Monday
July	22	Friday
July	25	Monday
July	28	Thursday
August	12	Friday
August	13	Saturday
August	19	Friday
August	31	Wednesday

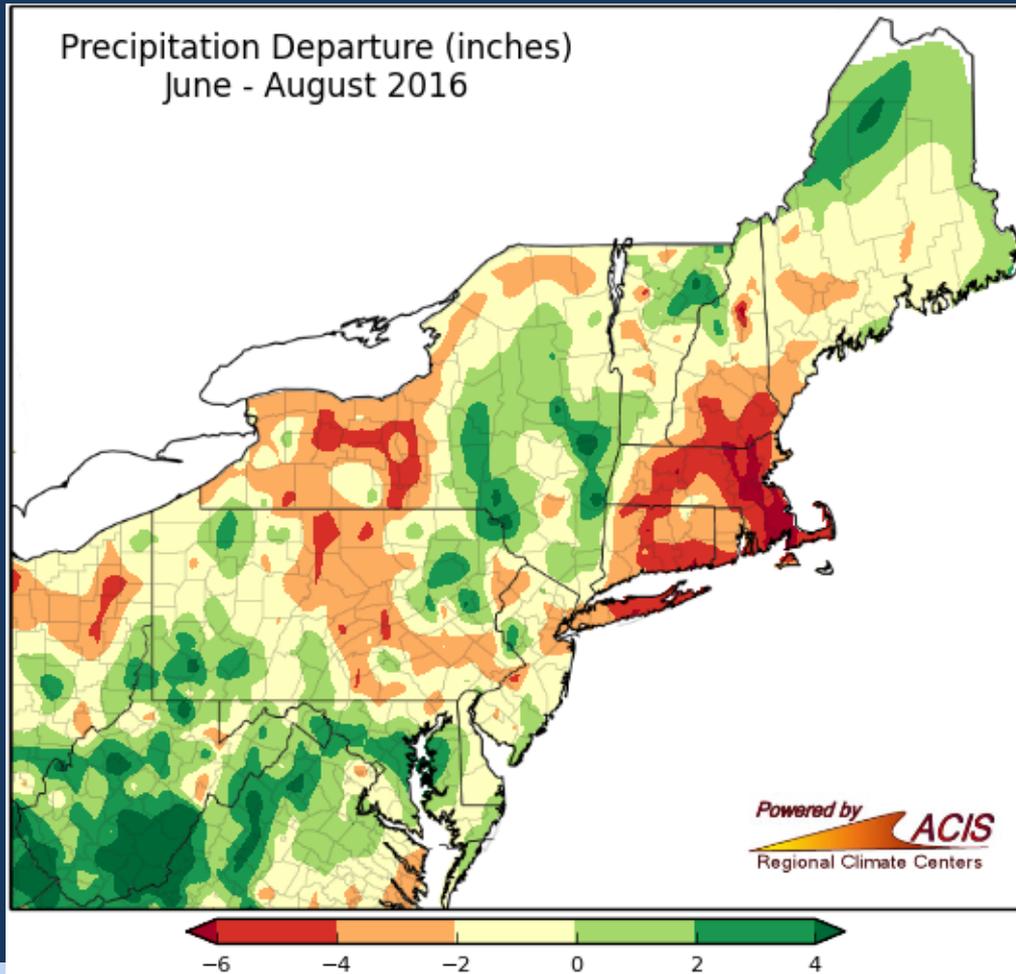


Trend Graph



Summer Precipitation Summary

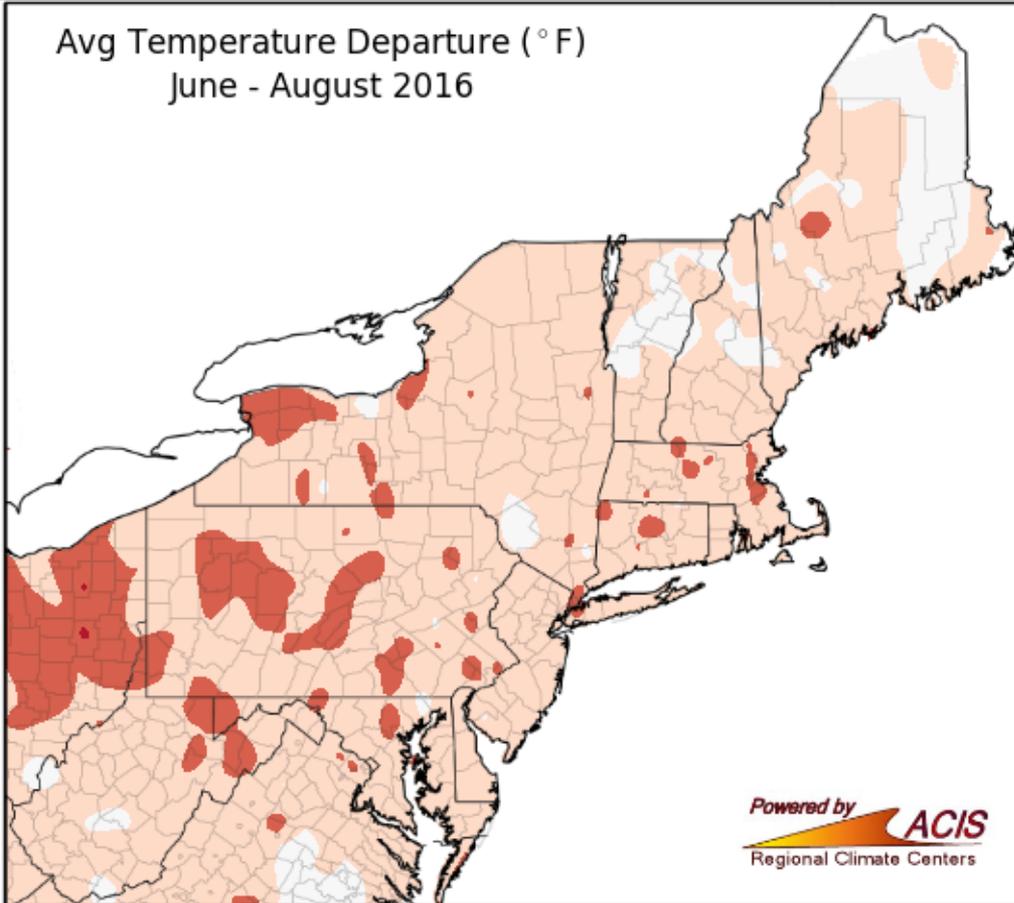
- Overall a drier summer for southern New England.



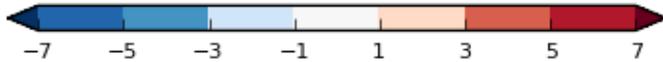
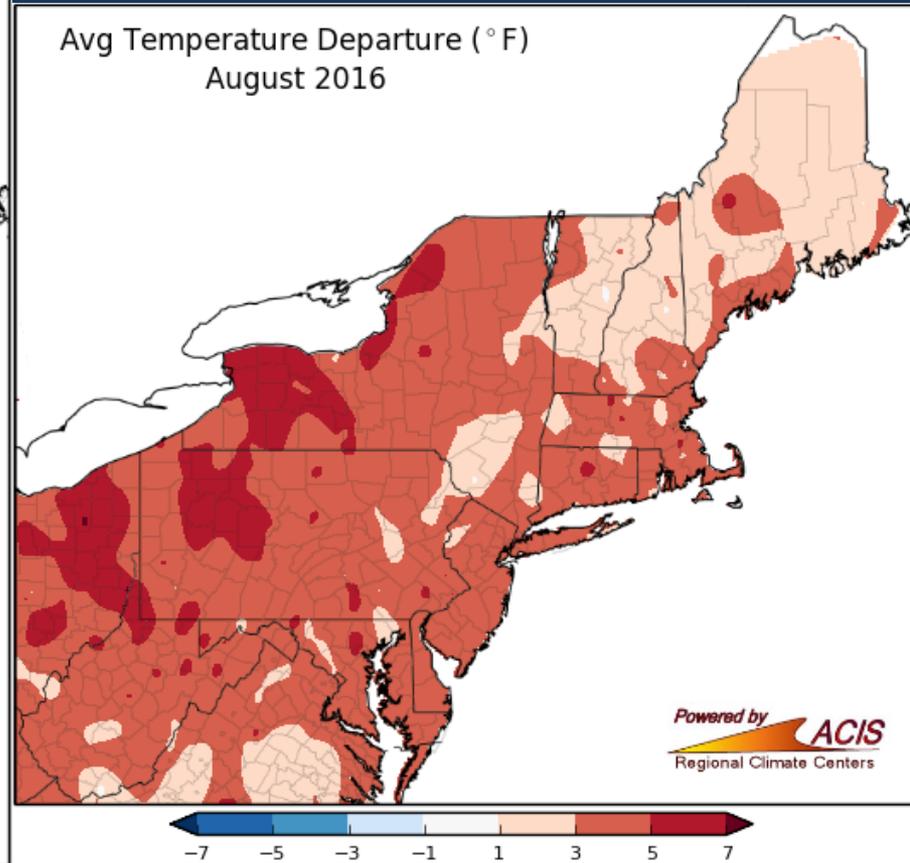
Summer Temperature summary

- Overall, warmer over the entire Northeast;
- August was much warmer in the Northeast.

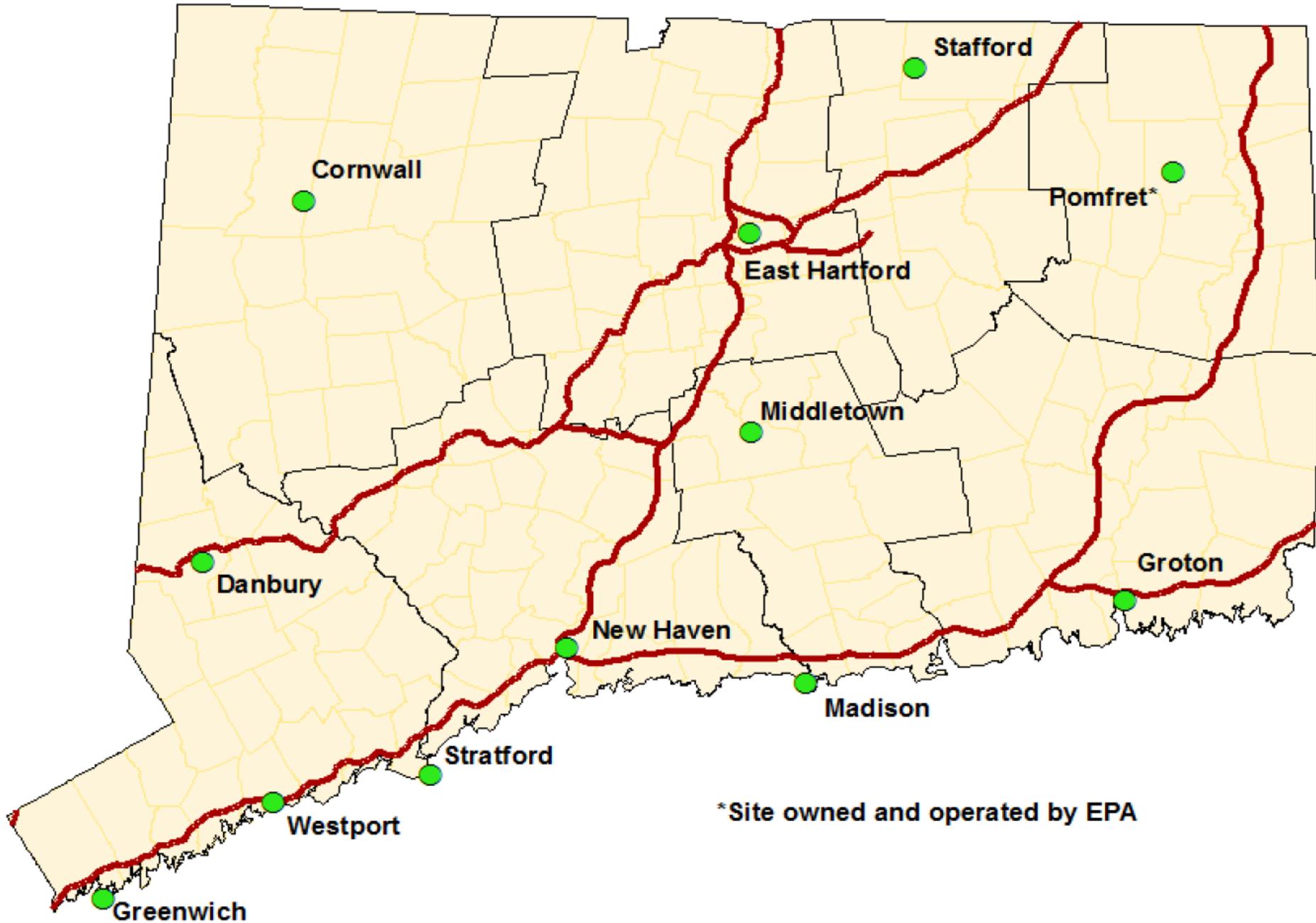
Avg Temperature Departure (°F)
June - August 2016



Avg Temperature Departure (°F)
August 2016



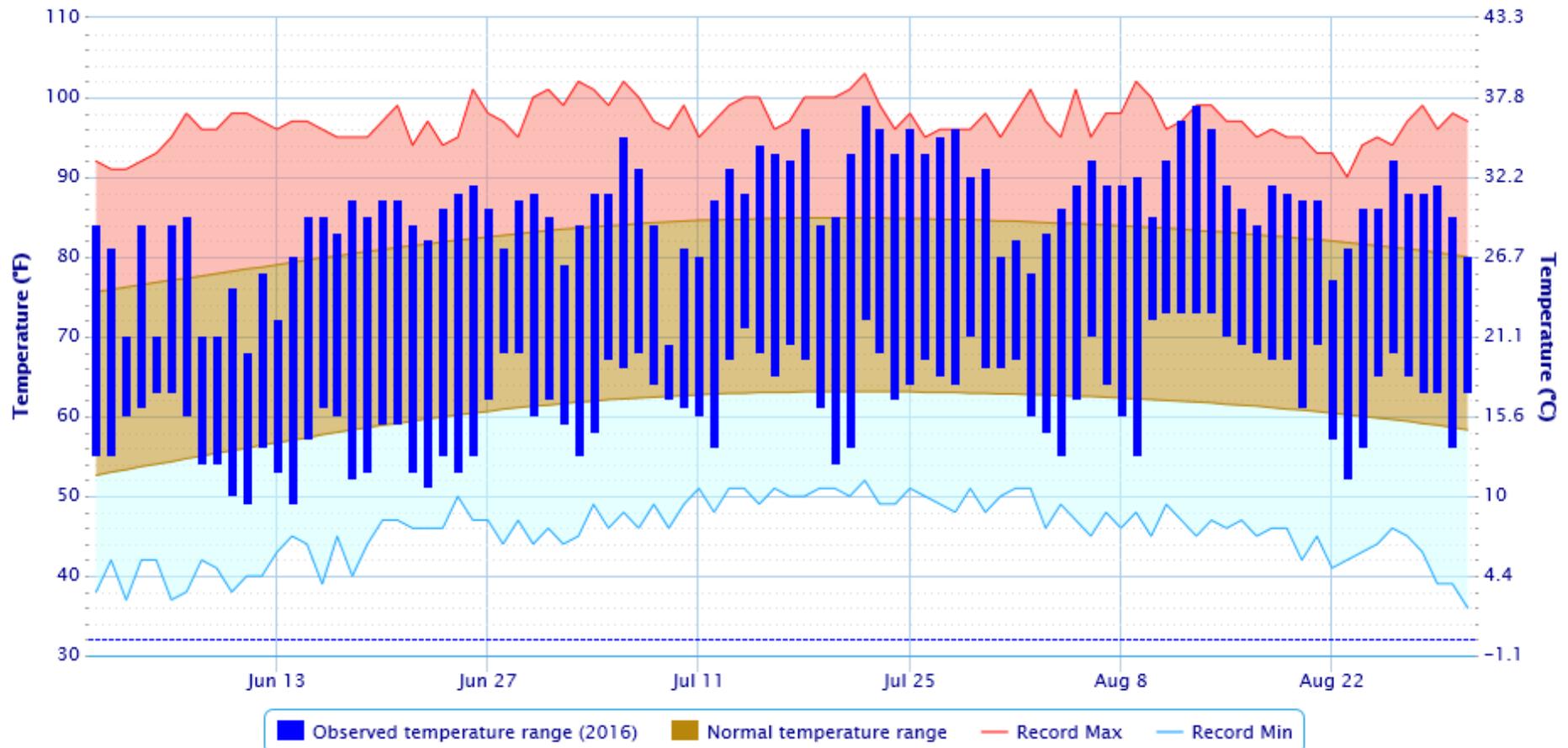
CT ozone Monitors



24 Days over 90 degrees at BDL Hartford

Daily Temperature Data - HARTFORD BRADLEY INTL AP, CT

Period of Record - 1949-01-01 to 2016-09-05. Normals period: 1981-2010. Click and drag to zoom chart.



**Connecticut Department of Energy & Environmental Protection
8-Hour Ozone Daily Maximums*
April 2016**

Site	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Abington	38	38	42	37	44	48	48	40	M	43	51	40	43	43	48	M	51	60	47	50	60	64	45	51	51	37	48	49	M	50	
Cornwall	45	43	45	39	48	52	M	43	47	45	49	42	46	49	51	54	58	61	52	55	66	72	44	M	52	37	49	52	53	54	
Danbury	39	41	44	36	45	51	49	42	44	45	49	40	44	48	50	53	60	65	53	49	60	67	42	49	52	32	50	48	54	58	
East Hartford	37	35	43	39	47	51	47	40	47	44	51	40	45	47	51	52	56	65	54	M	58	68	46	55	49	37	47	50	50	56	
Greenwich	36	44	48	40	51	53	53	46	46	47	54	46	44	49	52	58	55	68	61	59	60	59	46	57	M	44	42	52	50	57	
Groton	38	M	43	38	47	49	51	41	48	47	55	46	40	44	50	53	49	60	54	52	57	52	48	54	50	38	47	M	43	44	
Madison	31	40	43	35	45	53	51	41	M	46	54	42	39	42	48	52	48	58	54	51	51	51	45	51	51	37	48	49	43	45	
Middletown	37	40	43	37	46	54	52	42	48	46	56	42	46	47	53	55	58	68	58	57	63	73	50	57	57	36	49	48	49	57	
New Haven	31	39	43	36	46	49	47	38	44	40	45	39	35	44	49	51	49	59	54	50	46	56	44	51	50	33	45	46	44	48	
Stafford	39	37	43	38	45	51	49	40	46	44	52	39	43	44	48	50	51	61	49	51	61	67	45	52	49	38	48	51	51	53	
Stratford	34	42	44	39	47	55	52	41	46	46	55	41	41	45	50	54	52	59	53	56	56	51	43	52	53	41	48	50	48	51	
Westport	33	40	43	35	46	52	49	41	44	45	52	42	43	46	49	54	55	64	55	54	57	59	44	53	53	34	46	49	46	51	
# days > Federal Standard																						1									

Good (0-54 ppb)

Moderate (55-70 ppb)

Unhealthy for Sensitive Groups (71-85 ppb)

Unhealthy (86-105 ppb)

Very Unhealthy (>106 ppb)

Units - parts per billion (ppb)

Federal Standard = 70 ppb

M = missing data

* Data is preliminary and has not been quality assured

**Connecticut Department of Energy & Environmental Protection
8-Hour Ozone Daily Maximums*
May 2016**

Site	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Abington	41	24	28	32	M	M	27	38	45	50	57	65	50	54	34	46	47	48	43	45	M	55	52	30	76	83	68	67	52	29	52	
Cornwall	46	34	26	33	33	34	29	41	47	50	66	69	54	56	37	M	51	49	51	51	54	54	55	47	81	91	78	65	69	41	55	
Danbury	41	22	19	29	31	27	23	40	M	50	53	69	48	57	38	46	49	51	50	48	49	57	56	38	82	99	81	81	73	46	57	
East Hartford	43	18	25	33	30	35	23	39	47	50	57	66	46	55	34	46	48	49	42	49	49	54	52	27	75	93	70	81	66	36	49	
Greenwich	48	31	34	38	34	36	28	46	61	40	54	70	49	59	38	51	43	47	51	58	49	55	67	48	89	91	63	82	59	49	67	
Groton	41	33	29	35	30	33	41	41	54	49	54	64	44	54	36	49	50	45	44	54	48	55	58	28	87	80	54	60	51	24	48	
Madison	41	32	32	34	28	32	34	38	52	43	49	62	46	53	38	49	M	45	46	55	47	49	M	30	89	86	56	63	48	22	50	
Middletown	46	21	29	35	30	35	30	42	52	53	60	71	M	56	36	38	44	48	48	54	50	56	54	27	80	91	67	79	61	32	58	
New Haven	42	21	27	30	26	31	23	38	49	35	43	70	47	49	37	45	38	41	46	48	49	57	48	29	63	84	65	73	54	29	51	
Stafford	42	25	27	32	29	34	29	38	44	50	56	66	51	57	34	47	47	47	47	46	53	55	52	30	74	82	70	73	56	38	M	
Stratford	46	30	35	37	30	35	28	41	53	42	47	62	48	55	37	47	43	46	50	54	49	54	58	42	89	76	59	70	47	32	58	
Westport	40	28	26	32	30	32	24	41	56	40	53	69	48	57	36	47	41	47	51	56	45	58	62	28	87	90	61	81	58	38	64	
# days > Federal Standard												2														3	4	5	6	7		

Good (0-54 ppb)

Moderate (55-70 ppb)

Unhealthy for Sensitive Groups (71-85 ppb)

Unhealthy (86-105 ppb)

Very Unhealthy (>106 ppb)

Units - parts per billion (ppb)

Federal Standard = 70 ppb

M = missing data

*** Data is preliminary and has not been quality assured**

**Connecticut Department of Environmental Protection
8-Hour Ozone Daily Maximums*
June 2016**

Site	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Abington	43	40	27	52	30	56	60	30	36	28	35	34	26	33	41	56	42	49	49	45	48	45	54	48	47	50	47	39	49	48
Cornwall	55	55	26	56	32	M	50	27	42	42	54	32	28	31	62	58	43	56	54	62	43	46	53	58	56	74	61	42	38	44
Danbury	54	49	32	64	30	54	57	27	45	43	57	42	M	34	50	74	44	63	66	66	51	53	78	59	64	87	60	47	49	51
East Hartford	49	45	30	63	31	55	55	26	40	34	39	33	26	34	37	58	43	50	54	54	46	M	65	53	57	64	55	44	44	41
Greenwich	55	42	39	62	43	69	73	33	52	49	69	51	34	M	64	47	46	60	51	52	60	M	64	58	55	64	54	42	57	65
Groton	44	33	28	50	41	60	75	36	43	33	44	43	31	39	60	71	38	57	50	39	63	55	M	50	41	33	40	37	51	51
Madison	48	32	26	M	M	62	78	34	42	36	46	42	29	37	62	68	41	52	53	41	71	58	65	52	50	40	46	43	69	54
Middletown	46	41	35	62	35	64	63	29	43	34	43	39	28	35	53	69	40	49	52	47	56	52	73	49	48	55	51	44	52	53
New Haven	M	35	36	49	35	45	55	M	41	39	51	43	27	36	58	63	M	51	52	43	48	56	75	54	51	57	51	44	52	42
Stafford	47	45	29	48	31	55	56	28	M	31	38	31	25	33	42	53	40	50	53	49	44	46	58	47	51	61	50	41	46	43
Stratford	50	37	37	52	42	67	73	28	45	43	55	44	31	37	63	55	39	57	49	51	62	57	64	58	57	61	55	52	66	58
Westport	48	37	36	58	37	66	72	30	47	44	53	44	30	36	67	51	45	61	52	50	58	55	65	55	52	65	56	43	60	60
# days > Federal Standard	7						8									9						10		11						

Good (0-54 ppb)

Moderate (55-70 ppb)

Unhealthy for Sensitive Groups (71-85 ppb)

Unhealthy (86-105 ppb)

Very Unhealthy (>106 ppb)

Units - parts per billion (ppb)

Federal Standard = 70 ppb

M = missing data

*** Data is preliminary and has not been quality assured**

**Connecticut Department of Energy & Environmental Protection
8-Hour Ozone Daily Maximums*
July 2016**

Site	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Abington	50	34	43	51	42	74	54	31	25	27	23	54	51	40	64	52	59	67	35	33	66	90	39	41	57	38	47	62	51	43	30
Cornwall	53	32	37	53	48	66	53	45	23	29	34	61	65	55	54	48	47	55	32	34	62	66	41	44	57	33	41	61	50	41	30
Danbury	55	35	42	62	41	80	66	51	26	37	29	72	64	M	58	56	52	64	32	30	68	70	43	50	66	37	46	61	52	54	38
East Hartford	52	33	37	55	47	71	59	41	24	34	M	61	66	46	65	57	57	66	34	33	64	76	39	36	72	37	37	72	54	42	30
Greenwich	48	35	44	59	45	87	64	44	26	33	36	61	52	55	76	58	77	73	37	52	85	M	M	M	M	42	69	69	63	57	43
Groton	52	39	48	56	48	75	47	36	31	30	26	51	46	43	82	71	75	68	43	45	71	70	52	46	60	47	43	60	50	58	39
Madison	51	38	48	56	52	70	62	33	29	37	35	62	50	44	M	M	M	82	37	47	74	78	57	48	65	51	49	68	52	62	41
Middletown	50	34	46	56	45	80	67	36	28	34	28	62	59	48	71	61	70	84	35	34	78	100	M	44	69	38	52	66	52	47	35
New Haven	51	37	47	62	41	68	68	36	28	36	31	62	40	43	70	56	71	75	33	37	80	91	43	38	48	38	39	51	55	64	39
Stafford	M	M	M	M	46	67	58	38	23	29	30	59	66	43	55	49	50	65	34	32	M	72	40	35	63	38	46	64	44	38	31
Stratford	52	39	48	63	52	75	64	M	M	M	44	60	59	56	84	61	79	83	36	46	81	96	54	51	67	45	56	69	60	63	47
Westport	50	36	48	63	46	80	64	42	27	39	36	61	58	55	75	59	76	80	38	45	87	97	49	54	69	41	61	67	58	58	42
# days > Federal Standard	12					13						14			15	16	17	18			19	20			21			22			

Good (0-54 ppb)

Moderate (55-70 ppb)

Unhealthy for Sensitive Groups (71-85 ppb)

Unhealthy (86-105 ppb)

Very Unhealthy (>106 ppb)

Units - parts per billion (ppb)

Federal Standard = 70 ppb

M = missing data

* Data is preliminary and has not been quality assured

**Connecticut Department of Energy & Environmental Protection
8-Hour Ozone Daily Maximums*
August 2016**

Site	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Abington	33	31	M	36	55	47	30	34	54	28	47	55	46	39	40	42	31	51	40	40	31	33	46	55	59	45	40	35	39	44	50	
Cornwall	36	33	35	44	54	44	30	38	61	35	45	45	62	37	40	61	36	51	41	56	40	38	44	67	79	47	47	58	43	51	M	
Danbury	37	26	38	50	65	48	31	32	67	38	57	49	68	39	37	61	32	50	35	52	41	30	30	71	67	42	44	51	38	45	51	
East Hartford	35	27	28	51	69	47	30	35	60	30	56	49	69	38	38	52	31	43	45	56	35	35	38	67	68	37	44	42	38	34	48	
Greenwich	38	31	35	46	57	60	37	52	67	37	76	58	M	M	M	42	41	64	50	53	45	34	59	81	63	51	44	47	49	57	76	
Groton	35	28	31	32	45	62	39	34	57	M	51	59	62	55	49	40	36	49	47	47	31	39	48	62	58	70	44	31	48	37	62	
Madison	34	29	32	35	56	66	45	41	58	33	61	75	77	56	54	48	32	59	53	54	32	36	55	66	62	69	48	36	44	42	66	
Middletown	34	29	30	38	69	63	33	37	59	33	75	75	69	43	38	49	33	56	43	53	31	36	47	68	63	51	43	39	43	45	54	
New Haven	34	26	31	28	63	57	36	39	49	25	72	73	59	40	42	49	32	65	48	58	35	37	54	66	45	48	44	41	43	47	64	
Stafford	33	27	34	45	71	47	31	35	59	32	48	46	51	36	39	42	30	44	39	49	34	31	37	62	64	43	37	41	39	36	46	
Stratford	39	33	37	44	57	67	41	45	56	35	82	79	69	58	57	48	37	68	57	57	44	33	60	76	63	54	48	40	44	48	75	
Westport	38	29	34	44	61	M	M	47	63	36	87	68	72	48	56	52	31	67	47	49	41	34	58	79	64	49	47	45	47	54	76	
# days > Federal Standard	22				23						24	25	26												27	28						29

Good (0-54 ppb)

Moderate (55-70 ppb)

Unhealthy for Sensitive Groups (71-85 ppb)

Unhealthy (86-105 ppb)

Very Unhealthy (>106 ppb)

Units - parts per billion (ppb)

Federal Standard = 70 ppb

M = missing data

* Data is preliminary and has not been quality assured

CT Monitoring Site Design Value Update

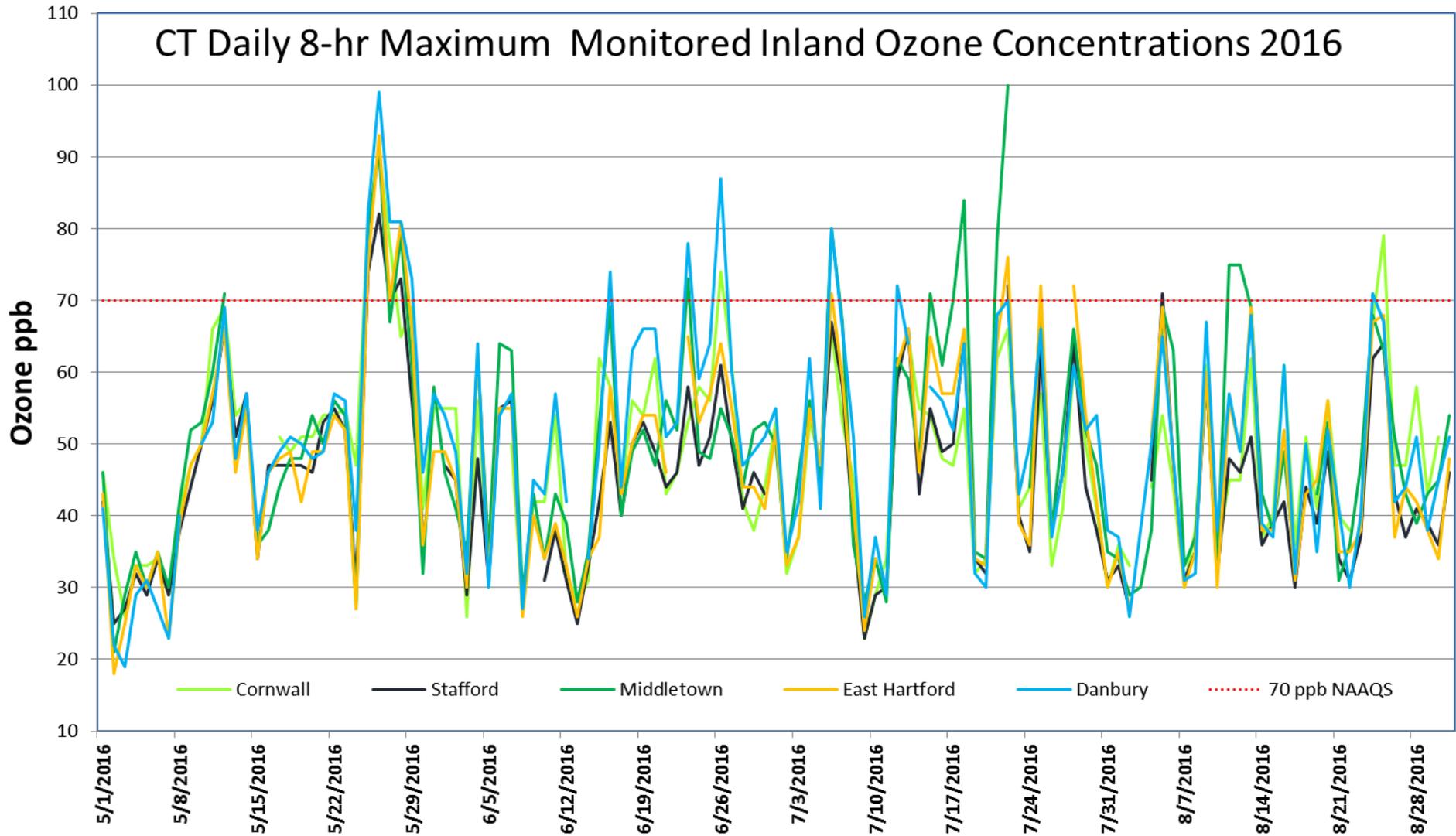
- Connecticut has 29 exceedance days to date, as of August 31st, 2016;
- New 8-hour ozone NAAQS = 70 ppb.

		To Date 2016 Compliance Status x = Violating NAAQS				
	Site Name	To Date : 2016 DV	2015 NAAQS	2008 NAAQS	1997 NAAQS	Next Possible NAAQS in Violation (key monitor in each NA is highlighted in RED)
SWCT Portion of NYC Area	Danbury	78	x	x		Four more 102+ ppb days violates 1997 NAAQS
	Greenwich	82	x	x		Four more 93+ ppb days violates 1997 NAAQS
	Madison	76	x	x		Four more 105+ ppb days violates 1997 NAAQS
	Middletown	79	x	x		Three more 97+ ppb days violates 1997 NAAQS
	New Haven - Crisculo Park	76	x	x		Four more 101+ ppb days violates 2008 NAAQS
	Stratford	81	x	x		Three more 95+ ppb days violates 1997 NAAQS
	Westport	85	x	x	x	Violates all NAAQS
Greater CT	Cornwall	73	x			Three more 86+ ppb days violates 2008 NAAQS One more 76+ ppb day violates 2008 NAAQS
	East Hartford	75	x			
	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				One more 76+ ppb days violates 2015 NAAQS



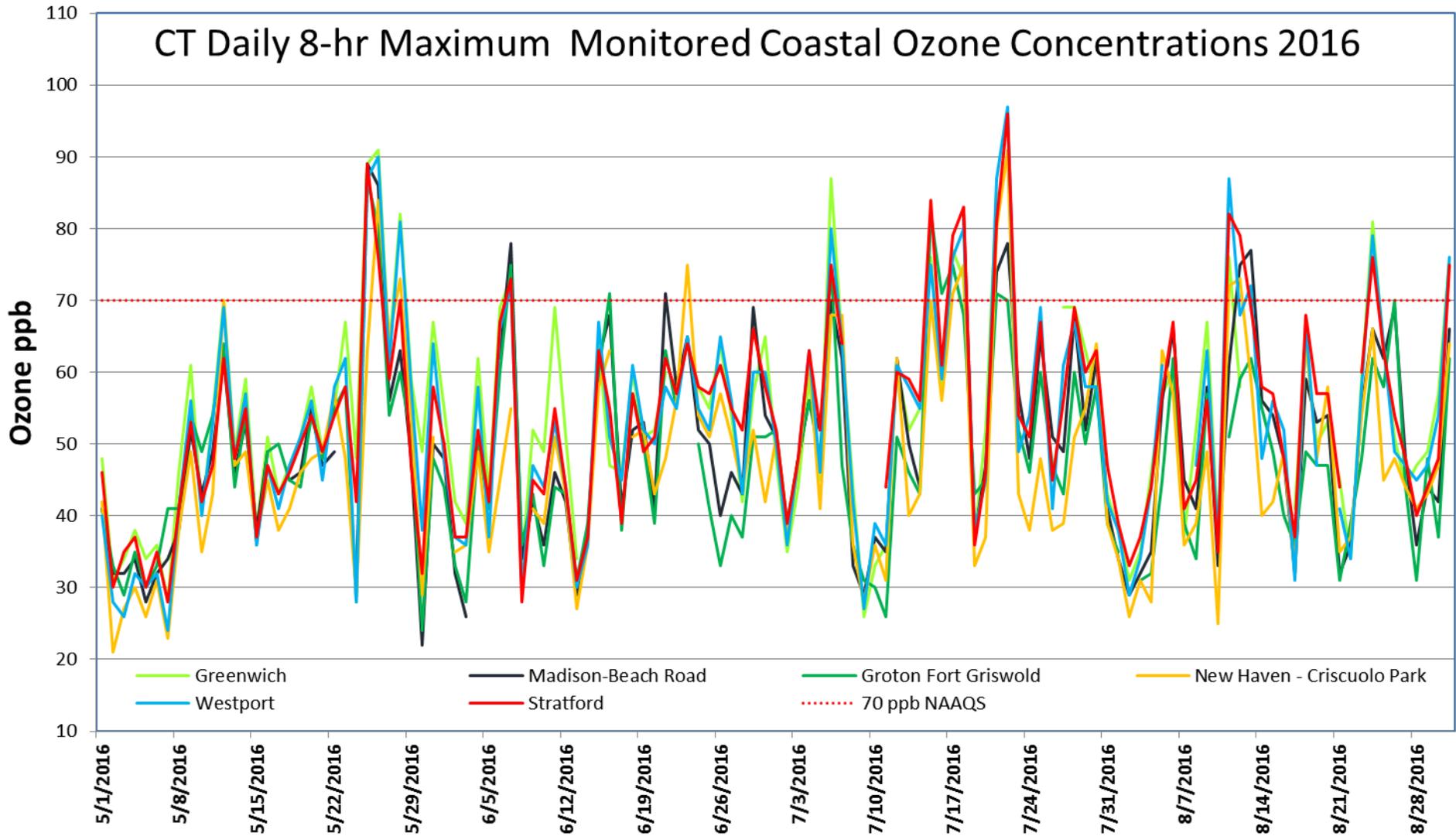
Inland Monitors

CT Daily 8-hr Maximum Monitored Inland Ozone Concentrations 2016



Coastal Monitors

CT Daily 8-hr Maximum Monitored Coastal Ozone Concentrations 2016



NOAA Model Performance

- The following tables show 29 USG or greater ozone exceedance days monitored in Connecticut;
- The NOAA 06z Day 2 model run correctly predicted an USG or greater 8-hour ozone concentration during 21 of those 29 days;
- Note the general USG+ under prediction until July;
- July modeled values show a sharp increase in magnitude and number of monitors over predicted;
- August predictions are more realistic, except for the major under prediction on August 11th.

Observed 8-hour Daily Max Ozone vs. NOAA Model

06z Day 2 Forecast for the 29 Exceedance Days to August 31, 2016

Observed 8-hour Ozone ppb

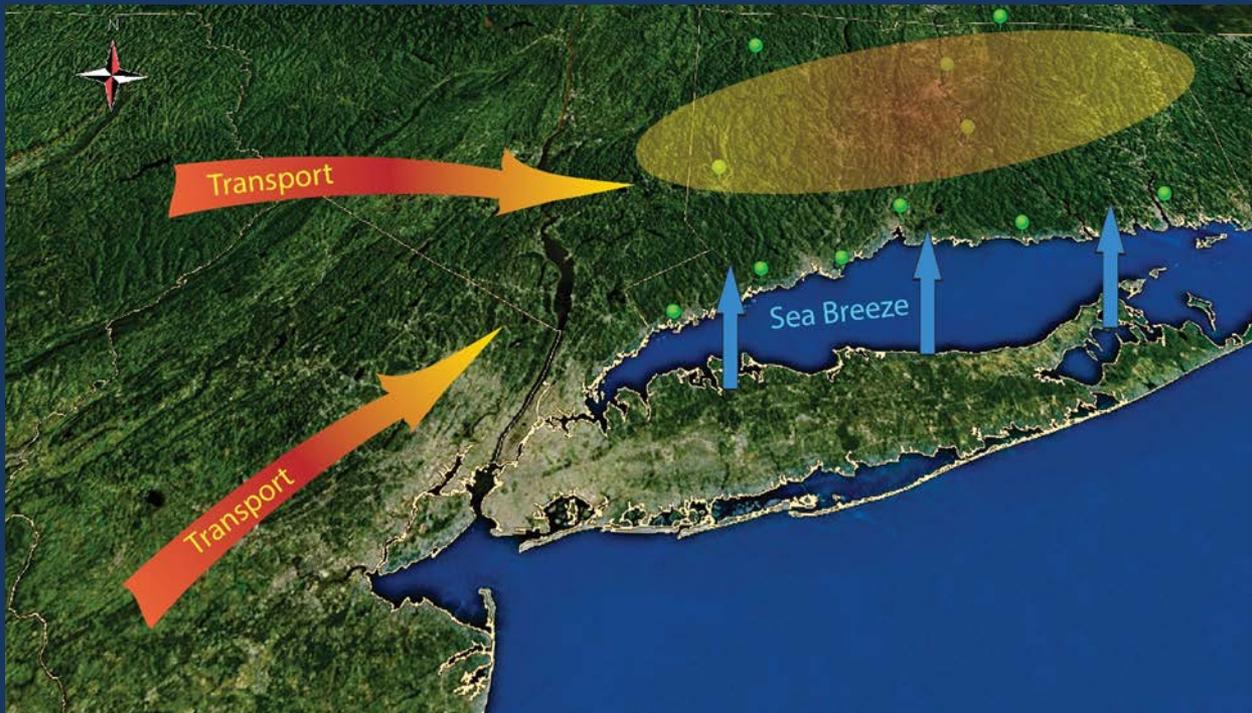
Site	4/22	5/12	5/25	5/26	5/27	5/28	5/29	6/7	6/16	6/21	6/23	6/26	7/6	7/12	7/15	7/16	7/17	7/18	7/21	7/22	7/25	7/28	8/5	8/11	8/12	8/13	8/24	8/25	8/31	Count	Site Max
Abington			76	83									74																	3	83
Cornwall	72		81	91	78							74																79		6	91
Danbury			82	99	81	81	73		74		78	87	80	72													71			11	99
East Hartford			75	93		81							71								76	72	72							7	93
Greenwich			89	91		82		73					87	76		77	73	85						76			81	76		12	91
Groton			87	80			75	71					75	82	71	75			71											9	87
Madison			89	86			78		71									82	74	78					75	77			9	89	
Middletown	73	71	80	91		79					73		80	71				84	78	100				75	75				13	100	
New Haven				84		73					75						71	75	80	91				72	73				9	91	
Stafford			74	82		73															72			71					5	82	
Stratford			89	76			73						75	84		79	83	81	96					82	79		76	75	13	96	
Westport			87	90		81		72					80	75		76	80	87	97					87		72	79	76	14	97	
Max 8-hr ppb	73	71	89	99	81	82	73	78	74	71	78	87	87	72	84	71	79	84	87	100	72	72	71	87	79	77	81	79	76		100

Modeled 8-hour 06z Day 2 Ozone ppb: 21/29 days (72.4%) modeled USG or greater

Site	4/22	5/12	5/25	5/26	5/27	5/28	5/29	6/7	6/16	6/21	6/23	6/26	7/6	7/12	7/15	7/16	7/17	7/18	7/21	7/22	7/25	7/28	8/5	8/11	8/12	8/13	8/24	8/25	8/31	Count	Site Max
Cornwall	60	52	54	66	65	54	73	46	58	45	45	49	68	62	76	61	55	54	46	62	66	77	72	63	52	52	53	68	67	4	77
Danbury	60	53	57	78	50	77	70	49	54	47	50	59	77	75	67	67	59	68	51	68	82	88	73	62	62	64	62	64	79	8	88
East Hartford	57	50	53	78	64	77	68	50	58	48	51	60	73	68	78	70	69	77	48	72	83	74	70	67	69	70	60	66	79	9	83
Greenwich	50	49	65	74	64	62	50	54	45	56	59	72	98	66	80	76	79	81	66	76	87	88	55	50	69	77	67	59	72	12	98
Groton	53	53	65	81	47	50	43	63	58	65	45	56	95	65	89	72	78	70	75	77	61	68	39	69	65	71	73	66	65	9	95
Madison	57	58	68	90	56	56	47	77	61	79	58	68	108	71	99	93	76	74	77	86	69	74	49	70	76	82	79	56	69	15	108
Middletown	54	51	54	79	53	72	58	55	54	51	49	57	89	71	92	72	68	84	58	87	76	72	61	65	81	76	64	60	79	13	92
New Haven	53	57	61	88	61	67	54	58	55	54	62	109	73	99	80	81	86	68	89	78	76	62	65	83	86	72	58	77	14	109	
Stafford	62	48	51	73	63	70	66	51	48	48	49	53	70	61	76	68	63	69	45	71	80	71	67	68	66	68	60	69	75	6	80
Stratford	50	54	63	85	61	61	49	57	46	55	54	67	112	71	98	84	87	82	71	87	79	79	58	60	78	84	72	57	73	15	112
Westport	51	50	64	80	61	62	50	54	47	54	57	65	104	68	87	80	87	84	65	80	87	86	59	58	76	81	70	58	73	12	104
Max 8-hr ppb	62	58	68	90	65	77	73	77	61	79	59	72	112	75	99	93	87	86	77	89	87	88	73	70	83	86	79	69	79		112

Exceedance Day Scenarios

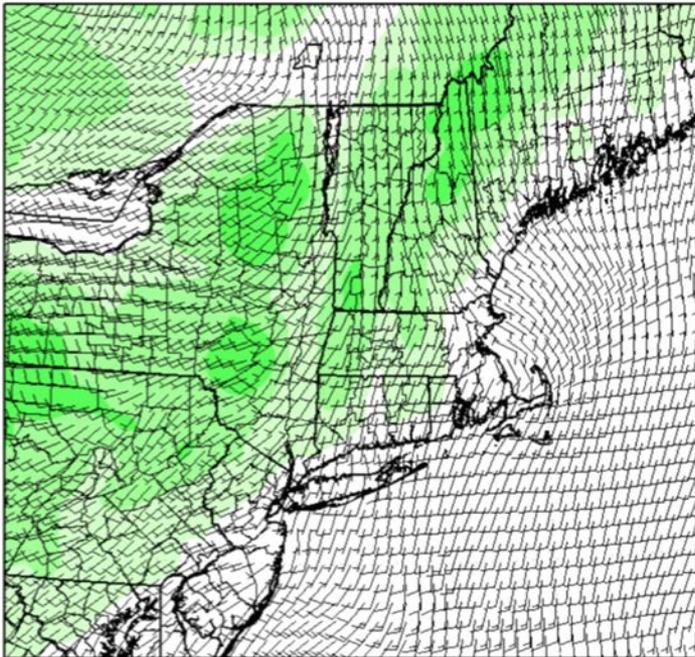
- **Inland-only Exceedances:** Ozone is transported aloft from the west and mixed down to the surface as daytime heating occurs. Strong southerly surface winds during the day bring in clean maritime air from the Atlantic Ocean, resulting in relatively low ozone levels along the coast. The maritime front may not penetrate very far inland, and therefore does not mitigate transported and local pollutants' contribution to inland exceedances.



Inland-only Exceedance: July 25, 2016

- Strong southerly winds off the ocean pushed the LIS plume, sparing the immediate coast.
- NOAA model did not model convection, which lowered ozone concentrations from full potential

10-M WND, SFC HGT NAM 06H FCST VALID 18Z 25 JUL



Wind barbs displayed at every other grid point

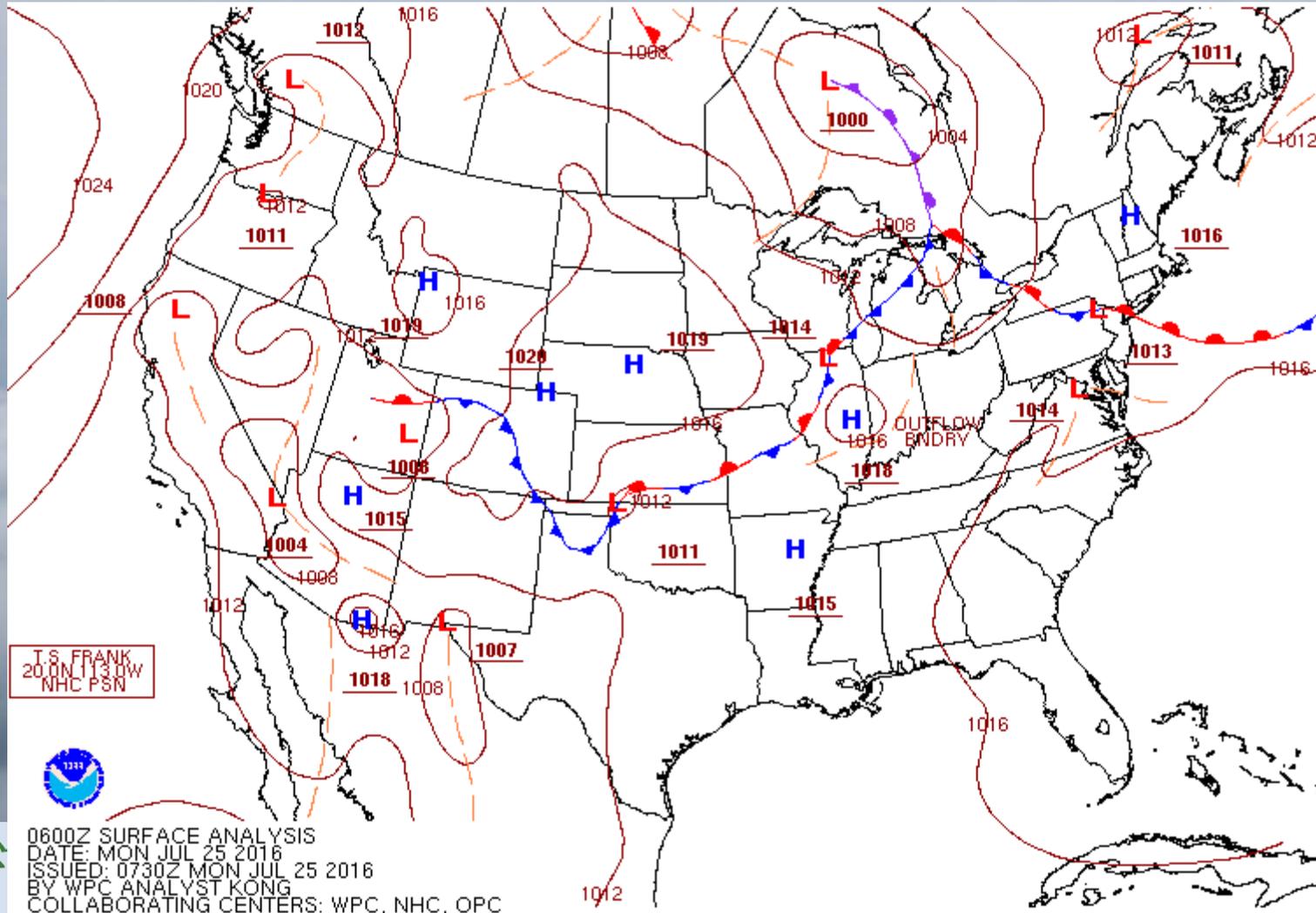
Daily Ozone AQI
Monday, July 25, 2016



Generated: 2016-07-27 18:26:40Z

July 25 , 2016 Surface Analysis Animation

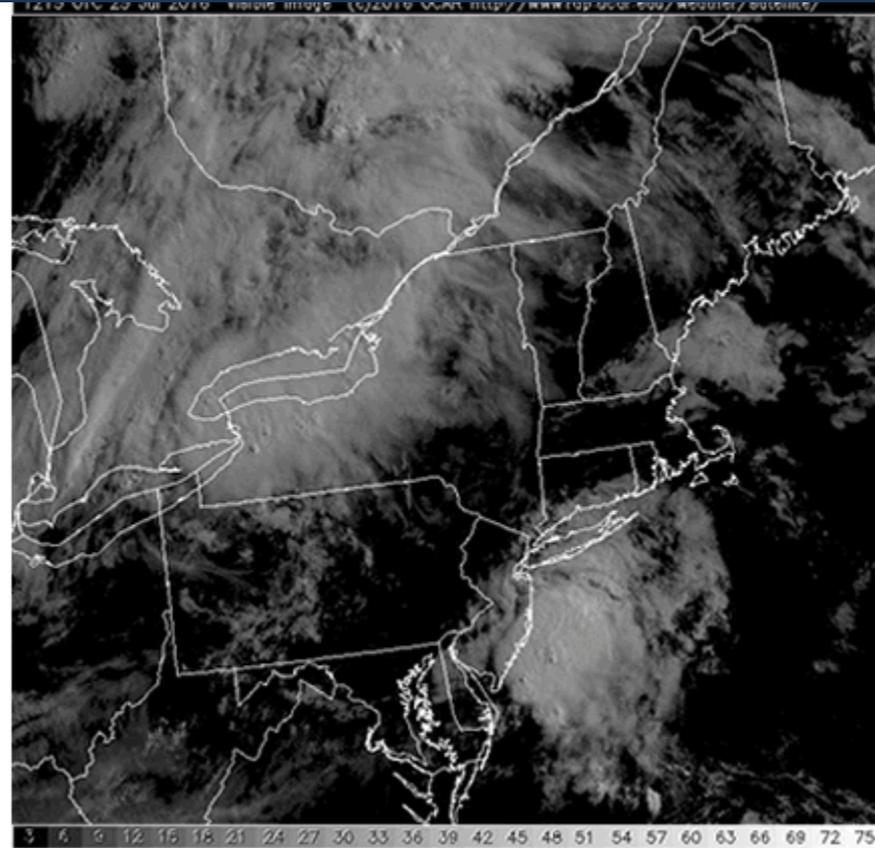
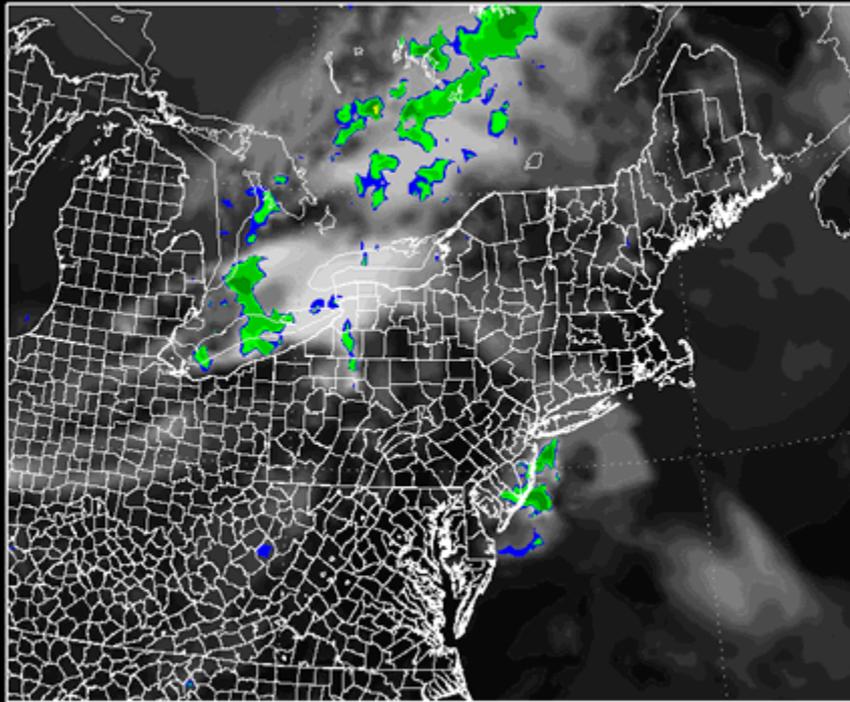
- Warm front passed through and pre-frontal trough developed near I-95 corridor, allowing southwest winds to funnel pollutants up the I-95 corridor.



July 25 , 2016 Satellite Animation

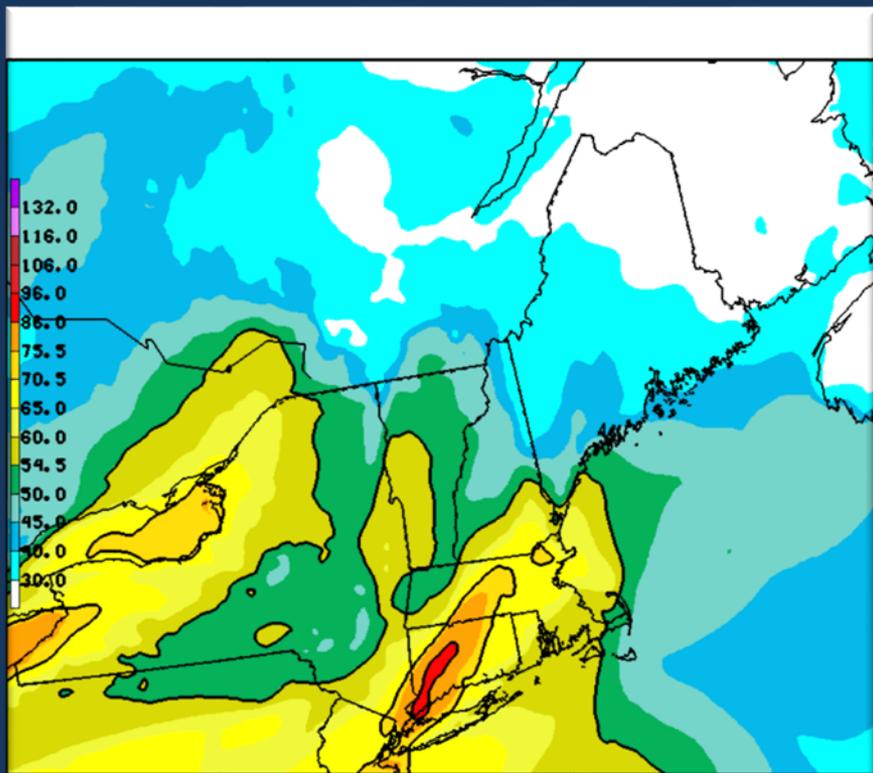
- NAM modeled clouds/precip vs. actual satellite shows that the model missed the first wave of convection, which lead to the modeled ozone over-prediction.

SATRAD CH2 NAM 00H FCST VALID 12Z 25 JUL 2016

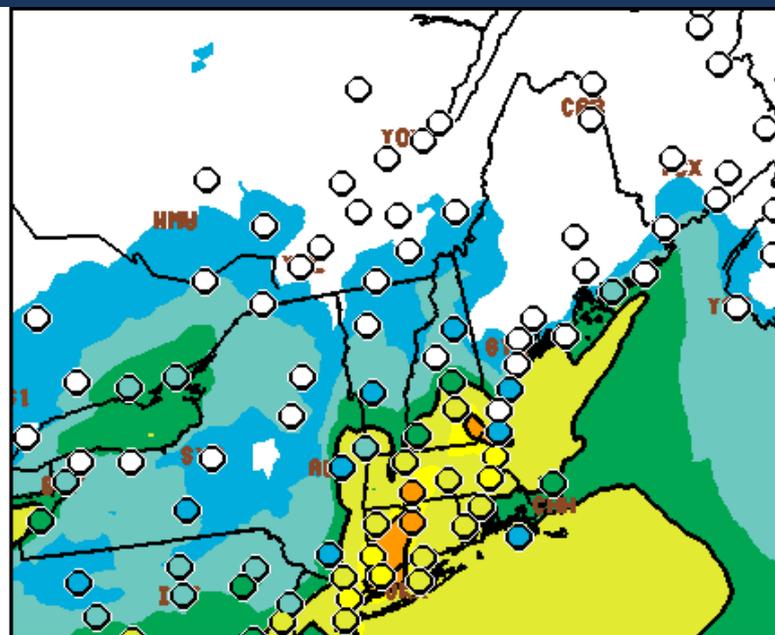


Connecticut Department of Energy and Environmental Protection

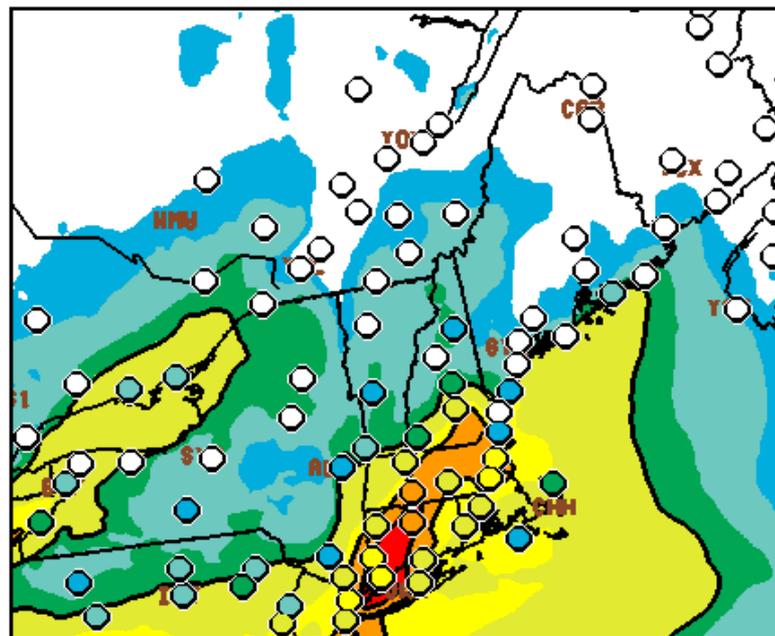
- Both Day 1 and Day 2 NOAA models greatly over-predicted the ozone plume;
- The new 'experimental' CMAQ model was much more realistic- but probably still missed the convection



PROD DAY2 OZHX08 0 20160724 06Z CYC"



PARA2 CMAQ.V5.0.2 DAY1 OZHX08 20160725 12Z CYC



PROD DAY1 OZHX08 20160725 12Z CYC"

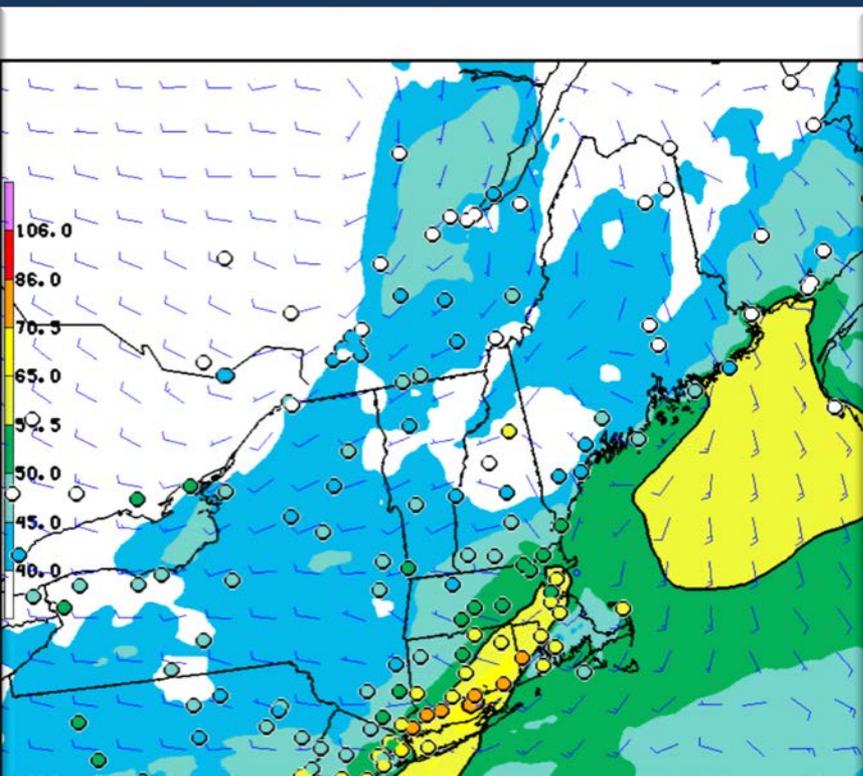
Exceedance Day Scenarios

- **Coastal-only Exceedances:** Strong westerly surface winds transport dirty air down Long Island Sound from source regions to the west (e.g., New York and New Jersey). The relatively cool waters of Long Island Sound confine the pollutants in the shallow marine boundary layer. Afternoon heating over coastal land creates a sea breeze with a southerly component, resulting in ozone exceedances along the coast

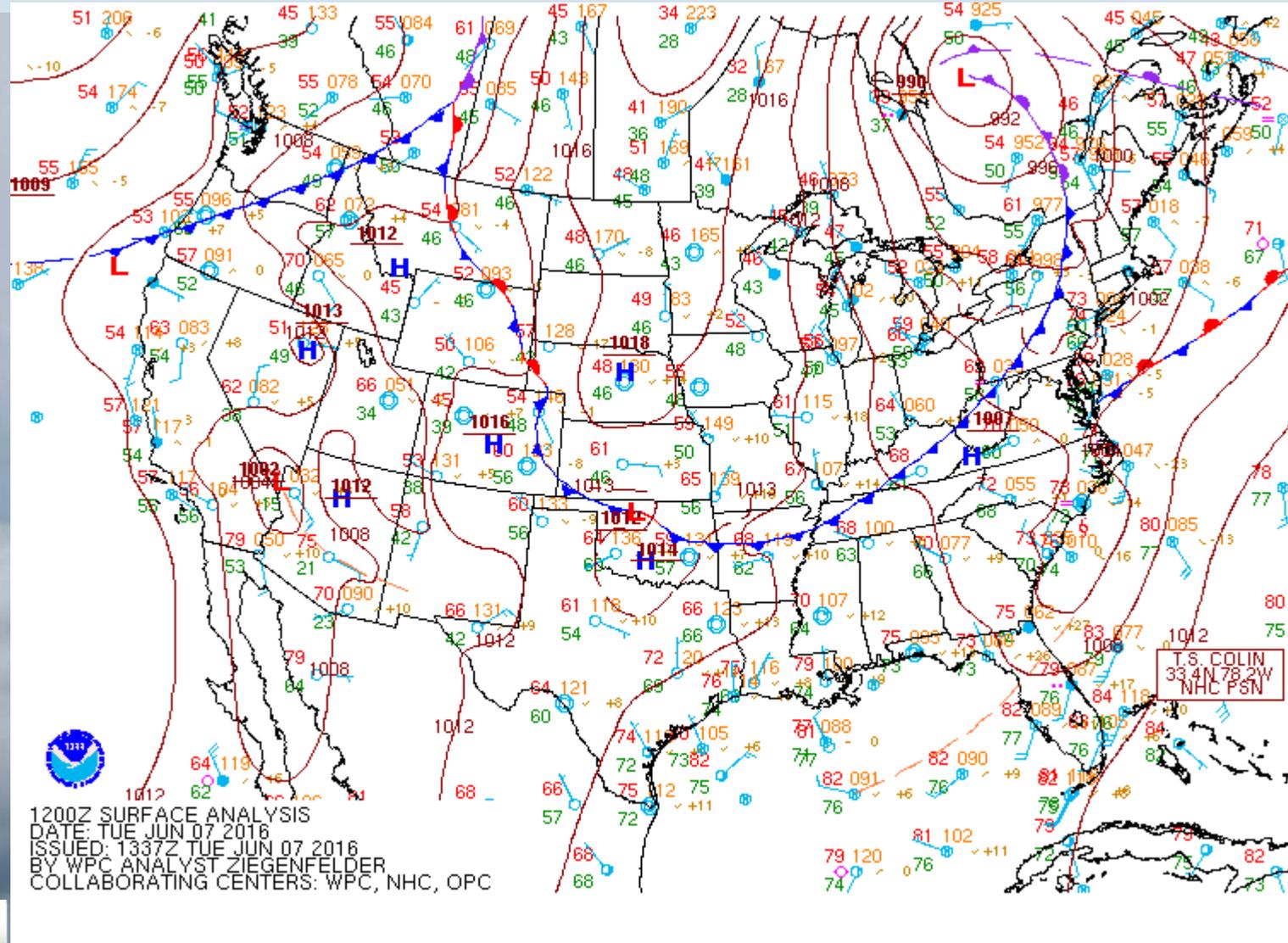


Coastal-only Exceedance: June 7, 2016

- Clean westerly surface winds following a cold front kept ozone lower away from the coast.
- Southwest winds ahead of the front funneled pollutants into LIS and into coastal monitors.
- Day 2 NOAA model predicted exceedance at the Madison monitor.

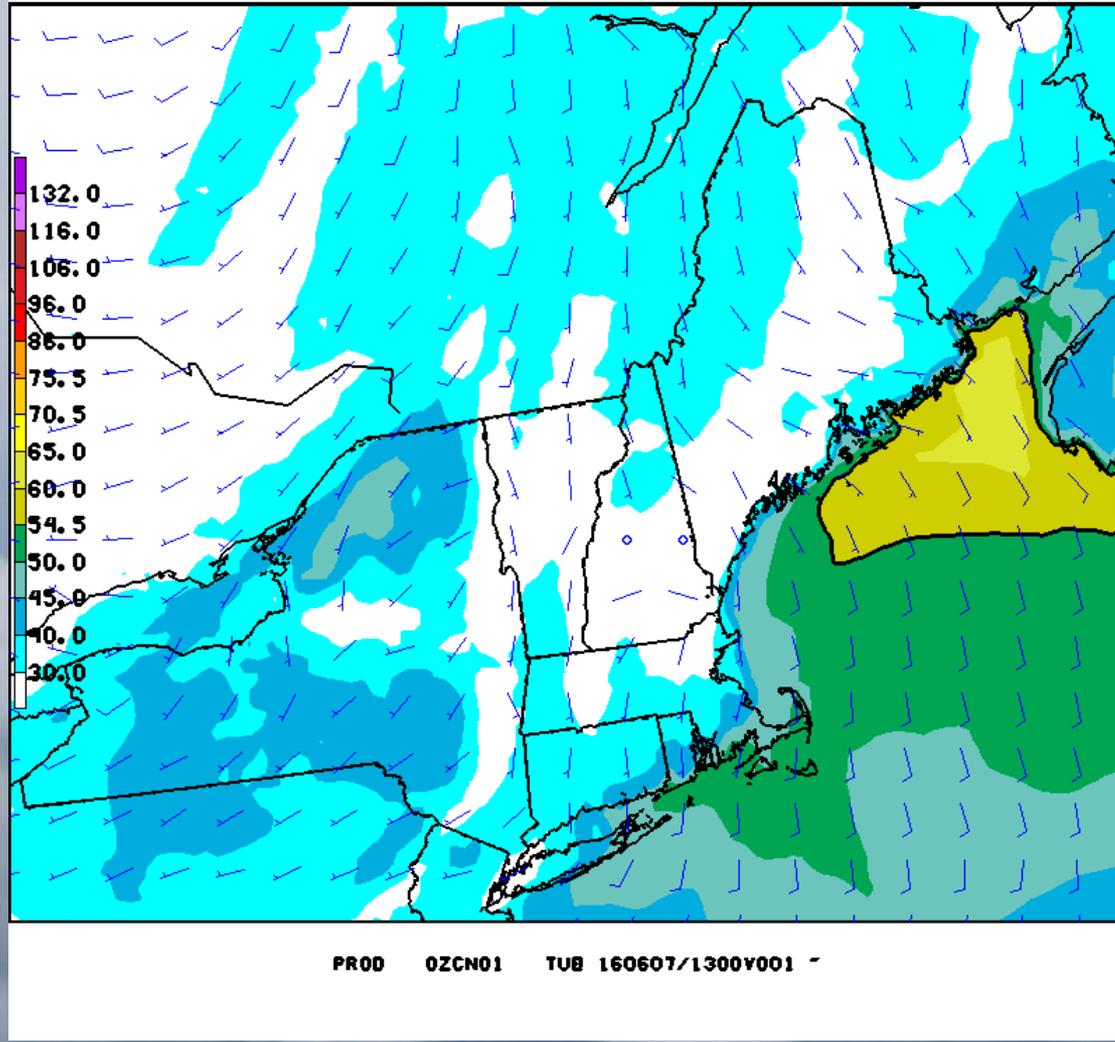


June 7, 2016 Surface Front Animation



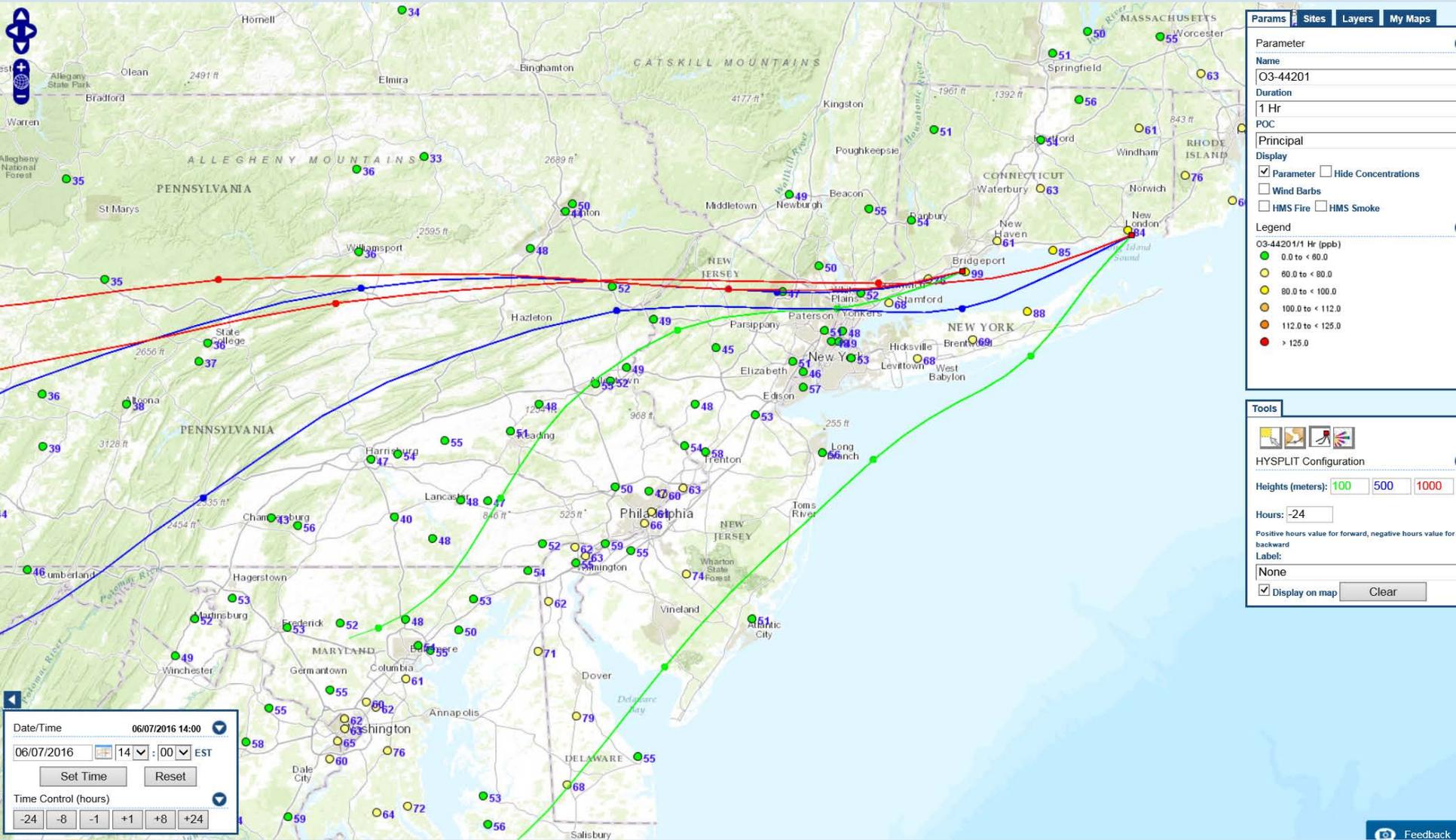
Approaching cold front produced southwest winds that transported ozone from I-95 corridor region into LIS. Frontal passage occurred around 7:00 pm local time in CT.

June 7, 12z NOAA Ozone Model



NOAA model 3-hr animation confirms elevated ozone advected from southwest surface winds.

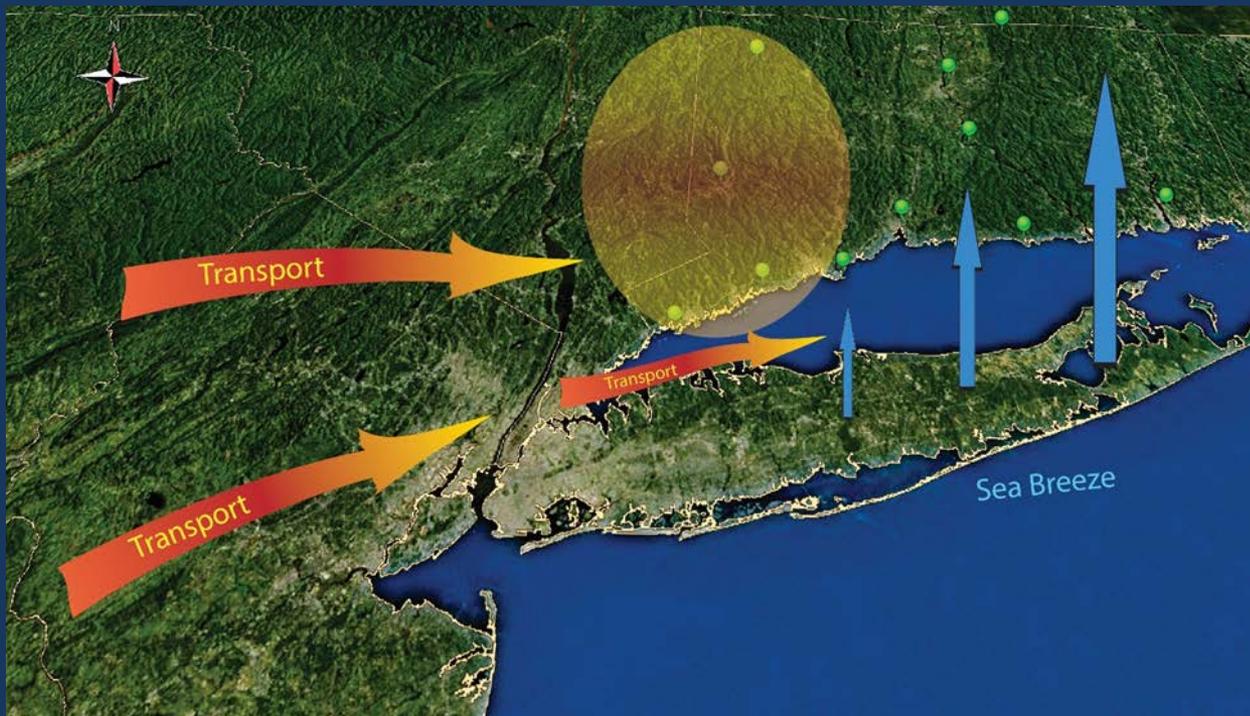
24-hr Back Trajectories 2:00 pm EST



It appears that the 24 hour back trajectories at 100 meters transported the precursors to the LIS region after passing over the I-95 corridor.

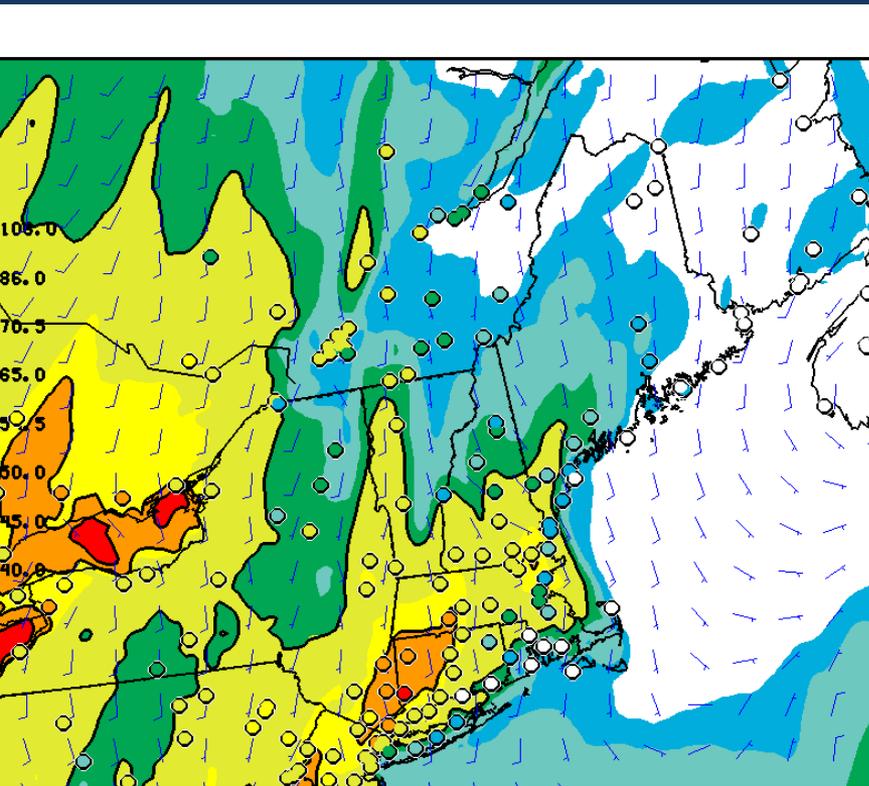
Exceedance Day Scenarios

- **Western Boundary-only Exceedances** : Southerly maritime surface flow invades the eastern two-thirds of Connecticut, keeping ozone levels in that portion of the state low. The south-southwest urban winds out of New York City result in exceedances along Connecticut's western boundary. Winds aloft are often weak for this scenario.

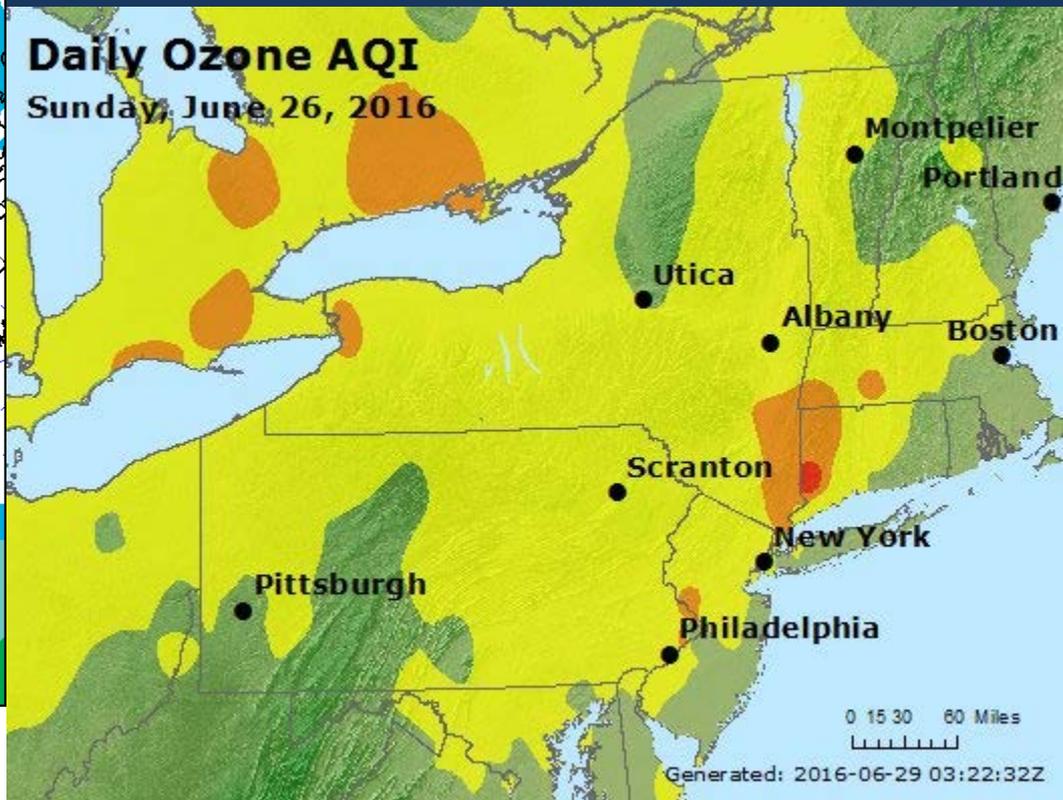


Western Boundary-only Exceedances: June 26

- Day 2 NOAA model showed correct position of ozone plume
- Southerly winds off ocean transported clean air to eastern Connecticut.



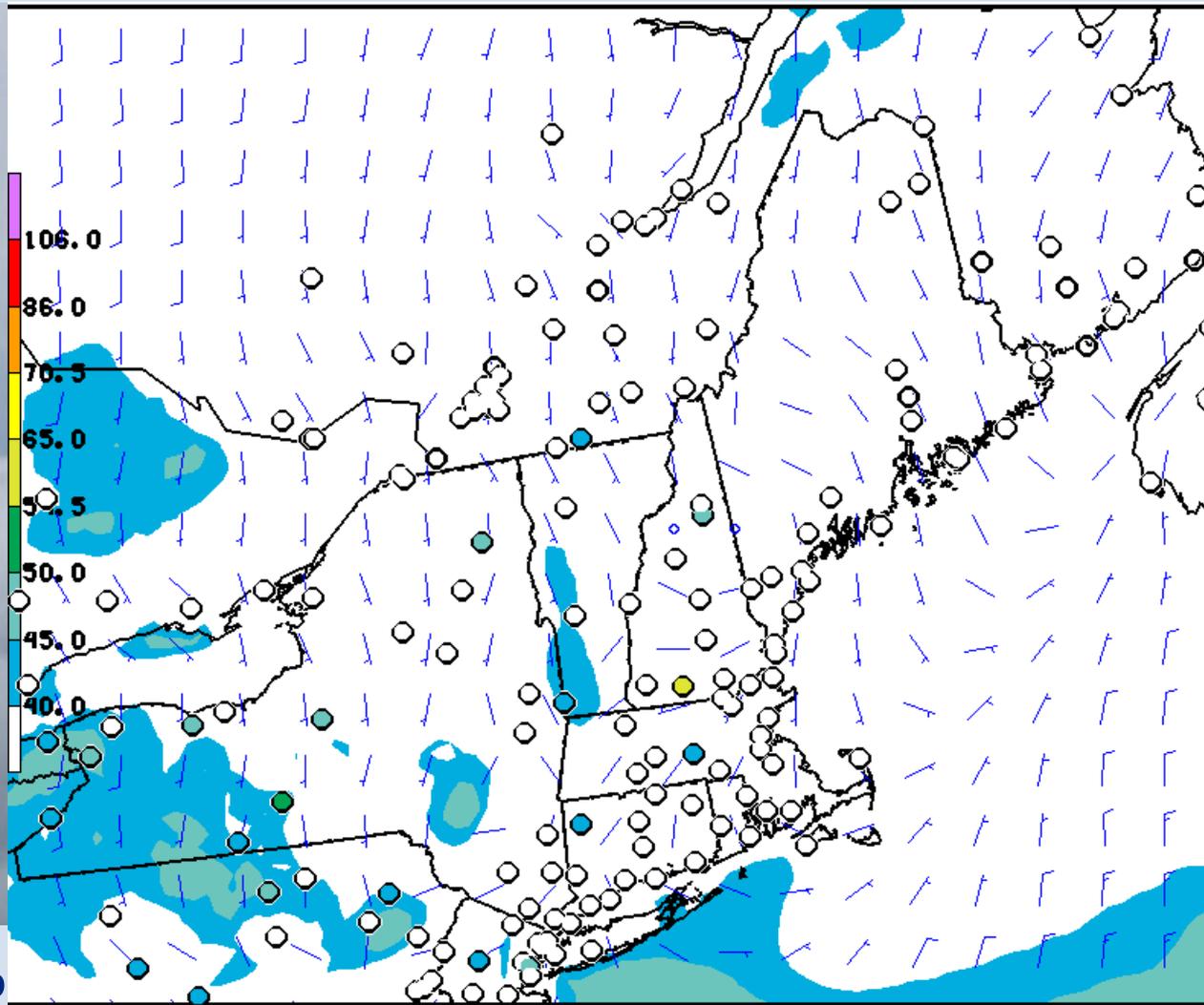
PROD DAY2 OZHX08 0 20160625 06Z CYC*



Generated: 2016-06-29 03:22:32Z

June 26, 2016 NOAA Model Animation

- Southerly winds off the ocean push the ozone plume to the northwest



PROD OZCN01 SUB 160626/1300Y001 -

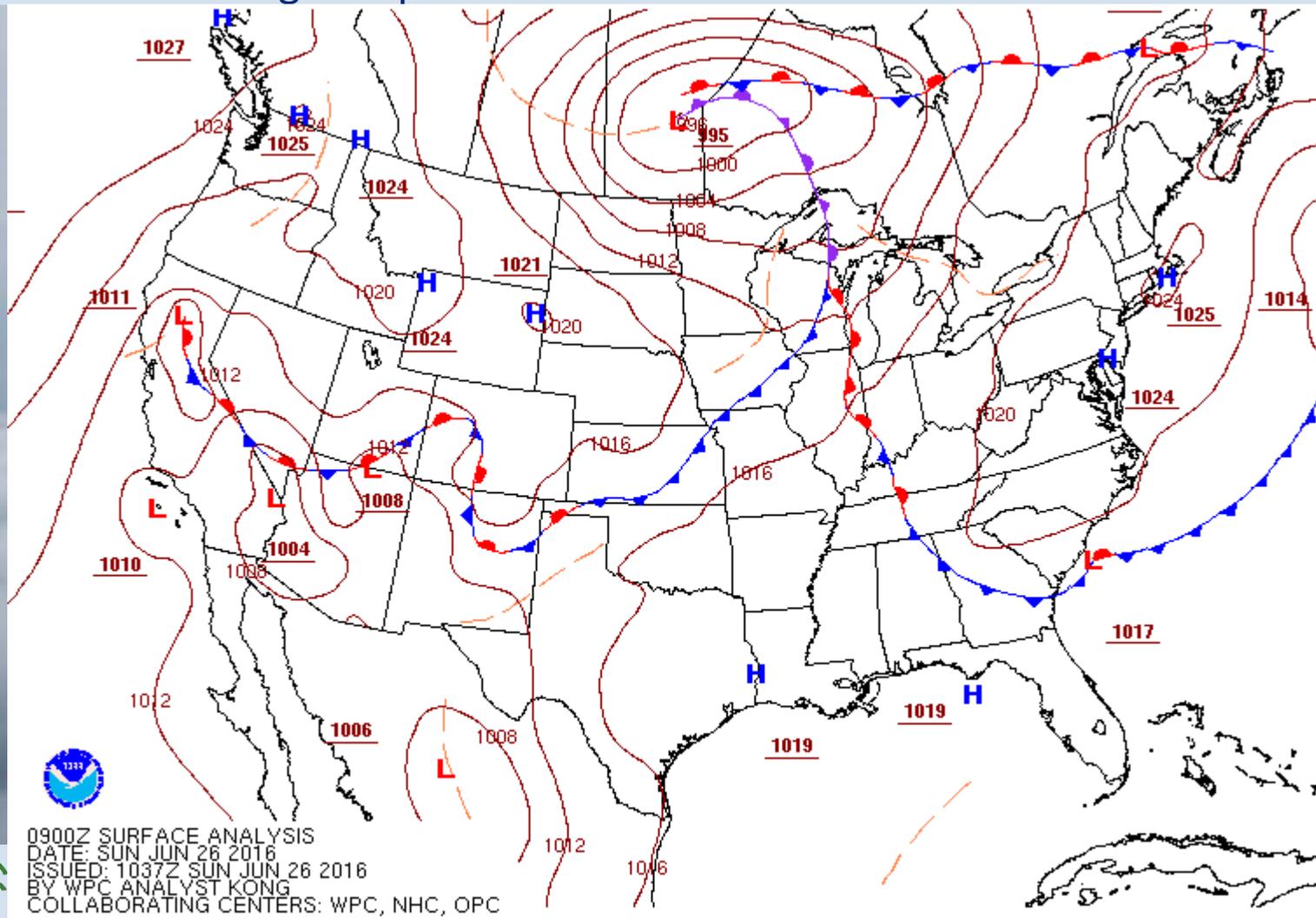


Co

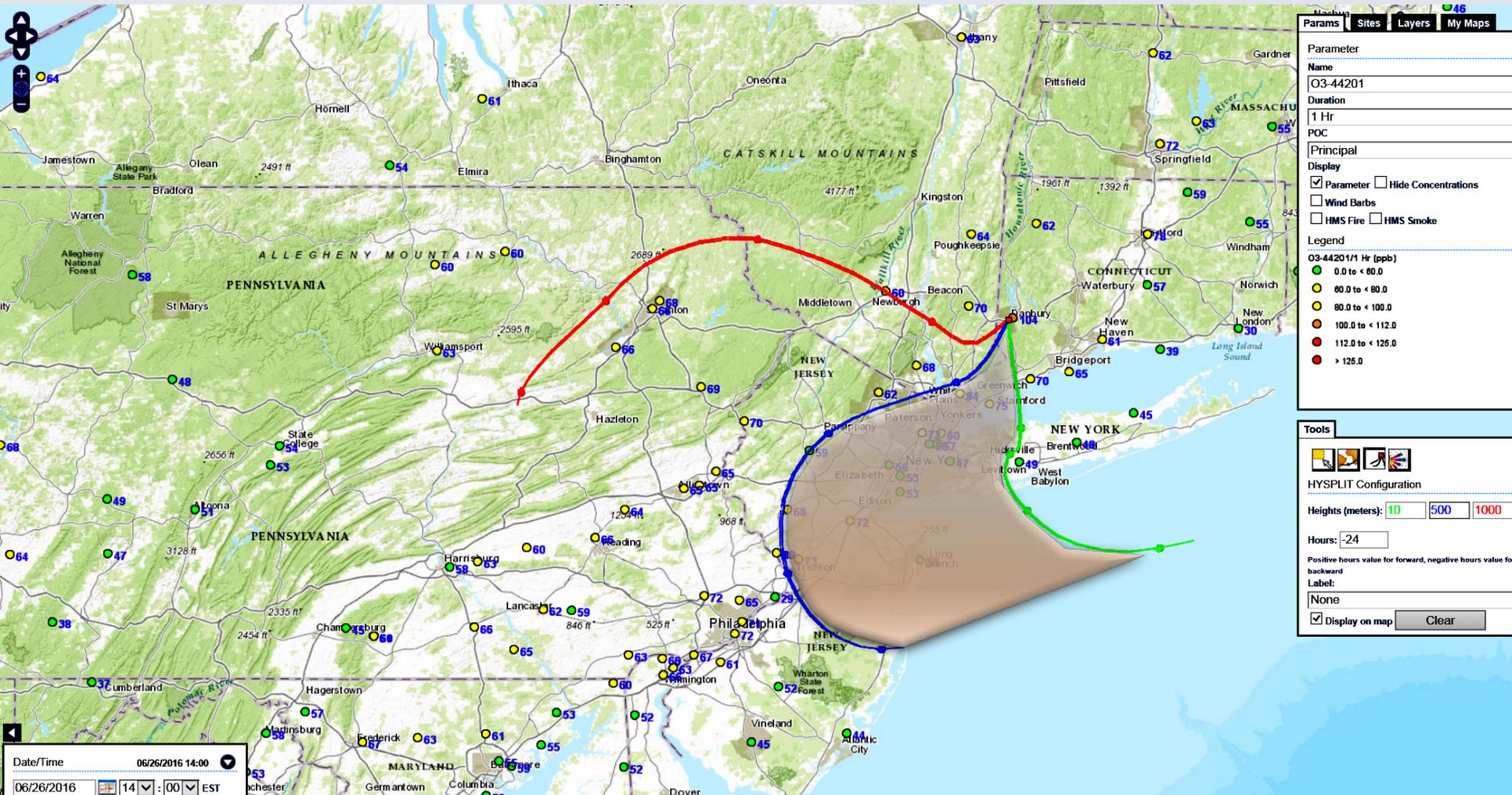
tion

June 26, 2016 Surface Analysis (5:00am -11:00pm) Animation

- Weak high pressure moves off the coast, allowing some southwest wrap around surface winds to bring NYC pollutants over western Connecticut.



24-hr Back Trajectories 2:00 pm EST



The 10/500 meters trajectories around CT showed light east winds becoming southwest during the afternoon. Low level flow from the NYC metro area impacted Danbury at the hour of peak ozone. Higher level flow at 1000 meters from the west, originated in eastern PA, from an area with elevated ozone.

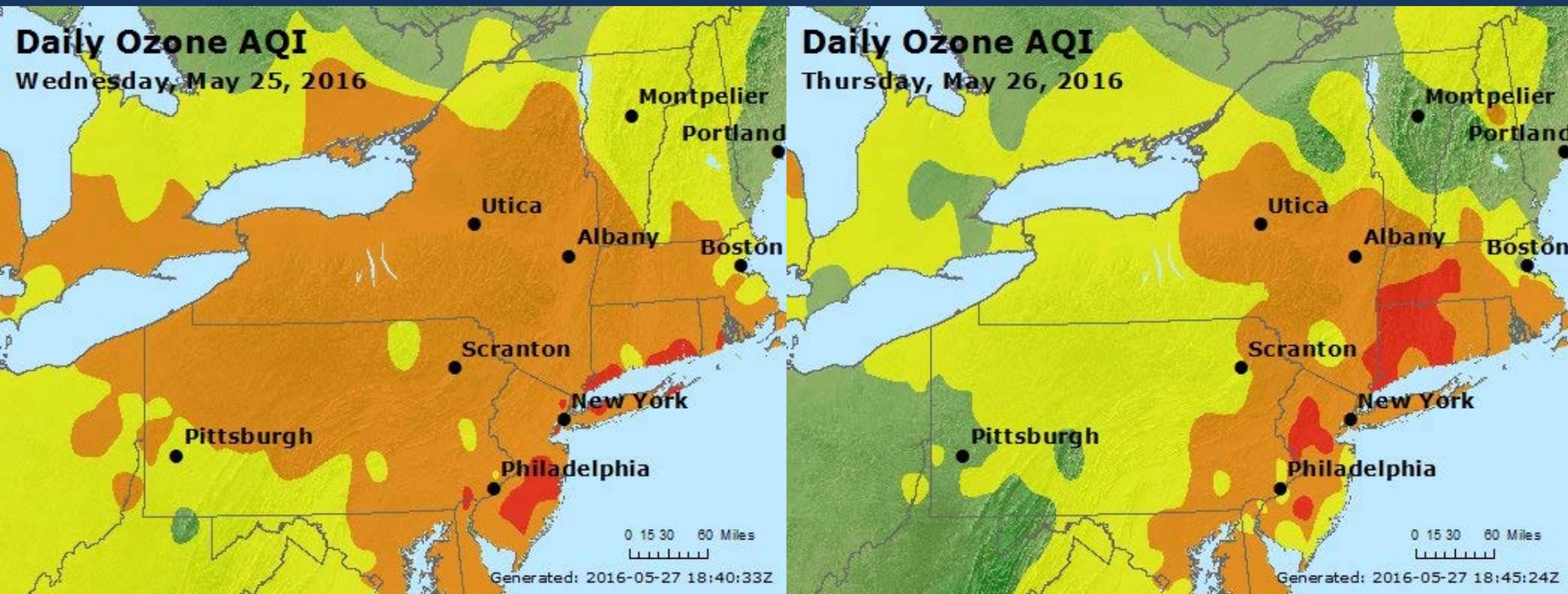
Exceedance Day Scenarios

- **State-wide Exceedances** : This is the classical worst-case pattern, with flow at the surface in the Northeast up the Interstate-95 corridor, transport at mid-levels also from the southwest via the low level jet and flow at upper levels from the west. All of these flows are from emission-rich upwind areas, serving to transport ozone precursors and previously formed ozone into Connecticut.

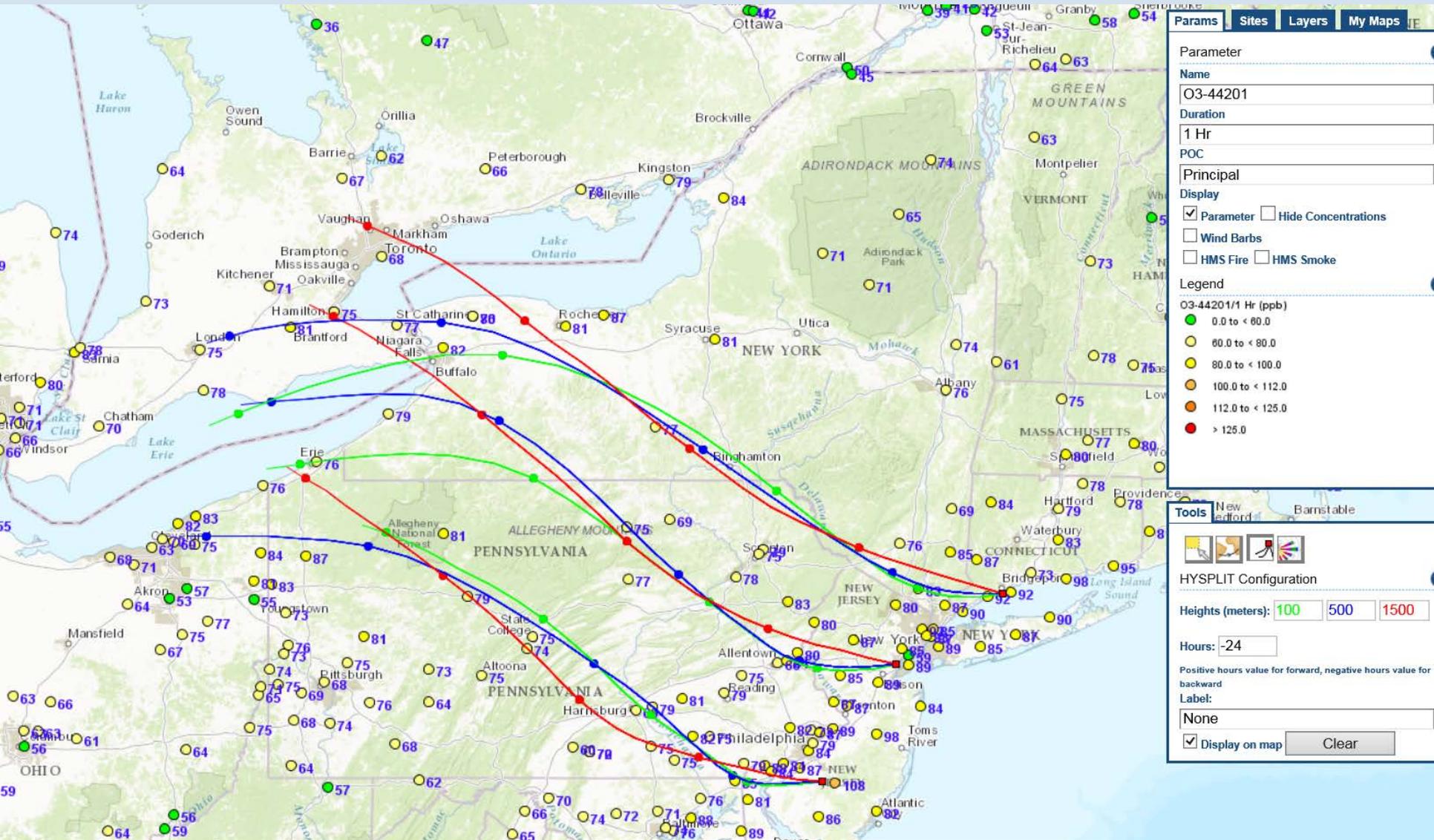


State-wide Exceedances: May 25-26

- This was indeed a worst-case scenario, with flow aloft from the west and northwest transporting ozone and precursors from Canadian wildfires. Low level winds turned southwest, which further enhanced the ozone production after passing the NYC area.

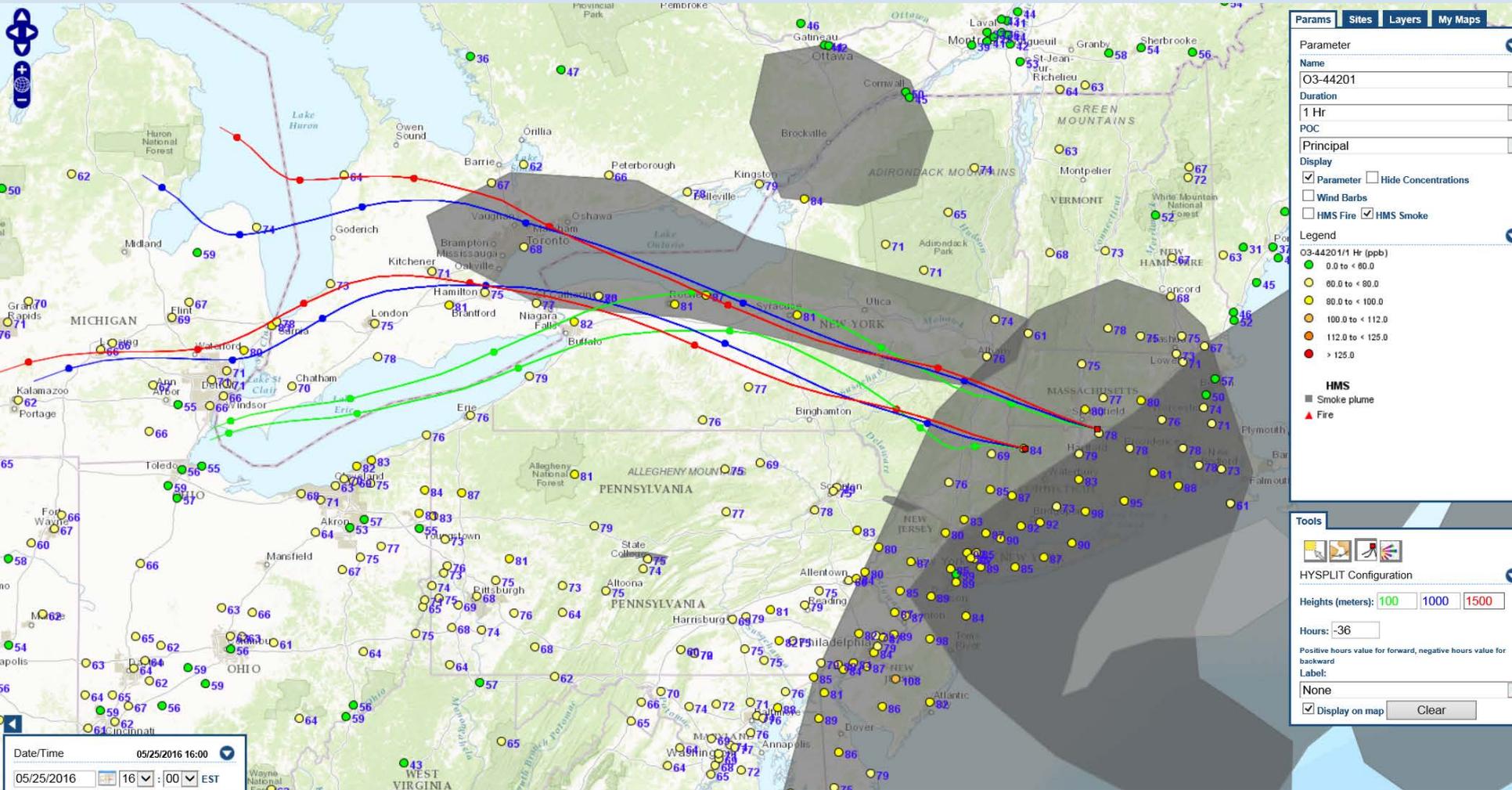


24-hr Back Trajectories May 25th, 4:00 pm



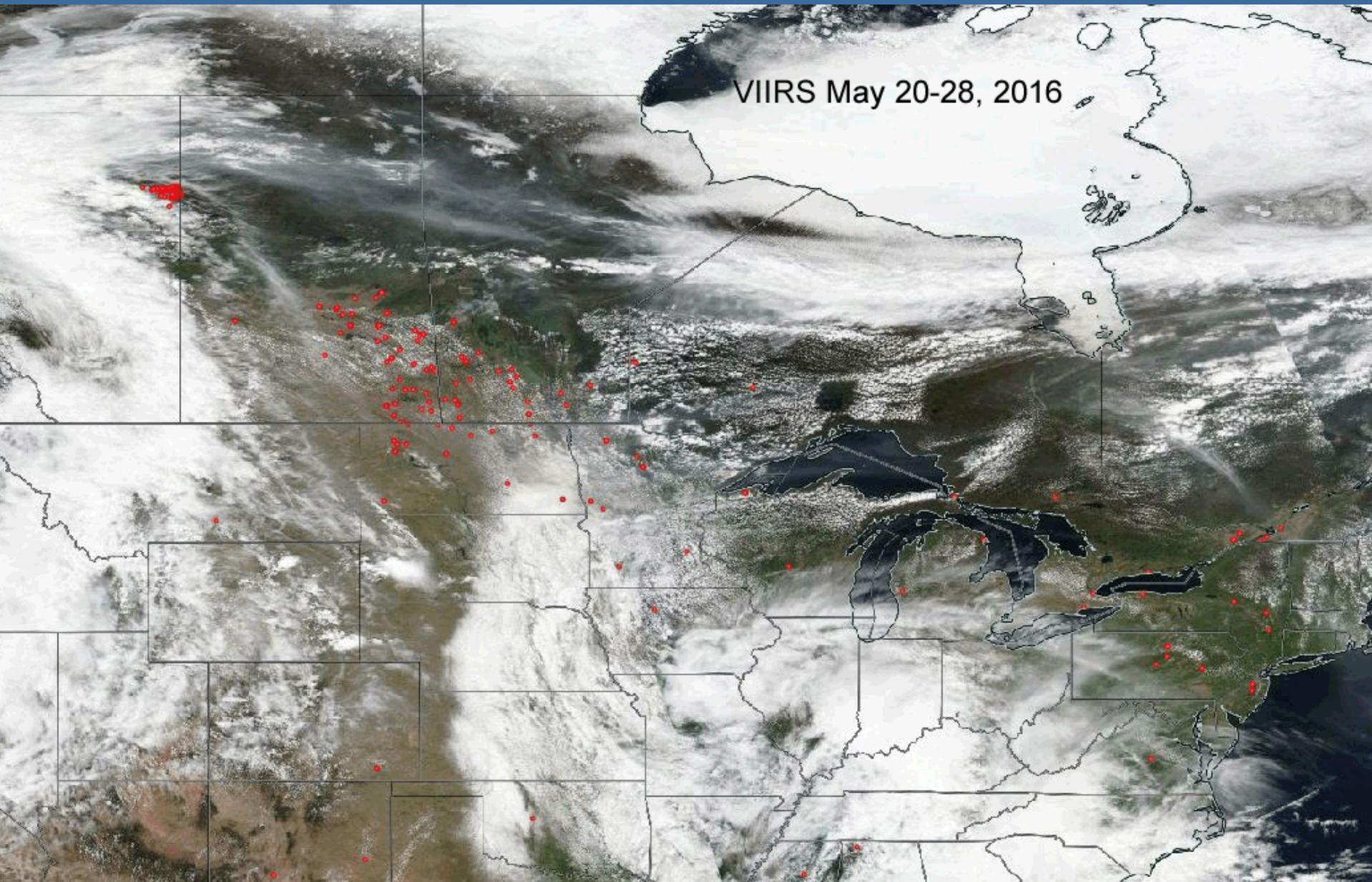
Long range transport from Michigan, with surface winds turning southwest during afternoon, mixed with I-95 corridor ozone and enhanced the ozone along the CT coast.

36-hr Back Trajectories 4:00 pm EST with Analyzed Smoke Plume

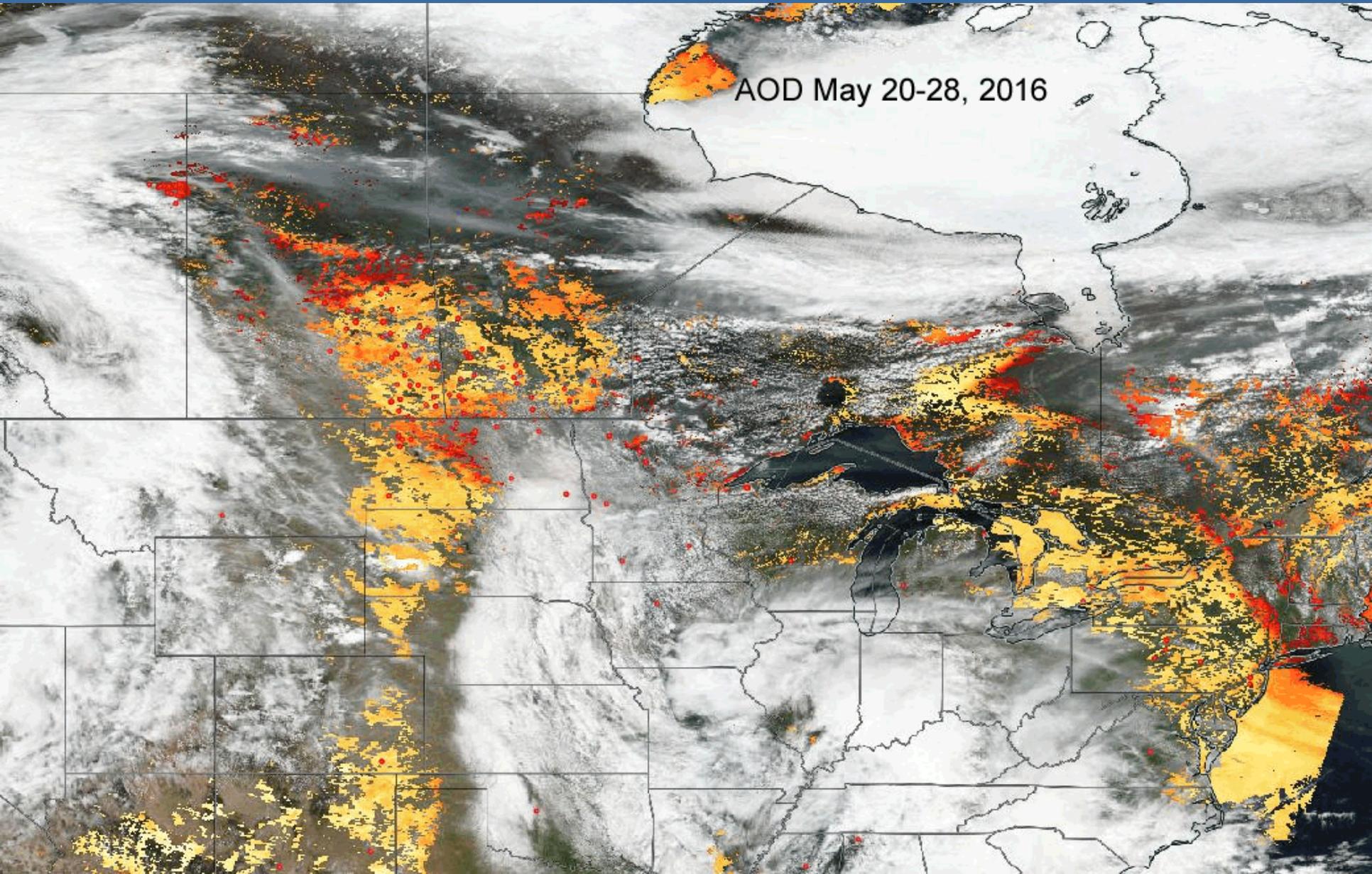


Long range transport from Michigan up to 1500 meters, appears to pass through smoke plume.

May 20-28 VIIRS Satellite

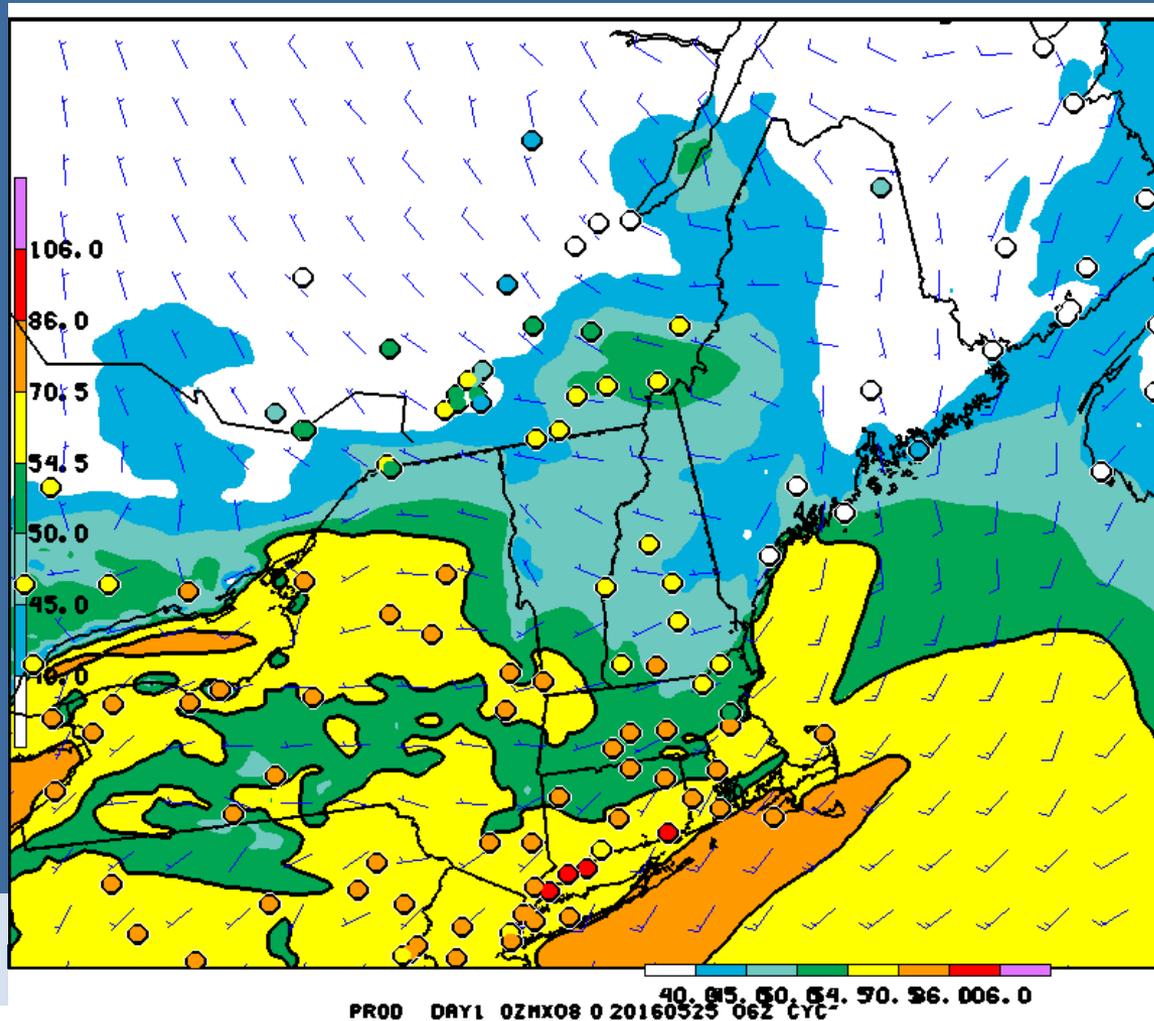


May 20-28 VIIRS Satellite with AOD



NOAA Ozone Model May 25th, 2016

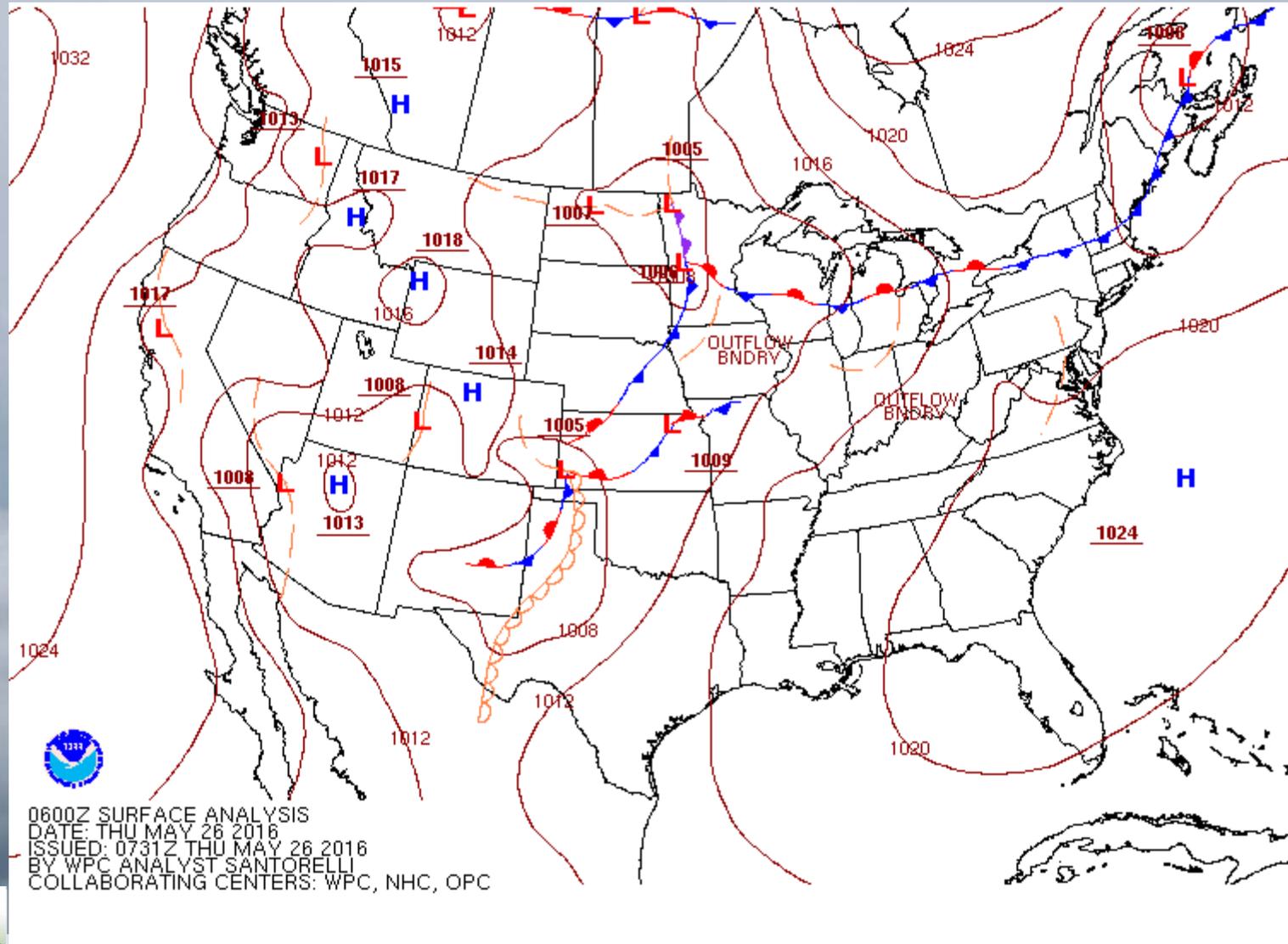
NOAA model does not model pollutants from wildfire smoke, so it vastly under-predicted the ozone.



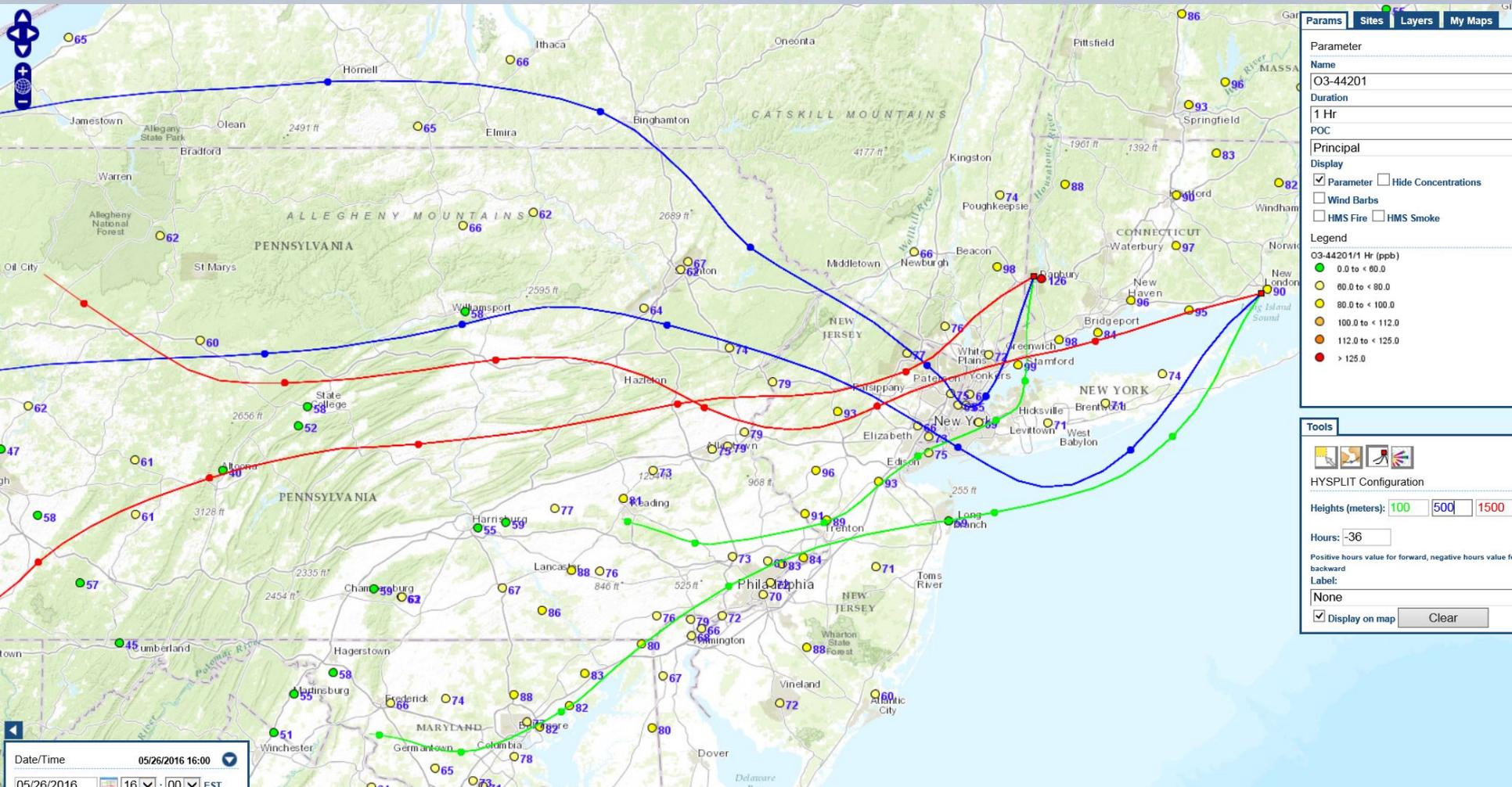
Con

tection

May 26, 2016 Surface Map Animation



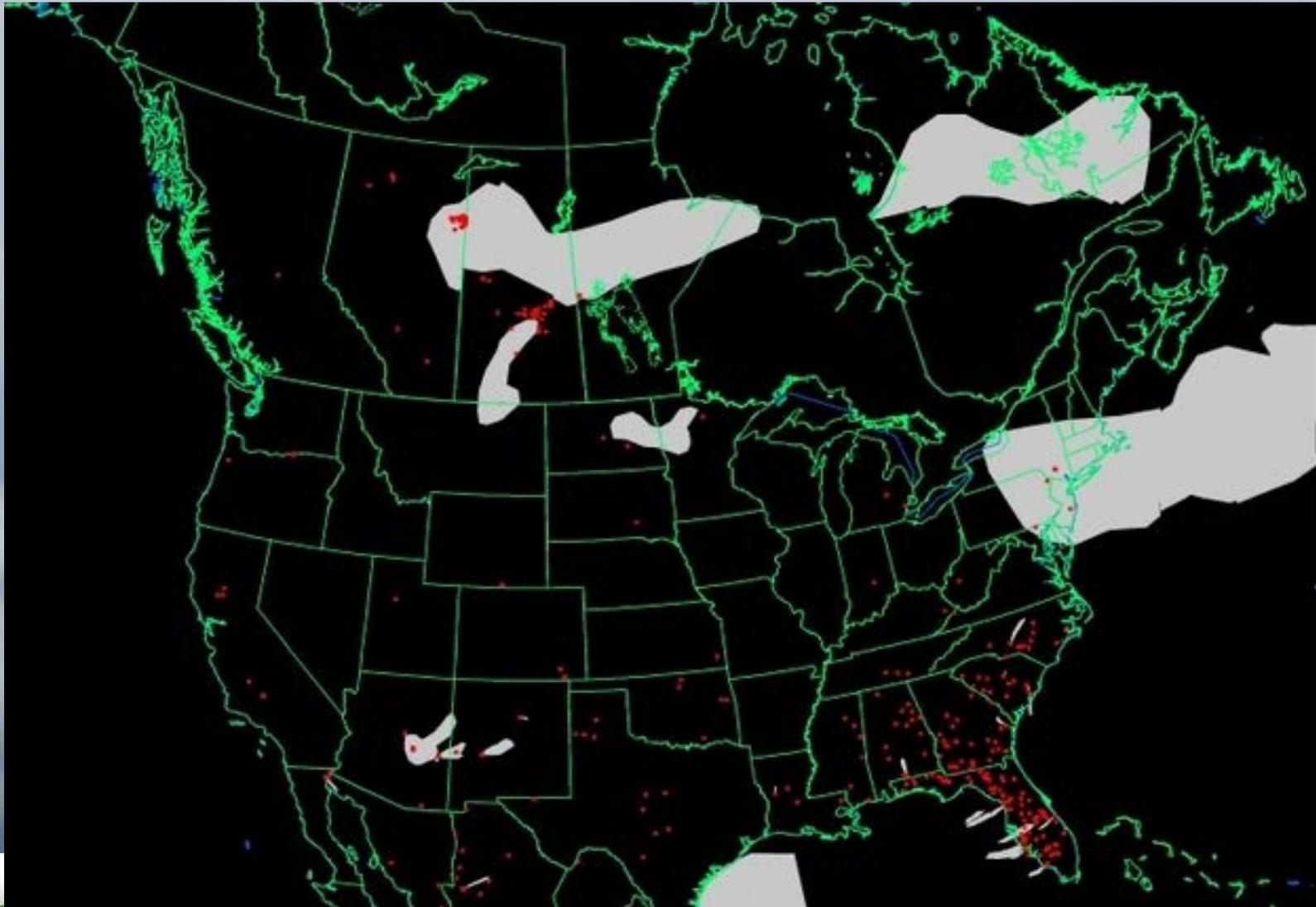
36-hour Back Trajectories, May 26th, 2016



Connecticut Department of Energy and Environmental Protection



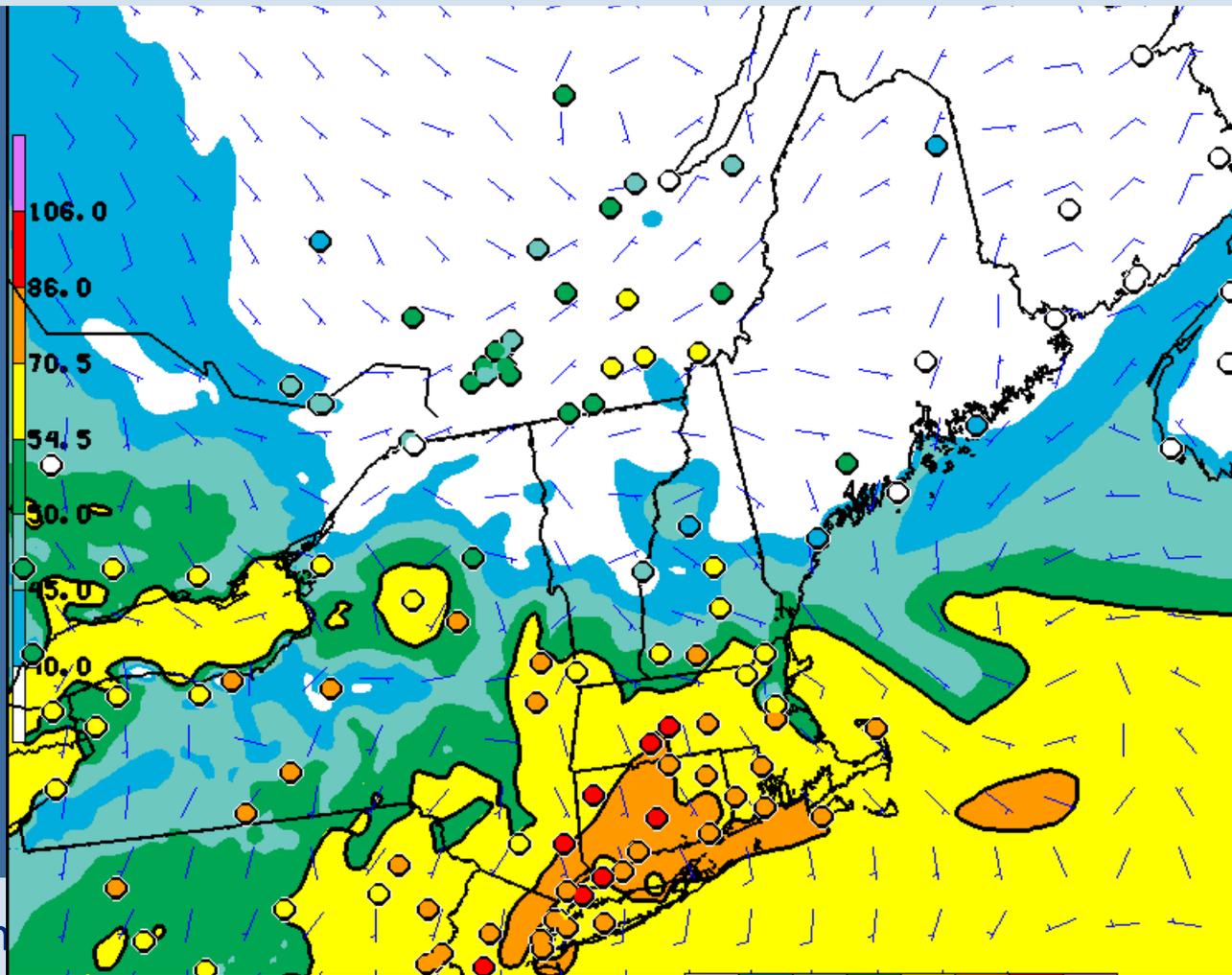
Smoke Plume Analyzed on May 26th, 2016



Connecticut Department of Energy and Environmental Protection

NOAA Ozone Model May 26th, 2016

NOAA modeled ozone plume from I-95 corridor, but underpredicted peak levels due to the smoke.



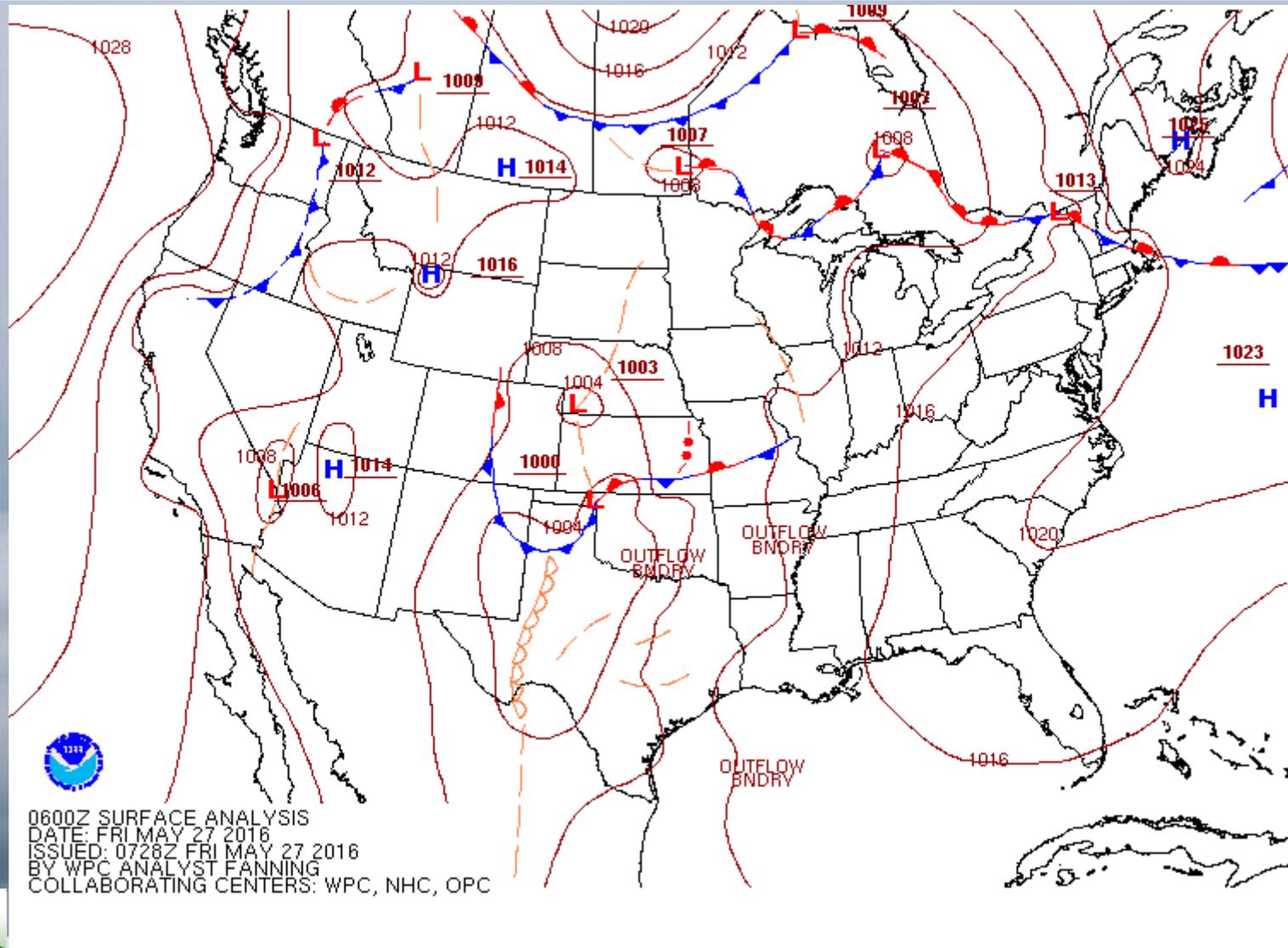
PROD DAY1 OZMX08 0 20160526 06Z CFC



Con

on

May 27, 2016 Surface Map Animation



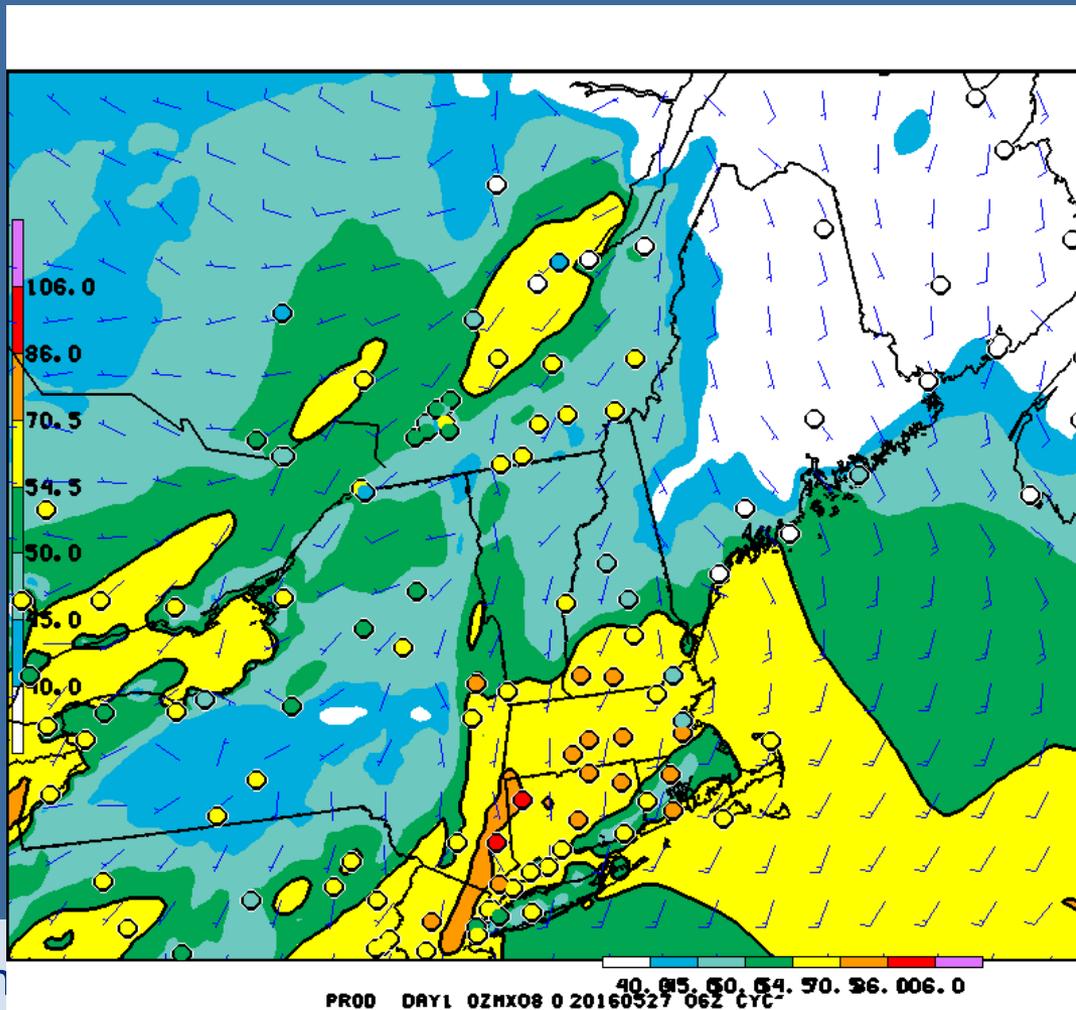
May 27th, 2016 Smoke Plume

By May 27th, it appears that the smoke plume had dissipated, but pollutants could have a lingering effect.



NOAA Ozone Model May 27th, 2016

Model was still under-predicting peak ozone levels.



Conn

Protection

Conclusions

- 29 exceedance days so far this year with new NAAQS of 70 ppb
- Last year there were 33 exceedance days with new NAAQS, but September 2015 had 5 exceedance days!
- Difficult to forecast exceedances with model tendency to under-predict up to July, then it tends to over-predict.
- The May 25-28th event was flagged as a possible exceptional event, but now we need to prove it!

