Ozone National Ambient Air Quality Standard Health Exceedances on June 17, 2018

Exceedance Locations and Levels

On Sunday, June 17, 2018, there were two (2) exceedances in New Jersey of the National Ambient Air Quality Standard (NAAQS) for ozone (daily maximum 8-hour average of 70 ppb). See Table 1.

Table 1. New Jersey 8-hr Maximum Ozone Concentrations on June 17, 2018

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	57
Bayonne	75
Brigantine	49
Camden Spruce St	40
Chester	57
Clarksboro	64
Colliers Mills	61
Columbia	59
Flemington	60
Leonia	74
Millville	59
Monmouth University	59
Newark Firehouse	68
Ramapo	59
Rider University	63
Rutgers University	60
Washington Crossing*	65
TOTAL EXCEEDANCES	2

*The Washington Crossing station is operated and maintained by EPA as part of the nationwide Clear Air Status and Trends Network (CASTNET).

From the out-of-state stations within New Jersey's ozone non-attainment areas, there were eight (8) exceedances of the ozone NAAQS. See Table 2.

Table 2. Ozone Concentrations at Out-of-State Monitoring Stations in New Jersey's Ozone Non-Attainment Areas on June 17, 2018

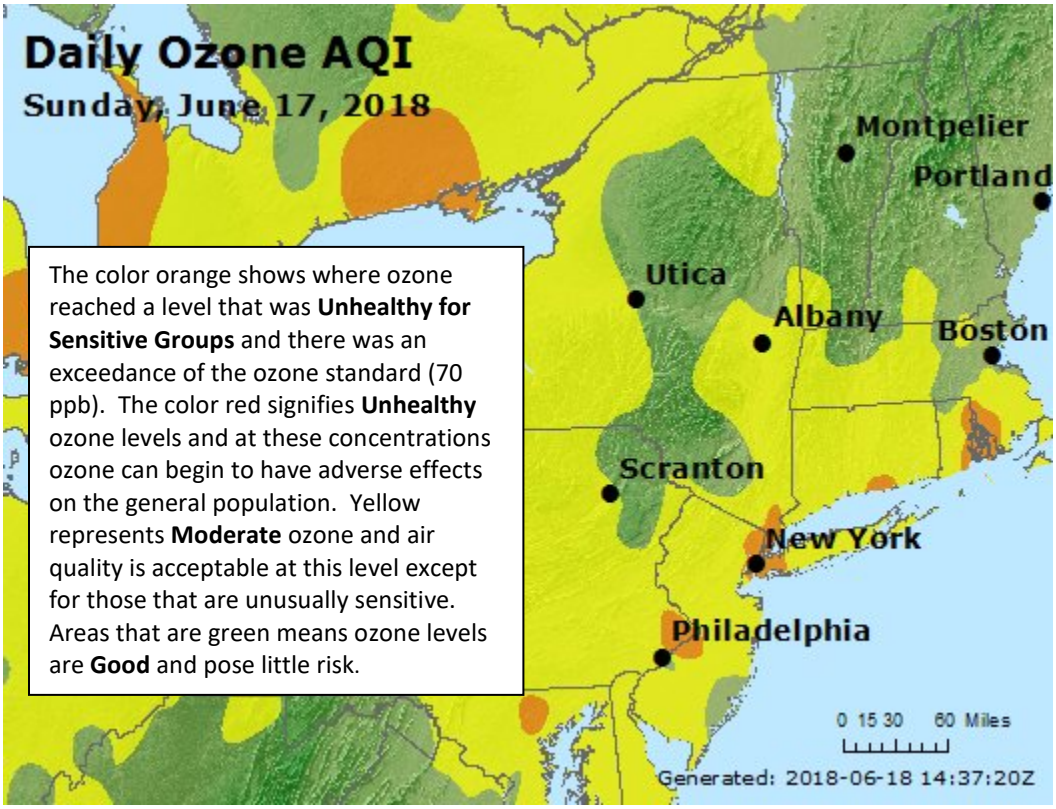
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	62
CT	Greenwich	60
CT	Madison-Beach Road	72
CT	Middletown-CVH-Shed	64
CT	New Haven	54
CT	Stratford	58
CT	Westport	59
DE	BCSP (New Castle Co.)	67
DE	BELLFNT2 (New Castle Co.)	64
DE	KILLENS (Kent Co.)	65
DE	LEWES (Sussex Co.)	59
DE	LUMS 2 (New Castle Co.)	62
DE	MLK (New Castle Co.)	66
DE	SEAFORD (Sussex Co.)	62
MD	Fair Hill	61
NY	Babylon	69
NY	Bronx - IS52	70
NY	CCNY	71
NY	Holtsville	68
NY	Pfizer Lab	73
NY	Queens	70
NY	Riverhead	68
NY	Rockland Cty	59
NY	White Plains	72
NY	Susan Wagner	No Data
PA	BRIS (Bucks Co.)	78
PA	CHES (Delaware Co.)	61
PA	NEWG (Chester Co.)	59
PA	NORR (Montgomery Co.)	63
PA	LAB (Philadelphia Co.)	71
PA	NEA (Philadelphia Co.)	81
PA	NEW (Philadelphia Co.)	74
	TOTAL EXCEEDANCES	8

The number of days in 2018 on which exceedances of the ozone NAAQS were recorded for all the states is summarized in Table 3. Figure 1 shows graphically the region's ozone concentrations on June 17, 2018.

Table 3. Number of Days Ozone NAAQS was Exceeded in NJ's Non-Attainment Areas in 2018

STATE	# of Days NAAQS was Exceeded January 1 – June 17, 2018 NAAQS = 70 ppb
Connecticut	5
Delaware	2
Maryland	2
New Jersey	6
New York	5
Pennsylvania	4

Figure 1. Ozone Air Quality Index for June 17, 2018



Source: www.airnow.gov

For ozone terminology definitions see NJDEP Air Quality Planning's Glossary and Acronyms webpage: http://nj.gov/dep/baqp/glossary.html

Weather

A broad area of high pressure dominated the eastern half of the United States on Sunday, June 17th, 2018. Two high pressure centers were noted to specifically influence our region. The first high pressure center started the day over the southeastern United States and shifted to off-shore North Carolina by mid-morning. Meanwhile, a secondary high pressure center remained anchored over the Appalachian Valley throughout the day. A surface trough developed between these two high pressure systems and extended from eastern Pennsylvania, south-southwestward along the Mid-Atlantic coast.

These weather features allowed for abundant sunshine and hot temperatures throughout the region. Winds were calm for much of the day and any noted wind direction throughout the area was influenced by high pressure circulation. Overall, wind directions tended south or southwest, especially in our southern nonattainment area, as these locations were just east of the abovementioned surface trough.

In addition, radar images indicate that a sea breeze front developed mid-afternoon on Sunday in response to hot temperatures and light winds at the surface. This boundary pushed west toward the New Jersey/Pennsylvania border throughout the late-afternoon/evening hours. This boundary led to a shift in wind direction and vertical mixing in the atmosphere.

Where Did the Air Pollution that Caused Ozone Come From?

Figures 2, 3, and 4 show the back trajectories starting at different wind heights for the monitored exceedance June 17, 2018. The figures illustrate from where the winds came during the 48 hours preceding the high ozone event. Nine (9) monitoring stations with an 8-hr ozone exceedance were used to run back trajectories. The selected sites and the maximum 8-hr ozone level recorded are listed in Table 4 below:

Table 4. Monitoring Stations with 8-hr Ozone Exceedances Selected to Run 48-hr Back Trajectories

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Madison-Beach Road	72
NJ	Bayonne	75
NJ	Leonia	74
NY	CCNY	71
NY	Pfizer Lab	73
PA	BRIS	78
PA	LABP	71
PA	NEA	81
PA	NEW	74

Surface level back trajectories (Figure 2) show that trajectories ending in the greater NYC metro area originated over Lake Ontario and traveled southeastward through New York, Pennsylvania, and New Jersey. These trajectories show that air originated at higher levels of the atmosphere and mixed down to the surface picking up emissions from cars, trucks, and industry along the way. Trajectories ending in Philadelphia originated in Pennsylvania and traveled southward through Maryland and Delaware before crossing through southern New Jersey and arriving at its endpoint. Trajectories impacting Philadelphia had some mixing from higher elevations but in general remained at the surface for the duration of its path. Trajectories ending in Northeast New Jersey and New York City area traveled south through upstate New York and Northeast Pennsylvania before crossing northern New Jersey and reaching their endpoints. The Connecticut trajectory exceedance is a possible example of ozone formation over a maritime region and recirculating air pollution back over land due to the high pressure system wind pattern and sea breezes. Mid-level trajectories (Figure 3) originated in various locations west-northwest of the trajectory endpoints. Trajectories traveling to Philadelphia crossed through Pennsylvania while trajectories traveling to northern New Jersey and NYC traveled through New York State. Air at the mid-levels also originated at 2000m and gradually mixed down to the mid-levels due to the presence of high pressure. Upper air backward trajectories also originated in locations northwest of their endpoints and traveled at a moderate speed before slowing down around 00Z. Trajectories at the upper level sank to lower levels early in their path and quickly rose to 1500m for the duration of their path. Figure 5 below shows graphically the national ozone concentrations on June 16th, 2018.

Figure 2. 48-hour Back Trajectories for June 17, 2018 at 10 meters

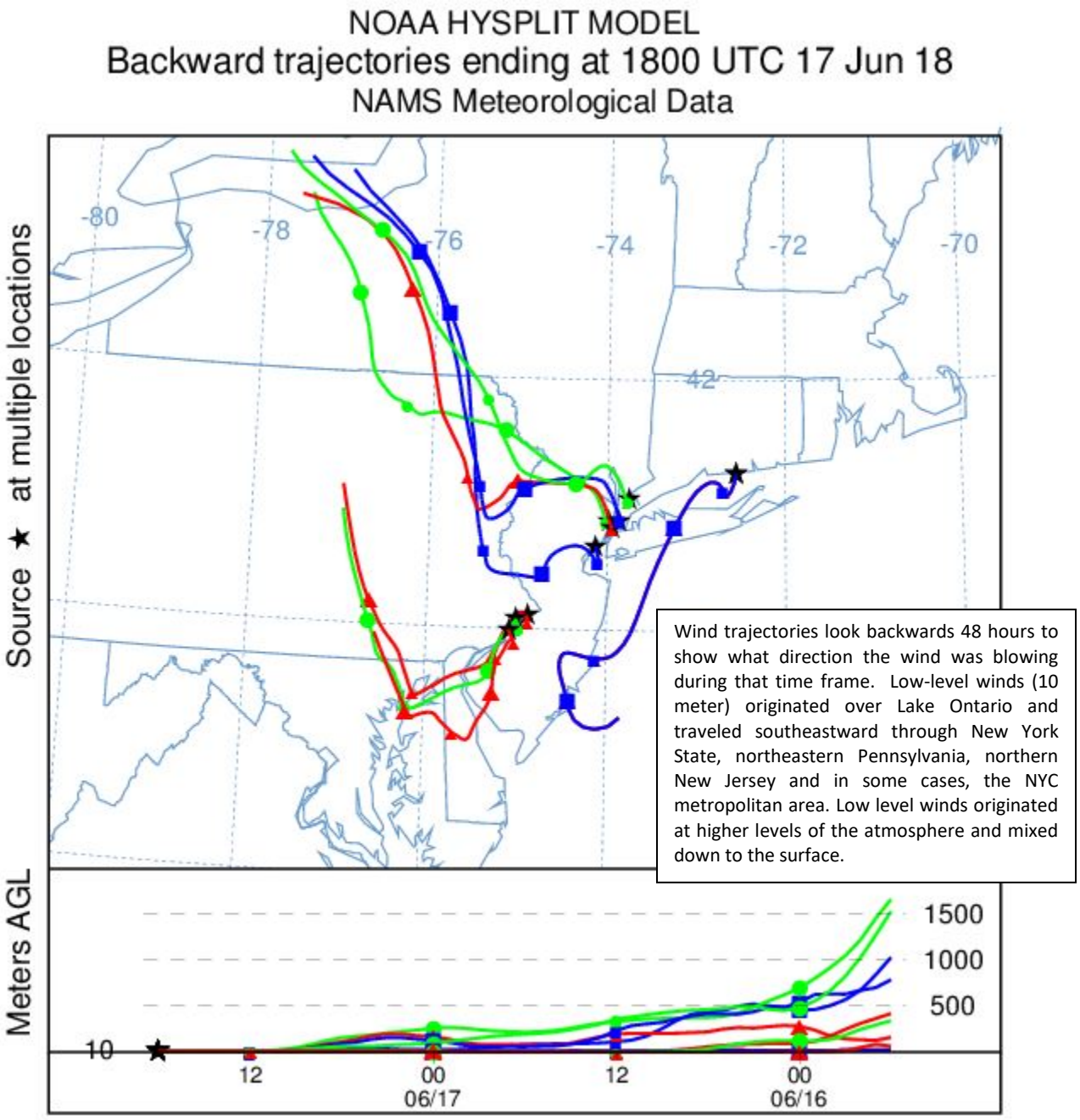


Figure 3. 48-hour Back Trajectories for June 17, 2018 at 500 meters

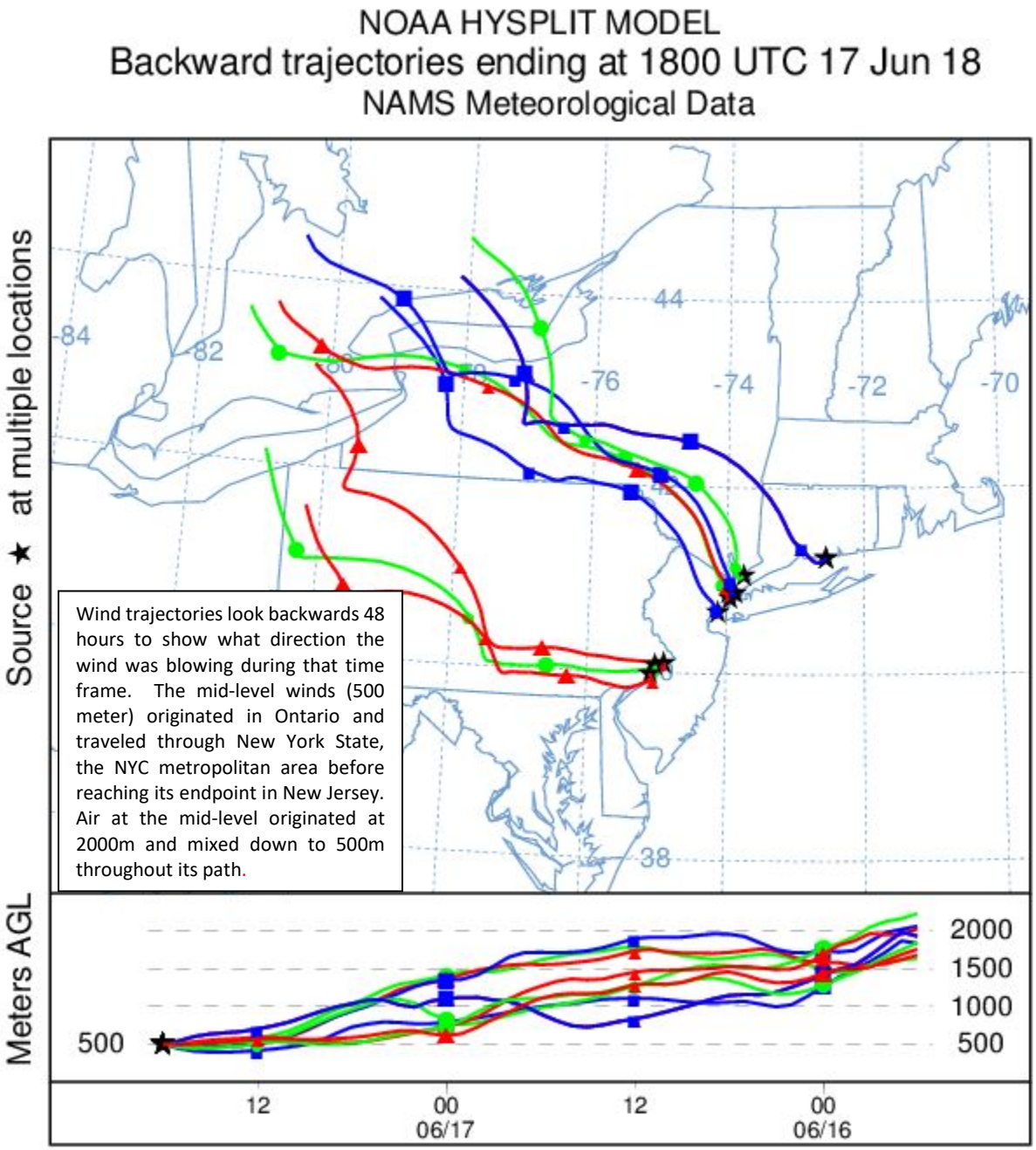


Figure 4. 48-hour Back Trajectories for June 17, 2018 at 1500 meters

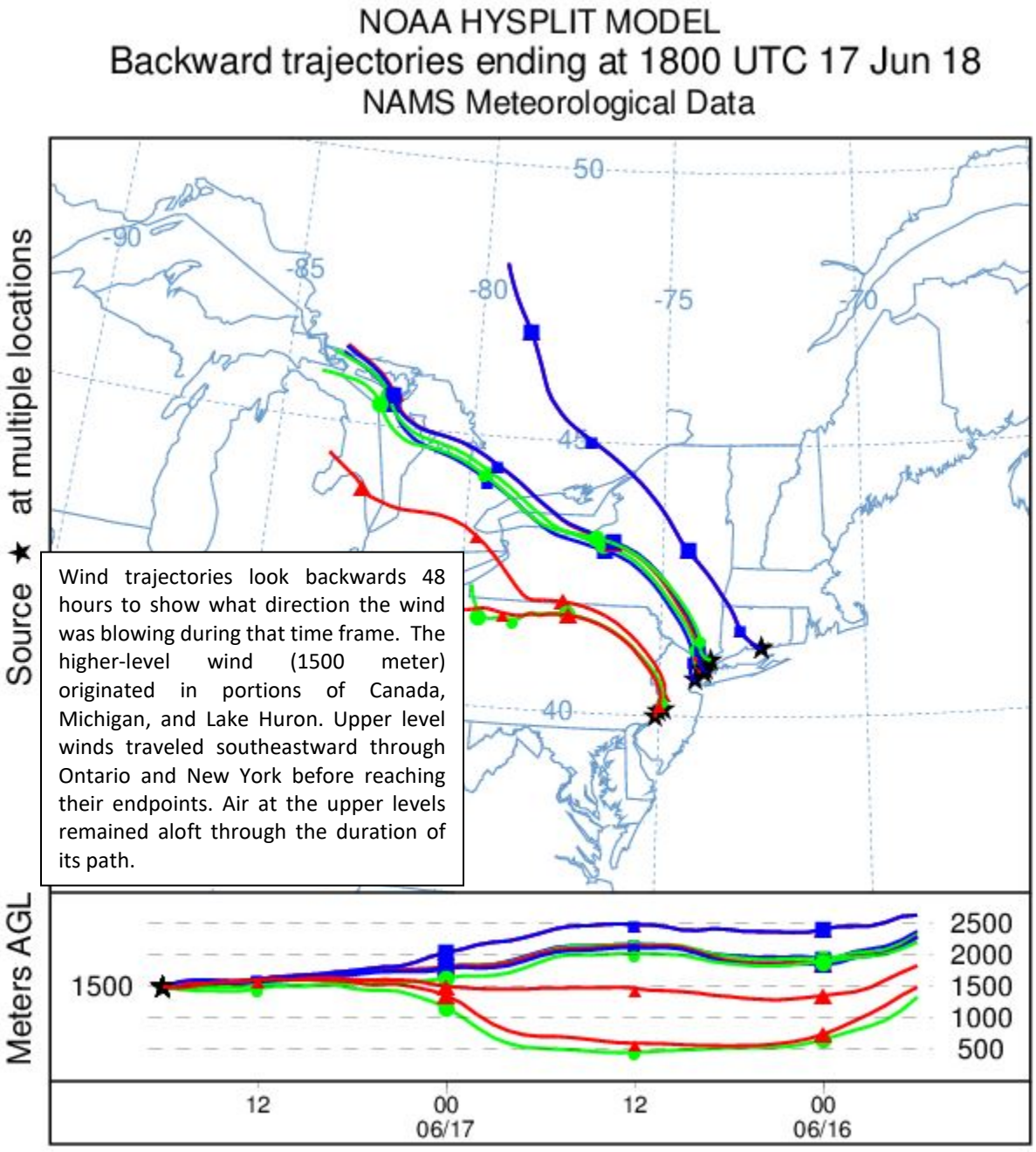
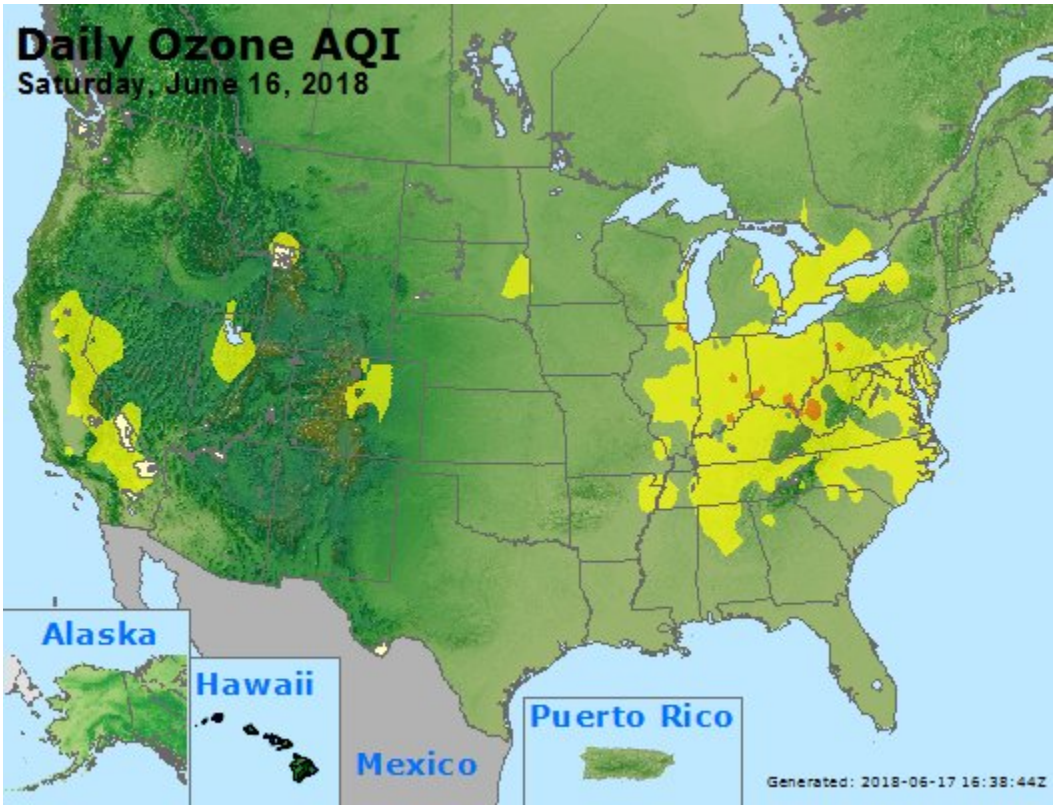


Figure 5. Ozone Air Quality Index for the United States on June 16, 2018



How is Ozone Created?

Ground-level ozone is an air pollutant known to cause a number of health effects and negatively impact air quality and the environment in New Jersey. Ozone is formed when oxides of nitrogen (NOx) and volatile organic compounds (VOCs) react in the presence of sunlight. Ozone can irritate any person's lungs, but the effect may be more pronounced for those with existing lung-related deficiencies, and therefore, one should take extra precautions on bad ozone days.

Find Out About Air Quality Every Day

The "What's Your Air Quality Today?" page at http://www.nj.gov/dep/cleanairnj/ tells you how to sign up to receive notifications and find out when your local air has reached unhealthy ozone levels.