Ozone National Ambient Air Quality Standard Health Exceedances on June 18, 2021

Exceedance Locations and Levels

On Friday, June 18, 2021, 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 Ozone Concentrations on 6/18/2021

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	57
Bayonne	66
Brigantine	59
Camden Spruce St	67
Chester	69
Clarksboro	65
Colliers Mills	63
Columbia	68
Flemington	69
Leonia	81
Millville	60
Monmouth University	63
Newark Firehouse	67
Ramapo	64
Rider University	71
Rutgers University	70
Washington Crossing*	70
TOTAL EXCEEDANCES	2

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

From the out-of-state stations within New Jersey's ozone nonattainment areas, there were six (6) exceedances of the ozone NAAQS. See Table 2.

Table 2. Ozone Concentrations at Out-of-State Monitoring Stations in New Jersey's Ozone Nonattainment Areas on 6/18/2021

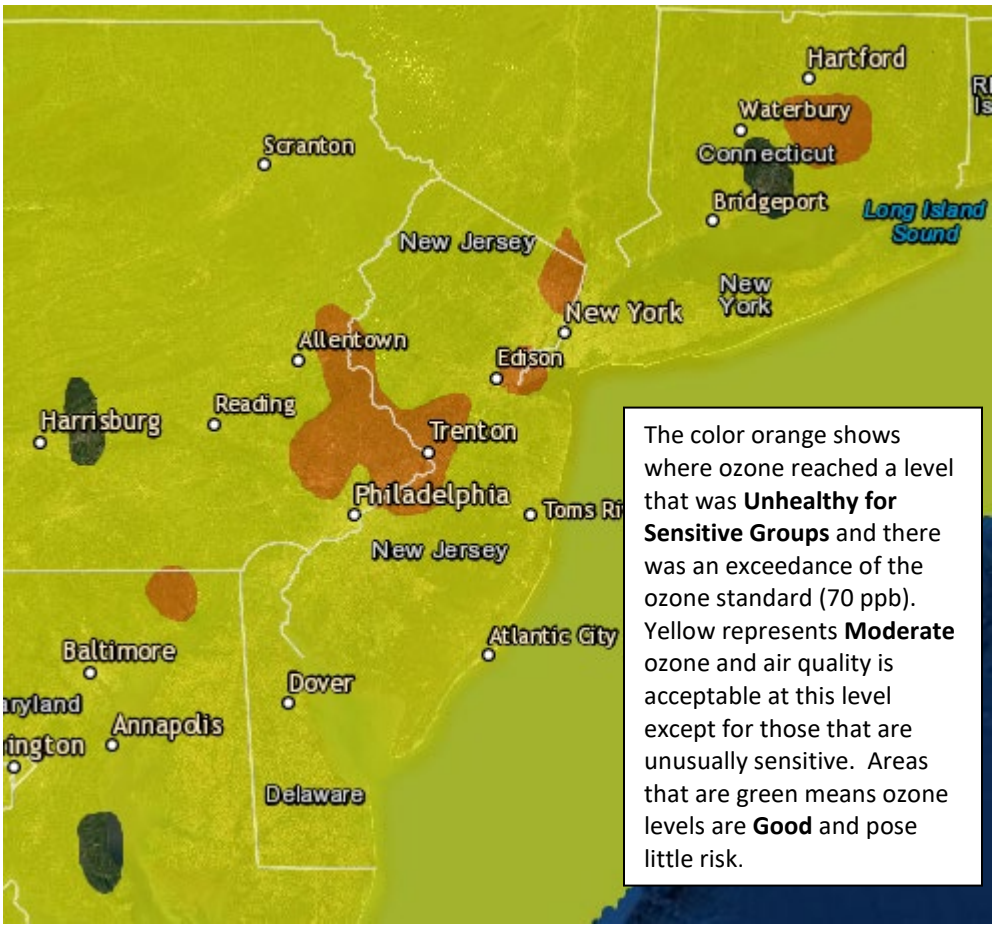
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	67
CT	Greenwich	64
CT	Madison-Beach Road	69
CT	Middletown-CVH-Shed	76
CT	New Haven	50
CT	Stratford	66
CT	Westport	67
DE	BCSP (New Castle Co.)	67
DE	BELLFNT2 (New Castle Co.)	67
DE	KILLENS (Kent Co.)	58
DE	LEWES (Sussex Co.)	59
DE	LUMS 2 (New Castle Co.)	62
DE	MLK (New Castle Co.)	68
DE	SEAFORD (Sussex Co.)	56
MD	Fair Hill	70
NY	Babylon	63
NY	Bronx - IS52	66
NY	CCNY	69
NY	Fresh Kills	71
NY	Holtsville	62
NY	Pfizer Lab	67
NY	Queens	65
NY	Riverhead	63
NY	Rockland Cty	70
NY	White Plains	65
PA	BRIS (Bucks Co.)	74
PA	CHES (Delaware Co.)	66
PA	NEWG (Chester Co.)	65
PA	NORR (Montgomery Co.)	72
PA	LAB (Philadelphia Co.)	66
PA	NEA (Philadelphia Co.)	74
PA	NEW (Philadelphia Co.)	71
	TOTAL EXCEEDANCES	6

The number of days in 2021 on which exceedances of the ozone NAAQS were recorded for all the states within New Jersey's ozone nonattainment areas is summarized in Table 3.

Table 3. Number of Days Ozone NAAQS was Exceeded in NJ's Nonattainment Areas in 2021

STATE	# of Days NAAQS was Exceeded January 1 – June 18, 2021 NAAQS = 70 ppb
Connecticut	5
Delaware	2
Maryland	2
New Jersey	5
New York	3
Pennsylvania	4

Figure 1. Ozone Air Quality Index for June 18, 2021



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

In the days leading up to June 18th, expansive high pressure dominated the Great Lakes region and the northeast as it slowly tracked eastward. Sunny skies and hot temperatures across much of the eastern United States allowed for the buildup and gradual accumulation of ozone precursors in states upwind of the nonattainment area. On June 18th, this area of expansive high pressure advanced eastward transporting a previously polluted airmass into the region. The accumulation of pollutants at the surface over several days, in combination with favorable weather conditions for ozone formation and localized transport up the I-95 corridor, resulted in multiple exceedances of the NAAQS across the nonattainment area.

On June 18th, high pressure positioned itself over the northeast before drifting eastward and eventually offshore. This allowed for winds to shift out of the southwest sending warmer temperatures northward into the nonattainment area. At the surface, temperatures quickly rose into the mid-80s with mostly sunny skies across the region and shore points. During the early morning hours, a surface trough developed for a short period of time along the I-95 corridor and extended southward over Maryland and Virginia. At this time, hourly ozone concentrations at the exceedance monitors spiked into the unhealthy for sensitive groups category allowing early morning concentrations to experience an unusually early start to ozone formation. This trough likely aided in the mixing of polluted air aloft down to the surface and was a contributing factor to the quickly rising ozone concentrations. Additionally, the long-range transport of ozone precursors from upwind states in combination with localized transport up the I-95 corridor likely played a role in the rising ozone concentrations at the surface, as the previously polluted air mass tracked eastward.

The handful of ozone exceedances observed across the nonattainment area occurred as a result of the favorable weather conditions mentioned above, as well as the transport of a polluted air mass from upwind states and the I-95 corridor into the nonattainment area on June 18th.

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 exceedances on June 18, 2021. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedances. Seven monitoring stations were chosen to model back trajectories and are listed in Table 4.

Table 4. Monitoring Stations with an 8-hr Ozone Exceedance that were selected to Run 48-hr Back Trajectories

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Middletown	76
NY	Fresh Kills	71
NJ	Leonia	81
NJ	Rider University	71
PA	Bristol	74
PA	NEA	74
PA	NEW	71

Back trajectories from June 18th show that the exceedances observed along the I-95 corridor, from the Philadelphia region to the northern NJ/NYC metropolitan area, and central Connecticut were influenced by a large high pressure system over the eastern United States and developing surface trough over the Mid-Atlantic region. It was this atmospheric setup that allowed for the localized transport of emissions at the surface as well as the long-range transport of elevated levels of ozone from the Great Lakes region.

The surface level-back trajectories (Figure 2) show that air originated over western New York/southern Ontario in the mid- to upper- levels of the atmosphere. As this air was influenced by high pressure, it traveled southeastward throughout the day on June 17th, slowly descending toward the surface. Air then made a turn northeast as a surface trough developed over the Mid-Atlantic on the 18th and slowly continued along the I-95 corridor into arrival. Air passed through various metropolitan locations along the way, picking up emissions from cars, trucks, and industry. Specifically, air impacting Pennsylvania, New Jersey, and New York monitors passed over the Baltimore/Chesapeake Bay vicinity and Philadelphia metropolitan area respectively, while further north, the central Connecticut monitor was more influenced by the New York City metropolitan area and the Long Island Sound.

Similarly, the mid-level back trajectories (Figure 3) show that air originated over southern Ontario and traveled southeastward across portions of New York and Pennsylvania through late on the 17th before making a turn more northeast, traveling slowly along the I-95 corridor.

Finally, upper-level back trajectories (Figure 4) show that air impacting the effected monitors also originated over the Great Lakes region and quickly traveled southeastward toward western New York/Pennsylvania though late on the 17th. Air then turned more zonal, racing east into arrival at the monitoring stations with exceedances.

Figure 5 shows the National Air Quality Index observed on June 17th, the day prior to this exceedance event. As shown in the figure, widespread moderate and isolated unhealthy for sensitive groups (USG) ozone levels were observed over the Great Lakes region on this day. It is likely that the transport of this polluted air from the Great Lakes region, in combination with localized transport of emissions at the surface, under favorable weather conditions mentioned previously, lead to several exceedances along the I-95 corridor and portions of central Connecticut.

Figure 2. 48-hour Back Trajectories for June 18, 2021 at 10 meters

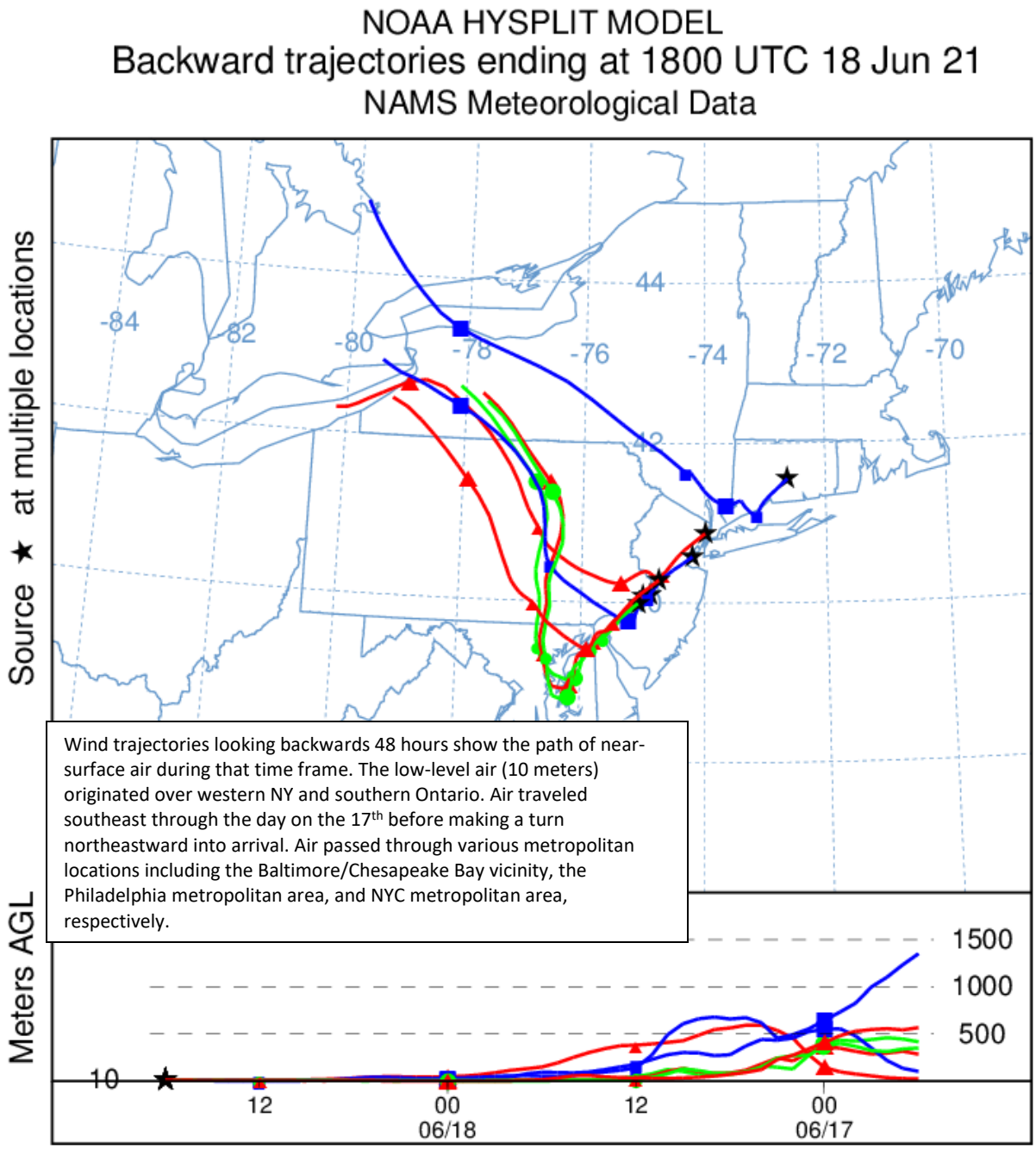


Figure 3. 48-hour Back Trajectories for June 18, 2021 at 500 meters

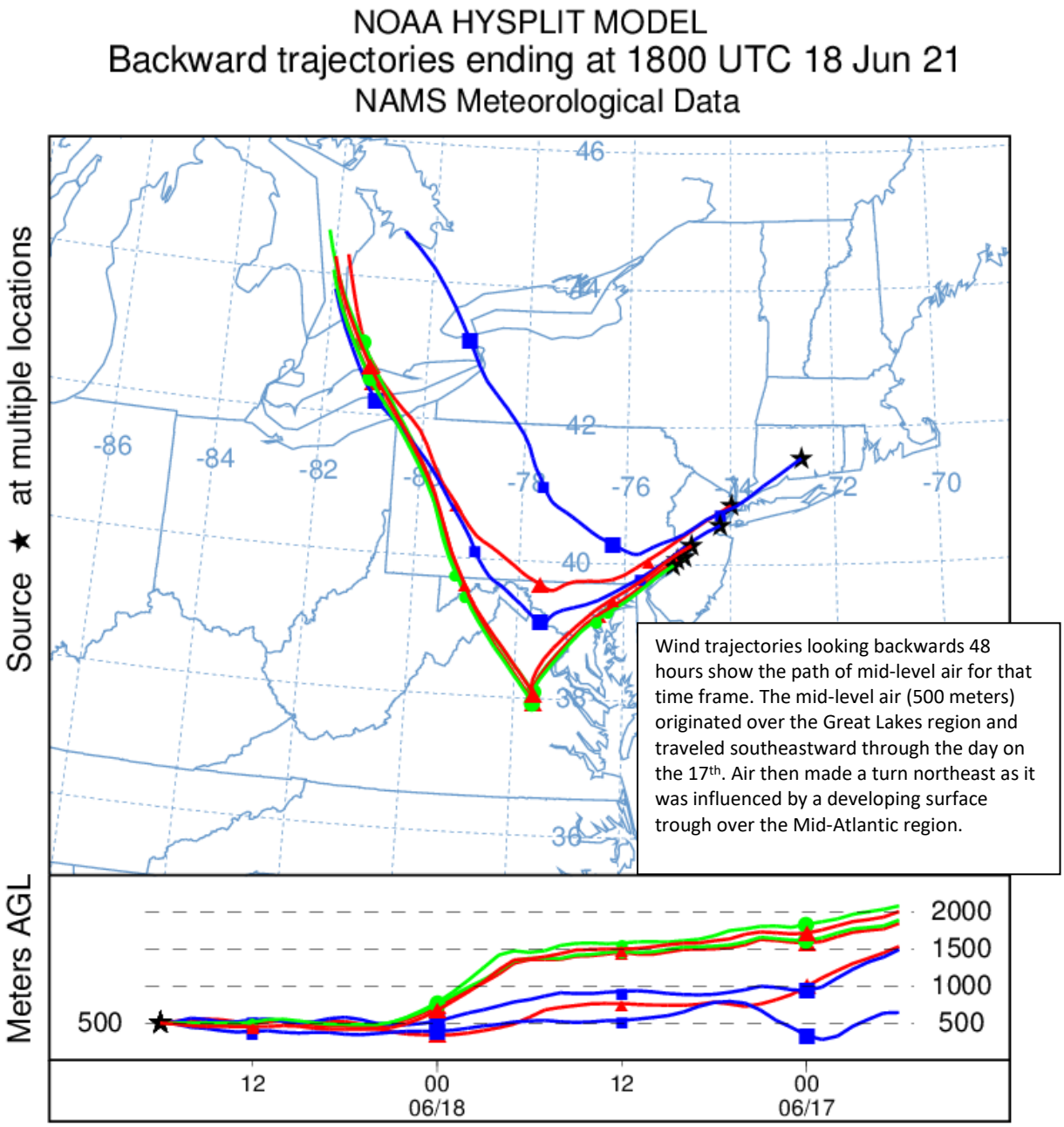


Figure 4. 48-hour Back Trajectories for June 18, 2021 at 1500 meters

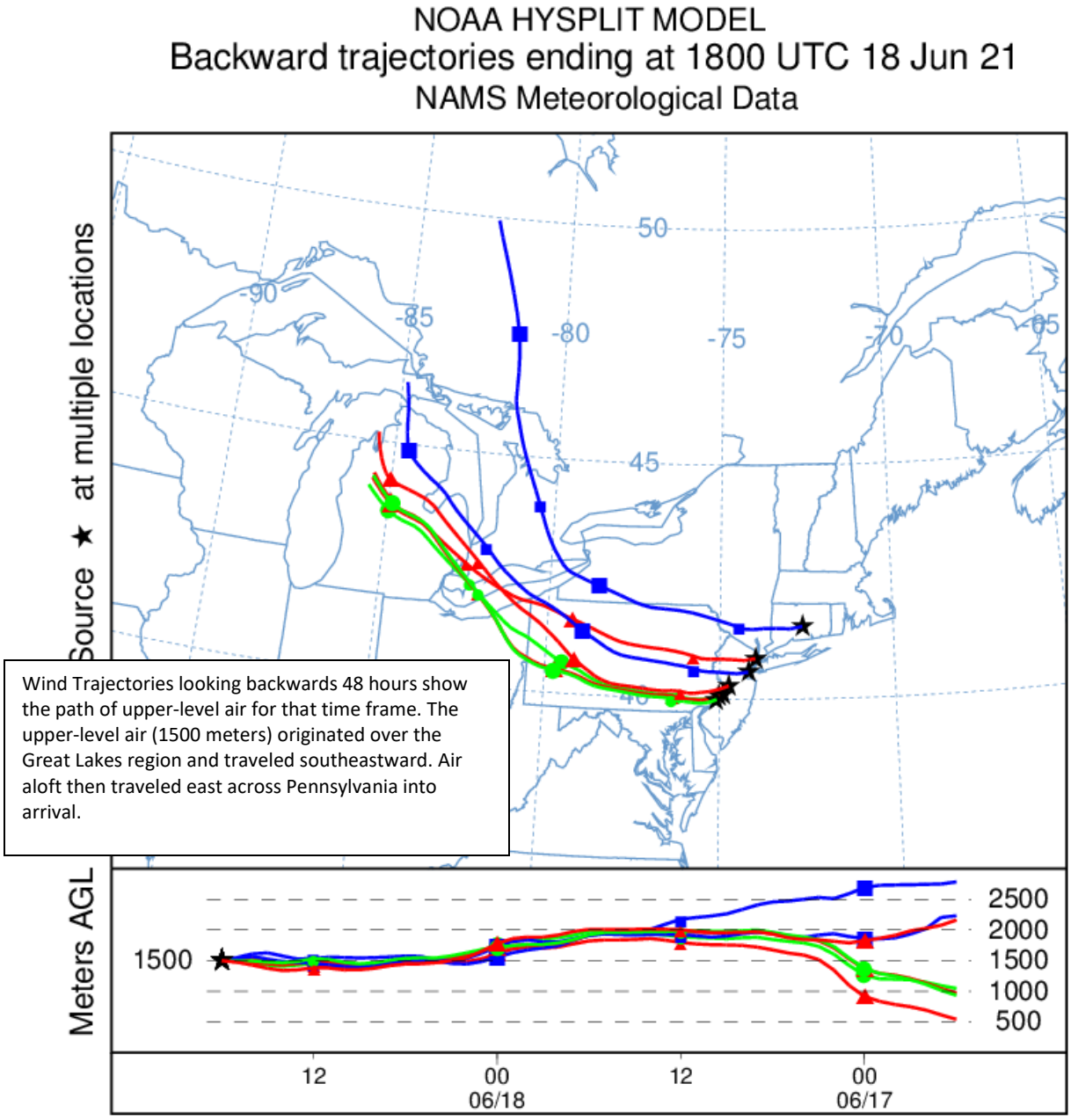
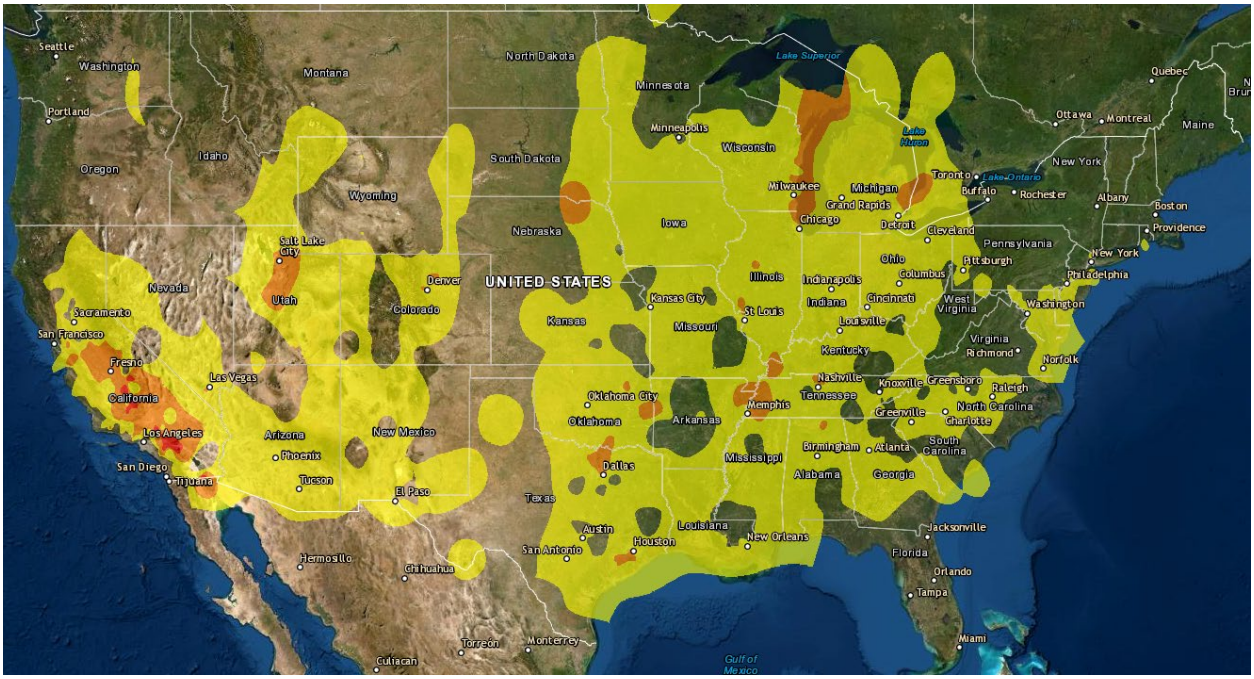


Figure 5. Combined Air Quality Index for the United States on June 17, 2021



Source: www.airnow.gov

How is Ozone Created?

Ground-level ozone is an air pollutant known to cause several 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

Learn more about your local ozone air quality forecast by visiting the "What's Your Air Quality Today?" page at http://www.nj.gov/dep/cleanairnj/ .