PM2.5 National Ambient Air Quality Standard Health Exceedances on June 29, 2023

Exceedance Locations and Levels

On Thursday, June 29, 2023, there were twelve (12) sites in New Jersey that exceeded the National Ambient Air Quality Standard (NAAQS) for PM2.5 (24-hour average of 35 micrograms/cubic meter, ug/m^3). A PM2.5 exceedance of the 24-hour NAAQS is measured when the concentration is 35.5 ug/m^3 or greater. The PM2.5 levels are being impacted by smoke from wildfires in Canada. See Table 1.

Note, all of NJ is in attainment for the PM2.5 annual and 24-hour NAAQS and there are no downwind nonattainment areas from NJ.

Table 1. New Jersey PM2.5 Concentrations on 6/29/2023

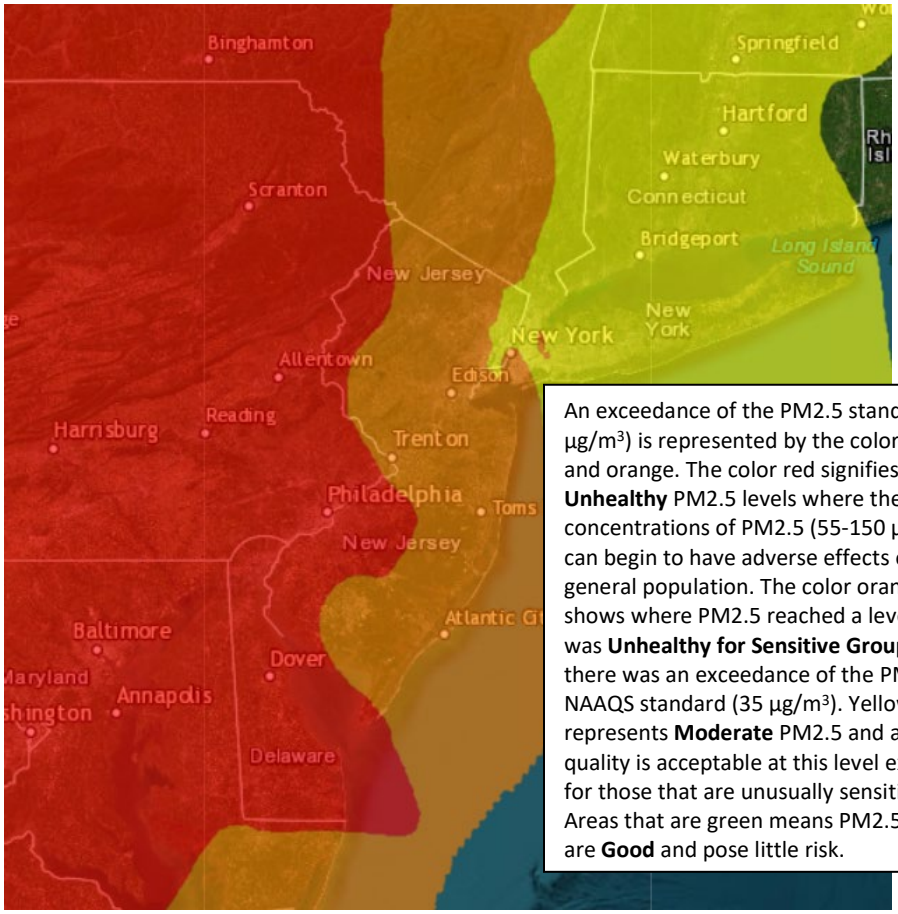
STATION	24-Hour Average (ug/m^3)
Brigantine	40.5
Camden Spruce St	59.0
Columbia	58.6
Elizabeth Lab	41.5
Flemington	44.4
Fort Lee Near Road	31.7
Jersey City Firehouse	33.6
Millville	51.8
Paterson	36.2
Rahway	41.8
Rider University	47.0
Rutgers University	48.2
Toms River	38.0
Trenton	51.9
Union City High School	34.0
TOTAL EXCEEDANCES	**12**

From the out-of-state stations adjacent to New Jersey, there were 18 exceedances of the PM2.5 NAAQS. See Table 2.

Table 2. PM2.5 Concentrations at Out-of-State Monitoring Stations Adjacent to New Jersey on 6/29/2023

STATE	STATION	24-Hour Average (ug/m^3)
CT	Bridgeport	25.9
CT	Danbury	20.9
CT	New Haven - Criscuolo Park	20.5
CT	Waterbury	21.4
DE	KILLENS (Kent Co.)	62.1
DE	LUMS 2 (New Castle Co.)	83.9
DE	MLK (New Castle Co.)	85.7
DE	Rte 9 Del City	82.8
DE	SEAFORD (Sussex Co.)	70.2
MD	Fair Hill	77.2
NY	Bklyn - PS274	No Data
NY	CCNY	31.0
NY	Division Street	No Data
NY	Eisenhower Park	21.6
NY	Fresh Kills	42.5
NY	Holtsville	21.4
NY	Manhattan/IS143	33.0
NY	Maspeth	27.9
NY	Queens	39.7
NY	Queens Near-Road	32.4
NY	White Plains	24.8
PA	Allentown	78.8
PA	Chester	77.6
PA	Freemansburg	79.9
PA	Marcus Hook	82.5
PA	New Garden	89.7
PA	Norristown	75.9
PA	FAB (Philadelphia Co.)	69.1
PA	MON (Philadelphia Co.)	No Data
PA	NEW (Philadelphia Co.)	72.1
PA	RIT (Philadelphia Co.)	78.8
PA	TOR (Philadelphia Co.)	73.1
	TOTAL EXCEEDANCES	**18**

Figure 1. PM2.5 Air Quality Index for June 29, 2023



Source: www.airnow.gov

For PM2.5 terminology definitions see NJDEP Air Quality Planning's Glossary and Acronyms webpage: https://www.nj.gov/dep/airmon/glossary.html

Weather

On Thursday June 29th multiple Unhealthy for Sensitive Groups (USG) and Unhealthy PM2.5 exceedances occurred across the region due to a complex atmospheric setup allowing for the meteorological transport of wildfire smoke over the northeastern United States. In the early morning hours, the region saw humid conditions and above average overnight temperatures. Low pressure was situated over northern New England and southern portions of Quebec, giving the area light winds out of the northwest, which allowed funneling of residual wildfire smoke from southeastern Canada. As the morning progressed, high pressure began building into the region, allowing for breaks in the clouds in southwest locations and bringing temperatures to the low-to-mid 80s. A weak surface trough was observed pushing off the coast throughout the day, which aided in additional mixing of wildfire smoke aloft. Hazy and smokey conditions were noted throughout the day. By the afternoon, a sea breeze developed, and with the lack of smoke occurring immediately offshore, it brought slightly cleaner conditions to coastal regions. This caused inland sections of the region to see Unhealthy levels, with coastal regions seeing USG levels. Favorable meteorological conditions leading to the transport of wildfire smoke led to PM2.5 exceedances throughout the forecasted area.

Where Did the Air Pollution that Caused PM2.5 Come From?

Widespread wildfires throughout Quebec and Ontario have continued to burn for the last several weeks, with high pressure allowing smoke from these fires to move into the region and cause widespread PM2.5 exceedances on Thursday, June 29th. Much of Canada has continued to see hot and dry conditions throughout the season, creating a favorable environment for wildfires to ignite and rapidly spread throughout the country. These wildfires have continued to burn over the last several weeks and elevated PM2.5 levels have been observed in various locations throughout Canada and the United States as the smoke moves throughout the atmosphere. Beginning on Tuesday, June 27th, high pressure moved into the Great Lakes Region and pushed eastward toward the coast. This atmospheric setup allowed the smoke plume from Canada to move over the Great Lakes and Unhealthy for Sensitive Groups (USG), Unhealthy, and Very Unhealthy levels of PM2.5 were observed. This plume then made its way east over the next two days, slowly increasing PM2.5 concentrations over the Mid-Atlantic until it reached New Jersey on Thursday, June 29th. Here the smoke plume was able to increase PM2.5 concentrations into the USG and Unhealthy categories throughout the state.

Figure 2 shows the AirNow Fire and Smoke Map for June 29th, which depicts the smoke plume in gray and the AQI levels across the region. Figure 3 shows that smoke began to make its way into the region early in the morning, with moderate levels of PM2.5 observed throughout the state. By 7-8 AM, multiple sites in the western part of the state started to see a rise in concentrations as the plume advanced further west. By 4 PM, all sites in New Jersey were into the USG category for PM2.5, with some reaching Unhealthy levels.

Figure 2. AirNow Fire and Smoke Map, Smoke Plume for June 29, 2023

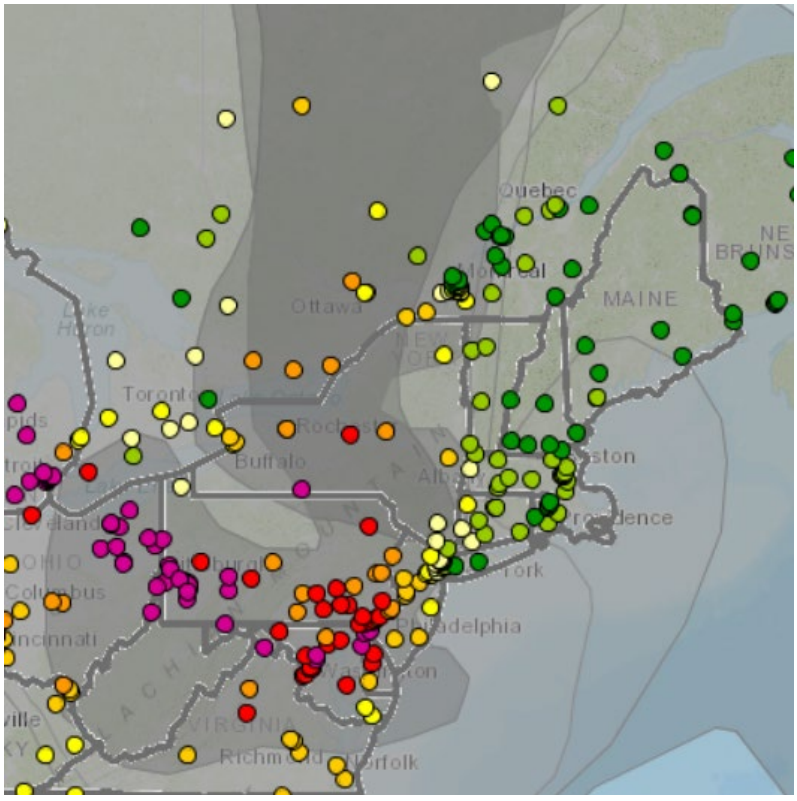
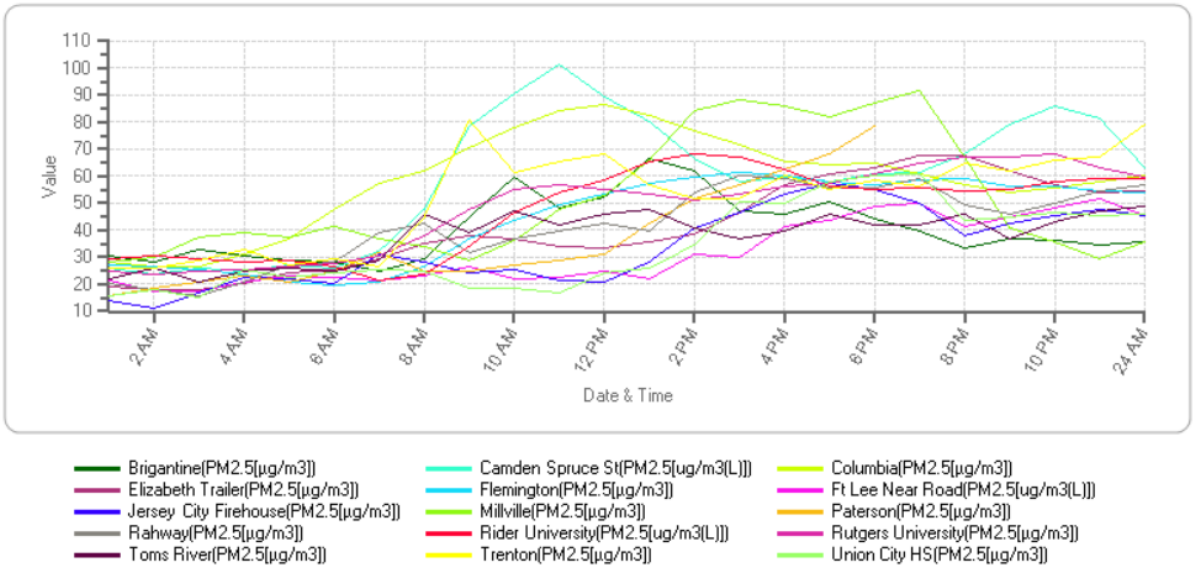


Figure 3. PM2.5 1-hr Concentrations for June 29, 2023

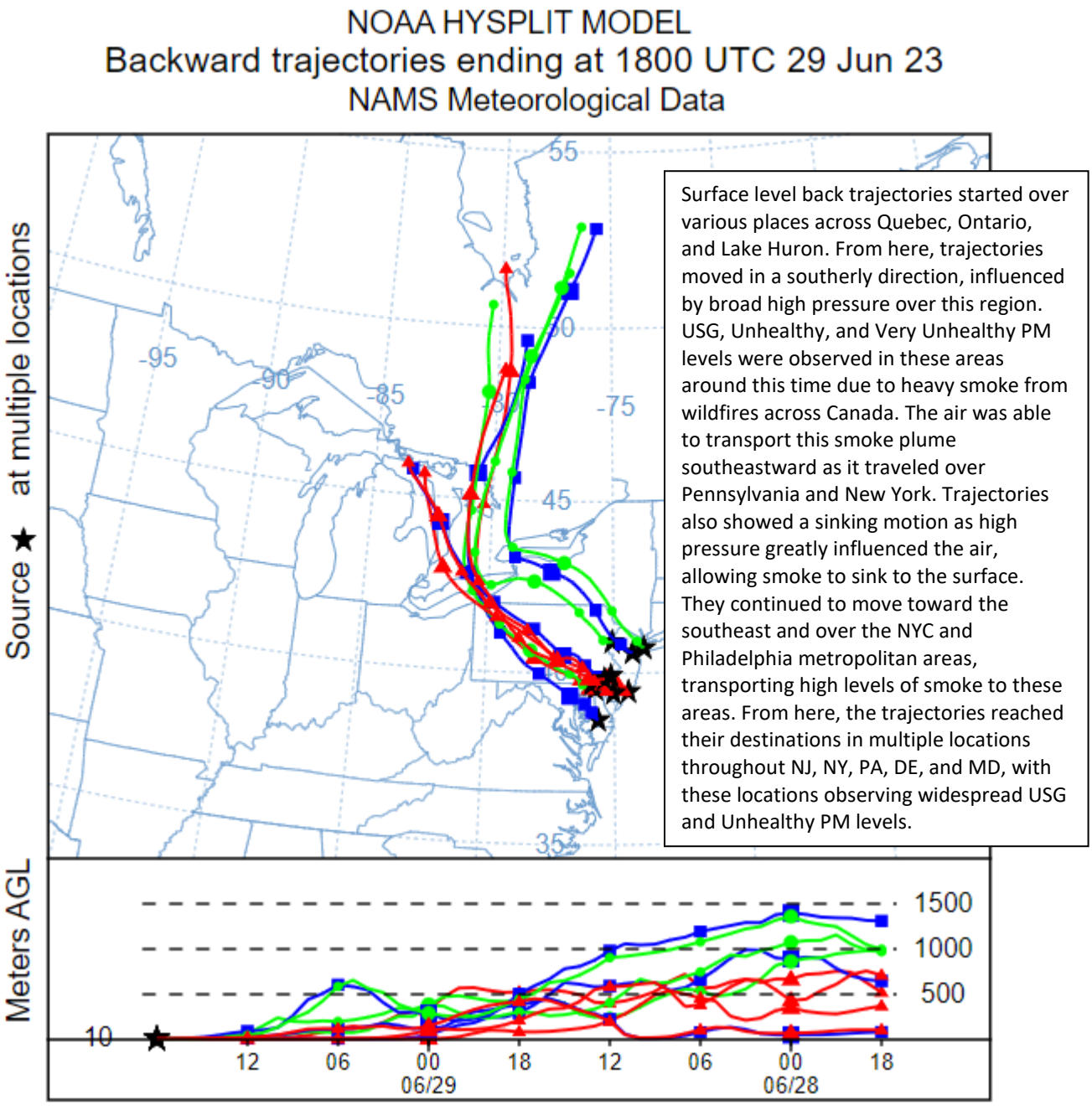


Figures 4, 5, and 6 show the back trajectories of different wind heights for the monitored exceedance(s) on this day. The figures illustrate where the air came from during the 48 hours preceding the 24-hour PM2.5 exceedances. A transport analysis is provided with each figure shown below along with a map of the National Air Quality Index for the previous day (Figure 7). The monitoring station(s) that were chosen to model back trajectories are listed in Table 3.

Table 3. Monitoring Stations with a 24-hr PM2.5 Exceedance that were selected to Run 48-hr Back Trajectories

STATE	STATION	Daily Maximum 24-Hr Average (ug/m^3)
DE	LUMS 2 (New Castle Co.)	83.9
DE	SEAFORD (Sussex Co.)	70.2
MD	Fair Hill	77.2
NJ	Brigantine	40.5
NJ	Camden Spruce St	59.0
NJ	Columbia	58.6
NJ	Millville	51.8
NJ	Rahway	41.8
NY	Queens	39.7
PA	Chester	77.6

Figure 4. 48-hour Back Trajectories for June 29, 2023 at 10 meters



Surface level back trajectories started over various places across Quebec, Ontario, and Lake Huron. From here, trajectories moved in a southerly direction, influenced by broad high pressure over this region. USG, Unhealthy, and Very Unhealthy PM levels were observed in these areas around this time due to heavy smoke from wildfires across Canada. The air was able to transport this smoke plume southeastward as it traveled over Pennsylvania and New York. Trajectories also showed a sinking motion as high pressure greatly influenced the air, allowing smoke to sink to the surface. They continued to move toward the southeast and over the NYC and Philadelphia metropolitan areas, transporting high levels of smoke to these areas. From here, the trajectories reached their destinations in multiple locations throughout NJ, NY, PA, DE, and MD, with these locations observing widespread USG and Unhealthy PM levels.

Figure 5. 48-hour Back Trajectories for June 29, 2023 at 500 meters

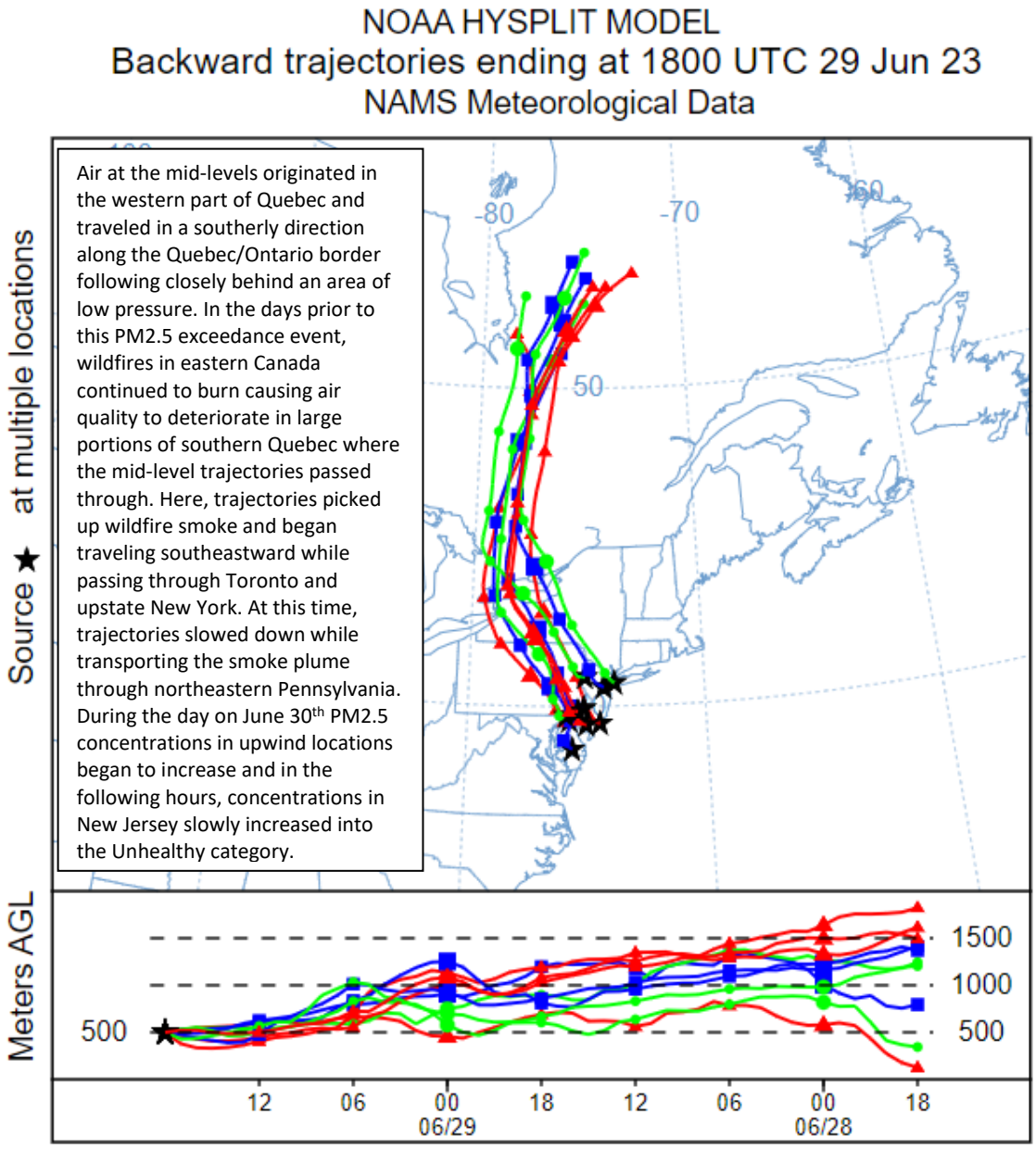


Figure 6. 48-hour Back Trajectories for June 29, 2023 at 1500 meters

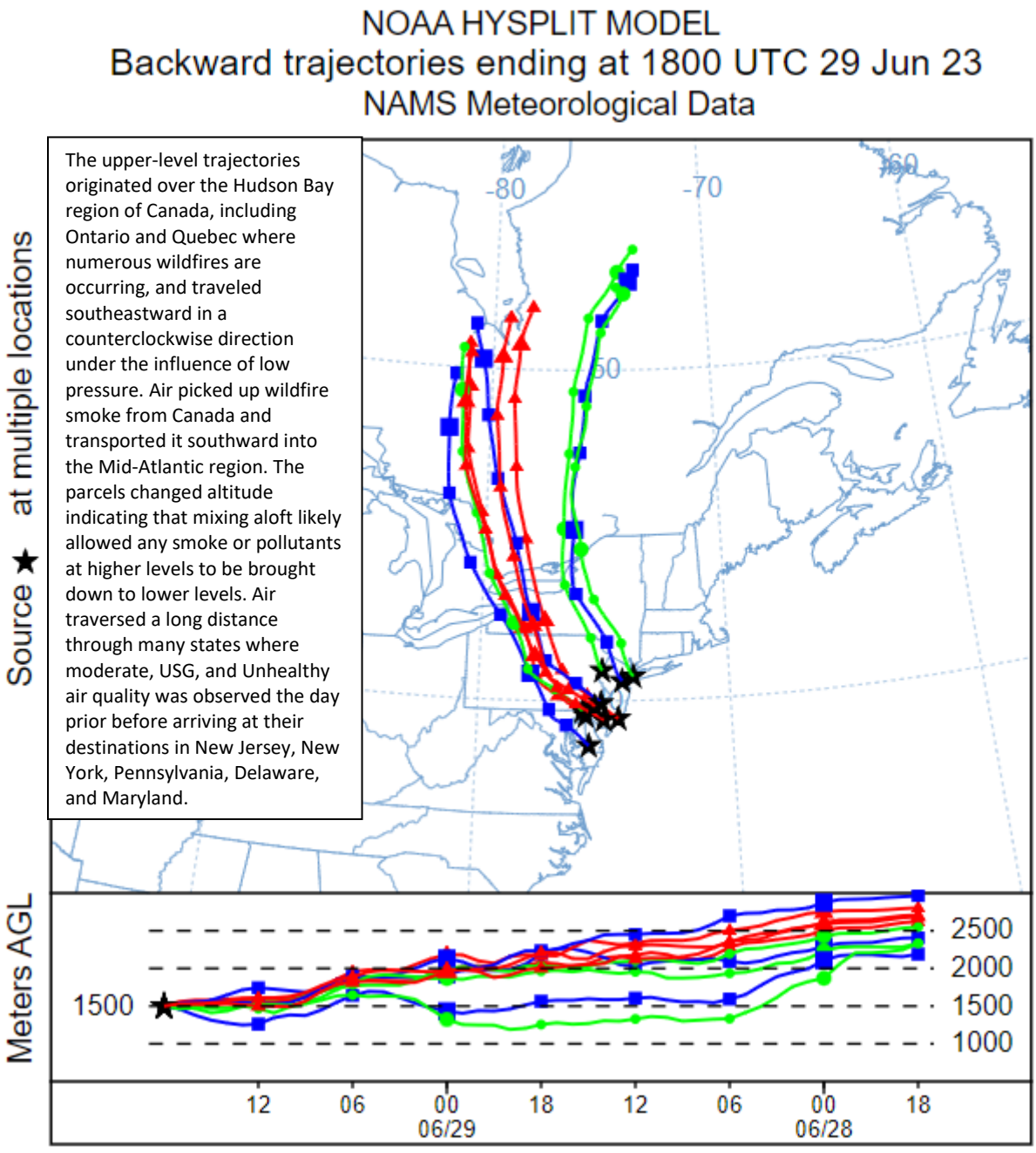
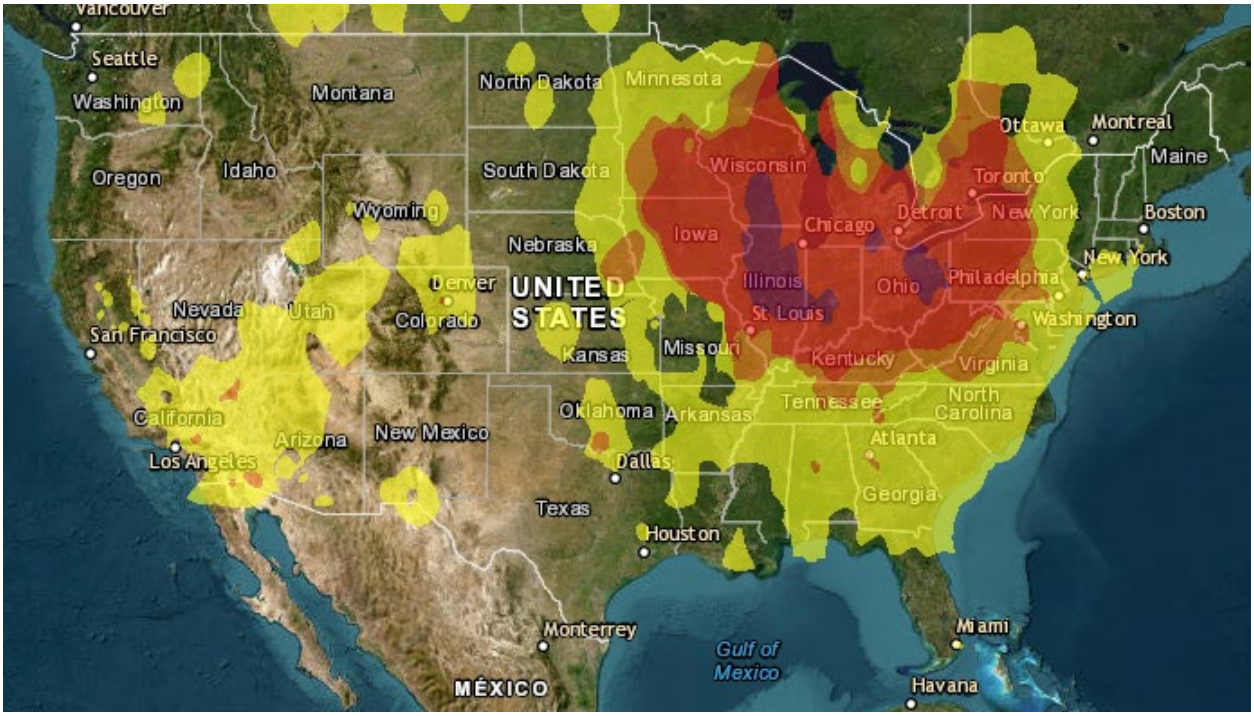


Figure 7. Air Quality Index for the United States on June 28, 2023



Source: www.airnow.gov

Find Out About Air Quality Every Day

Learn more about your local PM2.5 air quality forecast by visiting the "What's Your Air Quality Today?" page at https://www.nj.gov/dep/baqp/aqitoday.html .