PM2.5 National Ambient Air Quality Standard Health Exceedances on June 30, 2023

Exceedance Locations and Levels

On Friday, June 30, 2023, there were fourteen (14) 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 6/30/2023

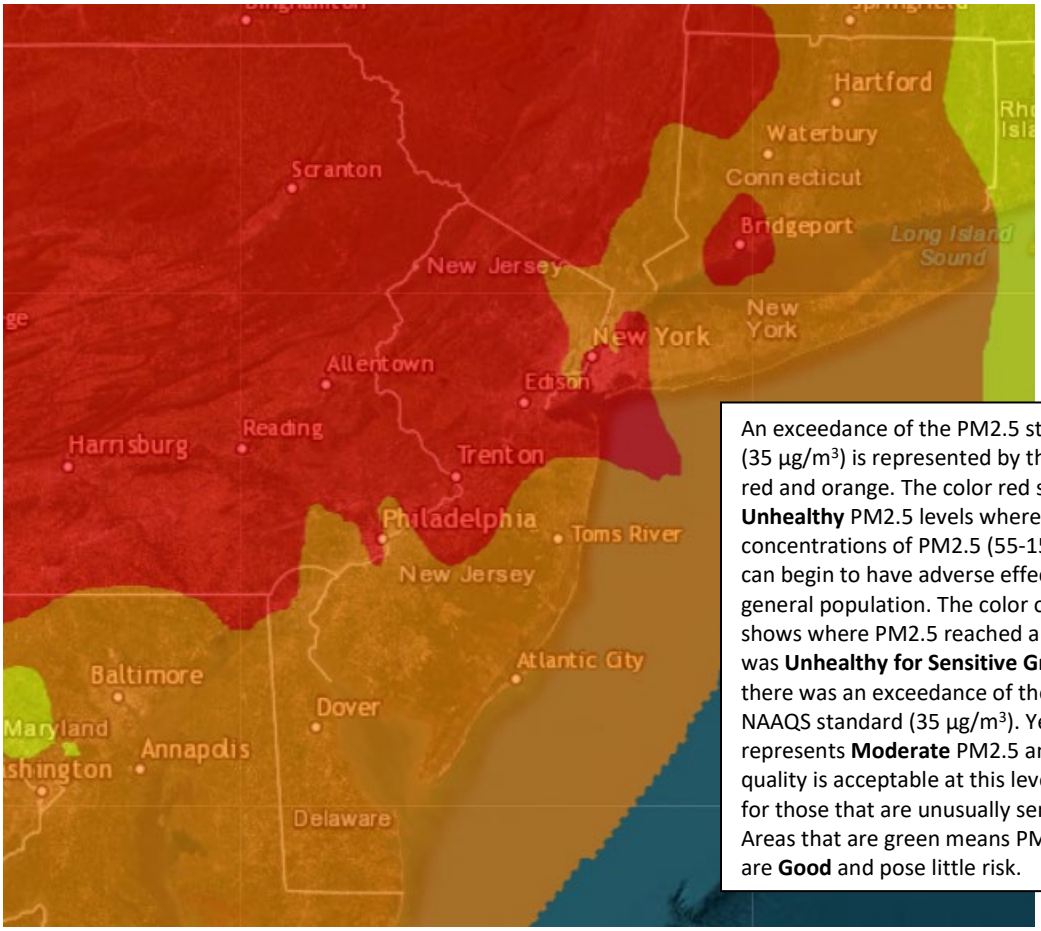
STATION	24-Hour Average (ug/m^3)
Brigantine	38.0
Camden Spruce St	44.3
Columbia	60.8
Elizabeth Lab	65.7
Flemington	56.7
Fort Lee Near Road	54.0
Jersey City Firehouse	54.3
Millville	40.7
Paterson	No Data
Rahway	62.1
Rider University	63.7
Rutgers University	66.1
Toms River	42.2
Trenton	60.3
Union City High School	54.3
TOTAL EXCEEDANCES	**14**

From the out-of-state stations adjacent to New Jersey, there were thirty (30) 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 6/30/2023

STATE	STATION	24-Hour Average (ug/m^3)
CT	Bridgeport	60.2
CT	Danbury	47.9
CT	New Haven - Criscuolo Park	51.4
CT	Waterbury	49.7
DE	KILLENS (Kent Co.)	40.0
DE	LUMS 2 (New Castle Co.)	50.8
DE	MLK (New Castle Co.)	54.0
DE	Rte 9 Del City	47.0
DE	SEAFORD (Sussex Co.)	46.8
MD	Fair Hill	56.4
NY	Bklyn - PS274	65.1
NY	CCNY	49.3
NY	Division Street	No Data
NY	Eisenhower Park	45.4
NY	Fresh Kills	66.7
NY	Holtsville	43.9
NY	Manhattan/IS143	56.0
NY	Maspeth	53.0
NY	Queens	66.7
NY	Queens Near-Road	54.2
NY	White Plains	46.8
PA	Allentown	78.8
PA	Chester	74.5
PA	Freemansburg	46.8
PA	Marcus Hook	77.0
PA	New Garden	51.3
PA	Norristown	65.2
PA	FAB (Philadelphia Co.)	59.0
PA	MON (Philadelphia Co.)	No Data
PA	NEW (Philadelphia Co.)	53.8
PA	RIT (Philadelphia Co.)	61.7
PA	TOR (Philadelphia Co.)	62.4
	TOTAL EXCEEDANCES	**30**

Figure 1. PM2.5 Air Quality Index for Friday, June 30, 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 Friday, June 30th, high pressure over the Mid-Atlantic continued to build into the region and dominate the weather pattern. Starting on Friday morning, calm winds began to blow out of the southeast, with onshore flow continuing throughout the day. Widespread Canadian wildfire smoke was observed the days prior to this event, with westerly winds on Thursday beginning to blow this smoke offshore. Overnight, PM2.5 values began to decline as winds continued to push the smoke plume eastward. When winds began to flow out of the southeast on Friday morning, smoke was transported back inland, pushing PM2.5 levels back into the USG and unhealthy categories throughout the region.

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

Widespread wildfires throughout eastern Canada have continued to burn for the last several weeks, with favorable weather patterns allowing smoke from these wildfires to move into the region and cause widespread PM2.5 exceedances for an extended period including June 30th. 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 region. Canada and the United States have experienced elevated PM2.5 concentrations as the smoke moves throughout the atmosphere and is transported to different regions. Earlier in the week, high pressure transported a dense smoke plume from Canada into the Great Lakes region resulting in poor air quality in upwind locations. High pressure advanced this plume eastward allowing the smoke from Canadian wildfires to migrate into the Mid-Atlantic region while growing increasingly polluted as it slowly tracked toward the coast. This plume then made its way into New Jersey where it quicky increased PM2.5 concentrations on Thursday, June 29th. Following the 29th, the smoke plume lingered over New Jersey and the Mid-Atlantic, impacting air quality across the region. On Friday June 30th, southeasterly onshore winds helped transport a large plume of smoke sitting over the Atlantic Ocean from days prior back onshore, allowing PM2.5 concentrations to remain elevated throughout the day.

Figure 2 shows the AirNow Fire and Smoke Map on June 30th, which depicts the smoke plume in gray and the AQI levels across the region. Figure 3 show that PM2.5 concentrations remained elevated across the state on Friday, June 30th, with maximum concentrations peaking between 85 and 90 ug/m^3.

Figure 2. AirNow Fire and Smoke Map, Smoke Plume for June 30, 2023

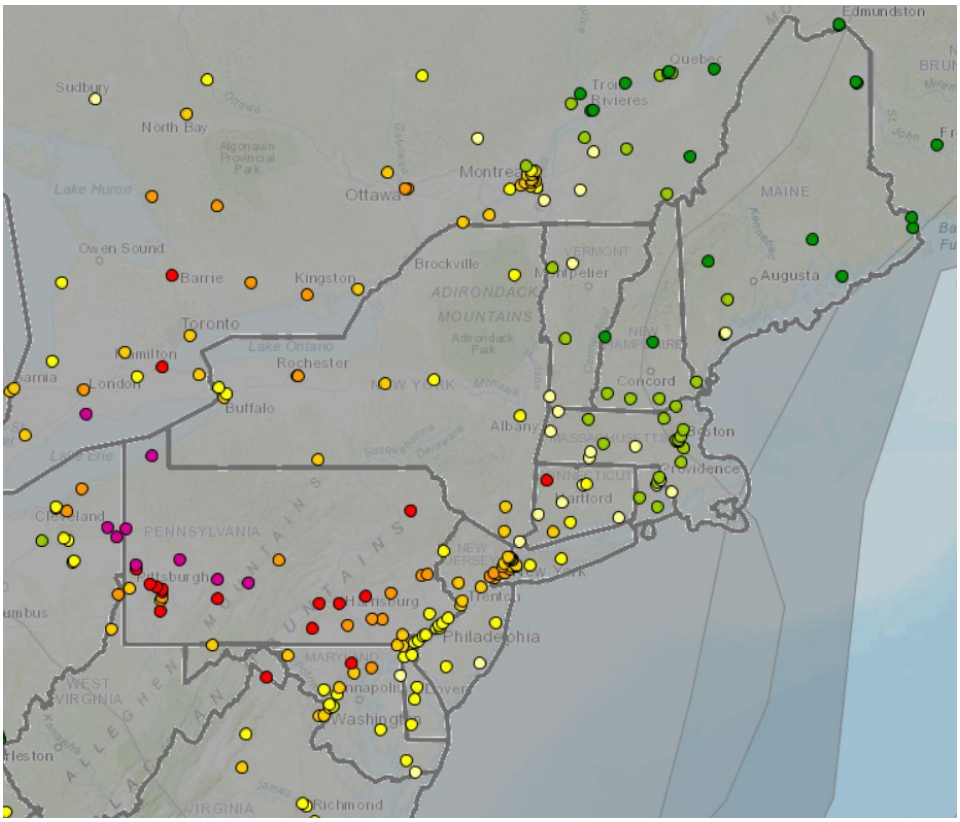
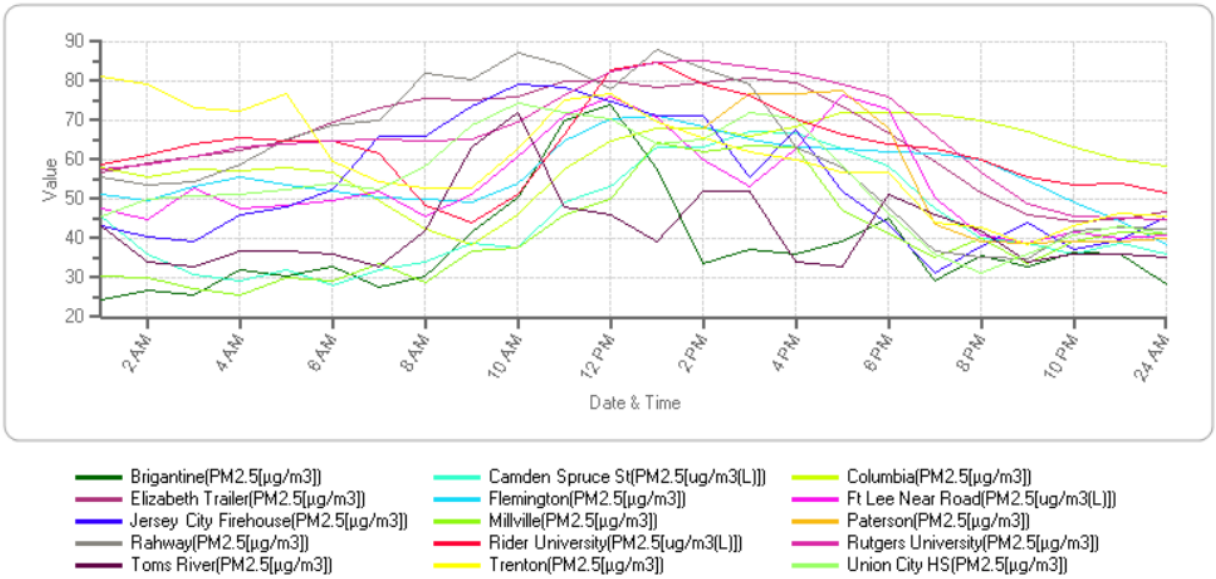


Figure 3. PM2.5 1-hr Concentrations for June 30, 2023

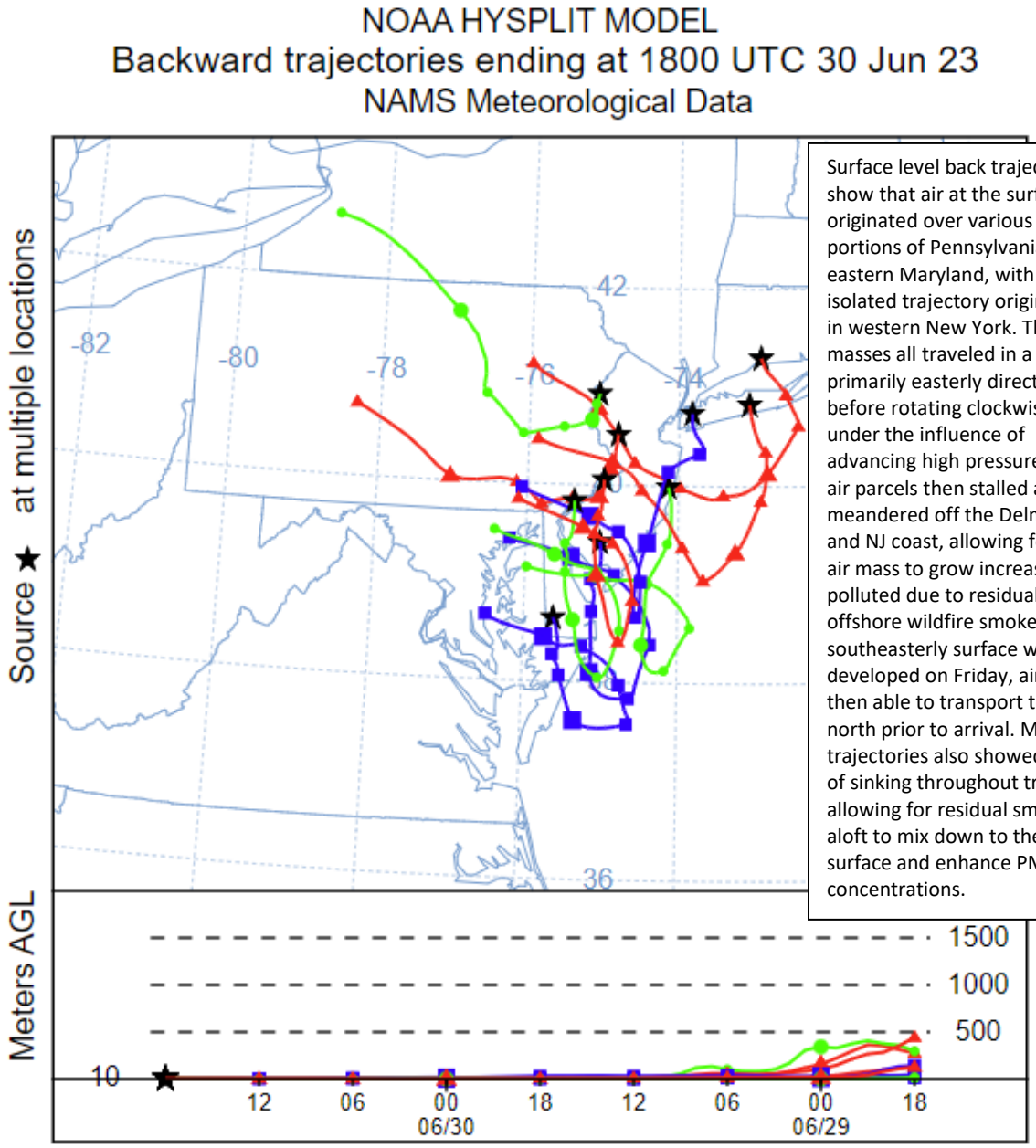


Figures 4, 5, and 6 show the back trajectories of different wind heights for the monitored exceedance(s) on this day. The figures illustrate where the air came from during the 48 hours preceding the 24-hour PM2.5 exceedances. A transport analysis is provided with each figure shown below along with a 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

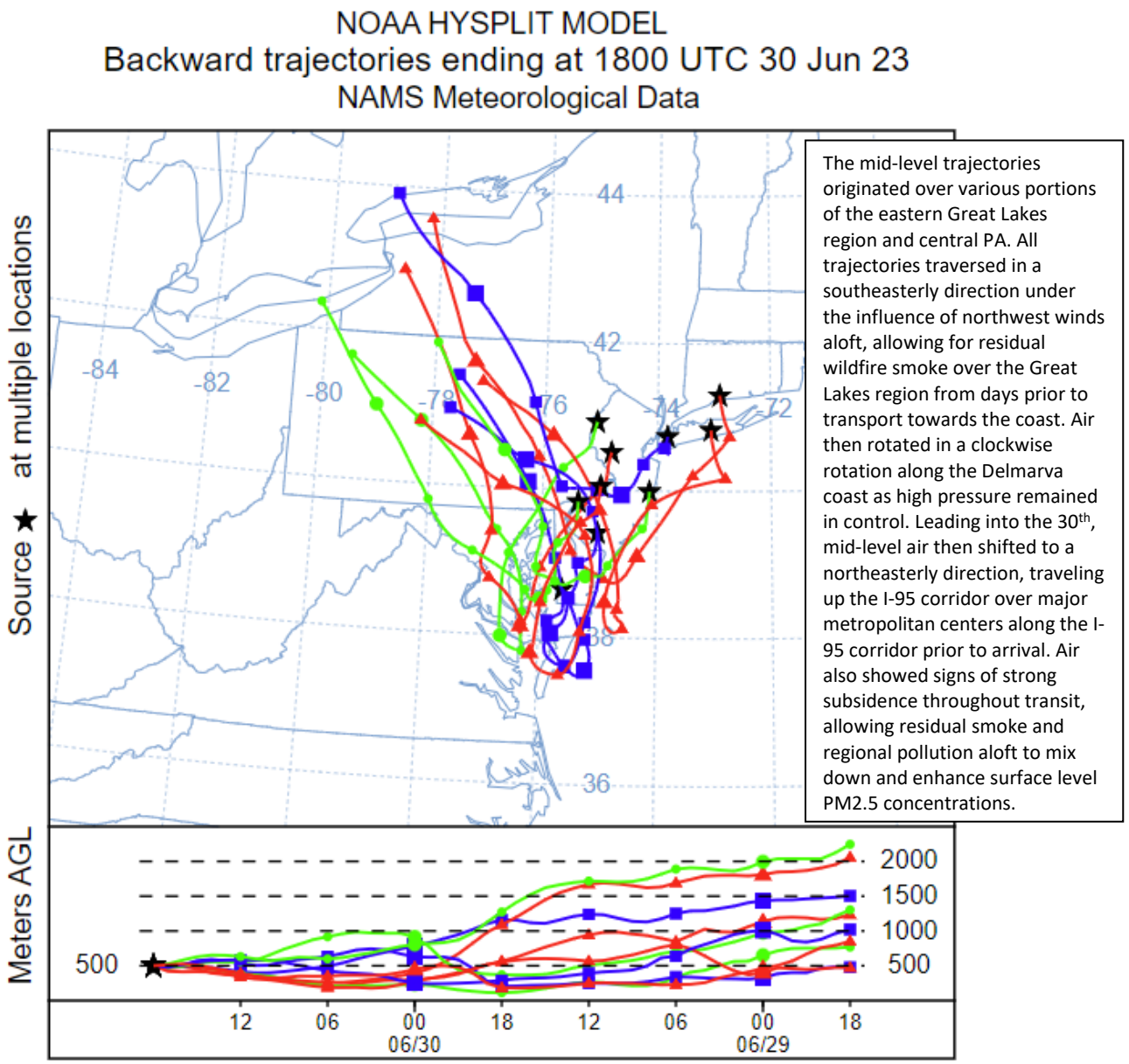
STATE	STATION	Daily Maximum 24-Hr Average (ug/m^3)
CT	New Haven-Criscuolo Park	51.4
DE	SEAFORD (Sussex Co.)	46.8
NJ	Columbia	60.8
NJ	Flemington	56.7
NJ	Millville	40.7
NJ	Toms River	42.2
NY	Holtsville	43.9
NY	Queens	66.7
PA	Chester	74.5
PA	TOR (Philadelphia Co.)	62.4

Figure 4. 48-hour Back Trajectories for June 30, 2023 at 10 meters



Surface level back trajectories show that air at the surface originated over various portions of Pennsylvania and eastern Maryland, with an isolated trajectory originating in western New York. The air masses all traveled in a primarily easterly direction before rotating clockwise under the influence of advancing high pressure. The air parcels then stalled and meandered off the Delmarva and NJ coast, allowing for the air mass to grow increasingly polluted due to residual offshore wildfire smoke. As southeasterly surface winds developed on Friday, air was then able to transport to the north prior to arrival. Most trajectories also showed signs of sinking throughout transit, allowing for residual smoke aloft to mix down to the surface and enhance PM2.5 concentrations.

Figure 5. 48-hour Back Trajectories for June 30, 2023 at 500 meters



The mid-level trajectories originated over various portions of the eastern Great Lakes region and central PA. All trajectories traversed in a southeasterly direction under the influence of northwest winds aloft, allowing for residual wildfire smoke over the Great Lakes region from days prior to transport towards the coast. Air then rotated in a clockwise rotation along the Delmarva coast as high pressure remained in control. Leading into the 30th, mid-level air then shifted to a northeasterly direction, traveling up the I-95 corridor over major metropolitan centers along the I-95 corridor prior to arrival. Air also showed signs of strong subsidence throughout transit, allowing residual smoke and regional pollution aloft to mix down and enhance surface level PM2.5 concentrations.

Figure 6. 48-hour Back Trajectories for June 30, 2023 at 1500 meters

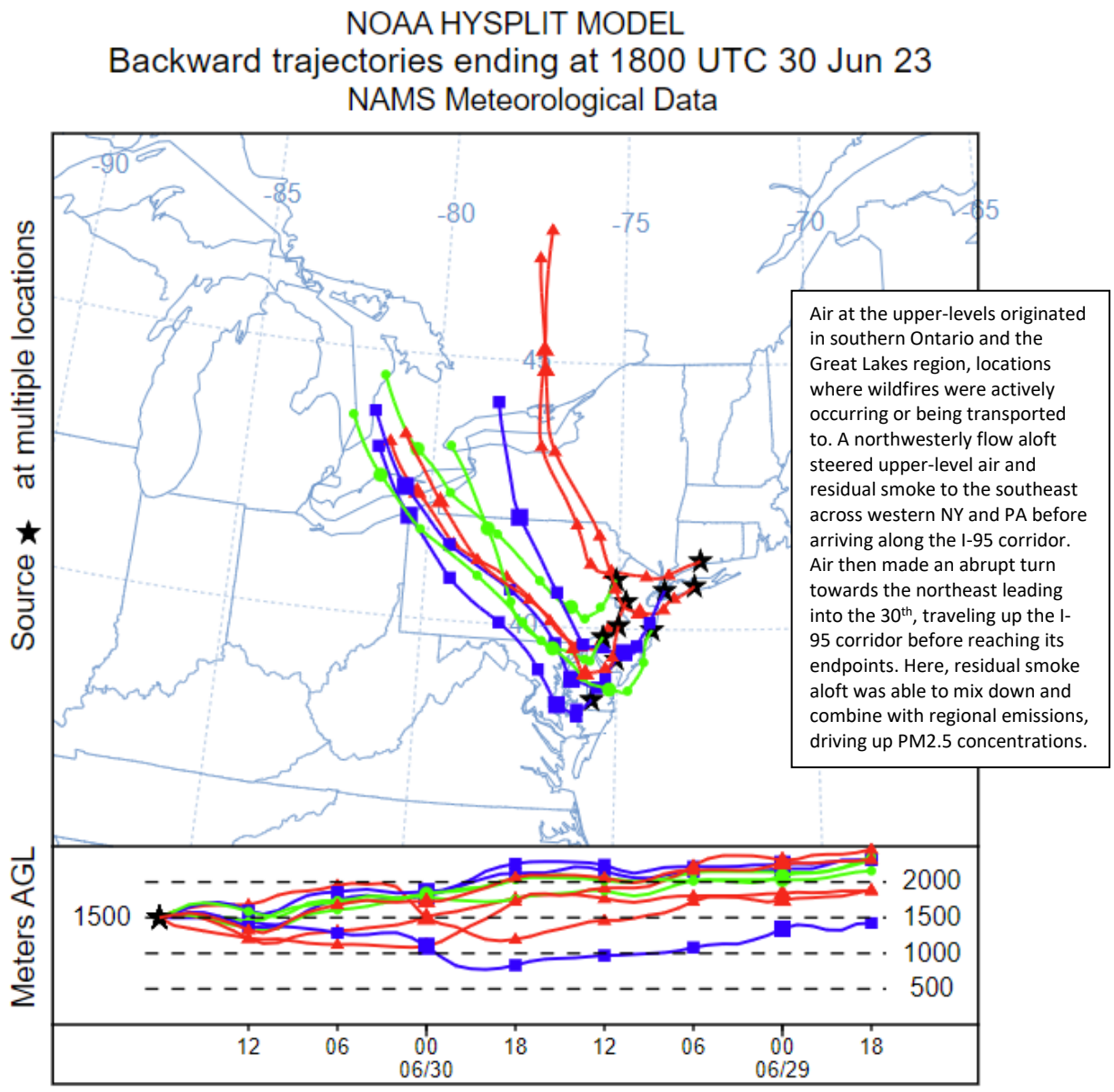
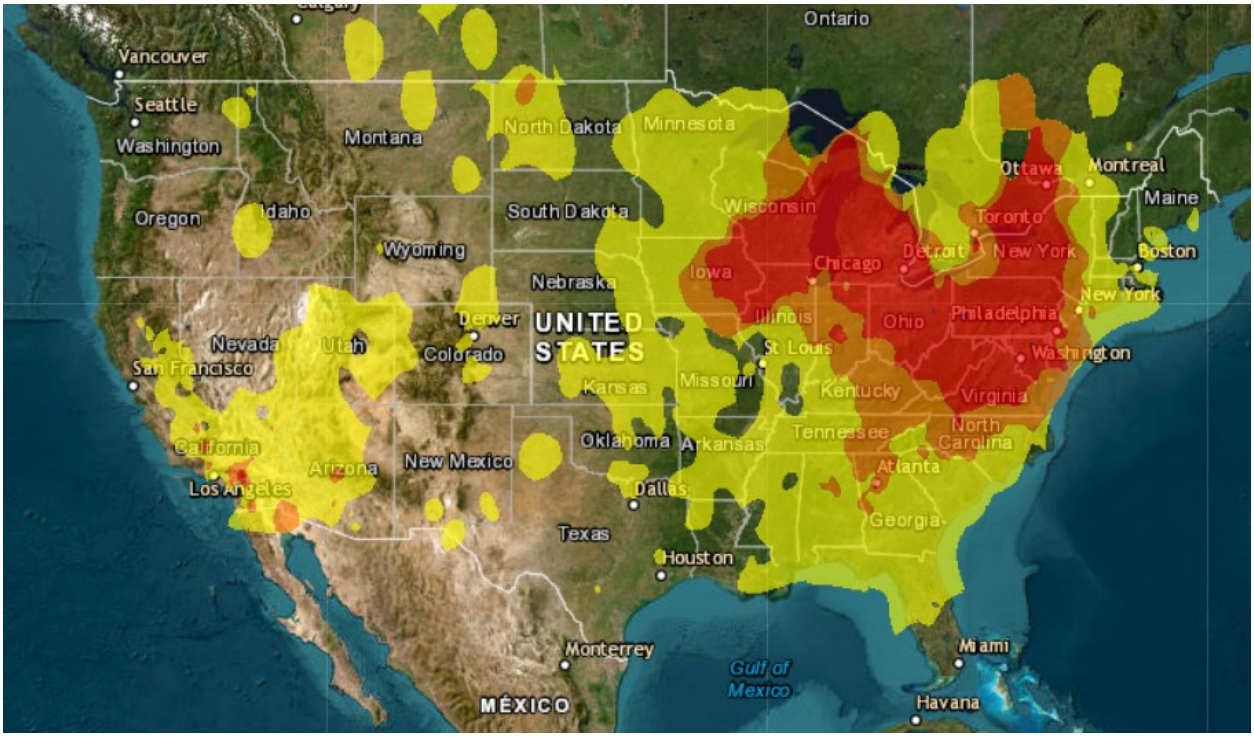


Figure 7. Air Quality Index for the United States on June 29, 2023



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 .