



Environmental Protection Agency

Ohio's Exceptional Events Demonstration for 2023 and 2025 PM_{2.5} Episodes in Stark County, OH

**Prepared by:
The Ohio Environmental Protection Agency
Division of Air Pollution Control**

September 2026

1. Introduction

1.1. Overview

On February 7, 2024, the United States Environmental Protection Agency (U.S. EPA) promulgated a revised National Ambient Air Quality Standard (NAAQS) for fine particulate matter (PM_{2.5}), with an effective date of May 6, 2024 (89 FR 16202). The level of the new annual PM_{2.5} NAAQS was set to 9.0 µg/m³. In advance of the deadline for nonattainment area designation recommendations, U.S. EPA asked state and local air agencies to submit demonstrations to exclude days impacted by exceptional events from consideration in the designations process.

In Stark County, Ohio, air quality was impacted during multiple PM_{2.5} episodes occurring from June to August 2023 and June to August 2025 by smoke entering the region from wildfires burning in Canada. Wildfires across Canada during this period produced smoke plumes that impacted surface air quality throughout the Great Lakes region. The smoke from these wildfires produced PM_{2.5} pollution episodes across the region that had significant health and regulatory implications. One of the regulatorily significant impacts of the wildfire smoke was the effect on air quality design values in Stark County, specifically for the Canton Fire St8 (39-151-0017) monitoring site. In addition to these PM_{2.5} episodes caused by Canadian wildfire smoke, air quality in Stark County was also impacted by a PM_{2.5} episode on July 4-5, 2025, resulting from smoke generated by widespread fireworks displays related to celebrations of the Fourth of July holiday in the United States.

Table 1 shows the 16 dates across 2023 and 2025 affected by regulatorily significant wildfire or fireworks smoke-driven PM_{2.5} episodes that, if excluded from the three-year (2023-2025) PM_{2.5} design value calculation, would result in a design value for the Canton Fire St8 (39-151-0017) monitoring site in Stark County that does not violate the 2024 PM_{2.5} NAAQS. Two of these dates are PM_{2.5} Tier 1 category days and 14 of these dates are PM_{2.5} Tier 2 category days according to the online U.S. EPA PM_{2.5} Tiering Tool. These 16 dates across 2023 and 2025 were affected by nine distinct regulatorily significant wildfire or fireworks smoke-driven PM_{2.5} episodes in Stark County, covering June 11, July 18, and August 1 and 4-5 in 2023, as well as June 4-5, June 7-8, June 12-13, July 4-5, July 15, and August 15-16 in 2025. Figures 1 and 2 were generated by the online U.S. EPA PM_{2.5} Tiering Tool for the Canton Fire St8 monitoring site in Stark County. These figures identify June 7 and July 4 in 2025 as PM_{2.5} Tier 1 category days, while the remaining 14 dates are identified as PM_{2.5} Tier 2 category days.

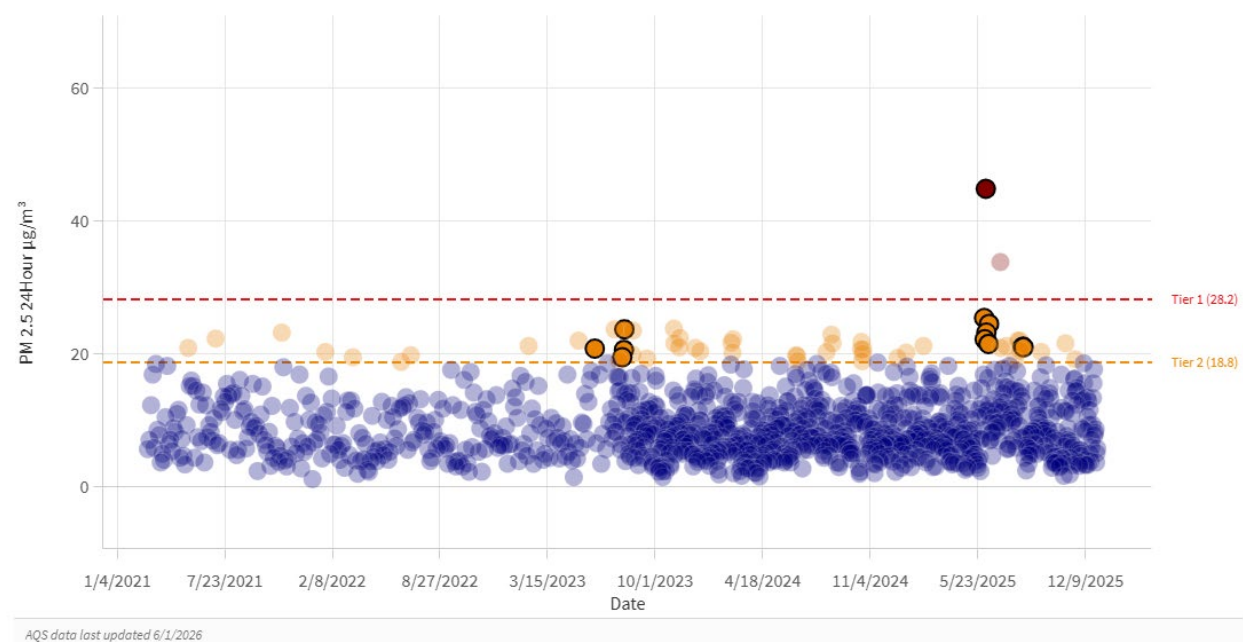
Table 1. Data requested for exclusion at the Canton Fire St8 (39-151-0017) monitoring site due to regulatorily significant wildfire or fireworks smoke-driven PM_{2.5} episodes.

Date of Event	Type of Event	U.S. EPA PM_{2.5} Tier	24-Hour Average PM_{2.5} Concentration (µg/m³)	5-Year Percentile	5-Year Rank
June 11, 2023	Canadian Wildfire Smoke	Tier 2	20.8	97.19	34
July 18, 2023	Canadian Wildfire Smoke	Tier 2	23.7	99.49	6
August 1, 2023	Canadian Wildfire Smoke	Tier 2	19.5	95.74	50
August 4, 2023	Canadian Wildfire Smoke	Tier 2	20.6	96.93	37
August 5, 2023	Canadian Wildfire Smoke	Tier 2	23.7	99.49	6
June 4, 2025	Canadian Wildfire Smoke	Tier 2	25.4	99.83	3
June 5, 2025	Canadian Wildfire Smoke	Tier 2	22.2	98.81	14
June 7, 2025	Canadian Wildfire Smoke	Tier 1	44.8	100.00	1
June 8, 2025	Canadian Wildfire Smoke	Tier 2	23.2	99.23	9
June 12, 2025	Canadian Wildfire Smoke	Tier 2	21.5	98.04	24
June 13, 2025	Canadian Wildfire Smoke	Tier 2	24.5	99.74	4
July 4, 2025	Fireworks Smoke	Tier 1	33.8	99.91	2
July 5, 2025	Fireworks Smoke	Tier 2	20.9	97.27	31
July 15, 2025	Canadian Wildfire Smoke	Tier 2	21.2	97.78	25
August 15, 2025	Canadian Wildfire Smoke	Tier 2	21.1	97.70	28
August 16, 2025	Canadian Wildfire Smoke	Tier 2	21.0	97.53	29

Figure 1. Time series plot of PM_{2.5} daily combined site data for the Canton Fire St8 (39-151-0017) monitoring site in Stark County from 2021-2025, with the June and August data points requested for PM_{2.5} data exclusion shown as bold circles. The PM_{2.5} Tier 1 threshold (28.20 µg/m³ for June/August) and PM_{2.5} Tier 2 threshold (18.80 µg/m³ for June/August), are based on 2021-2025, the most recent 5-year period of certified data at the time of publication of this document¹.

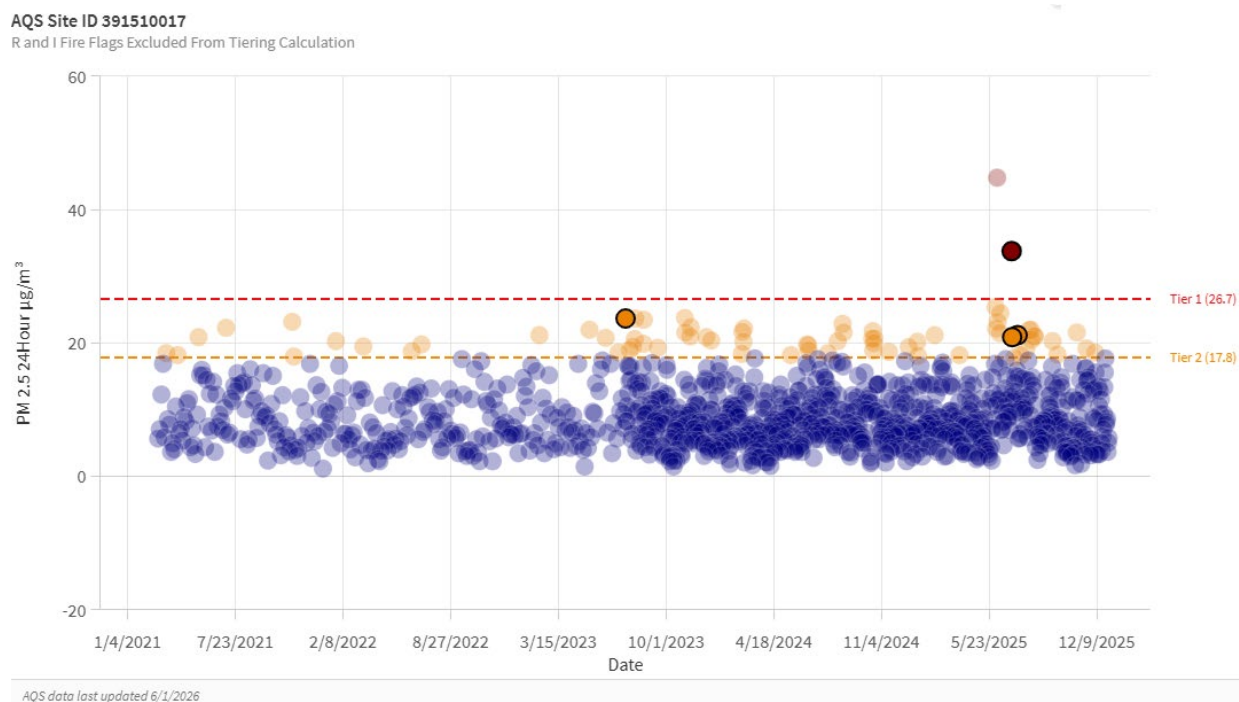
AQS Site ID 391510017

R and I Fire Flags Excluded From Tiering Calculation



¹ This figure was created on September 11, 2026, from the online U.S. EPA PM_{2.5} Tiering Tool available at <https://www.epa.gov/air-quality-analysis/pm25-tiering-tool-exceptional-events-analysis>

Figure 2. Time series plot of PM_{2.5} daily combined site data for the Canton Fire St8 (39-151-0017) monitoring site in Stark County from 2021-2025, with the July data points requested for PM_{2.5} data exclusion shown as bold circles. The PM_{2.5} Tier 1 threshold (26.70 µg/m³ for July) and PM_{2.5} Tier 2 threshold (17.80 µg/m³ for July), are based on 2021-2025, the most recent 5-year period of certified data at the time of publication of this document².



The Ohio Environmental Protection Agency (Ohio EPA) requests that U.S. EPA exclude the PM_{2.5} data from the five identified dates in 2023 (June 11, July 18, August 1, August 4, and August 5) and the 11 identified dates in 2025 (June 4, June 5, June 7, June 8, June 12, June 13, July 4, July 5, July 15, August 15, and August 16) from regulatory determinations, including calculations of annual PM_{2.5} design values, due to the influence of Canadian wildfire smoke or smoke from Fourth of July holiday celebration-related fireworks displays on the monitored concentrations at the Canton Fire St8 (39-151-0017) monitoring site during those days. When the 24-hour average PM_{2.5} concentrations measured at the Canton Fire St8 monitoring site on these 16 dates are included, the valid 2023-2025 annual PM_{2.5} design value is 9.3 µg/m³, above

² This figure was created on September 11, 2026, from the online U.S. EPA PM_{2.5} Tiering Tool available at <https://www.epa.gov/air-quality-analysis/pm25-tiering-tool-exceptional-events-analysis>

the 2024 annual PM_{2.5} NAAQS value of 9.0 µg/m³. However, if these sixteen 24-hour average PM_{2.5} concentrations were excluded, the Canton Fire St8 monitoring site in Stark County would have a 2023-2025 annual PM_{2.5} design value of 9.0 µg/m³, representing attainment of the 2024 annual PM_{2.5} NAAQS. Excluding the observed PM_{2.5} data from these sixteen dates across nine exceptional events has regulatory significance because it helps reduce the 2023-2025 annual PM_{2.5} design value for the Canton Fire St8 monitoring site in Stark County to a value that is at or below the 2024 annual PM_{2.5} NAAQS value of 9.0 µg/m³ and will help preclude Stark County from being designated a nonattainment area for the 2024 annual PM_{2.5} NAAQS.

1.2. Exceptional Events Rule Requirements

U.S. EPA's Treatment of Data Influenced by Exceptional Events ("Exceptional Events Rule", 81 FR 68216) provides the requirements that air agencies must meet when requesting U.S. EPA to exclude exceptional event-related concentrations from regulatory determinations. All of the required elements under 40 CFR 50.14(b)(2), 40 CFR 50.14(b)(4), 40 CFR 50.14(c)(1)(i), 40 CFR 50.14(c)(3)(iv)(A-E), and 40 CFR 50.14(c)(3)(v)(A-C) are included in this demonstration.

- A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s) is presented in Section 2 of this document.
- A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation, including analyses comparing the event-influenced concentrations to concentrations at the same monitoring site at other times, is presented in Section 3 of this document.
- A demonstration that the event was both not reasonably controllable and not reasonably preventable or was a fireworks display is presented in Section 4 of this document.
- A demonstration that the event was a fireworks display, a natural event, or a human activity that is unlikely to recur at a location is presented in Section 5 of this document.
- A demonstration that the public was promptly notified of the occurrence of the event(s) and the resulting concentrations that may result in the exceedance of an applicable air quality standard is presented in Section 6 of this document.
- A demonstration that Ohio followed the public comment process for the submission of this document, including a copy of all public comments received and Ohio's responses to those comments received, is presented in Section 7 of this document.

2. Narrative Conceptual Model

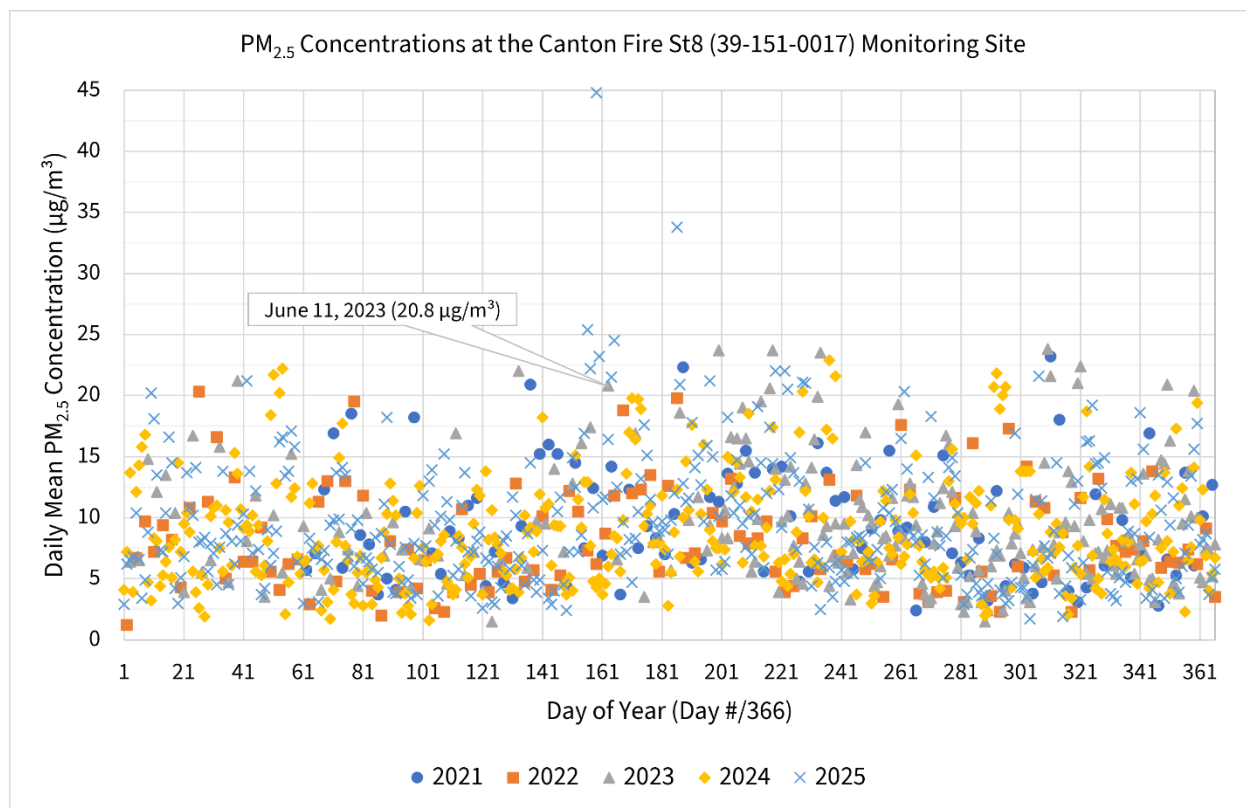
The narrative conceptual models for the nine distinct PM_{2.5} episodes impacting Stark County (covering June 11, July 18, and August 1 and 4-5 in 2023, as well as June 4-5, June 7-8, June 12-13, July 4-5, July 15, and August 15-16 in 2025) are presented in this section. Narrative conceptual models are presented separately for each PM_{2.5} episode.

2.1. Wildfire Smoke-Driven PM_{2.5} Episode on June 11, 2023

2.1.1. Episode Description

Air quality in Stark County, OH was impacted on June 11, 2023, by wildfire smoke entering the region from Quebec. Wildfire smoke plumes impacted Stark County during multiple episodes in the summer of 2023, including the June 11 PM_{2.5} episode. Figure 3 shows the daily average PM_{2.5} concentrations for the years 2021-2025 at the Canton Fire St8 monitoring site in Stark County. This figure illustrates the severity of the wildfire smoke-driven PM_{2.5} episode on June 11, 2023, compared to both other periods of the year and the same period across the past five years. It should be noted this figure excludes data that have previously been requested for exclusion and have regional concurrence.

Figure 3. 2021-2025 daily average PM_{2.5} concentrations at the Canton Fire St8 (39-151-0017) monitoring site in Stark County, with labeled data from the wildfire smoke-driven PM_{2.5} episode on June 11, 2023.



2.1.2. Meteorology

From June 7-11, 2023, two distinct weather patterns collectively transported wildfire smoke from Quebec into Ohio and effectively trapped the wildfire smoke-laden air near the surface. The strong low-pressure system centered over New Brunswick on June 7 continued to produce cyclonic (counterclockwise) flow, fueling a northerly wind transport corridor along its western edge. This flow pattern brought smoke from the wildfires burning west of James Bay in Quebec to Northeastern Ohio, where it descended to the surface. The stationary front along the southern edge of the Great Lakes region caused the air mass to stall, allowing the smoke to build up, resulting in high concentrations of PM_{2.5} at the surface and aloft. By June 9, the stationary front had pushed farther south, and the low-pressure system centered over New Brunswick had largely dissipated as a ridge of high pressure slowly made its way toward Ohio from the west. This ridge of high pressure trapped the transported wildfire smoke over Northeastern Ohio, allowing wildfire smoke lingering aloft to descend toward the surface on June 11, before the smoke was finally pushed out by a cold front that moved into Northeastern Ohio on the evening of June 11. Figure 4 shows the surface weather maps for 07:00 EST on June 7, June 9, and June 11. Figure 5 shows the 500-millibar height contour plots for 07:00 EST on June 7, June 9, and June 11. Figure 6 shows the MODIS Terra corrected reflectance true color satellite imagery with daily detected fire locations shown as red triangles for June 7, June 9, and June 11. Figure 7 shows a map of the HMS smoke polygons and 24-hour average PM_{2.5} concentrations with daily detected fire locations shown as red triangles for June 7, June 9, and June 11.

Figure 4. Surface weather maps for 07:00 EST on June 7 (top), June 9 (middle), and June 11 (bottom), 2023.

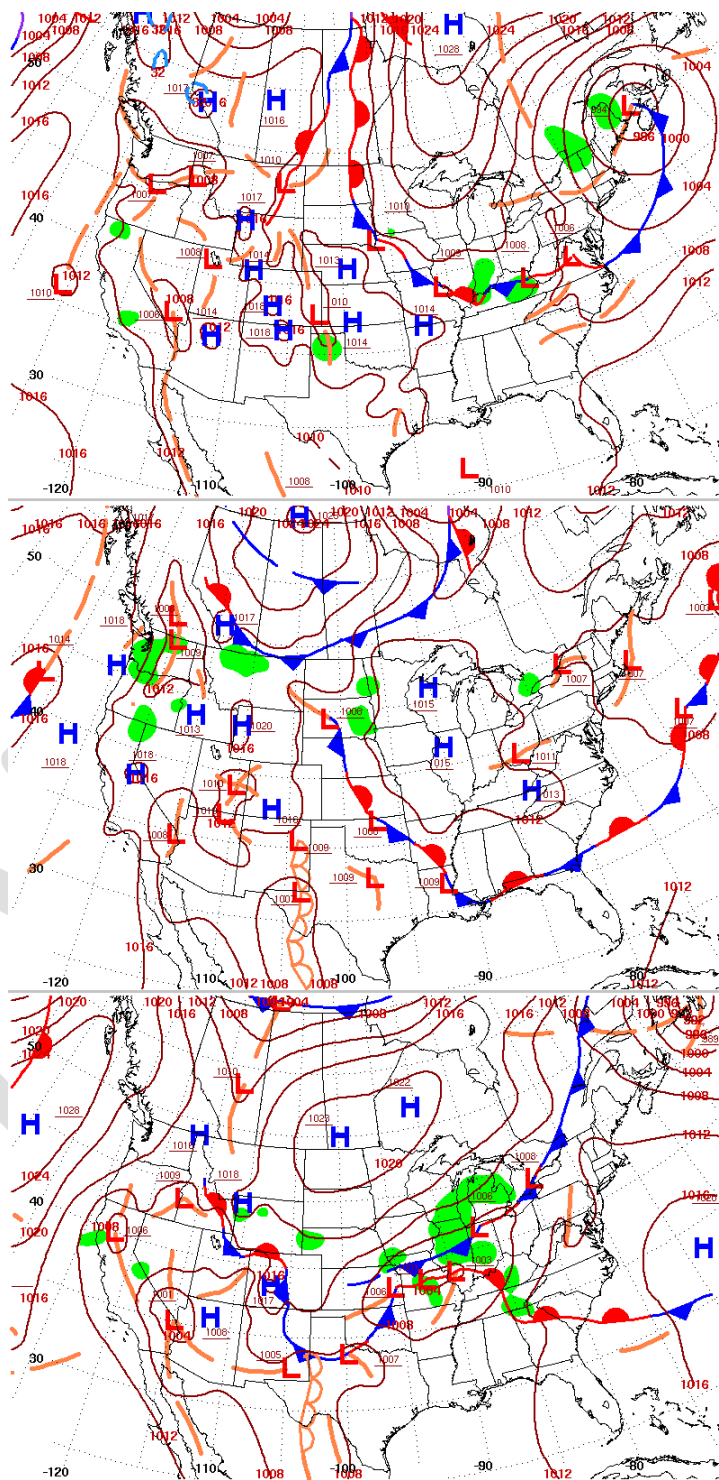


Figure 5. 500-millibar height contour plots for 07:00 EST on June 7 (top), June 9 (middle), and June 11 (bottom), 2023.

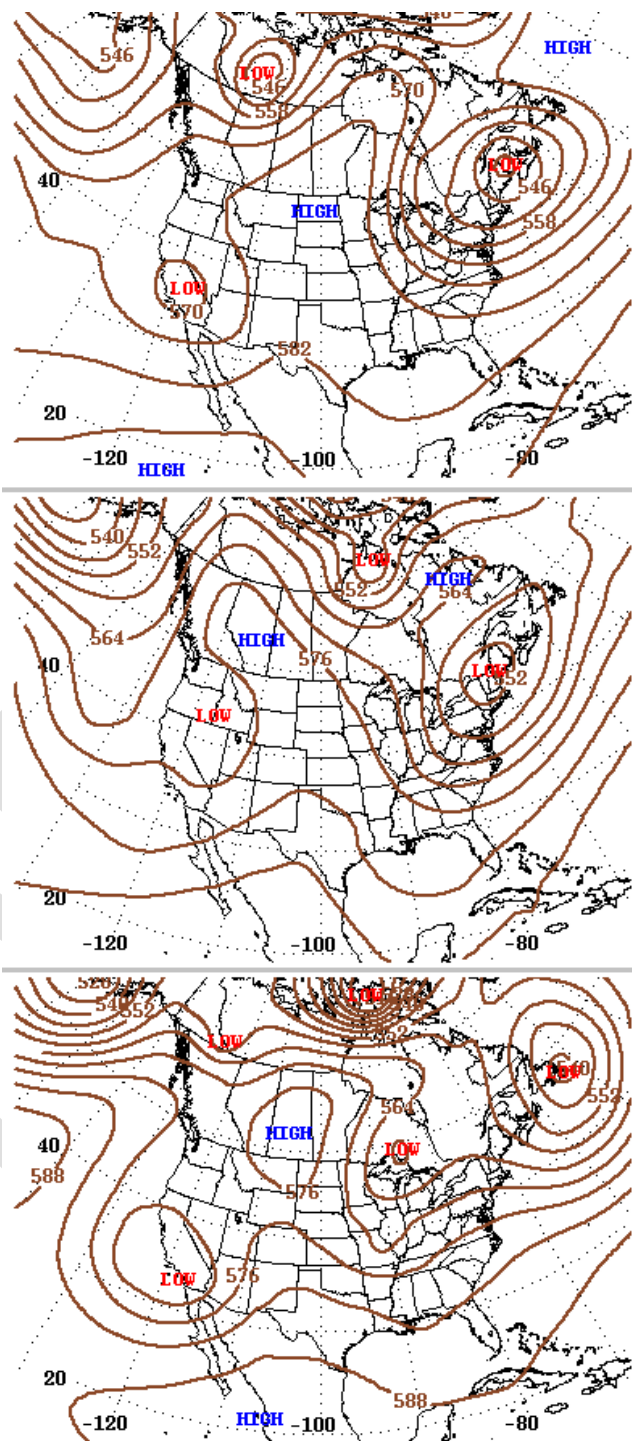


Figure 6. MODIS Terra corrected reflectance true color satellite imagery with daily detected fire locations shown as red triangles for June 7 (top left), June 9 (top right), and June 11 (bottom), 2023.

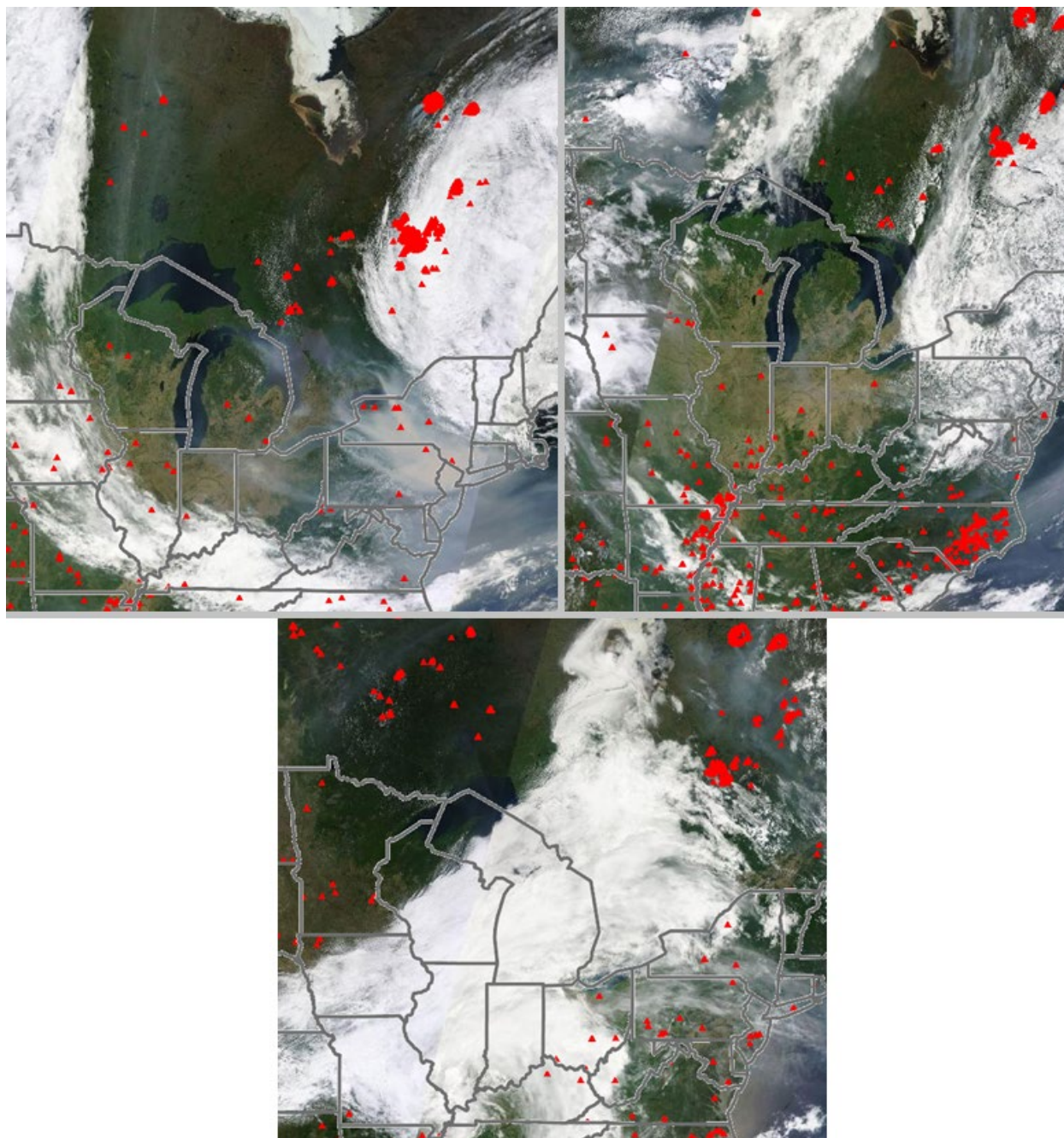
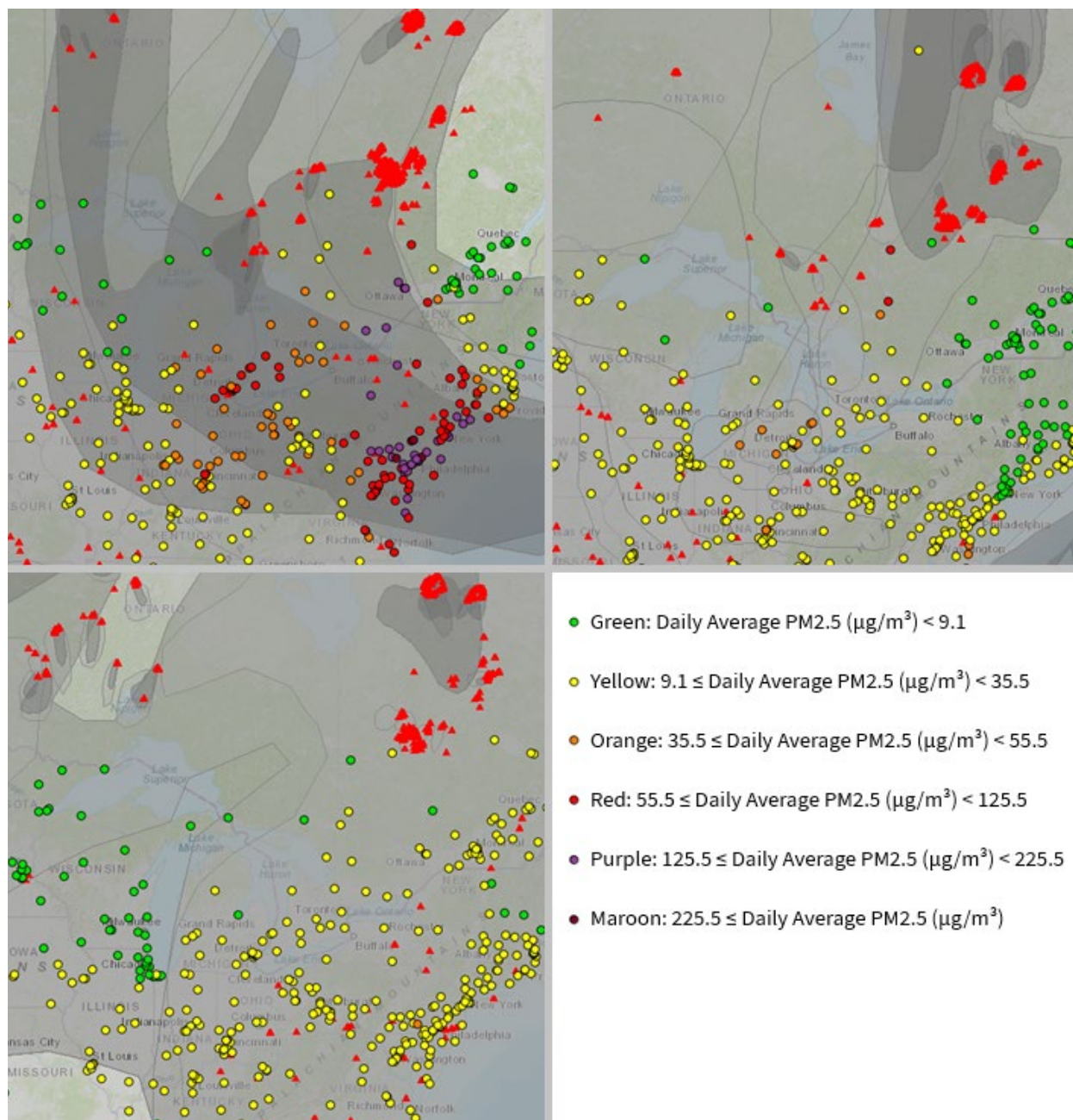


Figure 7. Map of the HMS smoke polygons and 24-hour average PM_{2.5} concentrations with daily detected fire locations shown as red triangles for June 7 (top left), June 9 (top right), and June 11 (bottom), 2023.



2.1.3. Canadian Wildfires

Starting on May 27, 2023, the Canadian Wildland Fire Information System (CWFIS)³ began to report extreme fire danger conditions from the southwest border of Ontario northeast across Quebec to the Gulf of St. Lawrence. The area of Quebec centered around the southern end of James Bay remained almost continuously under high to extreme fire danger through most of the month. On June 2, the Quebec provincial fire-management authority, Société de Protection des Forêts Contre le Feu (SOPFEU⁴), reported to the Canadian Interagency Forest Fire Center (CIFFC) a fire preparedness level 5 for the province, which is the highest alert level in Canada for mobilizing resources to fight wildfires and protect life and structures⁵. The province remained at a level 5 alert continuously until it was lowered to level 4 on July 17. On June 4, the Aviation, Forest Fire, and Emergency Services division of the Ontario Ministry of Natural Resources and Forestry (OMNRF-AFFES)⁶, reported to CIFFC a fire preparedness level 4 for the province⁷, which remained until being lowered to level 3 on July 11.

³ <https://cwfis.cfs.nrcan.gc.ca/home>

⁴ <https://sopfeu.qc.ca/>

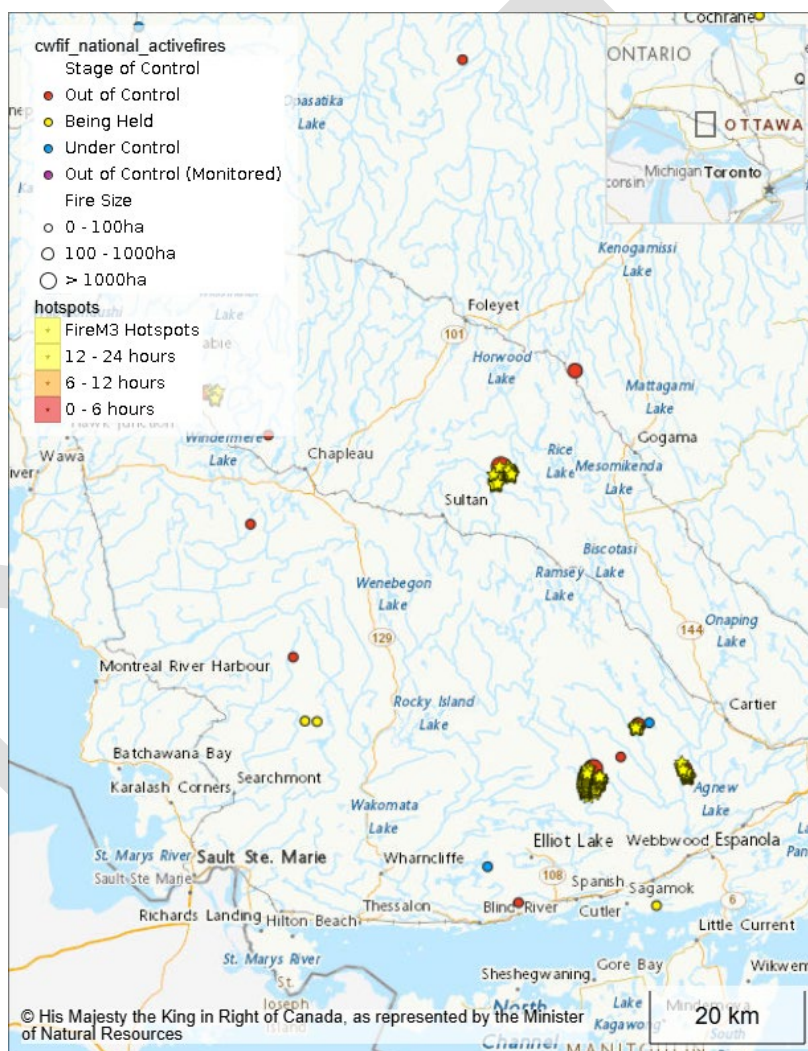
⁵ <https://ciffc.net/situation/2023-06-02>

⁶ <https://www.ontario.ca/page/forest-fire-management>

⁷ <https://ciffc.net/situation/2023-06-04>

Figure 8 is a CWFIS map showing the active wildfires and recent hotspots in central Ontario on June 8, 2023. On June 8 there were at least 52 active fires burning at least 107,826 acres in the province⁸. The smoke plumes arising from the wildfires and recent hotspots east-northeast of Sultan, Ontario on June 8 were located in the source region intersected by the HYSPLIT trajectories shown in Section 3 of this document for the wildfire smoke-driven PM_{2.5} episode on June 11, 2023.

Figure 8. Map from CWFIS of active wildfires (circles) and recent hotspots (stars) in central Ontario on June 8, 2023.



⁸ <https://ciffc.net/situation/2023-06-08>

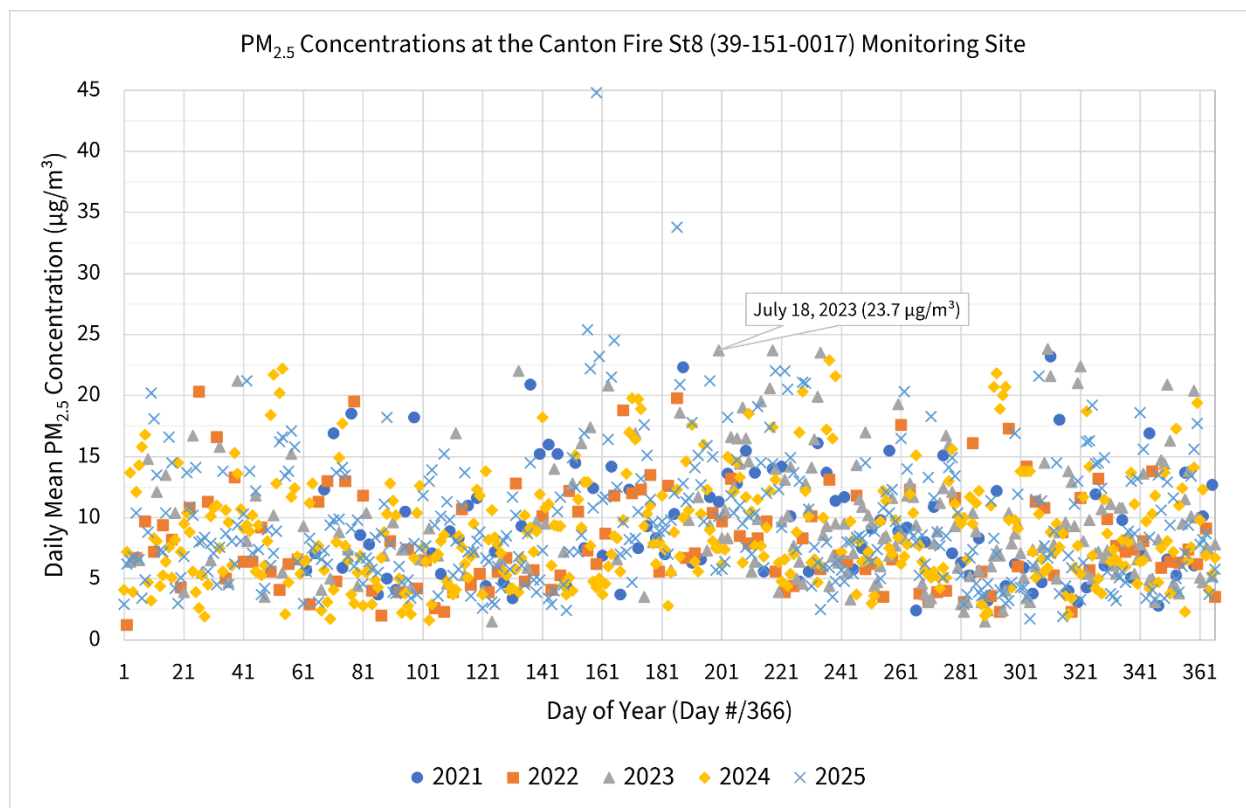
2.2. Wildfire Smoke-Driven PM_{2.5} Episode on July 18, 2023

2.2.1. Episode Description

Air quality in Stark County was impacted from July 16-18, 2023, by wildfire smoke entering the region from northern Alberta. The PM_{2.5} concentration data from July 16-17 were requested for exclusion as part of Ohio's Exceptional Events Demonstration for 2023 Wildfire Smoke-Driven PM_{2.5} Episodes in the Canton–Massillon, OH Metropolitan Statistical Area⁹, and received regional concurrence. Smoke plumes impacted Stark County during multiple episodes in the summer of 2023, including the July 18 episode. Figure 9 shows the daily average PM_{2.5} concentrations for the years 2021-2025 at the Canton Fire St8 monitoring site in Stark County. This figure illustrates the severity of the wildfire smoke-driven PM_{2.5} episode on July 18, 2023, relative to other periods of the year and compared to the same period in the past five years. It should be noted this figure excludes data that have previously been requested for exclusion and have regional concurrence.

⁹ https://dam.assets.ohio.gov/image/upload/epa.ohio.gov/Portals/27/sip/Main-Document-EE-Demo-for-the-Canton_Massillon_-OH-MSA-Submittal.pdf

Figure 9. 2021-2025 daily average PM_{2.5} concentrations at the Canton Fire St8 (39-151-0017) monitoring site in Stark County, with labeled data from the wildfire smoke-driven PM_{2.5} episode on July 18, 2023.



2.2.2. Meteorology

As previously discussed in Ohio's Exceptional Events Demonstration for 2023 Wildfire Smoke-Driven PM_{2.5} Episodes in the Canton–Massillon, OH Metropolitan Statistical Area¹⁰, from July 13-18, 2023, distinct airmass transport patterns connected the Midwest with western Canada and brought smoke into the Ohio Valley, including the Canton–Massillon, OH MSA. Figure 10 shows HMS smoke maps, daily average PM_{2.5} concentrations, satellite imagery, and surface weather maps for July 13-15, 2023, while Figure 11 shows the same for July 16-18, 2023. During July, a cyclonic (counterclockwise) circulation around a large low-pressure system centered on northern Manitoba carried smoke into the Midwest from source regions in northern Alberta, Canada. Thick smoke from the Canadian wildfires was transported along the trailing edge of the low-pressure system as it moved southeast through Ontario and Quebec.

¹⁰ https://dam.assets.ohio.gov/image/upload/epa.ohio.gov/Portals/27/sip/Main-Document-EE-Demo-for-the-Canton_Massillon_-OH-MSA-Submittal.pdf

Figure 10. Daily average PM_{2.5} concentrations overlapped with NOAA's HMS smoke layers (left), daily snapshot of NOAA-20 satellite imagery, and the surface weather map (right) during July 13-15, 2023.

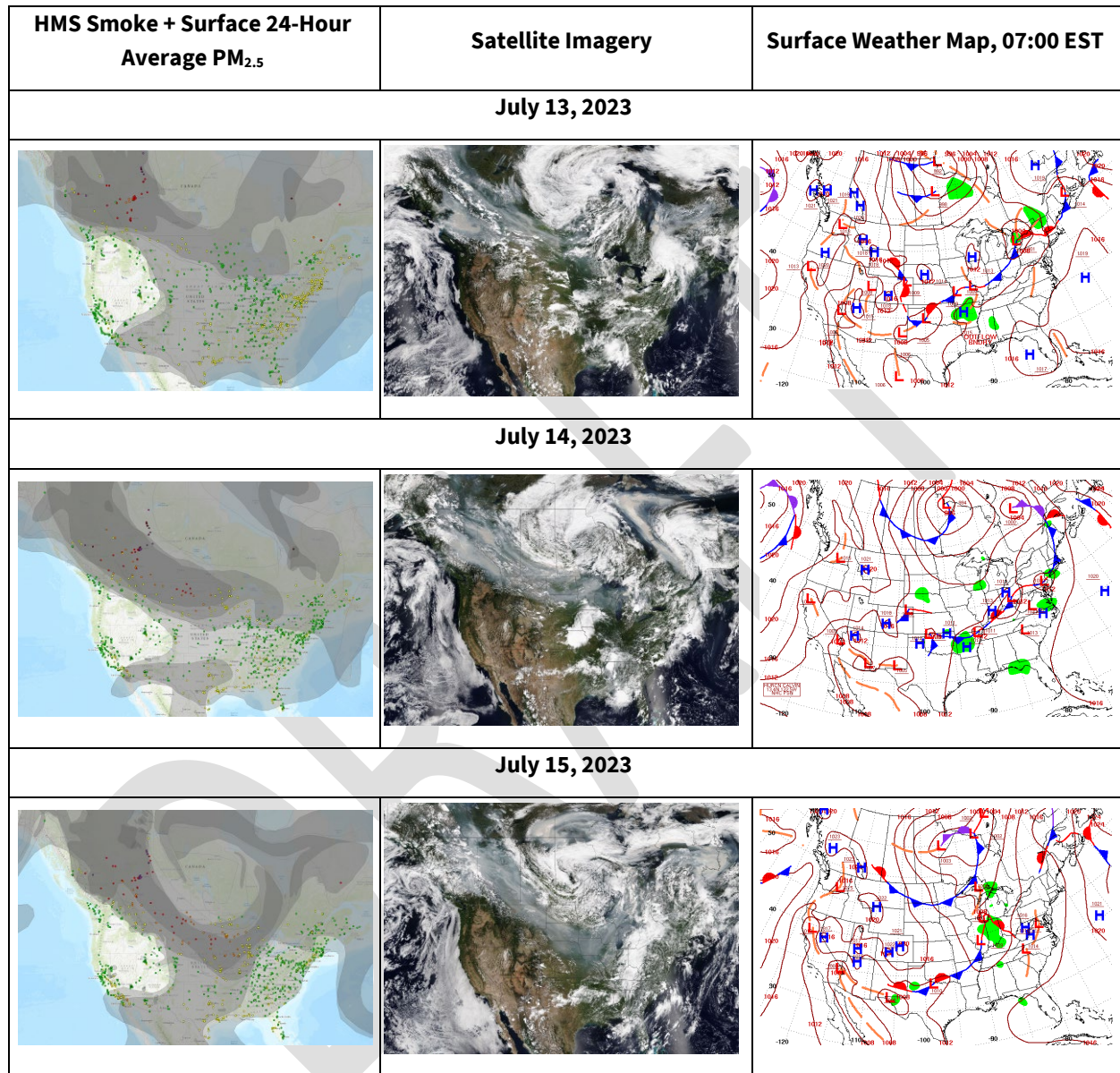
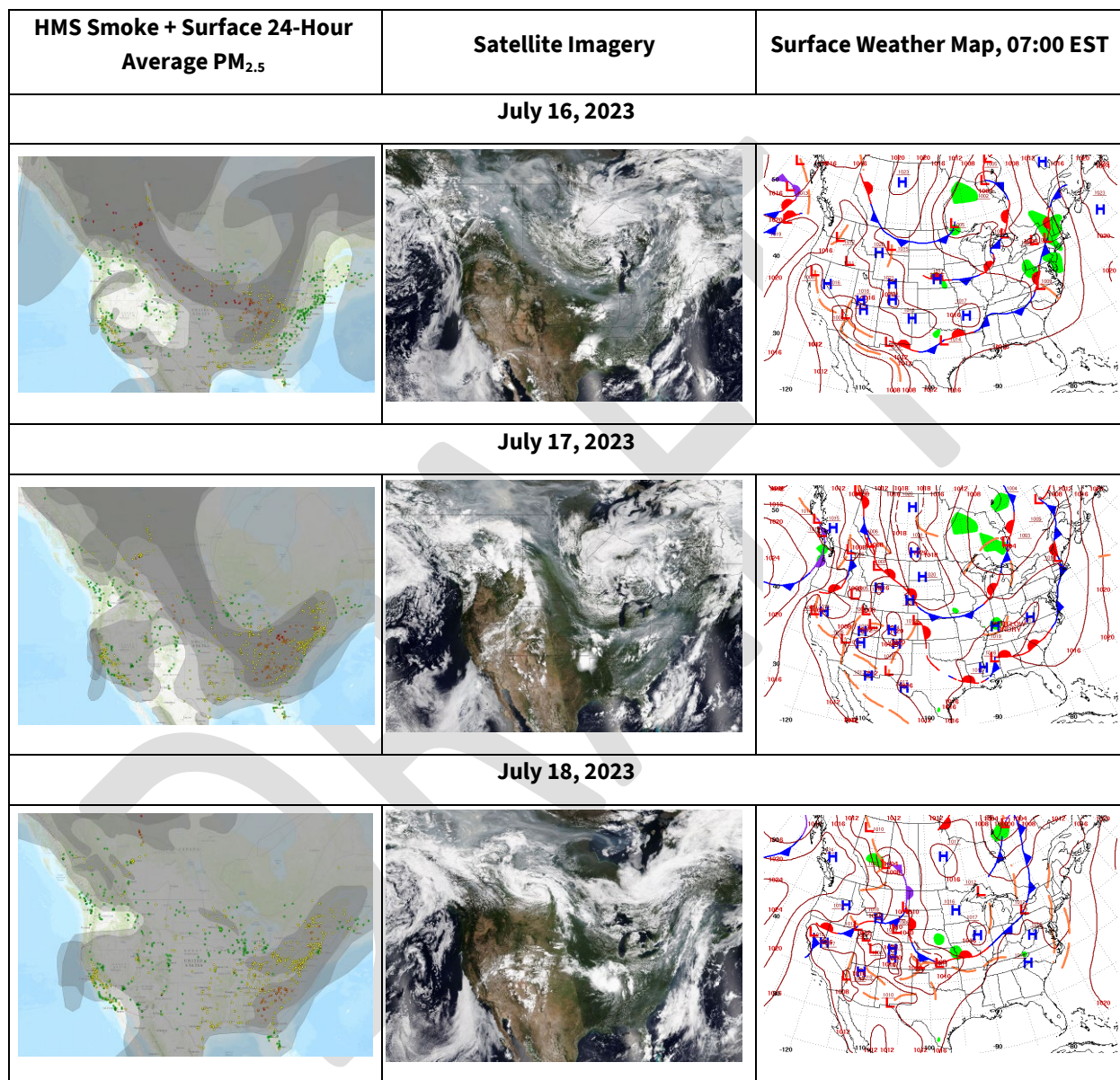


Figure 11. Daily average PM_{2.5} concentrations overlapped with NOAA's Hazard Mapping System (HMS) smoke layers (left), daily snapshot of the NOAA-20 satellite imagery of cloud cover, and the surface weather map (right) during July 16-18, 2023.



An omega block formed in the upper air during July 13-15, which featured two strong low-pressure systems off the coast of British Columbia and over northern Manitoba, blocked by a ridge of high pressure stretching from the Northwest Territories, through British Columbia and Alberta, down to northern Wyoming. This blocking feature, though weakened, remained

through July 17, allowing wildfire smoke from northern Alberta to be transported into the Midwest and the Ohio Valley and accumulate at the surface across the region.

Starting on July 15, 2023, the low-pressure system over Manitoba weakened and moved towards the Great Lakes. As a result, the ridge of high-pressure slowly pushed the trapped wildfire smoke eastward towards the Ohio Valley. This weak high-pressure system stalled on July 16-17 behind a stationary front over the Ohio Valley that trapped the Canadian wildfire smoke over the region, causing high PM_{2.5} concentrations at the surface. By the late evening of July 18, the omega block had dissipated, and a cold front extending from a low-pressure system over James Bay pushed through the northern Ohio Valley, clearing most of the wildfire smoke from the region.

2.2.3. Canadian Wildfires

On June 1, 2023, the Alberta provincial fire management authority, Alberta Wildfire¹¹, reported to CIFFC a fire preparedness level 5 for the province, which is the highest alert level in Canada for mobilizing resources to fight wildfires and protect life and structures¹². The province remained at a level 5 alert continuously until it was lowered on June 20 to level 4, at which it remained until it was again lowered to level 3 on July 29. Starting on July 5, 2023, CWFIS began to report very high and extreme fire danger conditions across most of Mackenzie County and Wood Buffalo National Park in northern Alberta. The area above the 57th parallel in northern Alberta remained almost continuously under high to extreme fire danger through most of the month. On July 2, 2023, the Saskatchewan provincial fire management authority, the Saskatchewan Public Safety Agency¹³, reported to CIFFC a fire preparedness level 3 for the province¹⁴. Saskatchewan remained at a fire preparedness level 3 until it was lowered to level 2 on August 4, 2023. On July 10, 2023, the British Columbia provincial fire management authority, the British Columbia Wildfire Service¹⁵, reported to CIFFC a fire preparedness level 5 for the province¹⁶. British Columbia remained at a fire prepared level 5 until it was lowered to level 4 on September 5, 2023.

¹¹ <https://www.alberta.ca/alberta-wildfire>

¹² <https://ciffc.net/situation/2023-06-01>

¹³ <https://www.saskpublicsafety.ca>

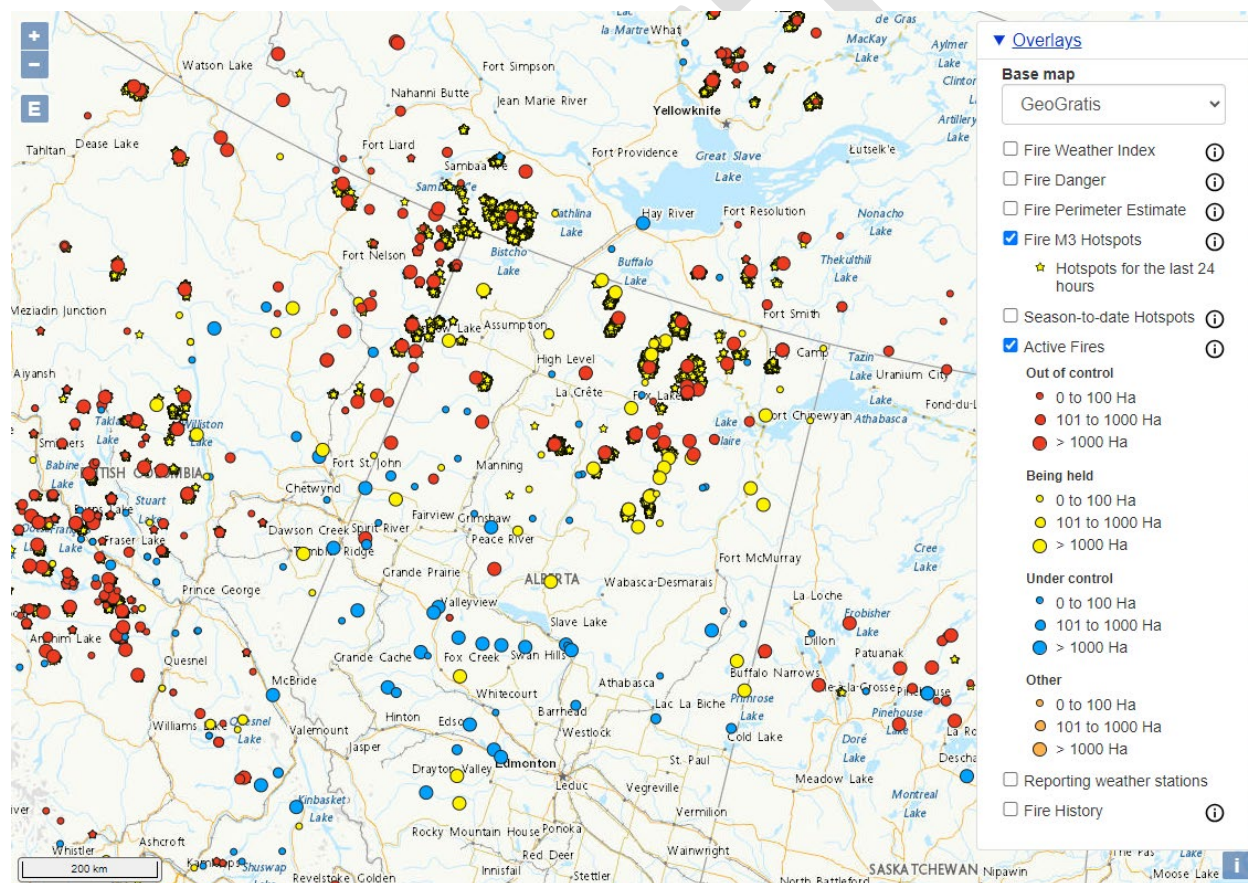
¹⁴ <https://ciffc.net/situation/2023-07-02>

¹⁵ <https://www2.gov.bc.ca/gov/content/safety/wildfire-status>

¹⁶ <https://ciffc.net/situation/2023-07-10>

Figure 12 is a CWFIS map showing the active wildfires and recent hotspots in Alberta and British Columbia on July 14, 2023. On July 14 there were at least 119 active fires burning at least 3,935,763 acres in Alberta, while there were at least 296 active fires burning at least 2,227,668 acres across British Columbia¹⁷. The smoke plumes arising from the wildfires and recent hotspots west of High Level, Alberta on July 14 were located in the source regions intersected by the HYSPLIT trajectories shown in Section 3 of this document for the wildfire smoke-driven PM_{2.5} episode on July 18, 2023.

Figure 12. Map from CWFIS of active wildfires (circles) and recent hotspots (stars) in Alberta and British Columbia on July 14, 2023.



¹⁷ <https://ciffc.net/situation/2023-07-14>

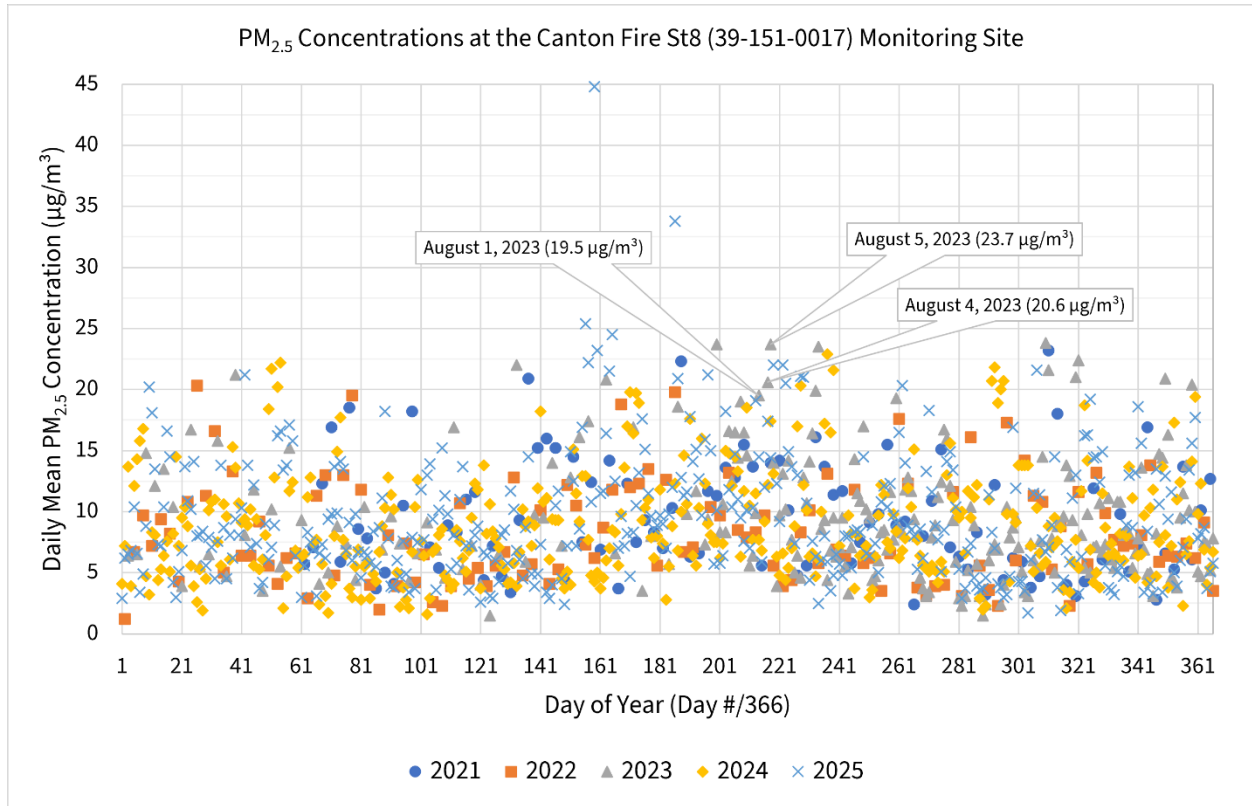
2.3. Wildfire Smoke-Driven PM_{2.5} Episode on August 1-5, 2023

2.3.1. Episode Description

Air quality in Stark County was impacted from August 1-5, 2023, by wildfire smoke entering the region from the area near Lake Athabasca in northwestern Saskatchewan, Canada. Smoke plumes impacted Stark County during multiple episodes in the summer of 2023, including the August 1-5 episode. The portion of this wildfire smoke-driven PM_{2.5} episode from August 2-3 was discussed in Ohio's Exceptional Events Demonstration for 2023 Wildfire Smoke-Driven PM_{2.5} Episodes in the Canton–Massillon, OH Metropolitan Statistical Area¹⁸, and regional concurrence was given for the request for exclusion of PM_{2.5} concentration data from August 2-3. Figure 13 shows the daily average PM_{2.5} concentrations for the years 2021-2025 at the Canton Fire St8 monitoring site in Stark County. This figure illustrates the severity of this wildfire smoke-driven PM_{2.5} episode relative to other periods of the year and compared to the same period in the past five years. Data collected on August 1 and 4-5 during this wildfire smoke-driven PM_{2.5} episode are labeled in the figure. It should be noted this figure excludes data that have previously been requested for exclusion and have regional concurrence.

¹⁸ https://dam.assets.ohio.gov/image/upload/epa.ohio.gov/Portals/27/sip/Main-Documents-EE-Demo-for-the-Canton_Massillon_-OH-MSA-Submittal.pdf

Figure 13. 2021-2025 daily average PM_{2.5} concentrations at the Canton Fire St8 (39-151-0017) monitoring site in Stark County, with labeled data from the August 1 and 4-5 PM_{2.5} episode in 2023.



2.3.2. Meteorology

From July 28 to August 6, 2023, distinct airmass transport patterns connected the Midwest with western Canada and brought wildfire smoke into the Great Lakes region, including the Canton–Massillon, OH MSA. Figure 14 shows HMS smoke maps, daily average PM_{2.5} concentrations, satellite imagery, and surface weather maps for July 31 – August 2, 2023, while Figure 15 shows the same for August 3-5, 2023. On July 28, a large high-pressure system formed over Alberta, picking up wildfire smoke from northern Alberta. Over July 28-30, as the high-pressure system carrying wildfire smoke slowly moved southeast, a large low-pressure system with cyclonic circulation formed over James Bay, creating a wind transport corridor between the two systems for wildfire smoke to travel from northern Alberta down toward the Great Lakes. By August 1, the wildfire smoke following this wind transport corridor had covered the Great Lakes region and slowly moved eastward through August 4, when a cold front from a separate low-pressure system that formed east of James Bay largely began to push the wildfire smoke out from the western Great Lakes region. Lingering wildfire smoke persisted aloft in Northeastern Ohio and the eastern Great Lakes region, continually descending toward the surface and mixing until finally dissipating in the afternoon of August 6.

Figure 14. Daily average PM_{2.5} concentrations overlapped with NOAA’s HMS smoke layers (left), daily snapshot of NOAA-20 satellite imagery, and the surface weather map (right) during July 31 – August 2, 2023.

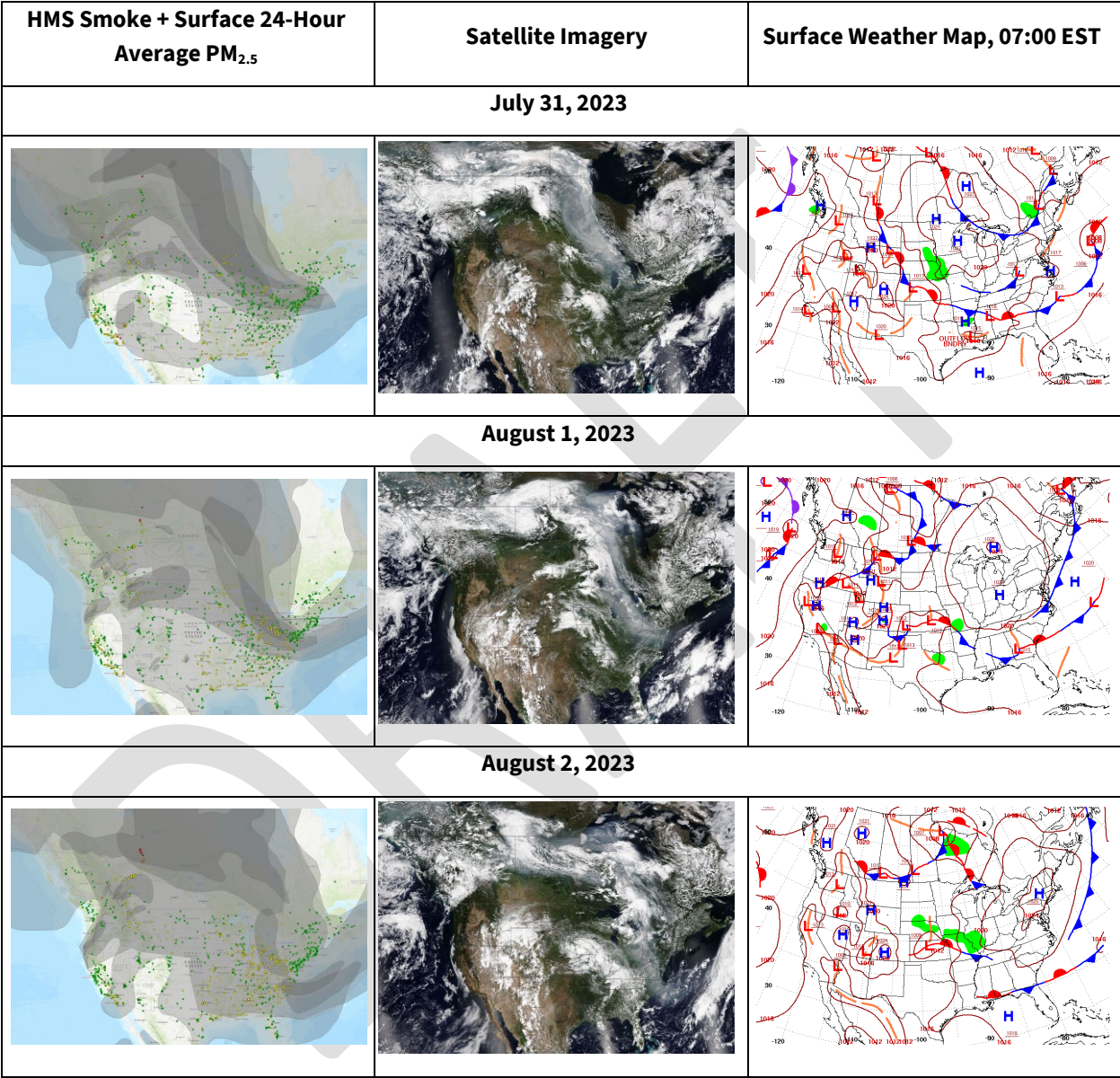
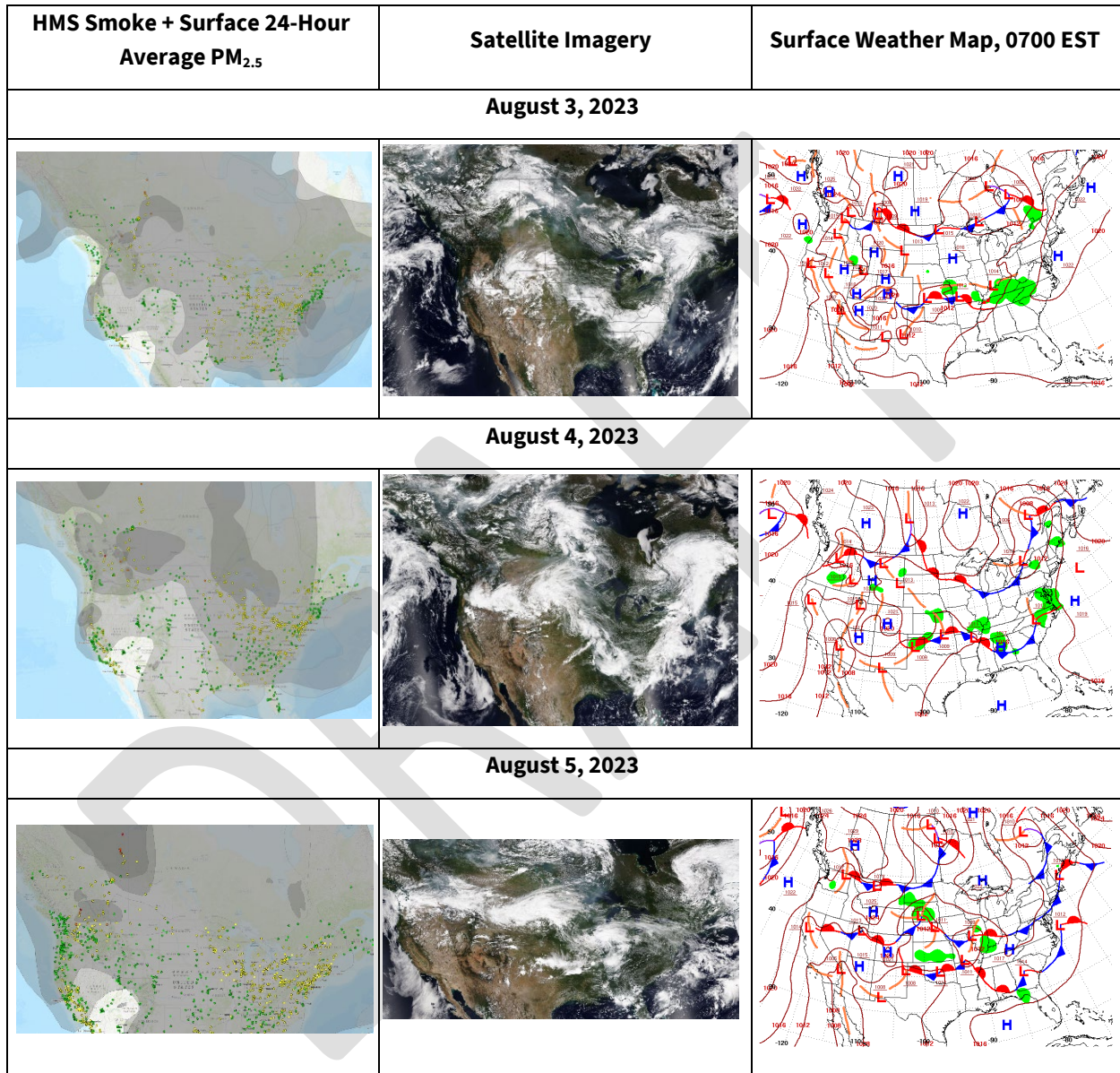


Figure 15. Daily average PM_{2.5} concentrations overlapped with NOAA's HMS smoke layers (left), daily snapshot of the NOAA-20 satellite imagery of cloud cover, and the surface weather map (right) during August 3-5, 2023.



2.3.3. Canadian Wildfires

Throughout July 2023, the Saskatchewan Public Safety Agency reported¹⁹ to CIFFC a fire preparedness level of 3 or higher for the province²⁰. From July 27 to August 4, 2023, the Manitoba provincial fire management authority, the Manitoba Wildfire Service²¹, reported²² to CIFFC a fire preparedness level 3 for the province²³. From July 22-30, 2023, CWFIS reported²⁴ high, very high, or extreme fire danger conditions in northern Saskatchewan²⁵.

¹⁹ <https://ciffc.net/situation/2023-07-01>

²⁰ <https://ciffc.net/situation/2023-07-31>

²¹ https://www.gov.mb.ca/nrnd/wildfire_program/index.html

²² <https://ciffc.net/situation/2023-07-27>

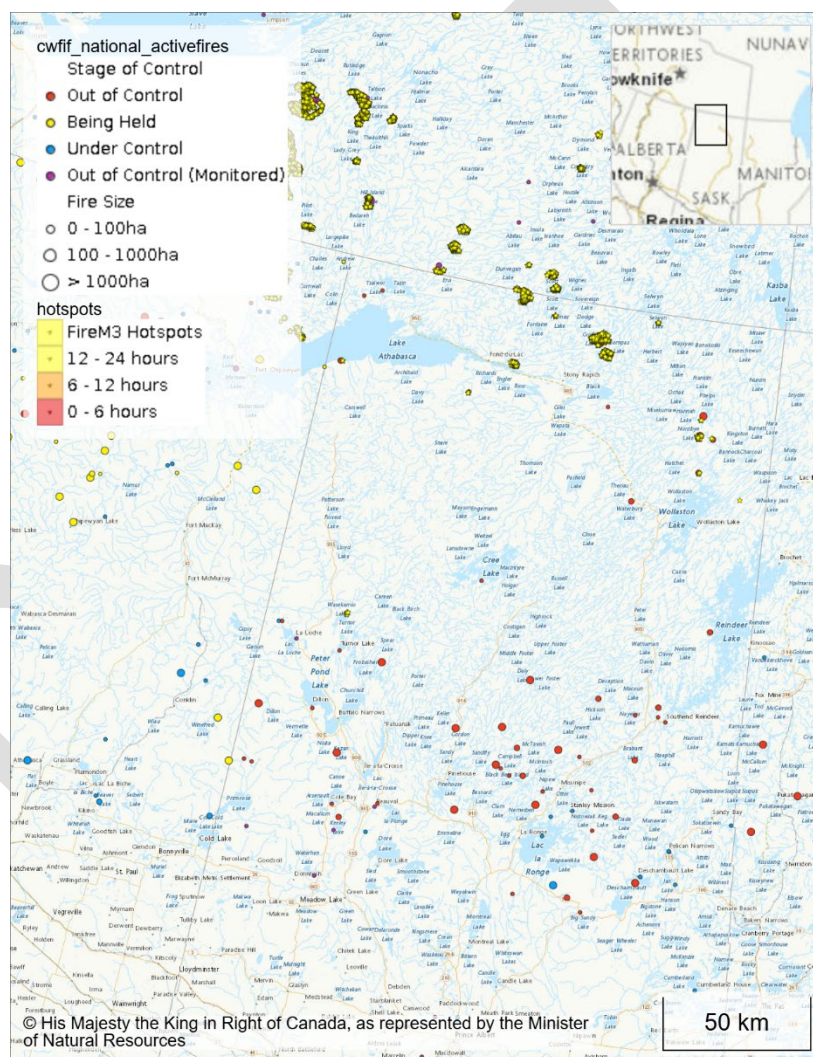
²³ <https://ciffc.net/situation/2023-08-04>

²⁴ <https://ciffc.net/situation/2023-07-22>

²⁵ <https://ciffc.net/situation/2023-07-30>

Figure 16 is a CWFIS map showing the active wildfires and recent hotspots in northern Saskatchewan on July 27, 2023. On July 27 there were at least 12 active wildfires burning at least 353,525 acres across Saskatchewan²⁶. The smoke plumes arising from the wildfires and recent hotspots north of Wollaston Lake, Saskatchewan on July 27 were located in the source regions intersected by the HYSPLIT trajectories shown in Section 3 of this document for the wildfire smoke-driven PM_{2.5} episode on August 1, 2023.

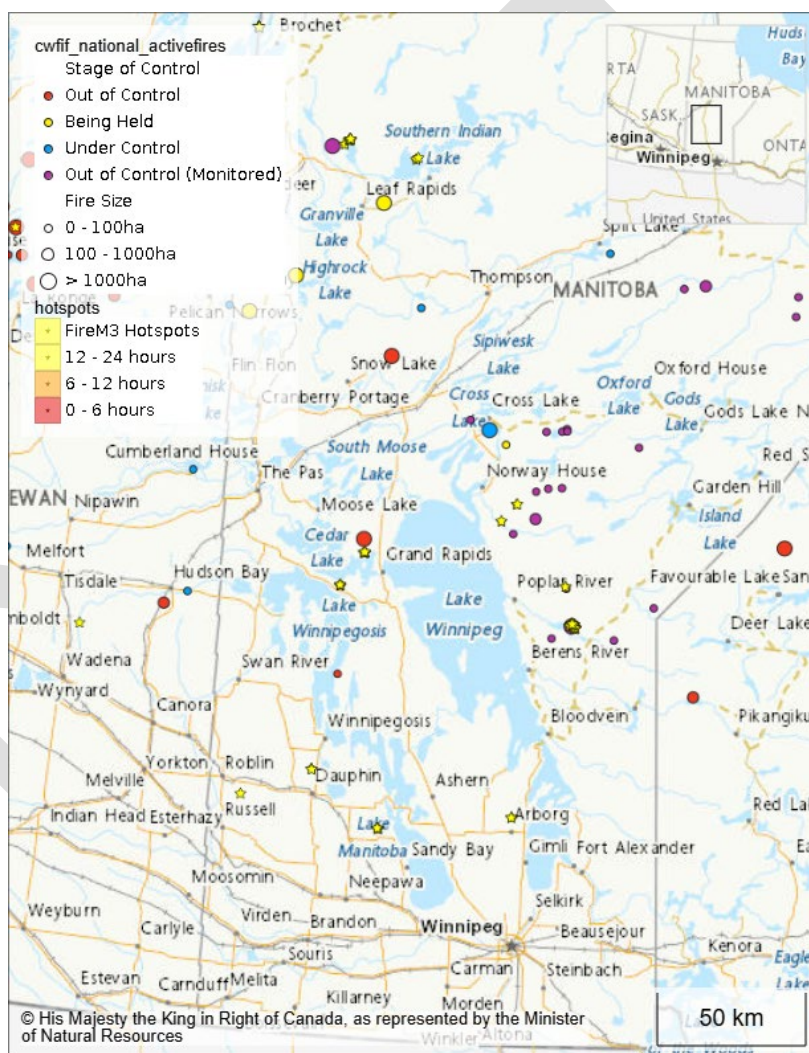
Figure 16. Map from CWFIS of active wildfires (circles) and recent hotspots (stars) in northern Saskatchewan on July 27, 2023.



²⁶ <https://ciffc.net/situation/2023-07-27>

Figure 17 is a CWFIS map showing the active wildfires and recent hotspots in Manitoba on July 31, 2023. On July 31 there were at least 9 active wildfires burning at least 103,765 acres across Manitoba²⁷. The smoke plumes arising from the wildfires and recent hotspots east-southeast of Poplar River, Manitoba on July 31 were located in the source regions intersected by the HYSPLIT trajectories shown in Section 3 of this document for the wildfire smoke-driven PM_{2.5} episode on August 4, 2023.

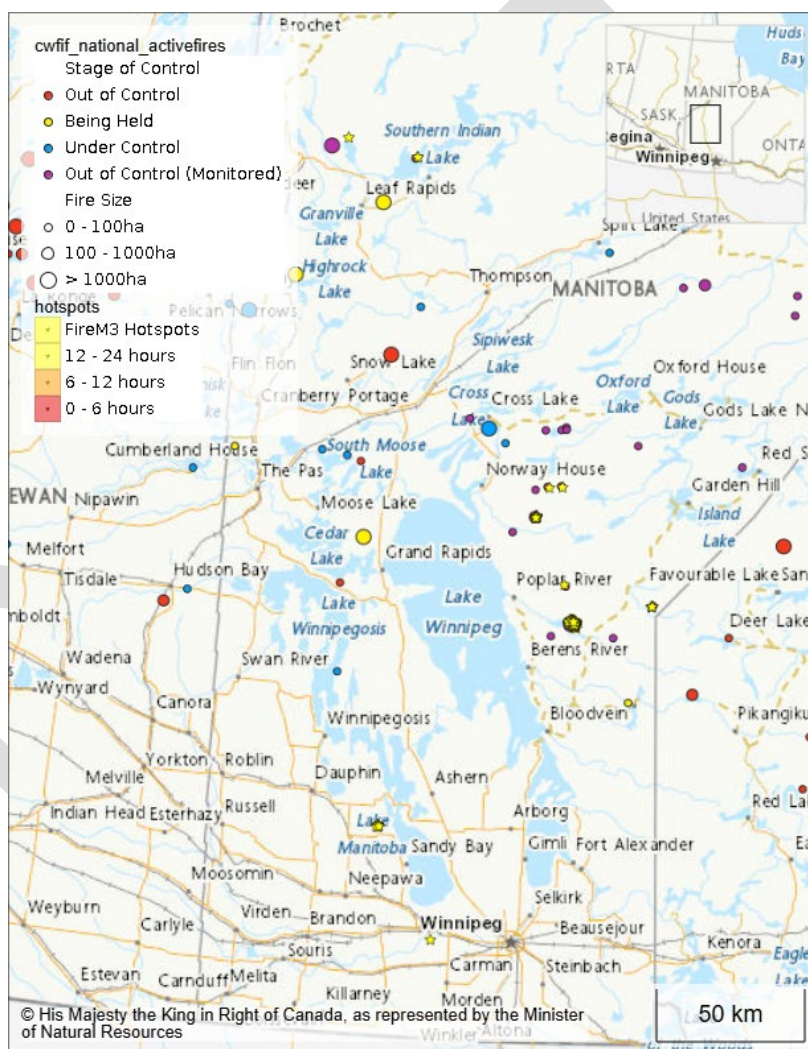
Figure 17. Map from CWFIS of active wildfires (circles) and recent hotspots (stars) in Manitoba on July 31, 2023.



²⁷ <https://ciffc.net/situation/2023-07-31>

Figure 18 is a CWFIS map showing the active wildfires and recent hotspots in Manitoba on August 2, 2023. On August 2 there were at least 14 active wildfires burning at least 103,782 acres across Manitoba²⁸. The smoke plumes arising from the wildfires and recent hotspots east-southeast of Poplar River, Manitoba on August 2 were located in the source regions intersected by the HYSPLIT trajectories shown in Section 3 of this document for the wildfire smoke-driven PM_{2.5} episode on August 5, 2023.

Figure 18. Map from CWFIS of active wildfires (circles) and recent hotspots (stars) in Manitoba on August 2, 2023.



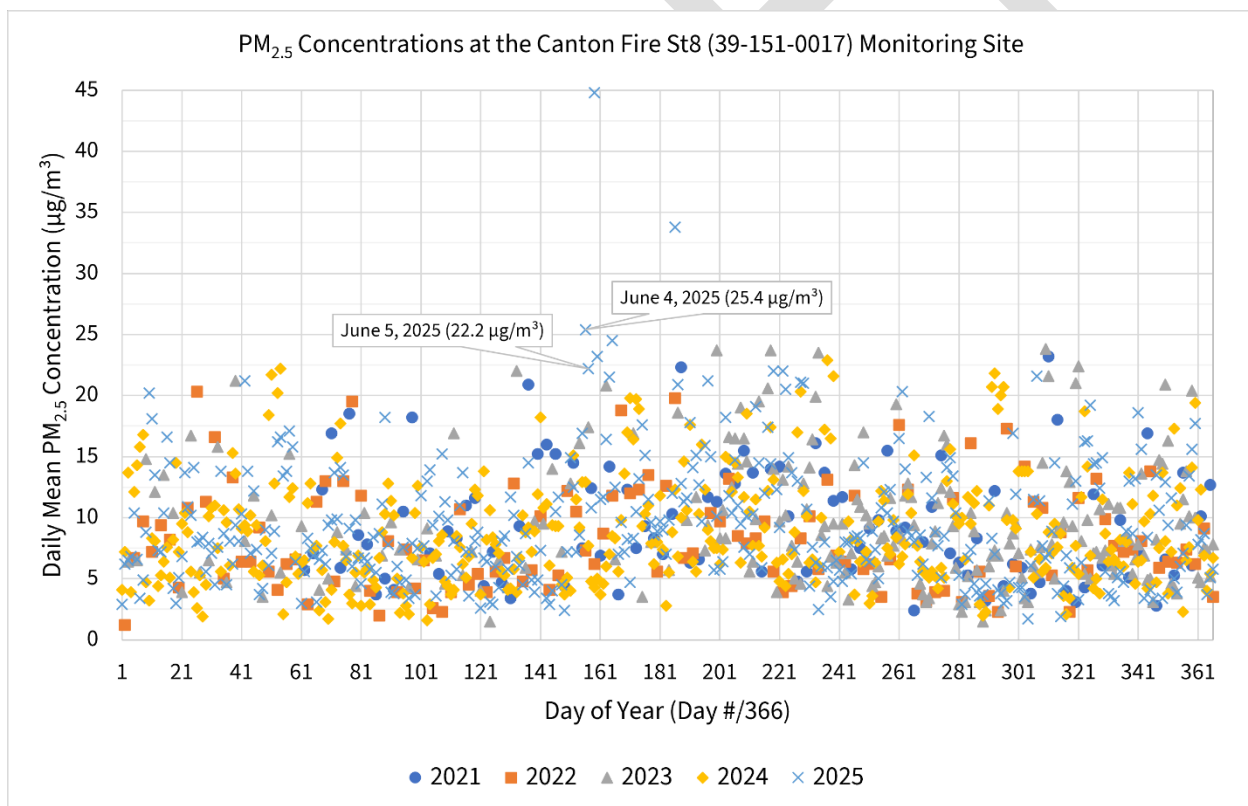
²⁸ <https://ciffc.net/situation/2023-08-02>

2.4. Wildfire Smoke-Driven $PM_{2.5}$ Episode on June 4-5, 2025

2.4.1. Episode Description

Air quality in Stark County was impacted from June 4-5, 2025, by wildfire smoke entering the region from wildfires burning in western Ontario, southeastern Manitoba, and western Manitoba. Figure 19 shows the daily average $PM_{2.5}$ concentrations for the years 2021-2025 at the Canton Fire St8 monitoring site in Stark County. This figure illustrates the severity of this wildfire smoke-driven $PM_{2.5}$ episode relative to other periods of the year and compared to the same period in the past five years. Data collected on June 4-5 during this wildfire smoke-driven $PM_{2.5}$ episode are labeled in the figure. It should be noted this figure excludes data that have previously been requested for exclusion and have regional concurrence.

Figure 19. 2021-2025 daily average $PM_{2.5}$ concentrations at the Canton Fire St8 (39-151-0017) monitoring site in Stark County, with labeled data from the June 4-5 $PM_{2.5}$ episode in 2025.



2.4.2. Meteorology

From May 29 to June 5, 2025, a combination of weather patterns collectively transported wildfire smoke from central Saskatchewan, western and southeastern Manitoba, and western Ontario into Ohio and effectively trapped the wildfire smoke-laden air near the surface over several days. On May 29, an omega block had formed, with a ridge of high pressure stretching from Utah to northern Saskatchewan, with low-pressure systems off the coast of British Columbia and over southern Ontario. A stationary front from northern Alberta to James Bay allowed smoke from these wildfires to build up and slowly be transported to the southeast along the eastern edge of the ridge of high pressure. By June 1, the stationary front had pushed wildfire smoke south into the Great Lakes region while the strong low-pressure system had moved eastward to Quebec and New Brunswick. By June 3, the stationary front still continued to slowly push south as a low-pressure system formed over northern Manitoba, while the weakened ridge of high pressure stalled over the Ohio River Valley with a low-pressure system to the west off the coast of New England, trapping the transported wildfire smoke both aloft and near the surface across the Midwest and Mid-Atlantic regions. The high-pressure ridge remained in place through June 5, slowly weakening but still trapping transported wildfire smoke near the surface in Eastern Ohio, until a front bringing heavy precipitation finally pushed through in the late evening of June 5. Figure 20 shows the surface weather maps for 07:00 EST on May 29, June 1, June 4, and June 5. Figure 21 shows the 500-millibar height contour plots for 07:00 EST on May 29, June 1, June 4, and June 5. Figure 22 shows the MODIS Terra corrected reflectance true color satellite imagery with daily detected fire locations shown as red triangles for May 29, June 1, June 4, and June 5. Figure 23 shows a map of the HMS smoke polygons and 24-hour average PM_{2.5} concentrations with daily detected fire locations shown as red triangles for May 29, June 1, June 4, and June 5.

Figure 20. Surface weather maps for 07:00 EST on May 29 (top left), June 1 (top right), June 4 (bottom left), and June 5 (bottom right), 2025.

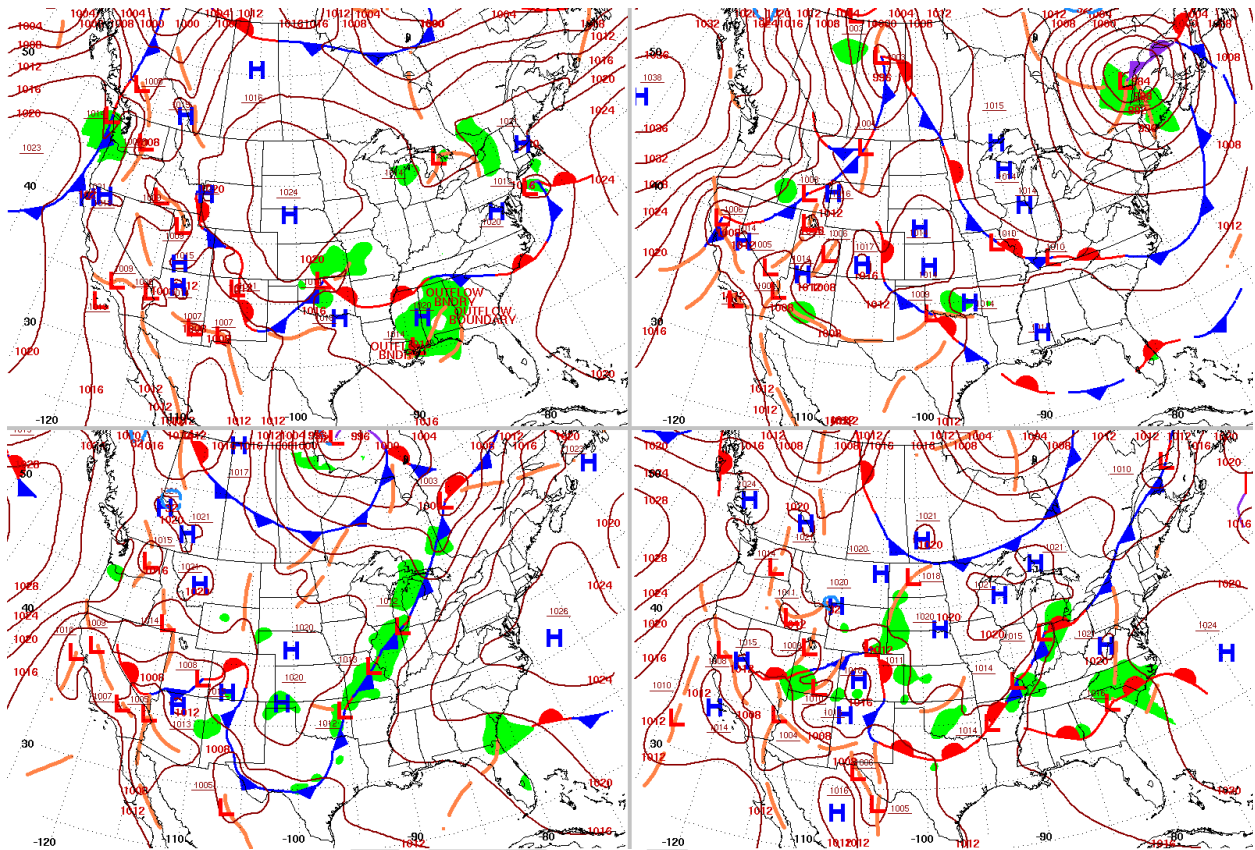


Figure 21. 500-millibar height contour plots for 07:00 EST on May 29 (top left), June 1 (top right), June 4 (bottom left), and June 5 (bottom right), 2025.

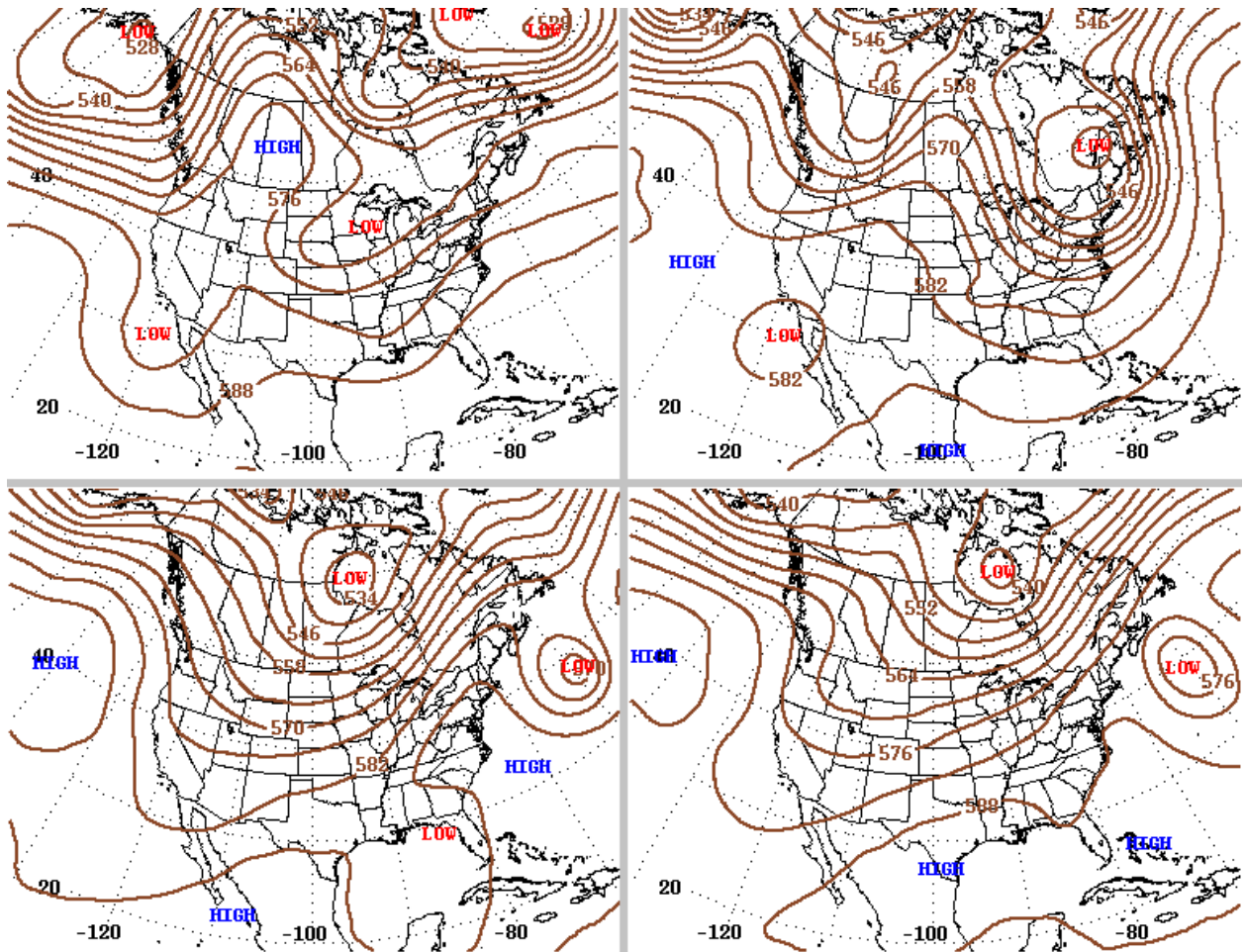


Figure 22. MODIS Terra corrected reflectance true color satellite imagery with daily detected fire locations shown as red triangles for May 29 (top left), June 1 (top right), June 4 (bottom left), and June 5 (bottom right), 2025.

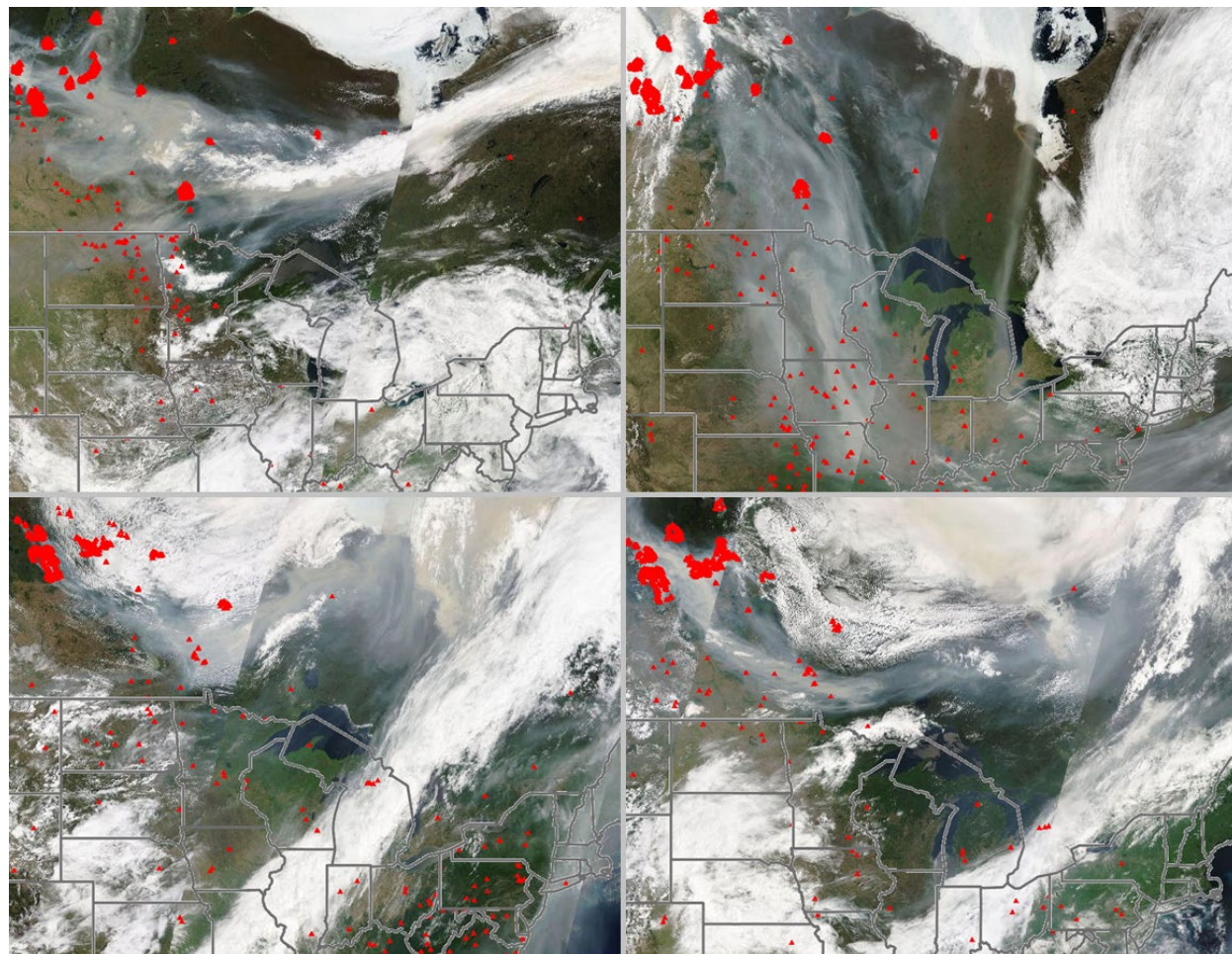
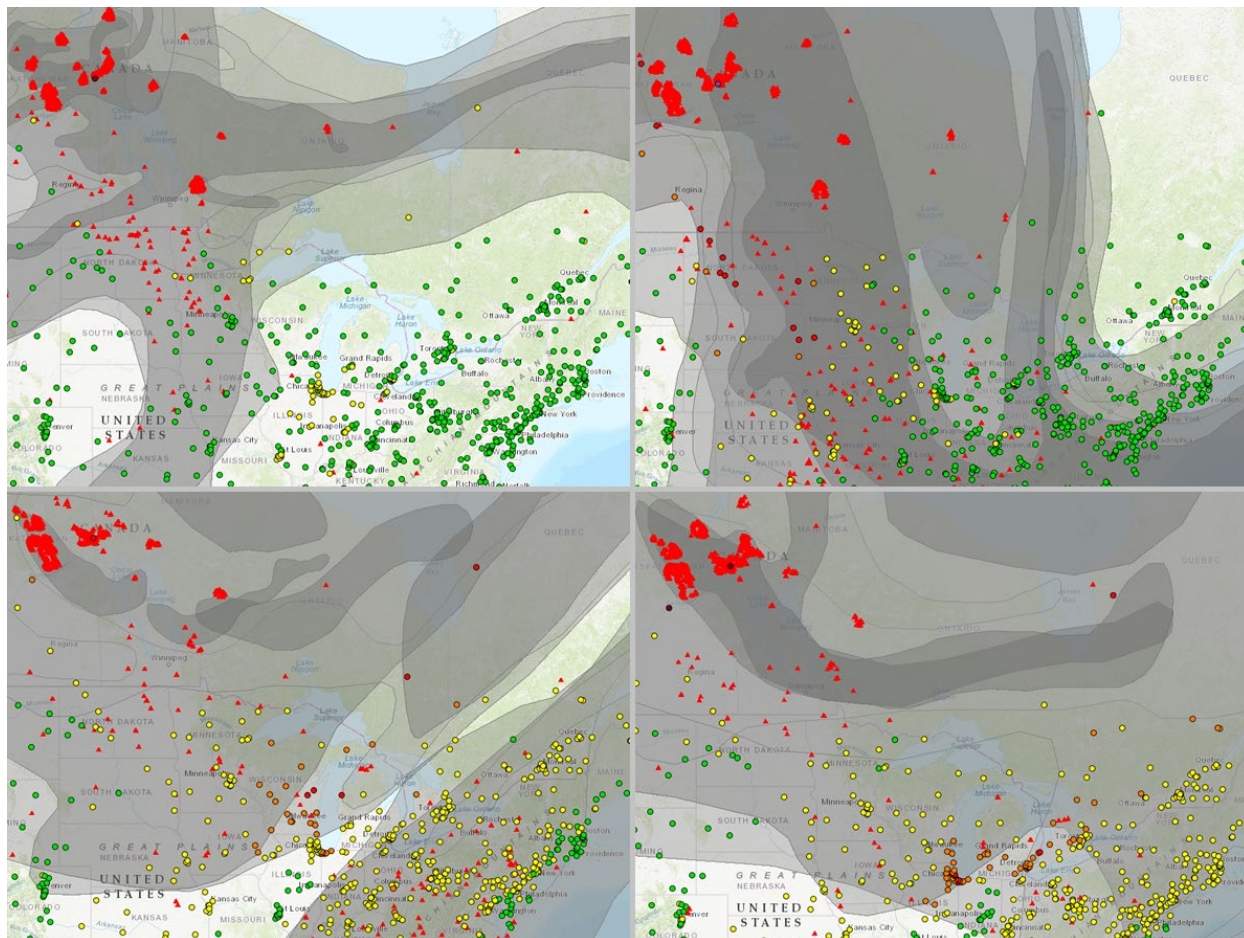


Figure 23. Map of the HMS smoke polygons and 24-hour average PM_{2.5} concentrations with daily detected fire locations shown as red triangles for May 29 (top left), June 1 (top right), June 4 (bottom left), and June 5 (bottom right), 2025.



2.4.3. Canadian Wildfires

From May 18 to May 30, 2025, OMNRF-AFFES reported²⁹ to CIFFC a fire preparedness level of 3 for the province³⁰. On May 31, 2025, this was raised to fire preparedness level 4 for Ontario³¹, where it remained until being lowered to level 3 on June 16, 2025³². Throughout this period, CWFIS reported very high and extreme fire danger conditions were also reported during this period for most of western Ontario.

²⁹ <https://ciffc.net/situation/2025-05-18>

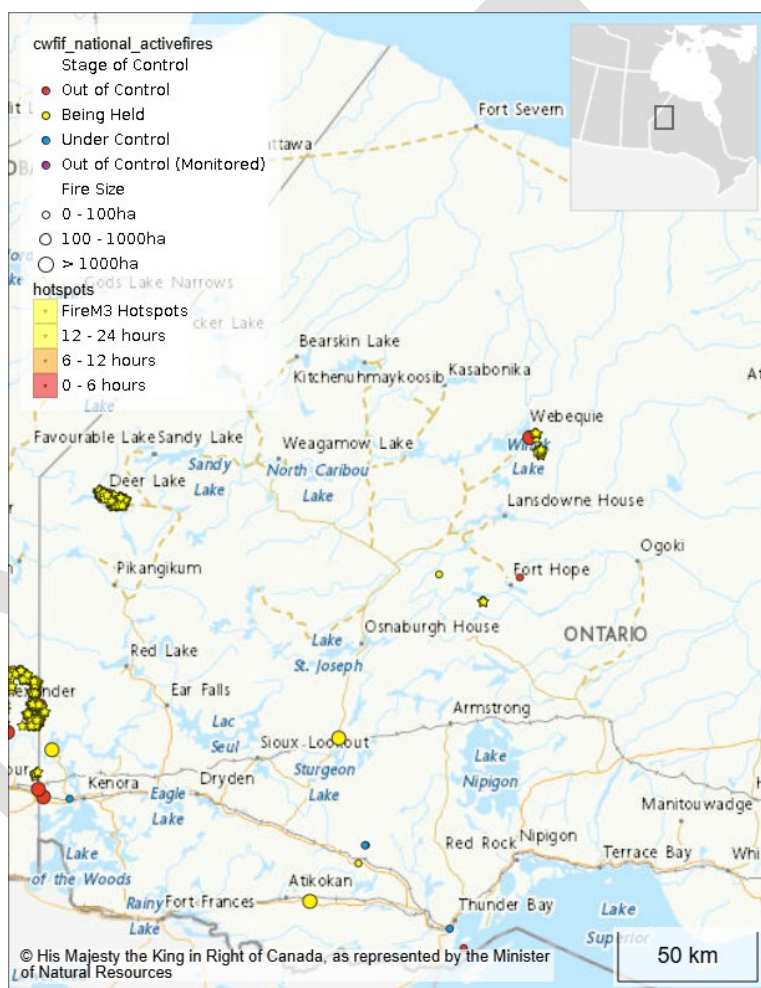
³⁰ <https://ciffc.net/situation/2025-05-30>

³¹ <https://ciffc.net/situation/2025-05-31>

³² <https://ciffc.net/situation/2025-06-16>

Figure 24 is a CWFIS map showing the active wildfires and recent hotspots in western Ontario on May 31, 2025. On May 31, there were at least 15 active wildfires burning at least 148,479 acres across Ontario³³. The smoke plumes arising from these wildfires and recent hotspots near Webequie, Ontario on May 31 were located in the source regions intersected by the HYSPLIT trajectories shown in Section 3 of this document for the wildfire smoke-driven PM_{2.5} episode from June 4-5, 2025.

Figure 24. Map from CWFIS of active wildfires (circles) and recent hotspots (stars) in western Ontario on May 31, 2025.



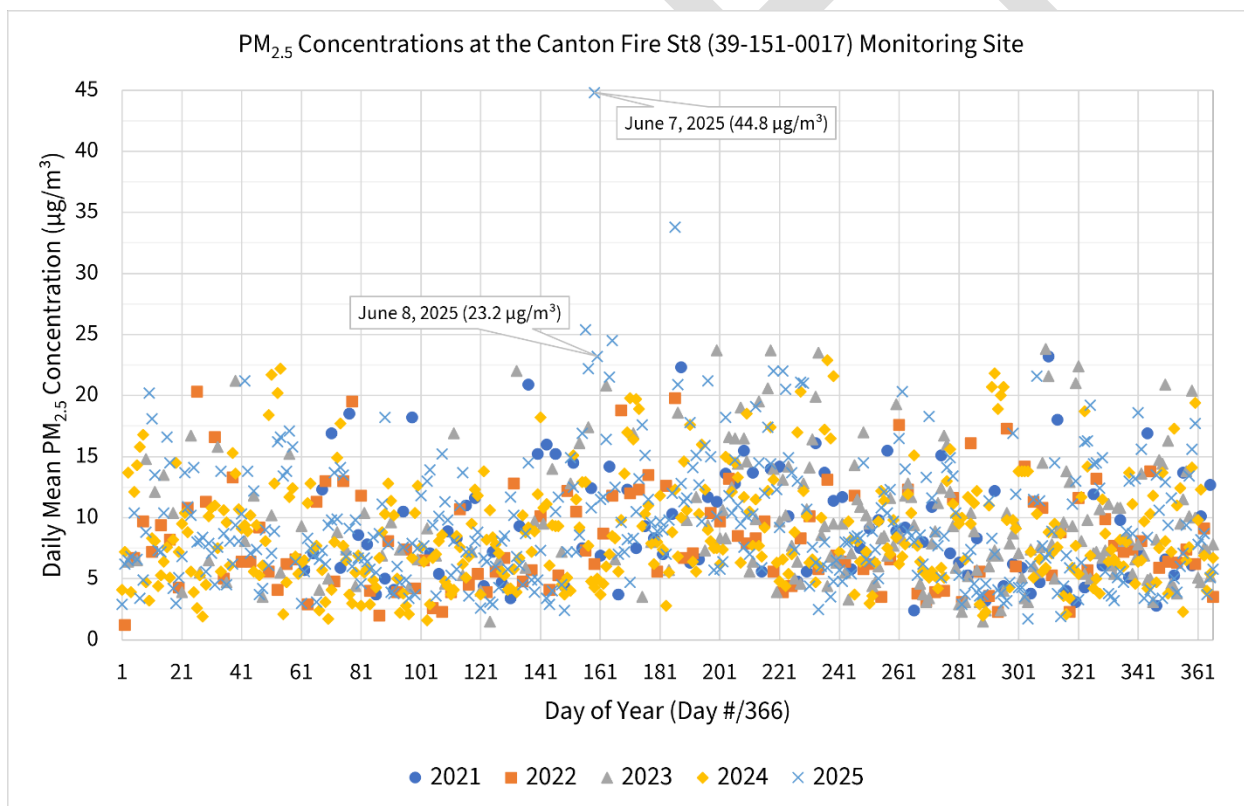
³³ <https://ciffc.net/situation/2025-05-31>

2.5. Wildfire Smoke-Driven $PM_{2.5}$ Episode on June 7-8, 2025

2.5.1. Episode Description

Air quality in Stark County was impacted from June 7-8, 2025, by wildfire smoke entering the region from wildfires burning in Saskatchewan and British Columbia. Figure 25 shows the daily average $PM_{2.5}$ concentrations for the years 2021-2025 at the Canton Fire St8 monitoring site in Stark County. This figure illustrates the severity of this wildfire smoke-driven $PM_{2.5}$ episode relative to other periods of the year and compared to the same period in the past five years. Data collected on June 7-8 during this wildfire smoke-driven $PM_{2.5}$ episode are labeled in the figure. It should be noted this figure excludes data that have previously been requested for exclusion and have regional concurrence.

Figure 25. 2021-2025 daily average $PM_{2.5}$ concentrations at the Canton Fire St8 (39-151-0017) monitoring site in Stark County, with labeled data from the June 7-8 $PM_{2.5}$ episode in 2025.



2.5.2. Meteorology

On June 6, 2025, a stationary front stretching from northern Saskatchewan down to Lake Superior and over to Quebec allowed smoke from wildfires burning in Saskatchewan and British Columbia to build up and slowly be transported to the southeast along the weakened eastern edge of the pre-existing ridge of high pressure. By June 7, the stationary front carrying wildfire smoke had moved down into the Midwest, while a low-pressure system formed over central Saskatchewan. On June 8, the stationary front carrying wildfire smoke had stalled over Ohio, keeping wildfire smoke trapped near the surface, while the low-pressure system had slowly pushed over to southern Manitoba. On June 9, the front associated with the low-pressure system, now centered over Minnesota, reached Northern Ohio and began to push out the lingering wildfire smoke near the surface. Figure 26 shows the surface weather maps for 07:00 EST on June 6-9, 2025. Figure 27 shows the 500-millibar height contour plots for 07:00 EST on June 6-9, 2025. Figure 28 shows the MODIS Terra corrected reflectance true color satellite imagery with daily detected fire locations shown as red triangles for June 6-9, 2025. Figure 29 shows a map of the HMS smoke polygons and 24-hour average PM_{2.5} concentrations with daily detected fire locations shown as red triangles for June 6-9, 2025.

Figure 26. Surface weather maps for 07:00 EST on June 6 (top left), June 7 (top right), June 8 (bottom left), and June 9 (bottom right), 2025.

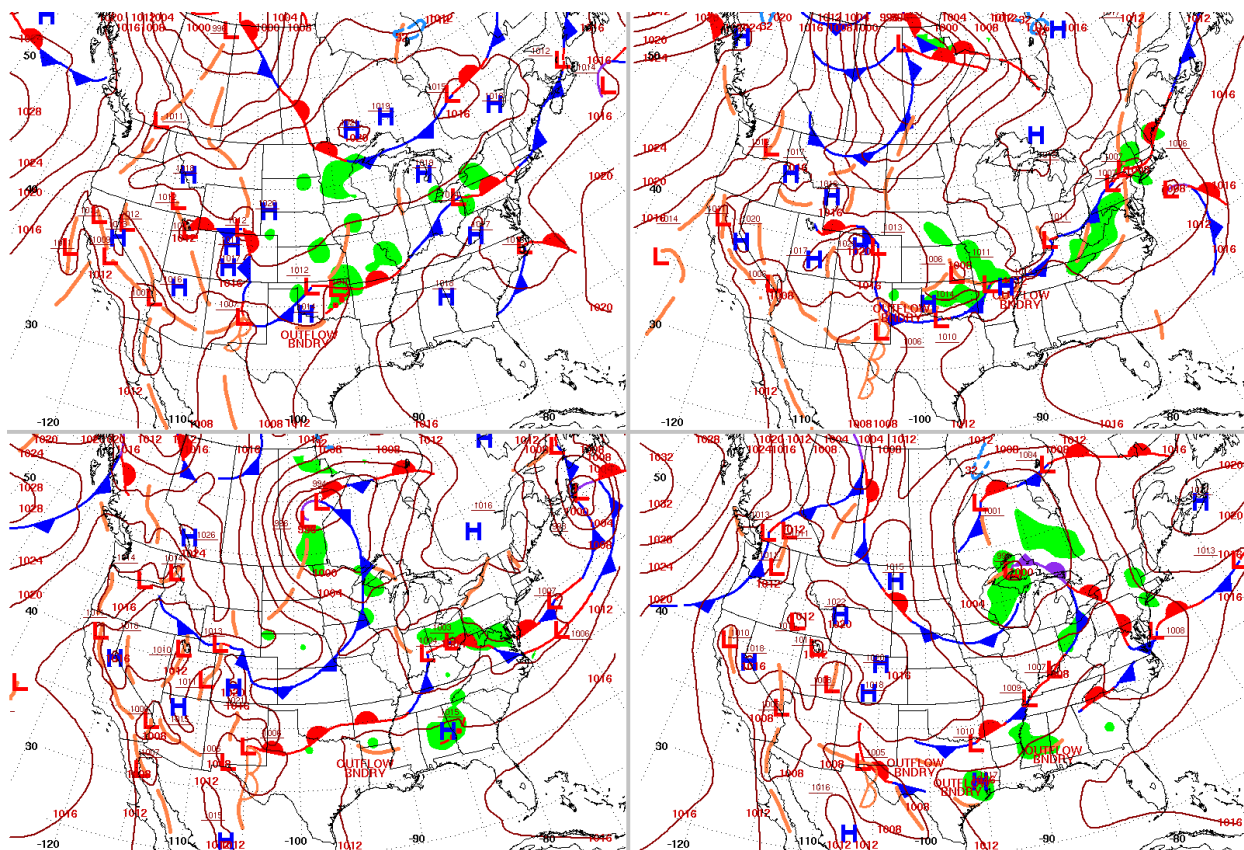


Figure 27. 500-millibar height contour plots for 07:00 EST on June 6 (top left), June 7 (top right), June 8 (bottom left), and June 9 (bottom right), 2025.

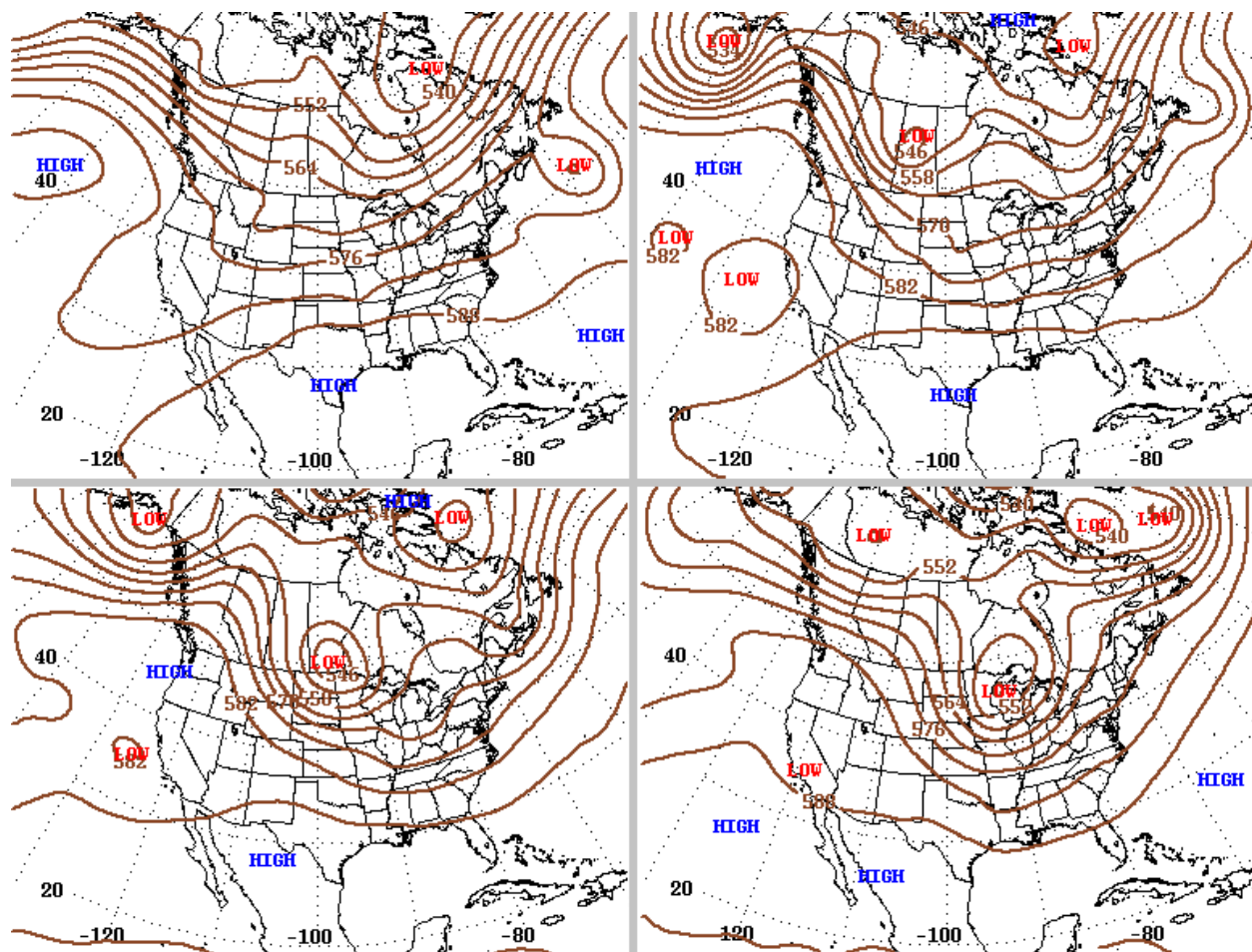


Figure 28. MODIS Terra corrected reflectance true color satellite imagery with daily detected fire locations shown as red triangles for June 6 (top left), June 7 (top right), June 8 (bottom left), and June 9 (bottom right), 2025.

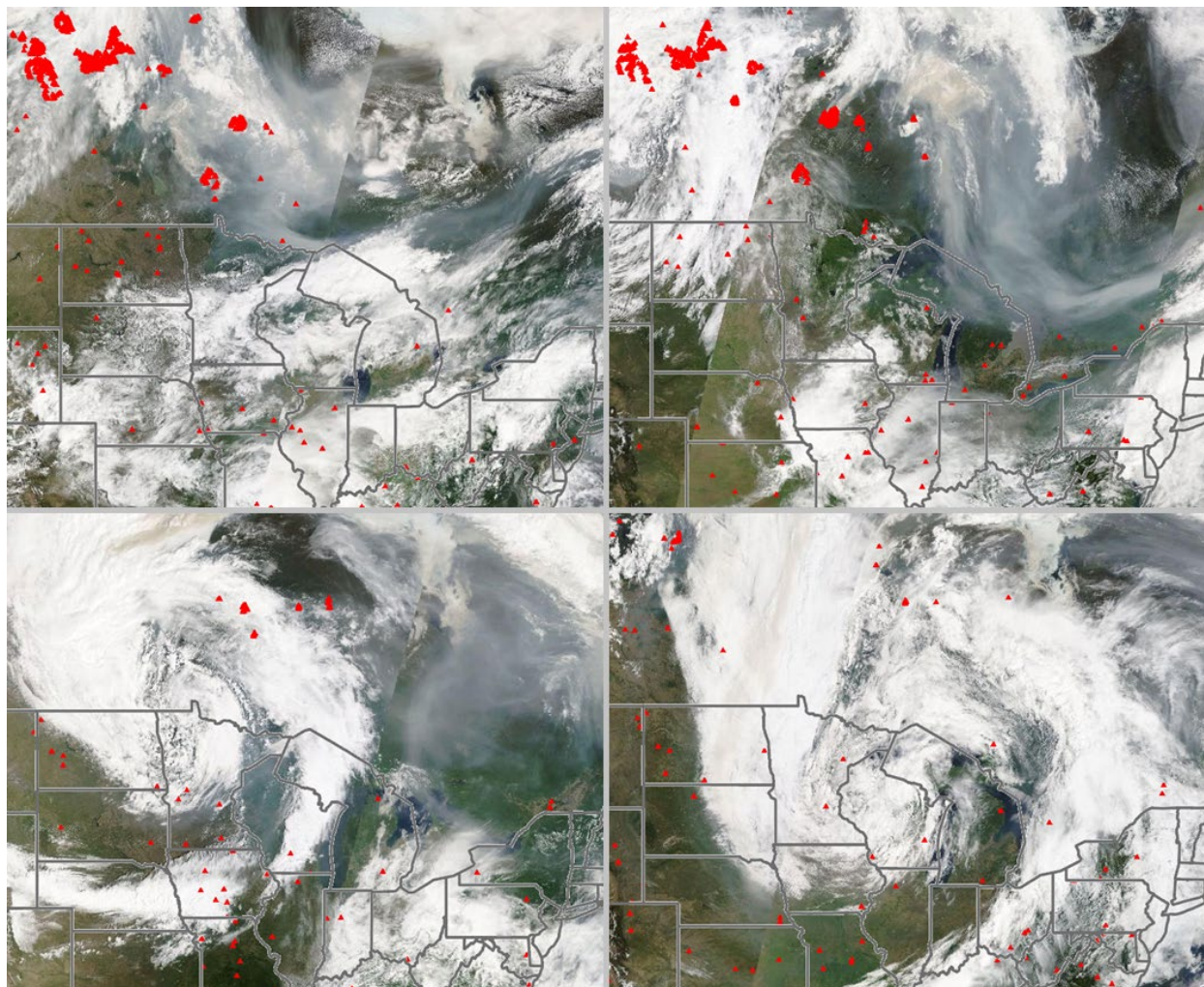
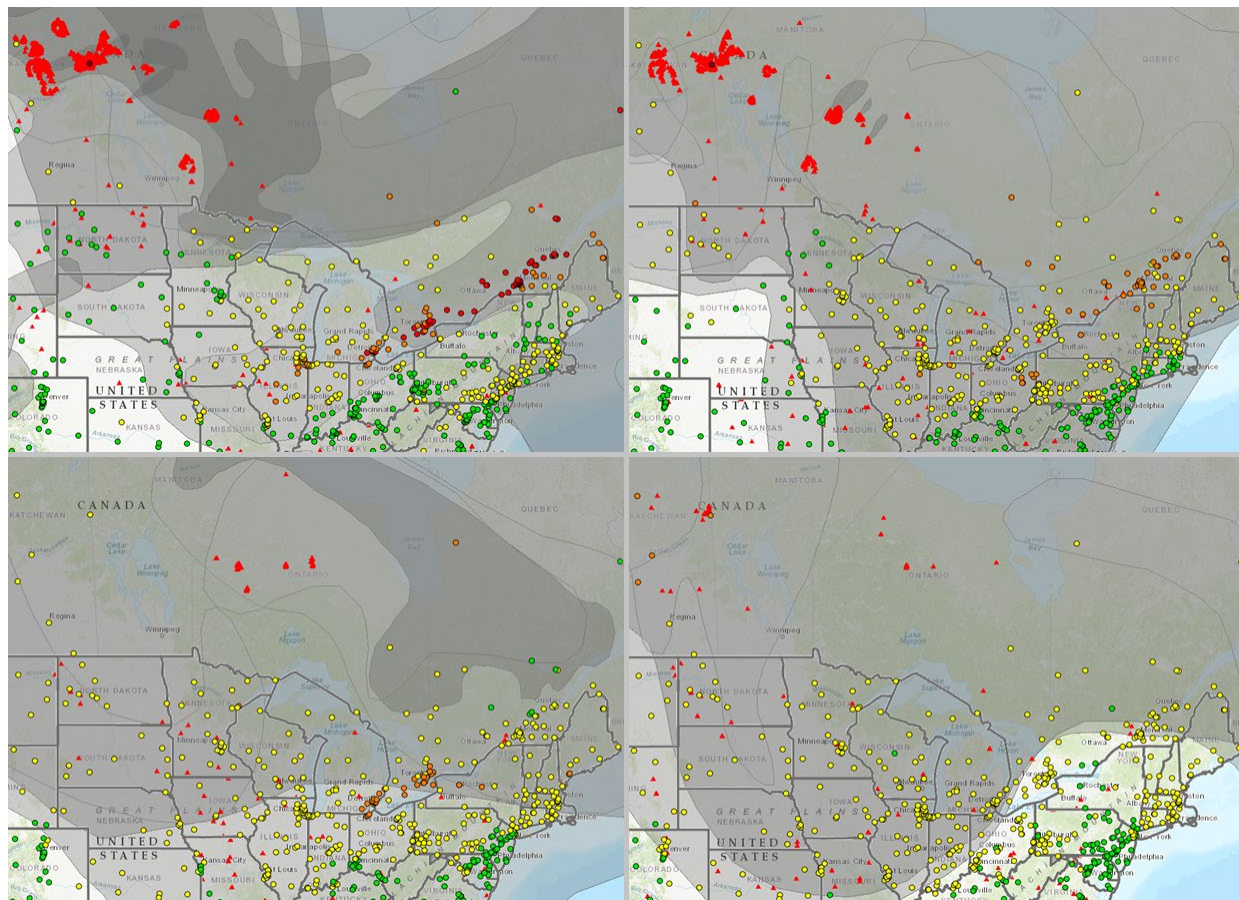


Figure 29. Map of the HMS smoke polygons and 24-hour average PM_{2.5} concentrations with daily detected fire locations shown as red triangles for June 6 (top left), June 7 (top right), June 8 (bottom left), and June 9 (bottom right), 2025.



2.5.3. Canadian Wildfires

From May 27 to June 16, 2025, the Saskatchewan Public Safety Agency reported³⁴ to CIFFC a fire preparedness level of 5 for the province³⁵. From May 2 to July 2, 2025, CWFIS reported³⁶ high, very high, and extreme fire danger across northeastern British Columbia³⁷. From May 27 to June 14, 2025, the northeastern portion of British Columbia³⁸ was continuously under extreme fire danger³⁹.

³⁴ <https://ciffc.net/situation/2025-05-27>

³⁵ <https://ciffc.net/situation/2025-06-16>

³⁶ https://cwfis.cfs.nrcan.gc.ca/en/interactive-map?selectedDate=2025-05-02¢er=-126.9_57.8&zoom=3.36&layerIds=public%3Afd

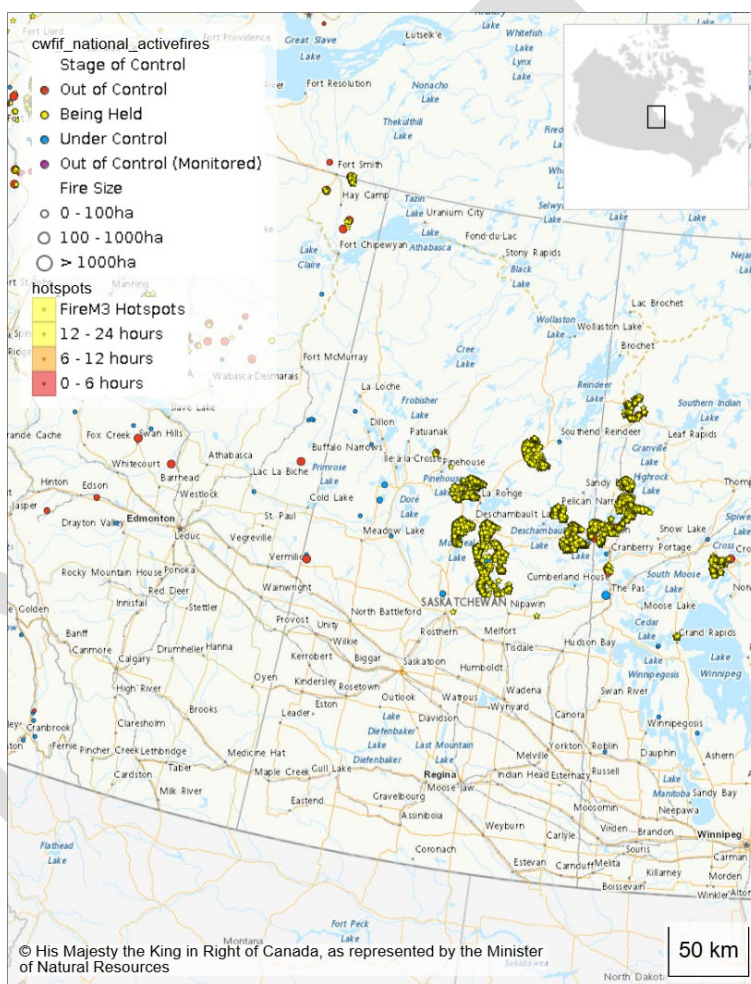
³⁷ https://cwfis.cfs.nrcan.gc.ca/en/interactive-map?selectedDate=2025-07-02¢er=-126.9_57.8&zoom=3.36&layerIds=public%3Afd

³⁸ https://cwfis.cfs.nrcan.gc.ca/en/interactive-map?selectedDate=2025-05-27¢er=-126.9_57.8&zoom=3.36&layerIds=public%3Afd

³⁹ https://cwfis.cfs.nrcan.gc.ca/en/interactive-map?selectedDate=2025-06-14¢er=-126.9_57.8&zoom=3.36&layerIds=public%3Afd

Figure 30 is a CWFIS map showing the active wildfires and recent hotspots in Saskatchewan on June 2, 2025. On June 2, there were at least 9 active wildfires burning at least 1,571,786 acres across Saskatchewan⁴⁰. The smoke plumes arising from the wildfires and recent hotspots north of Candle Lake, Saskatchewan on June 2 were located in the source regions intersected by the HYSPLIT trajectories shown in Section 3 of this document for the wildfire smoke-driven PM_{2.5} episode on June 7, 2025.

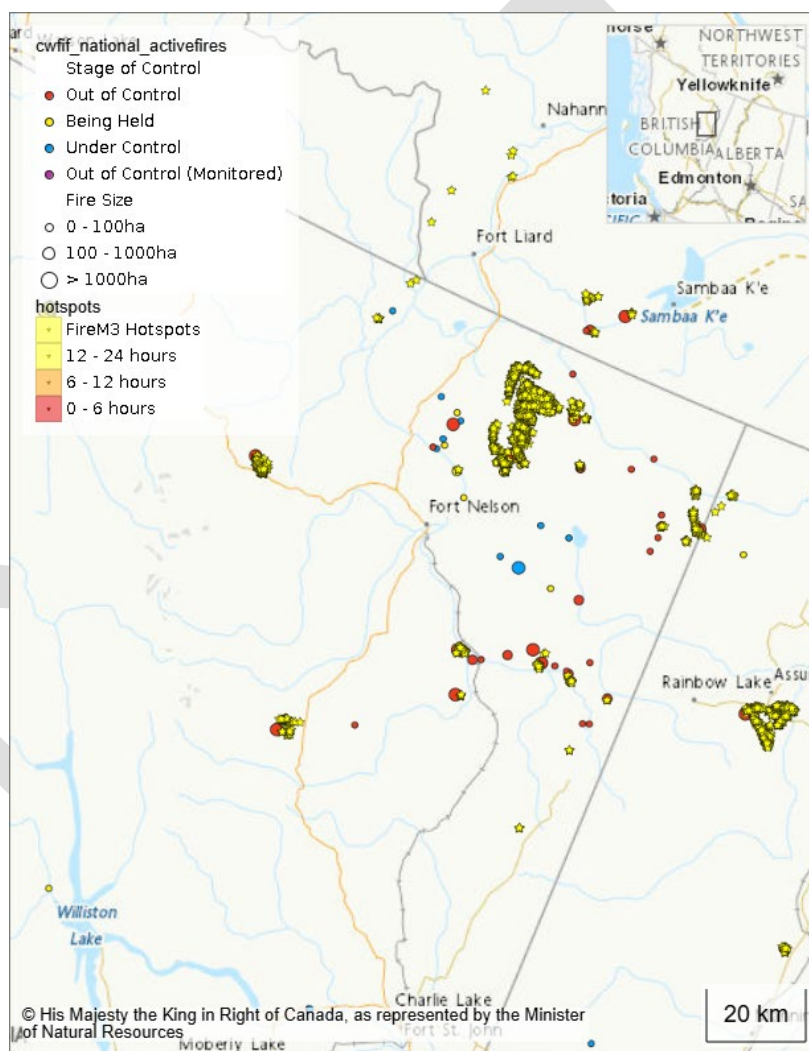
Figure 30. Map from CWFIS of active wildfires (circles) and recent wildfire hotspots (stars) in Saskatchewan on June 2, 2025.



⁴⁰ <https://ciffc.net/situation/2025-06-02>

Figure 31 is a CWFIS map showing the active wildfires and recent hotspots in northeastern British Columbia on June 2, 2025. On June 2, there were at least 58 active wildfires burning at least 238,448 acres across British Columbia⁴¹. The smoke plumes arising from the wildfires and recent hotspots west of Fort Nelson, British Columbia on June 2 were located in the source regions intersected by the HYSPLIT trajectories shown in Section 3 of this document for the wildfire smoke-driven PM_{2.5} episode on June 8, 2025.

Figure 31. Map from CWFIS of active wildfires (circles) and recent wildfire hotspots (stars) in northeastern British Columbia on June 2, 2025.



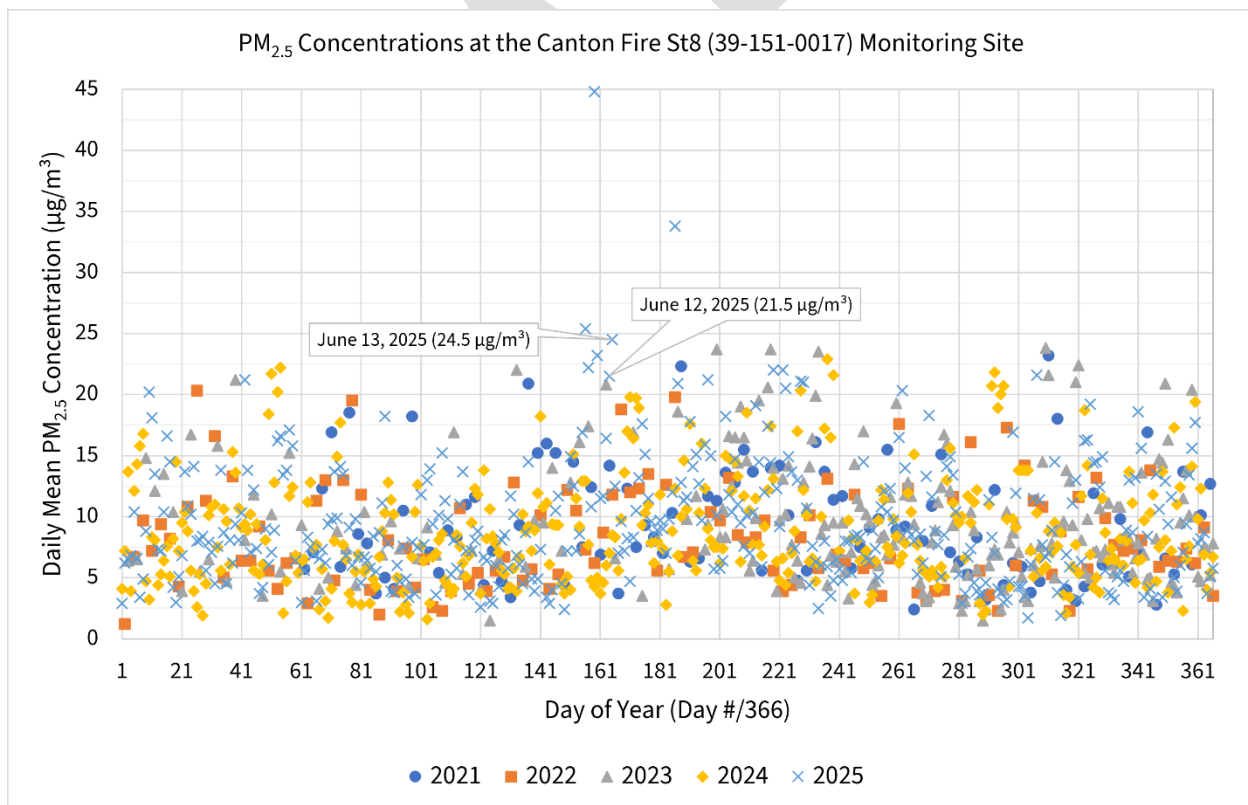
⁴¹ <https://ciffc.net/situation/2025-06-02>

2.6. Wildfire Smoke-Driven $PM_{2.5}$ Episode on June 12-13, 2025

2.6.1. Episode Description

Air quality in Stark County was impacted from June 12-13, 2025, by wildfire smoke entering the region from wildfires burning in central Saskatchewan and western Manitoba, particularly from a wildfire complex burning north-northwest of Creighton, Saskatchewan. Figure 32 shows the daily average $PM_{2.5}$ concentrations for the years 2021-2025 at the Canton Fire St8 monitoring site in Stark County. This figure illustrates the severity of this wildfire smoke-driven $PM_{2.5}$ episode relative to other periods of the year and compared to the same period in the past five years. Data collected on June 12-13 during this wildfire smoke-driven $PM_{2.5}$ episode are labeled in the figure. It should be noted this figure excludes data that have previously been requested for exclusion and have regional concurrence.

Figure 32. 2021-2025 daily average $PM_{2.5}$ concentrations at the Canton Fire St8 (39-151-0017) monitoring site in Stark County, with labeled data from the June 12-13 $PM_{2.5}$ episode in 2025.



2.6.2. Meteorology

On June 10, 2025, the front over western Canada began to stall, forming a stationary front containing large amounts of smoke from the wildfires burning in central Saskatchewan and western Manitoba. By June 11, the stationary front had pushed the wildfire smoke down to the Upper Midwest. On June 12, the stationary front stalled over the Great Lakes region, trapping wildfire smoke near the surface. The stationary front continued to slowly move eastward on June 13, keeping wildfire smoke trapped near the surface over Ohio, until precipitation rolled in early on June 14 and cleared out the near-surface wildfire smoke from Ohio. Figure 33 shows the surface weather maps for 07:00 EST on June 10-13, 2025. Figure 34 shows the 500-millibar height contour plots for 07:00 EST on June 10-13, 2025. Figure 35 shows the MODIS Terra corrected reflectance true color satellite imagery with daily detected fire locations shown as red triangles for June 10-13, 2025. Figure 36 shows a map of the HMS smoke polygons and 24-hour average PM_{2.5} concentrations with daily detected fire locations shown as red triangles for June 10-13, 2025.

Figure 33. Surface weather maps for 07:00 EST on June 10 (top left), June 11 (top right), June 12 (bottom left), and June 13 (bottom right), 2025.

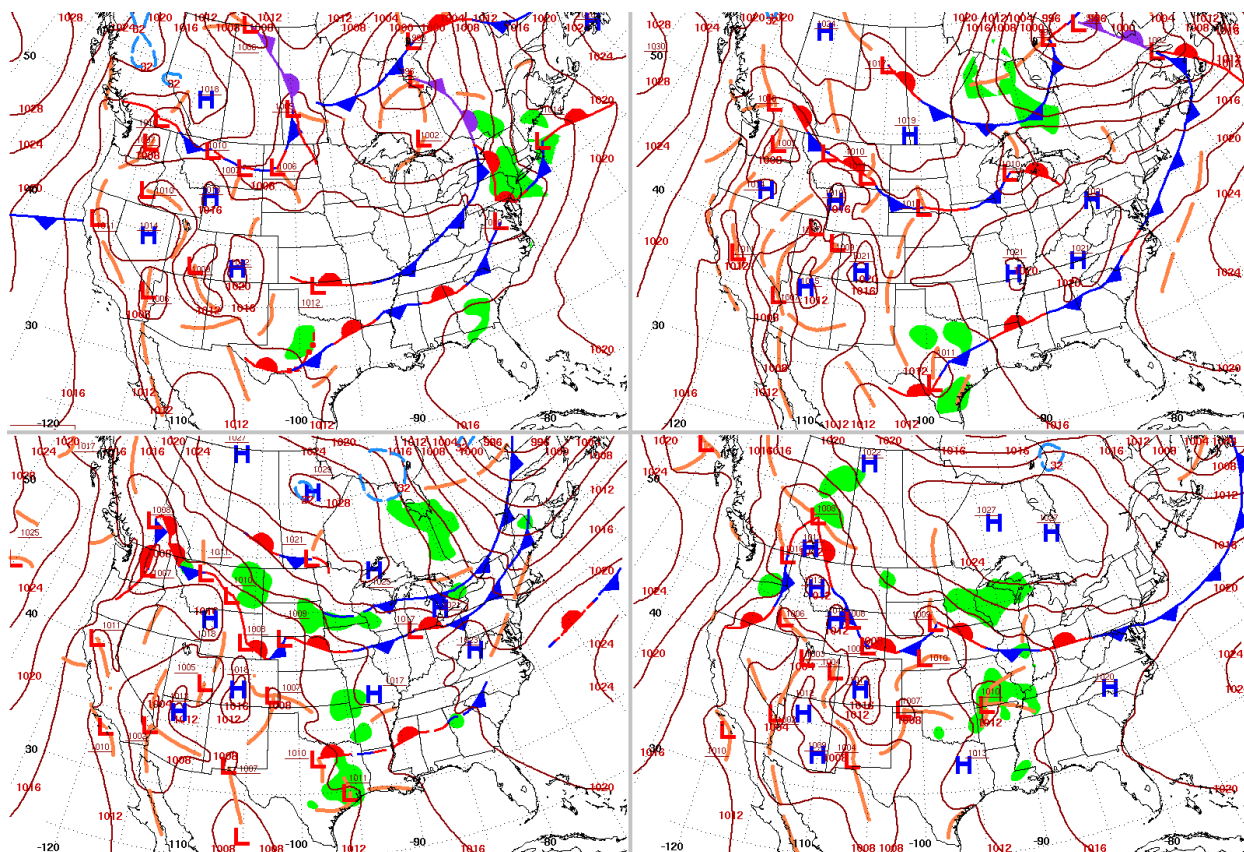


Figure 34. 500-millibar height contour plots for 07:00 EST on June 10 (top left), June 11 (top right), June 12 (bottom left), and June 13 (bottom right), 2025.

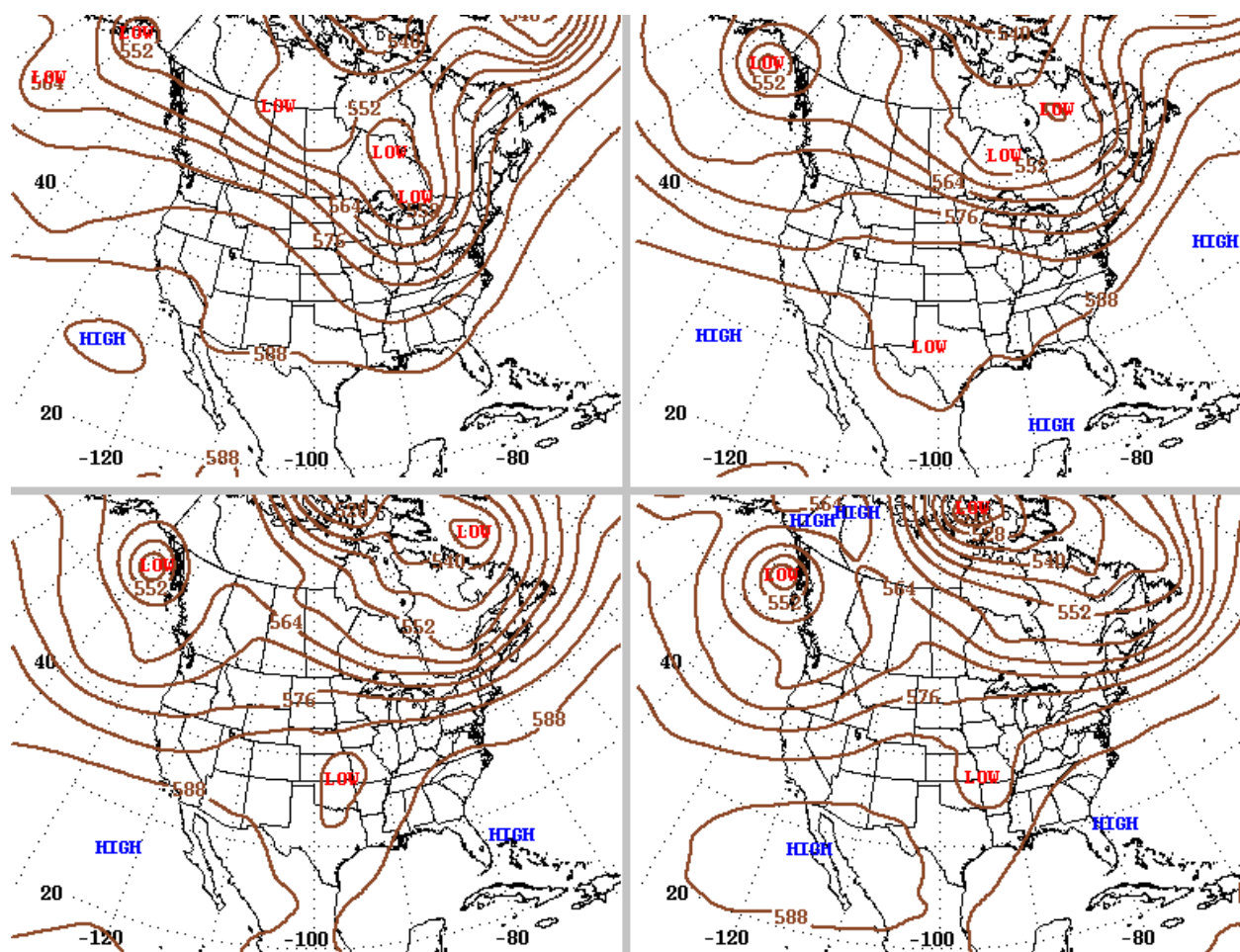


Figure 35. MODIS Terra corrected reflectance true color satellite imagery with daily detected fire locations shown as red triangles for June 10 (top left), June 11 (top right), June 12 (bottom left), and June 13 (bottom right), 2025.

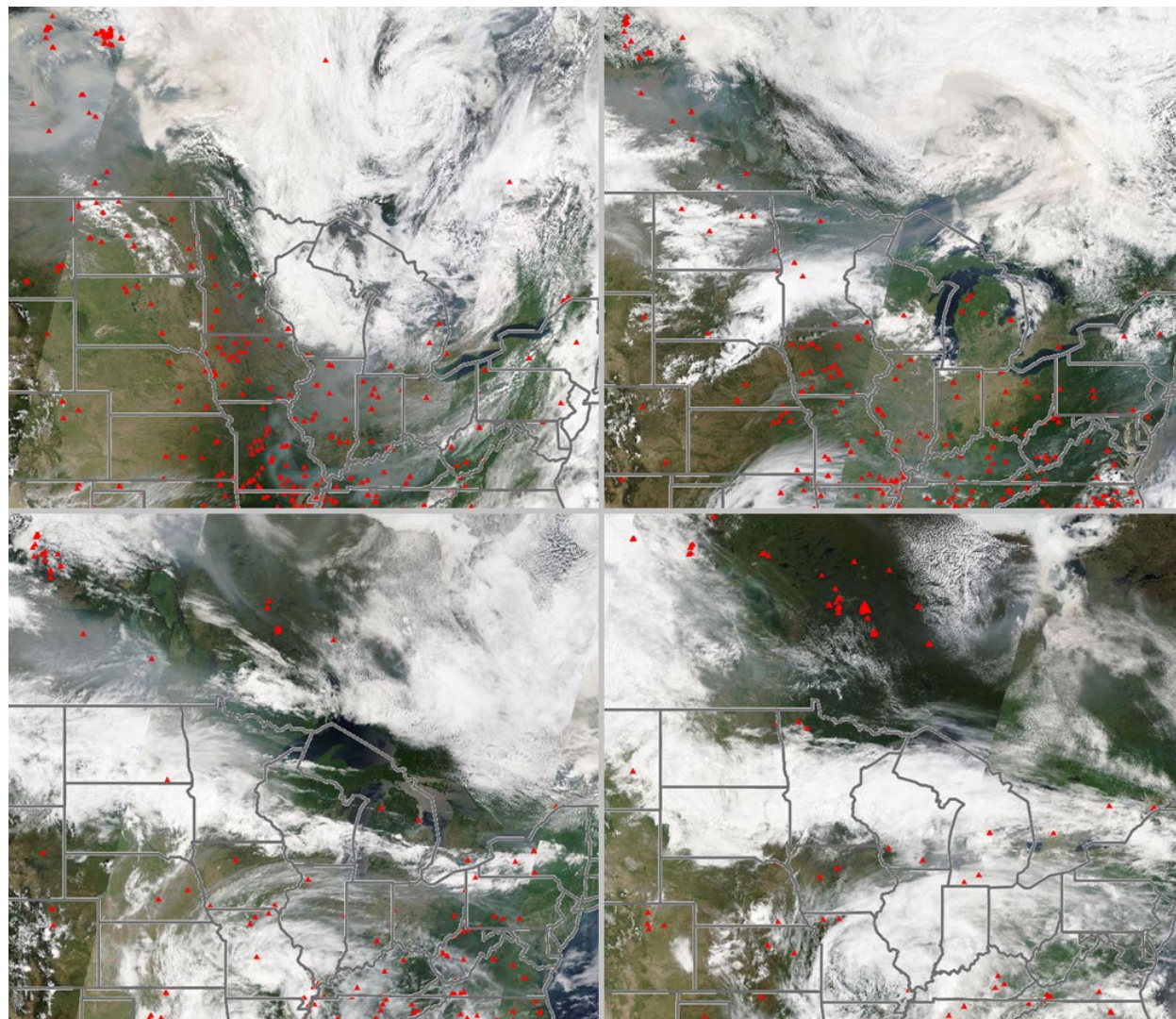
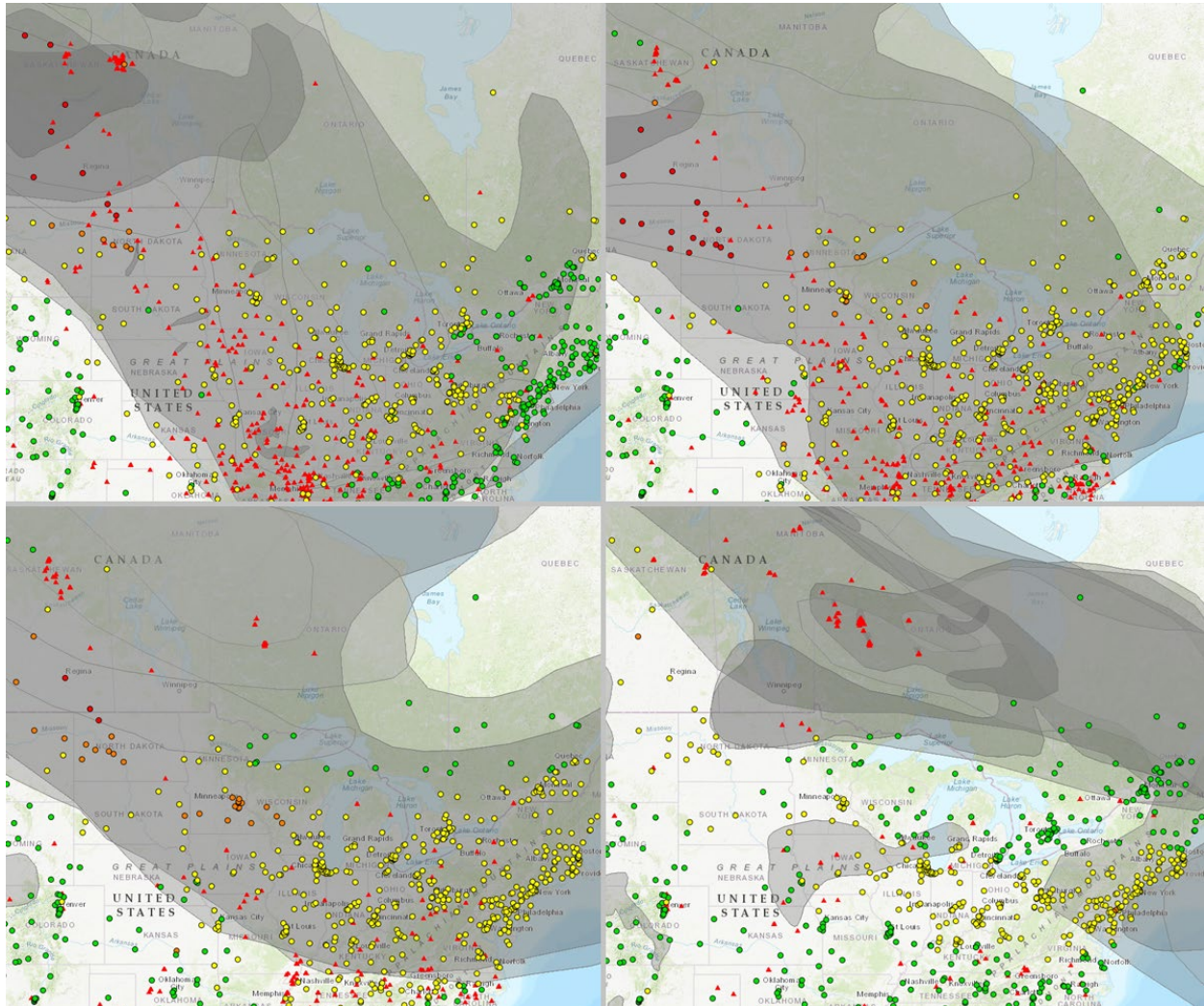


Figure 36. Map of the HMS smoke polygons and 24-hour average PM_{2.5} concentrations with daily detected fire locations shown as red triangles for June 10 (top left), June 11 (top right), June 12 (bottom left), and June 13 (bottom right), 2025.

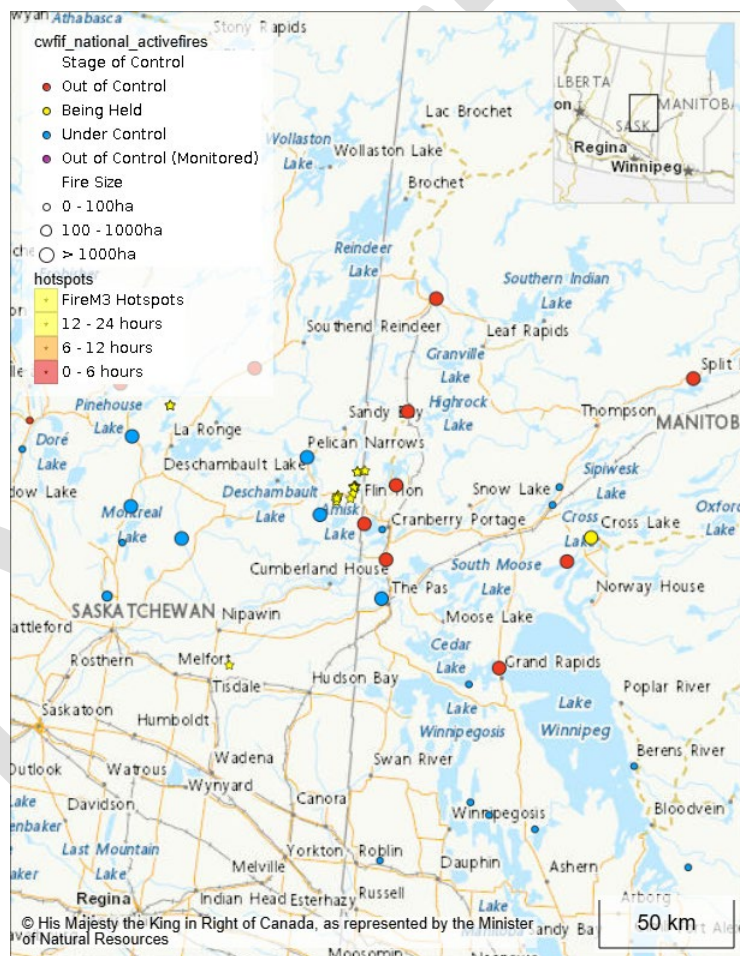


2.6.3. Canadian Wildfires

From May 27 to June 16, 2025, the Saskatchewan Public Safety Agency reported to CIFFC a fire preparedness level of 5 for the province. From May 29 to August 12, 2025, the Manitoba Wildfire Service reported to CIFFC a fire preparedness level 5 for the province. Throughout this period, CWFIS reported high, very high, and extreme fire danger conditions across most of Saskatchewan and Manitoba. Very high and extreme fire danger conditions were also reported during this period for portions of western Ontario, as well as northern Alberta.

Figure 37 is a CWFIS map showing the active wildfires and recent hotspots in Saskatchewan and Manitoba on June 9, 2025. On June 9, there were at least 11 active wildfires burning at least 2,192,349 acres in Saskatchewan and at least 24 active wildfires burning at least 1,321,804 acres in Manitoba⁴². The smoke plumes arising from the wildfires and recent hotspots north-northwest of Creighton, Saskatchewan on June 9 were located in the source regions intersected by the HYSPLIT trajectories shown in Section 3 of this document for the wildfire smoke-driven PM_{2.5} episode on June 12, 2025.

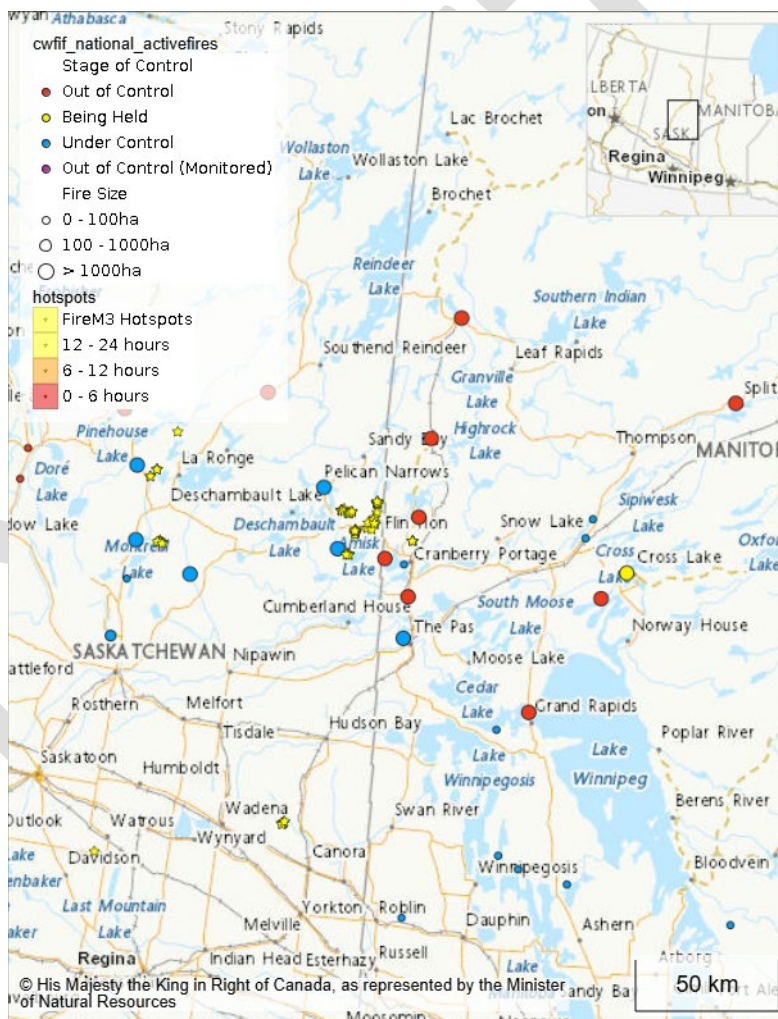
Figure 37. Map from CWFIS of active wildfires (circles) and recent hotspots (stars), in Saskatchewan and Manitoba on June 9, 2025.



⁴² <https://ciffc.net/situation/2025-06-09>

Figure 38 is a CWFIS map showing the active wildfires and recent hotspots in Saskatchewan and Manitoba on June 10, 2025. On June 10, there were at least 11 active wildfires burning at least 2,249,033 acres in Saskatchewan and at least 20 active wildfires burning at least 1,318,977 acres in Manitoba⁴³. The smoke plumes arising from the wildfires and recent hotspots north-northwest of Creighton, Saskatchewan on June 10 were located in the source regions intersected by the HYSPLIT trajectories shown in Section 3 of this document for the wildfire smoke-driven PM_{2.5} episode on June 13, 2025.

Figure 38. Map from CWFIS of active wildfires (circles) and recent hotspots (stars), in Saskatchewan and Manitoba on June 10, 2025.



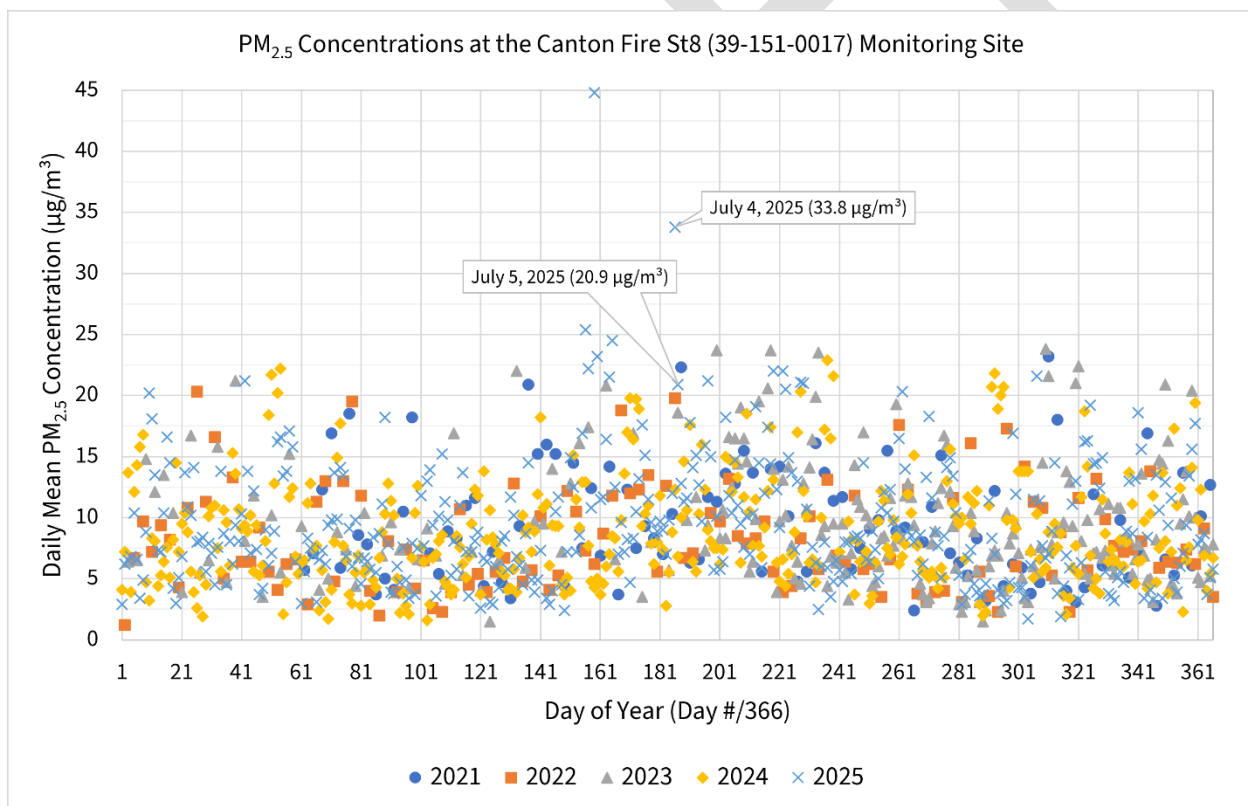
⁴³ <https://ciffc.net/situation/2025-06-10>

2.7. Fireworks Smoke-Driven $PM_{2.5}$ Episode on July 4-5, 2025

2.7.1. Episode Description

Air quality in Stark County was impacted from July 4-5, 2025, by smoke from several Fourth of July holiday celebration-related fireworks displays across Eastern and Northeastern Ohio. Figure 39 shows the daily average $PM_{2.5}$ concentrations for the years 2021-2025 at the Canton Fire St8 monitoring site in Stark County. This figure illustrates the severity of this fireworks smoke-driven $PM_{2.5}$ episode relative to other periods of the year and compared to the same period in the past five years. Data collected on July 4-5 during this fireworks smoke-driven $PM_{2.5}$ episode are labeled in the figure. It should be noted this figure excludes data that have previously been requested for exclusion and have regional concurrence.

Figure 39. 2021-2025 daily average $PM_{2.5}$ concentrations at the Canton Fire St8 (39-151-0017) monitoring site in Stark County, with labeled data from the July 4-5 $PM_{2.5}$ episode in 2025.



2.7.2. Meteorology

On July 2, 2025, a large ridge of high-pressure began to settle over the Central United States. By July 3, a high-pressure system had formed over the Ohio River Valley, which stalled over Ohio and Western Pennsylvania on July 4. The high-pressure system remained in place until late on July 5, when a cold front coming from the northwest began to slowly push the high-pressure system out east. Across these dates, several Fourth of July holiday celebration-related fireworks displays produced near-surface smoke and smoke lingering aloft over much of the region, including Ohio, which continued to impact Stark County. By the morning of July 6, the cold front had displaced the high-pressure system, largely dissipating the remaining fireworks smoke aloft. Figure 40 shows the surface weather maps for 07:00 EST on July 3-6, 2025. Figure 41 shows the 500-millibar height contour plots for 07:00 EST on July 3-6, 2025. Figure 42 shows the MODIS Aqua corrected reflectance true color satellite imagery for July 3-6, 2025. Figure 43 shows a map of the HMS smoke polygons and 1-hour average $PM_{2.5}$ concentrations for 22:00 EST on July 3-5, 2025, illustrating the widespread Fourth of July holiday celebration-related fireworks displays causing regionwide increases in monitored $PM_{2.5}$ concentrations.

Figure 40. Surface weather maps for 07:00 EST on July 3 (top left), July 4 (top right), July 5 (bottom left), and July 6 (bottom right), 2025.

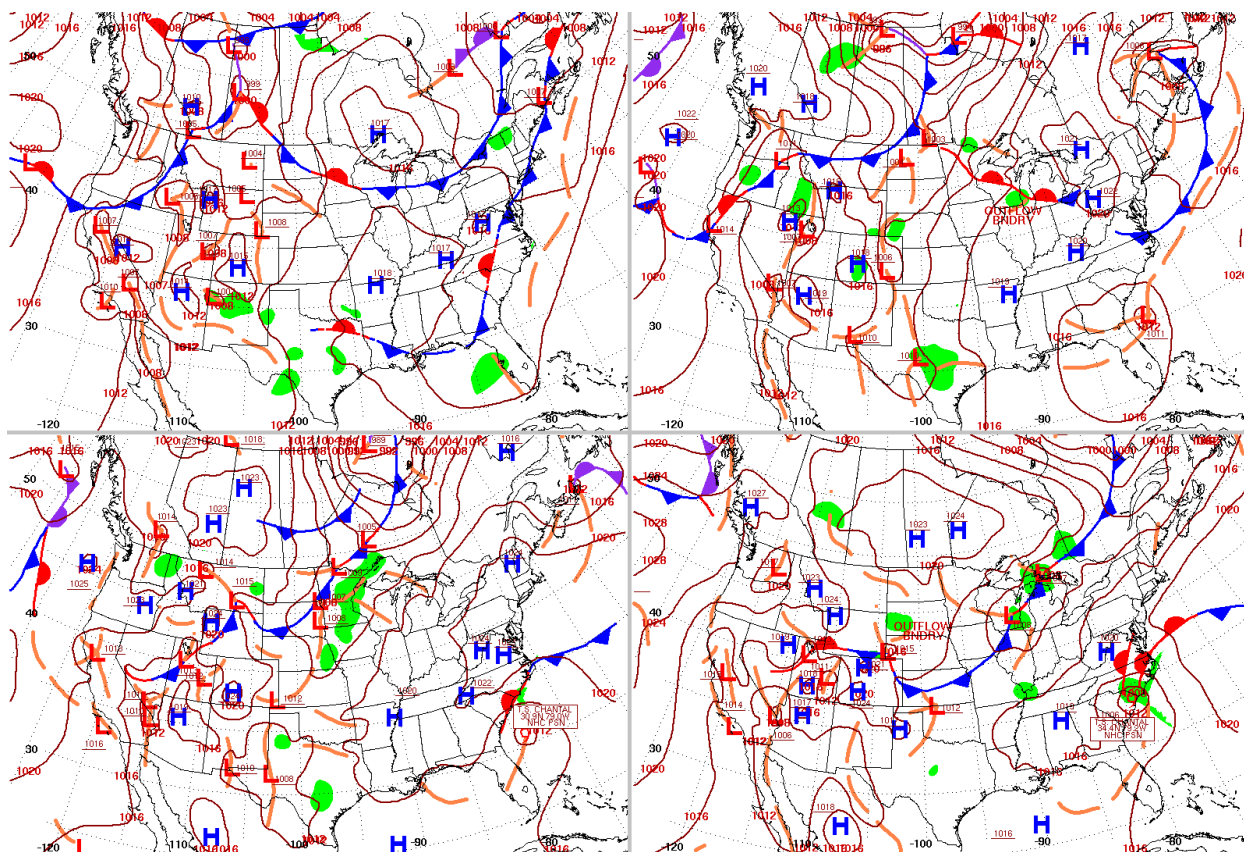


Figure 41. 500-millibar height contour plots for 07:00 EST on July 3 (top left), July 4 (top right), July 5 (bottom left), and July 6 (bottom right), 2025.

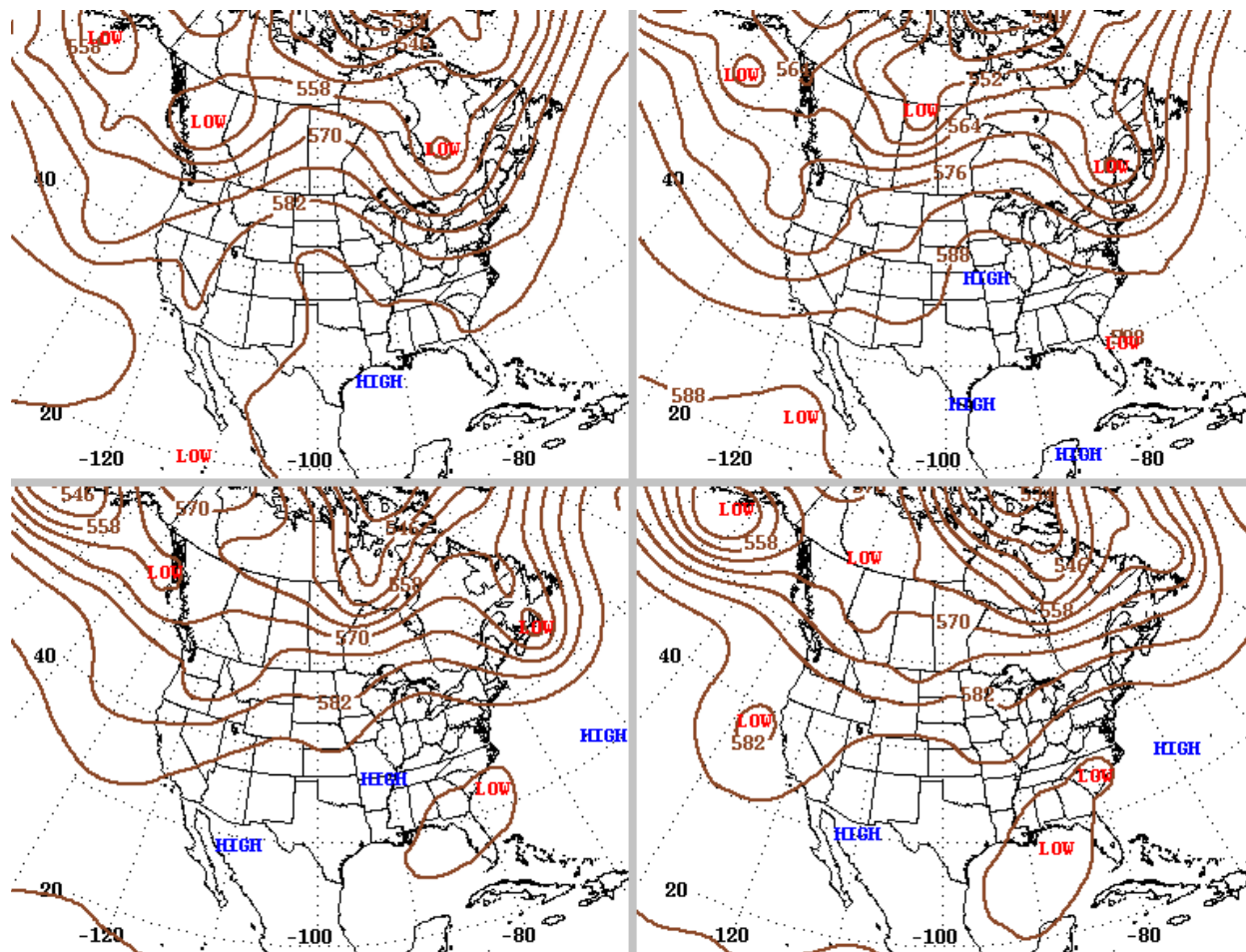


Figure 42. MODIS Aqua corrected reflectance true color satellite imagery for July 3 (top left), July 4 (top right), July 5 (bottom left), and July 6 (bottom right), 2025.

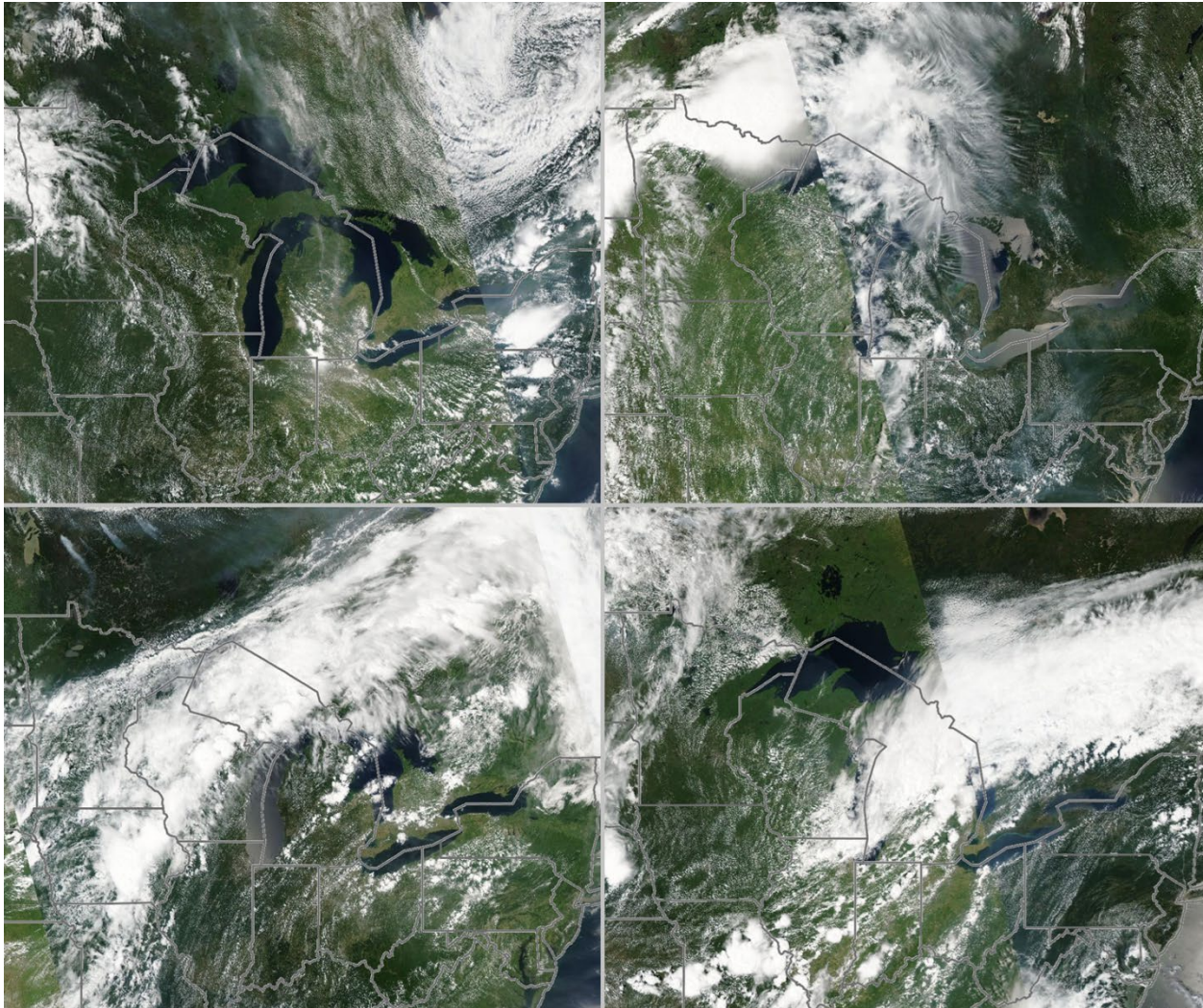
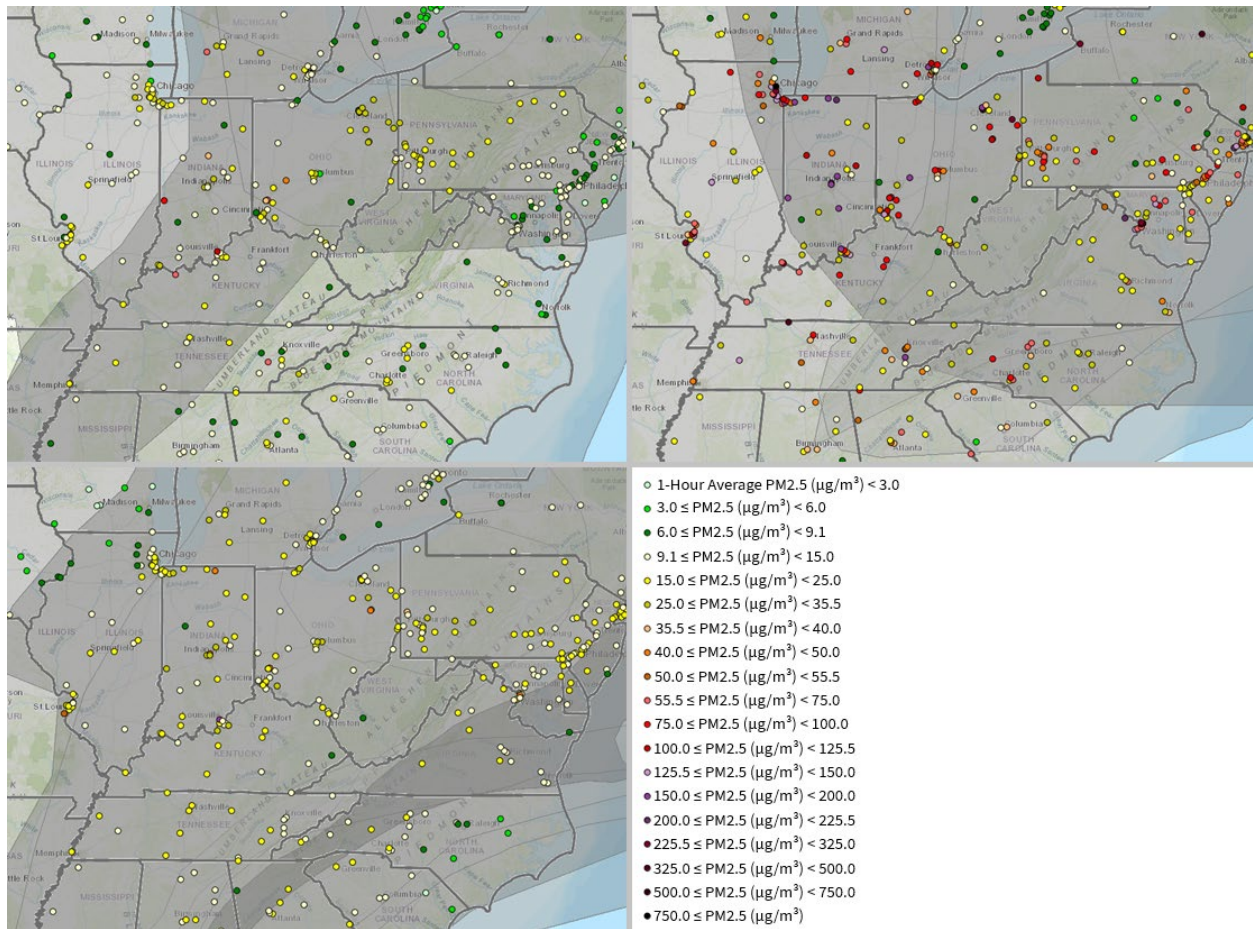


Figure 43. Map of the HMS smoke polygons and 1-hour average PM_{2.5} concentrations for 22:00 EST on July 3 (top left), July 4 (top right), and July 5 (bottom), 2025.



2.7.3. Fourth of July Holiday Celebration-Related Fireworks Displays in 2025

From July 3-5, 2025, municipalities across Central, Eastern, and Northeastern Ohio celebrated the Fourth of July holiday in the United States with large fireworks displays, often with many nearby municipalities holding these fireworks displays nearly simultaneously, generating large amounts of smoke. Table 2 provides a list of news media reports on the various municipal fireworks displays that occurred during early July 2025. Avon Lake, Brunswick, Buckeye Lake, Canton, Columbus, Gahanna, Groveport, Johnstown, Massillon, North Ridgeville, Pickerington, Reynoldsburg, and Woodsfield held municipal fireworks displays in Ohio on July 3. Akron, Alliance, Ashland, Aurora, Berea, Bexley, Cambridge, Cleveland, Dublin, Elyria, Grove City, Hilliard, Lakewood, Lorain, Medina, Mentor, New Albany, Sandusky, Steubenville, Sunbury, Warren, Westerville, Westlake, Willoughby, Wooster, Worthington, and Upper Arlington held municipal fireworks displays in Ohio on July 4. Barnesville, Bay Village, Carrollton, Fairport Harbor, Hudson, Martins Ferry, New Philadelphia, Orrville, Sandusky, and Toronto held municipal fireworks displays in Ohio on July 5. This is not an exhaustive list of municipalities that held fireworks displays during this period but illustrates the cultural importance of fireworks displays to celebrations of the Fourth of July Holiday in the United States.

Table 2. News media reporting on the Fourth of July holiday celebration-related fireworks displays across Central, Eastern, and Northeastern Ohio in 2025.

Date	Source	Headline
June 25, 2025	The Canton Repository	Looking for a Fourth of July fireworks display? Here's a guide in the Canton region ⁴⁴
July 3, 2025	WSYX	2025 Central Ohio fireworks: Where and when are this year's shows? ⁴⁵
July 3, 2025	WTOV	2025 Ohio Valley fireworks ⁴⁶
July 4, 2025	WJW	2025 Northeast Ohio fireworks displays ⁴⁷

⁴⁴ <https://www.cantonrep.com/story/entertainment/2025/06/22/4th-of-july-fireworks-2025-near-me-stark-county-ohio/83534983007>

⁴⁵ <https://abc6onyourside.com/news/local/central-ohio-fireworks-2024-schedule-bexley-columbus-red-white-boom-dublin-gahanna-granville-grove-city-johnstown-pickerington-reynoldsburg-sunbury-westerville-worthington-upper-arlington-july-4-holiday-events>

⁴⁶ <https://wtov9.com/news/local/2025-ohio-valley-fireworks>

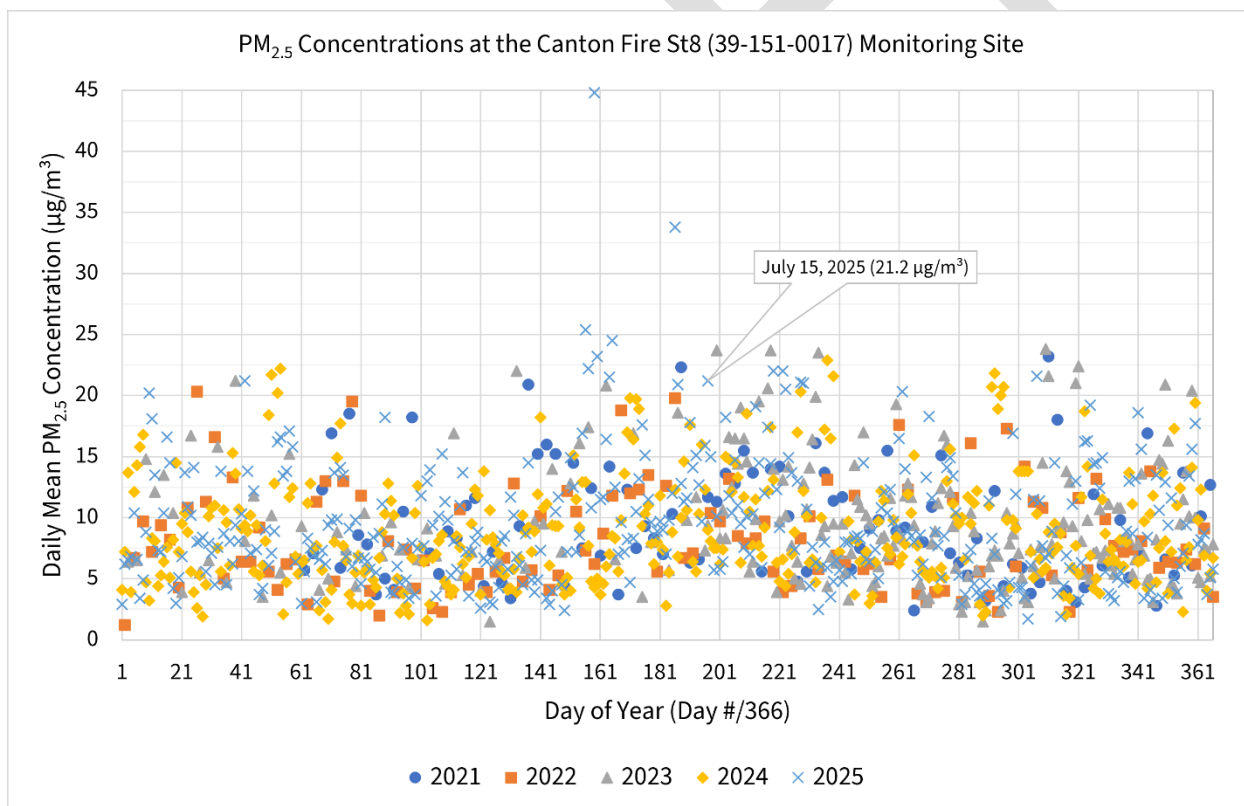
⁴⁷ <https://fox8.com/news/2025-northeast-ohio-fireworks-displays/>

2.8. Wildfire Smoke-Driven $PM_{2.5}$ Episode on July 15, 2025

2.8.1. Episode Description

Air quality in Stark County was impacted on July 15, 2025, by wildfire smoke entering the region from wildfires burning in central Saskatchewan. Figure 44 shows the daily average $PM_{2.5}$ concentrations for the years 2021-2025 at the Canton Fire St8 monitoring site in Stark County. This figure illustrates the severity of this wildfire smoke-driven $PM_{2.5}$ episode relative to other periods of the year and compared to the same period in the past five years. The monitored $PM_{2.5}$ concentration on July 15 during this wildfire smoke-driven $PM_{2.5}$ episode is labeled in the figure. It should be noted this figure excludes data that have previously been requested for exclusion and have regional concurrence.

Figure 44. 2021-2025 daily average $PM_{2.5}$ concentrations at the Canton Fire St8 (39-151-0017) monitoring site in Stark County, with labeled data from the July 15 $PM_{2.5}$ episode in 2025.



2.8.2. Meteorology

On July 9-10, 2025, a stationary front stalled over Saskatchewan, allowing smoke from wildfires burning across central Saskatchewan to accumulate. A low-pressure system formed over southern Manitoba on July 11, picking up some of this wildfire smoke along its western edge. From July 12-13, this low-pressure system made its way towards James Bay, while a front extending across the western Great Lakes down to Missouri continued to transport the accumulated wildfire smoke. On July 14, the large area of high pressure over the Southeastern United States pushed north, causing the wildfire smoke-laden front sweeping across the Great Lakes to begin to stall. By July 15, the front had become stationary, trapping wildfire smoke near the surface across Ohio. A front carrying precipitation began to sweep across Ohio early on July 16, bringing afternoon thunderstorms to Stark County that pushed the lingering wildfire smoke eastward. Figure 45 shows the surface weather maps for 07:00 EST on July 12-15, 2025. Figure 46 shows the 500-millibar height contour plots for 07:00 EST on July 12-15, 2025. Figure 47 shows the MODIS Terra corrected reflectance true color satellite imagery with daily detected fire locations shown as red triangles for July 12-15, 2025. Figure 48 shows a map of the HMS smoke polygons and 24-hour average PM_{2.5} concentrations with daily detected fire locations shown as red triangles for July 12-15, 2025.

Figure 45. Surface weather maps for 07:00 EST on July 12 (top left), July 13 (top right), July 14 (bottom left), and July 15 (bottom right), 2025.

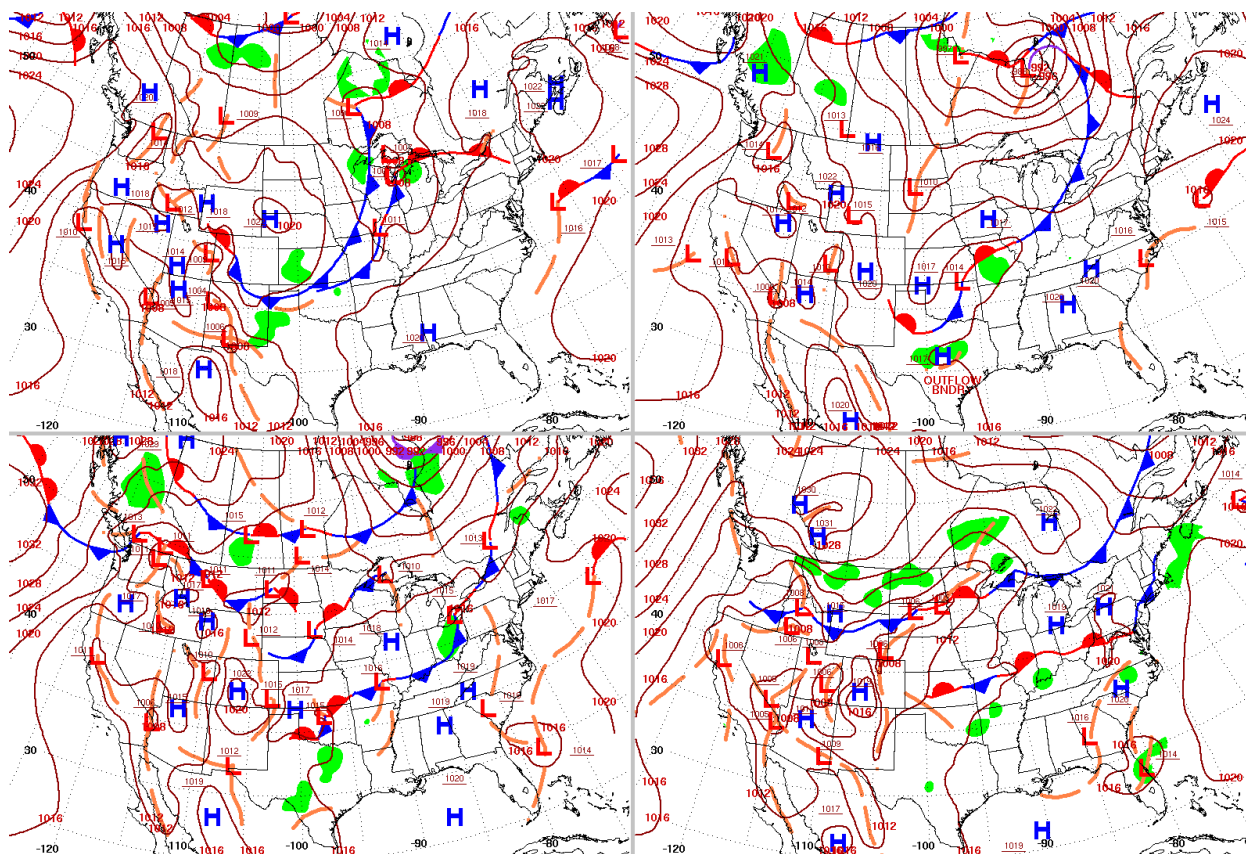


Figure 46. 500-millibar height contour plots for 07:00 EST on July 12 (top left), July 13 (top right), July 14 (bottom left), and July 15 (bottom right), 2025.

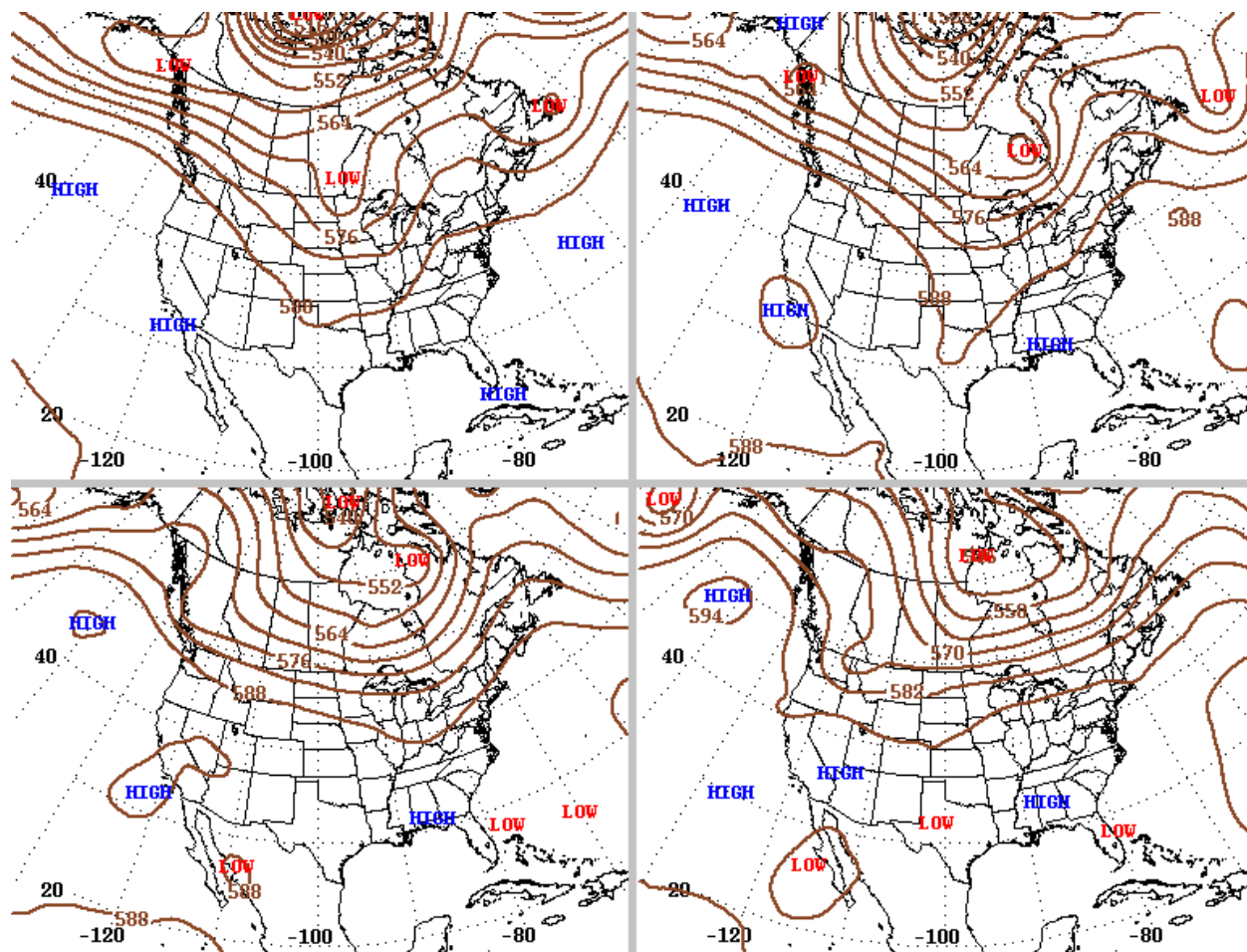


Figure 47. MODIS Terra corrected reflectance true color satellite imagery with daily detected fire locations shown as red triangles for July 12 (top left), July 13 (top right), July 14 (bottom left), and July 15 (bottom right), 2025.

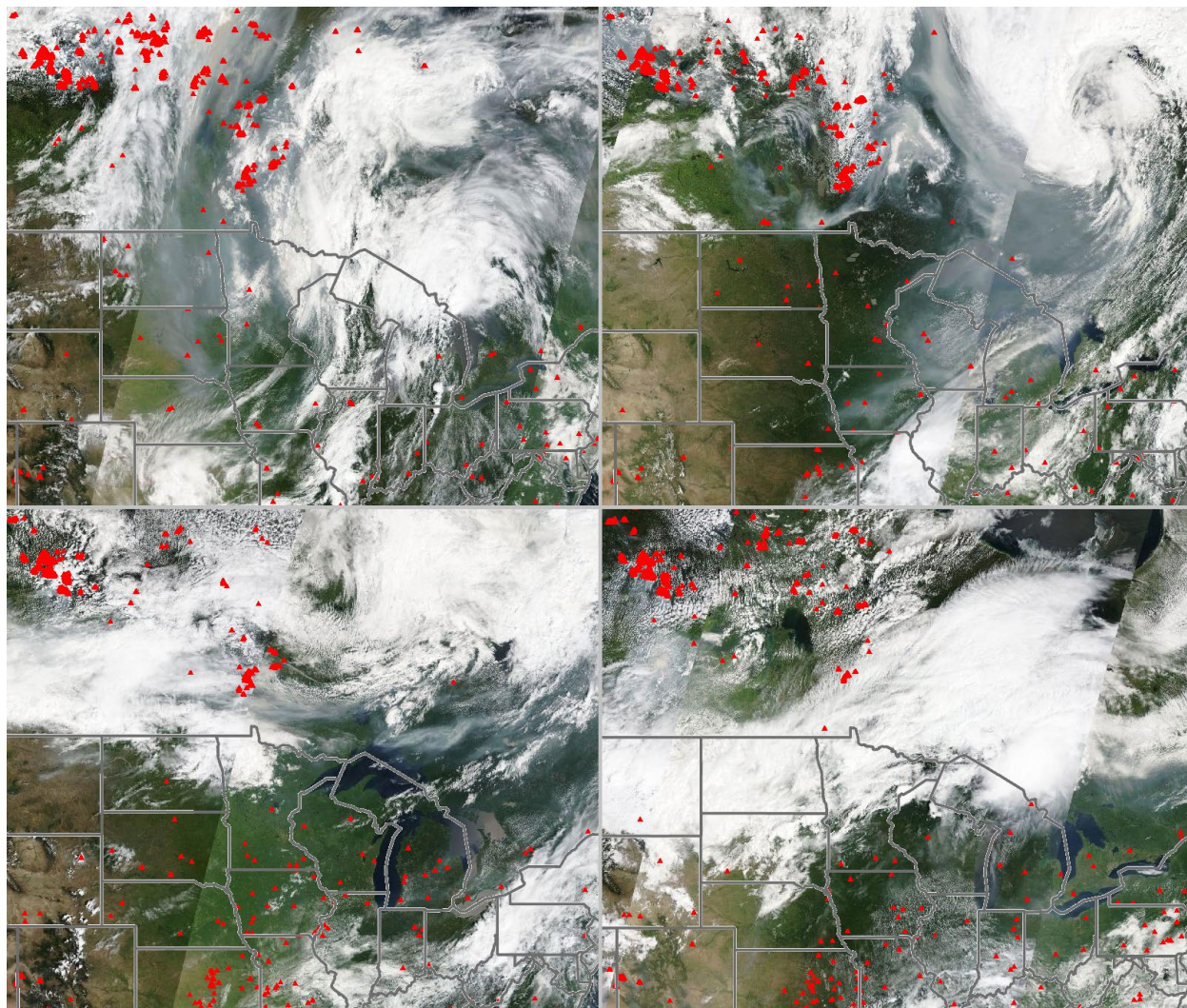
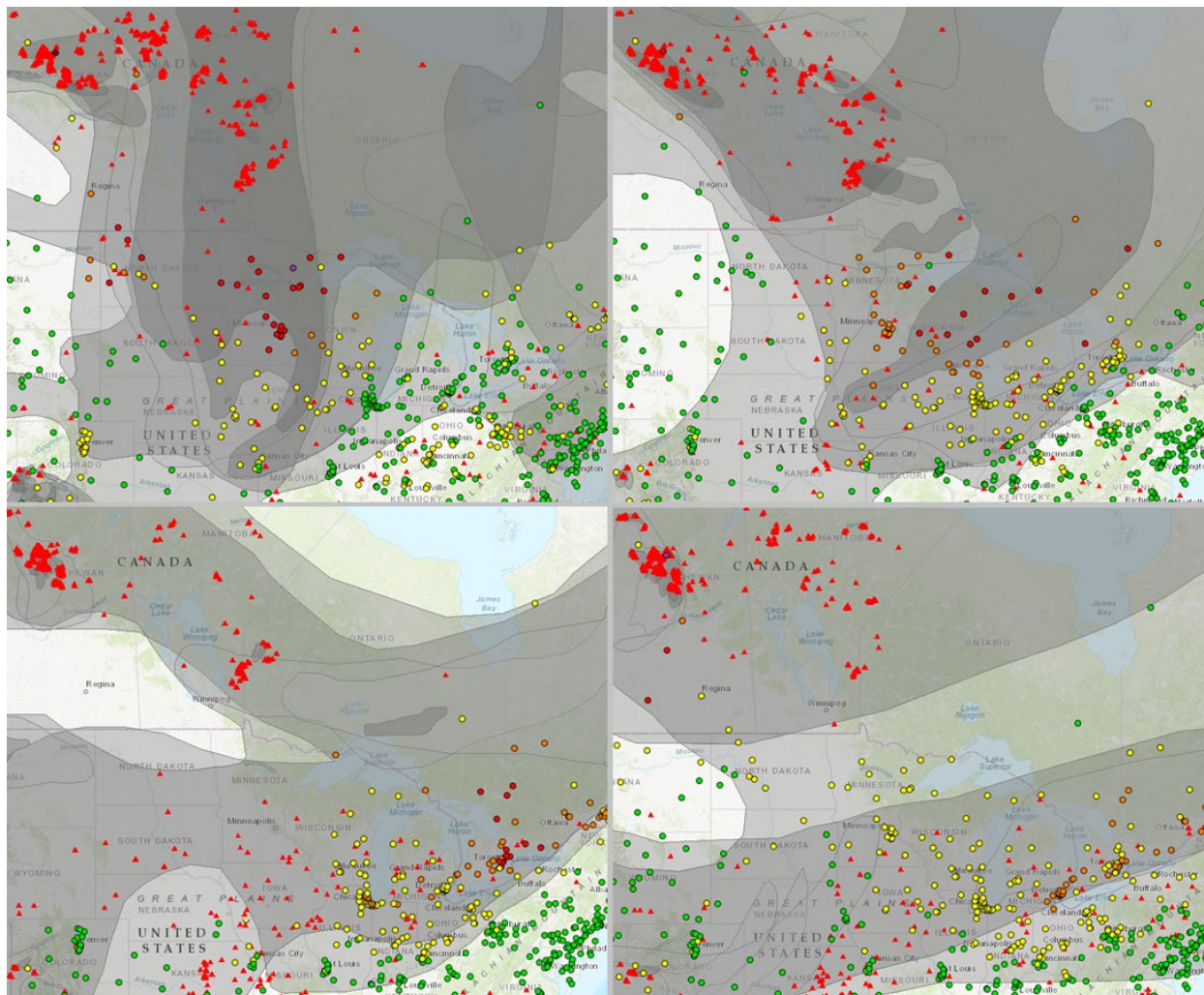


Figure 48. Map of the HMS smoke polygons and 24-hour average PM_{2.5} concentrations with daily detected fire locations shown as red triangles for July 12 (top left), July 13 (top right), July 14 (bottom left), and July 15 (bottom right), 2025.



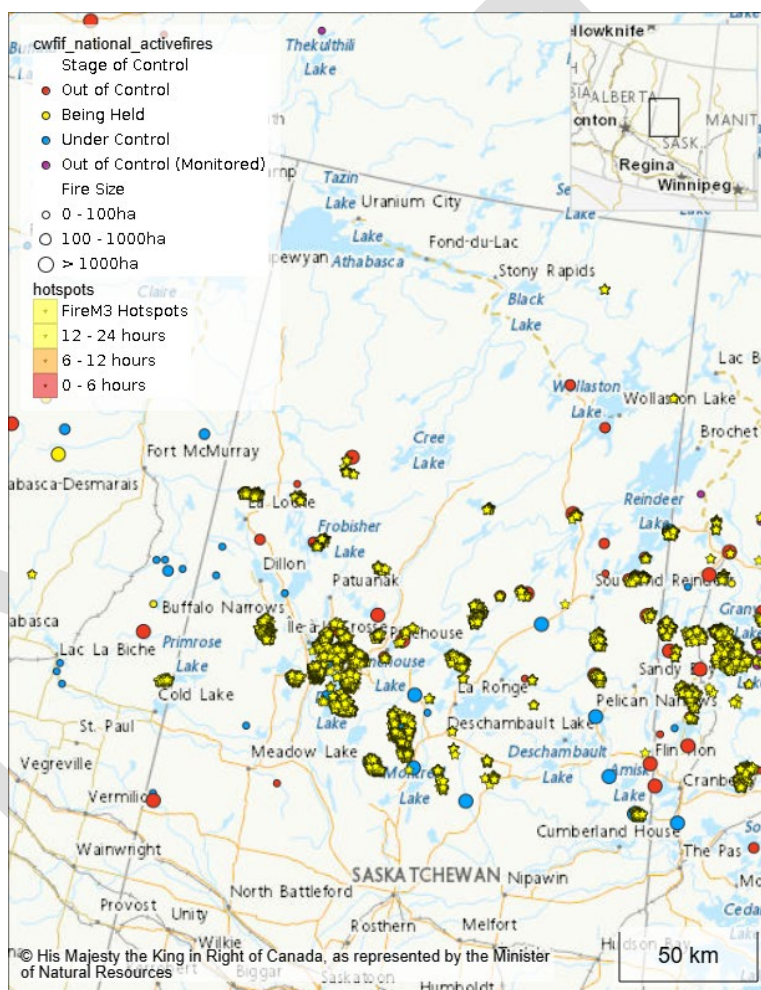
2.8.3. Canadian Wildfires

From May 29 to August 12, 2025, the Manitoba Wildfire Service reported to CIFFC a fire preparedness level 5 for the province. From July 1 to August 14, 2025, the Saskatchewan Public Safety Agency reported to CIFFC a fire preparedness level of 5 for the province⁴⁸. Throughout this period, CWFIS reported high, very high, and extreme fire danger conditions across most of Saskatchewan and Manitoba. Very high and extreme fire danger conditions were also reported during this period for portions of western Ontario, northern Alberta, and central British Columbia.

⁴⁸ <https://ciffc.net/situation/2025-07-01>

Figure 49 is a CWFIS map showing the active wildfires and recent hotspots in Saskatchewan on July 11, 2025. On July 11, there were at least 19 active wildfires burning at least 2,990,197 acres in Saskatchewan⁴⁹. The smoke plumes arising from the wildfires and recent hotspots north-northwest of La Ronge, Saskatchewan on July 11 were located in the source regions intersected by the HYSPLIT trajectories shown in Section 3 of this document for the wildfire smoke-driven PM_{2.5} episode on July 15, 2025.

Figure 49. Map from CWFIS of active wildfires (circles) and recent hotspots (stars) in Saskatchewan on July 11, 2025.



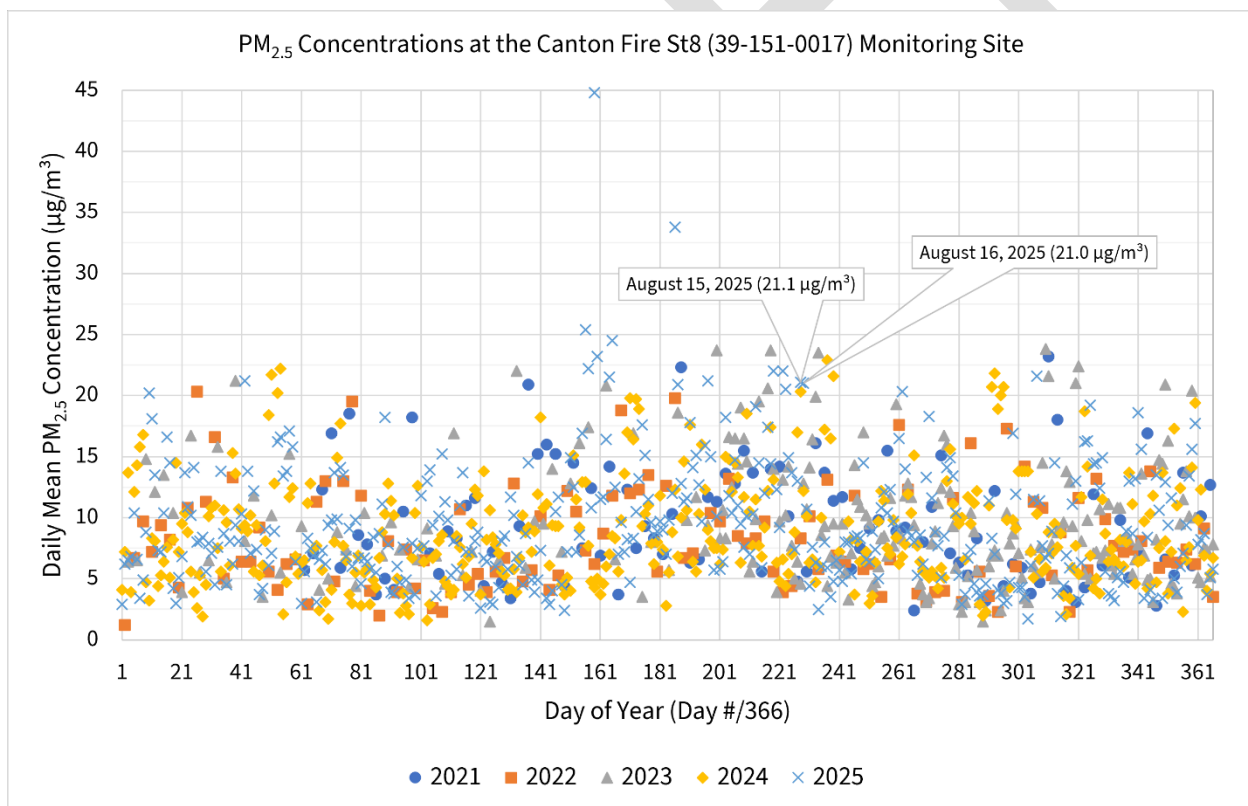
⁴⁹ <https://ciffc.net/situation/2025-07-11>

2.9. Wildfire Smoke-Driven $PM_{2.5}$ Episode on August 15-16, 2025

2.9.1. Episode Description

Air quality in Stark County was impacted on August 15-16, 2025, by wildfire smoke entering the region from wildfires burning across central Saskatchewan. Figure 50 shows the daily average $PM_{2.5}$ concentrations for the years 2021-2025 at the Canton Fire St8 monitoring site in Stark County. This figure illustrates the severity of this wildfire smoke-driven $PM_{2.5}$ episode relative to other periods of the year and compared to the same period in the past five years. The monitored $PM_{2.5}$ concentrations from August 15-16 during this wildfire smoke-driven $PM_{2.5}$ episode are labeled in the figure. It should be noted this figure excludes data that have previously been requested for exclusion and have regional concurrence.

Figure 50. 2021-2025 daily average $PM_{2.5}$ concentrations at the Canton Fire St8 (39-151-0017) monitoring site in Stark County, with labeled data from the August 15-16 $PM_{2.5}$ episode in 2025.



2.9.2. Meteorology

On August 10, 2025, a large low-pressure system formed over Manitoba and western Ontario. By August 11, a ridge of high pressure had formed over British Columbia and Alberta, causing the smoke from wildfires burning across central Saskatchewan to accumulate along the western edge of the low-pressure system. The front carrying wildfire smoke that extended from this low-pressure system swept across Minnesota on August 12 before stalling over Indiana and Ohio on August 13. By August 14, the wildfire smoke-laden stationary front had stretched across Ohio, with another strong low-pressure system having formed over Saskatchewan and Manitoba with a ridge of high pressure off to the west, allowing more wildfire smoke to be transported to the back end of the newly strengthened front. Wildfire smoke slowly descended to the surface over Ohio on August 15 and 16 as high pressure settled over Ohio. Figure 51 shows the surface weather maps for 07:00 EST on August 12, August 14, August 15, and August 16, 2025. Figure 52 shows the 500-millibar height contour plots for 07:00 EST on August 12, August 14, August 15, and August 16, 2025. Figure 53 shows the MODIS Terra corrected reflectance true color satellite imagery with daily detected fire locations shown as red triangles for August 12, August 14, August 15, and August 16, 2025. Figure 54 shows a map of the HMS smoke polygons and 24-hour average PM_{2.5} concentrations with daily detected fire locations shown as red triangles for August 12, August 14, August 15, and August 16, 2025.

Figure 51. Surface weather maps for 07:00 EST on August 12 (top left), August 14 (top right), August 15 (bottom left), and August 16 (bottom right), 2025.

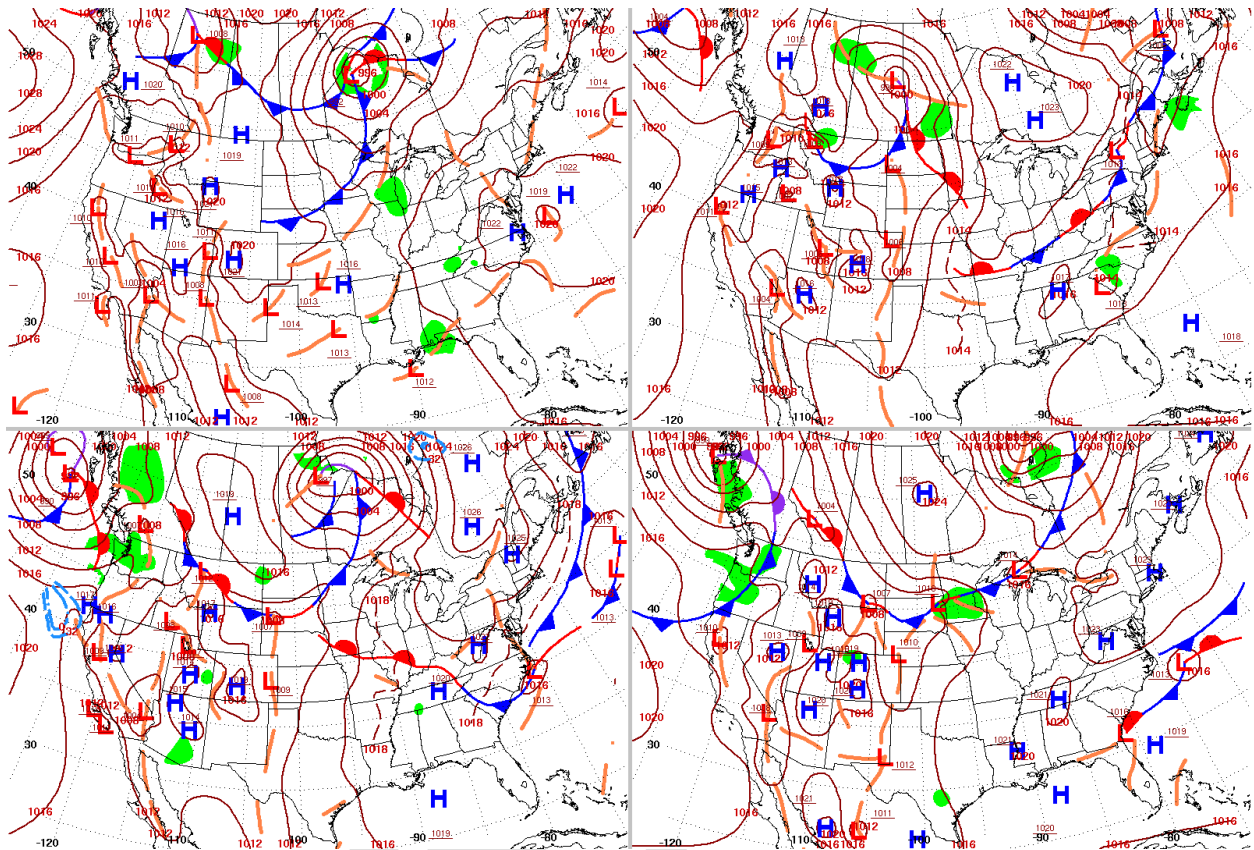


Figure 52. 500-millibar height contour plots for 07:00 EST on August 12 (top left), August 14 (top right), August 15 (bottom left), and August 16 (bottom right), 2025.

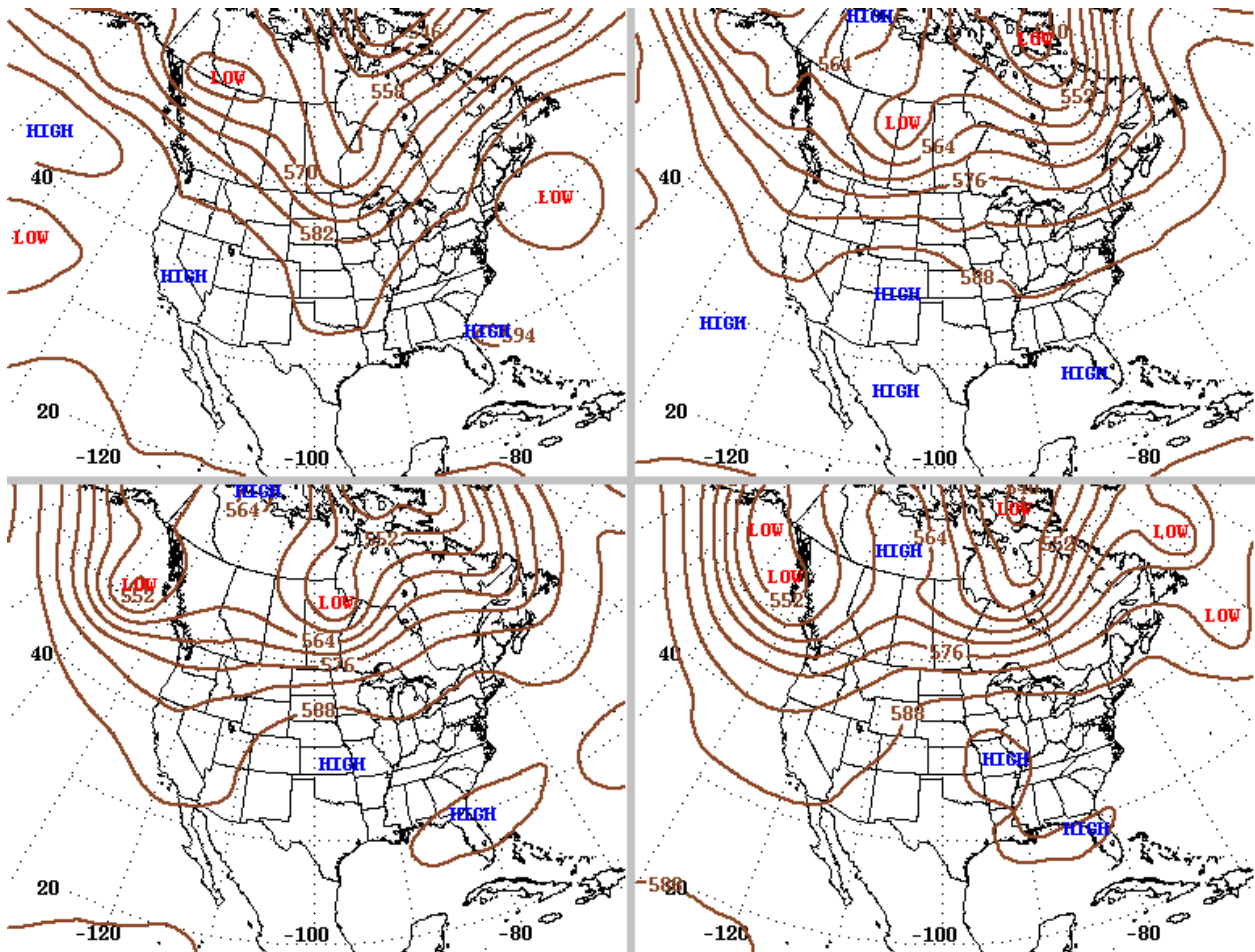
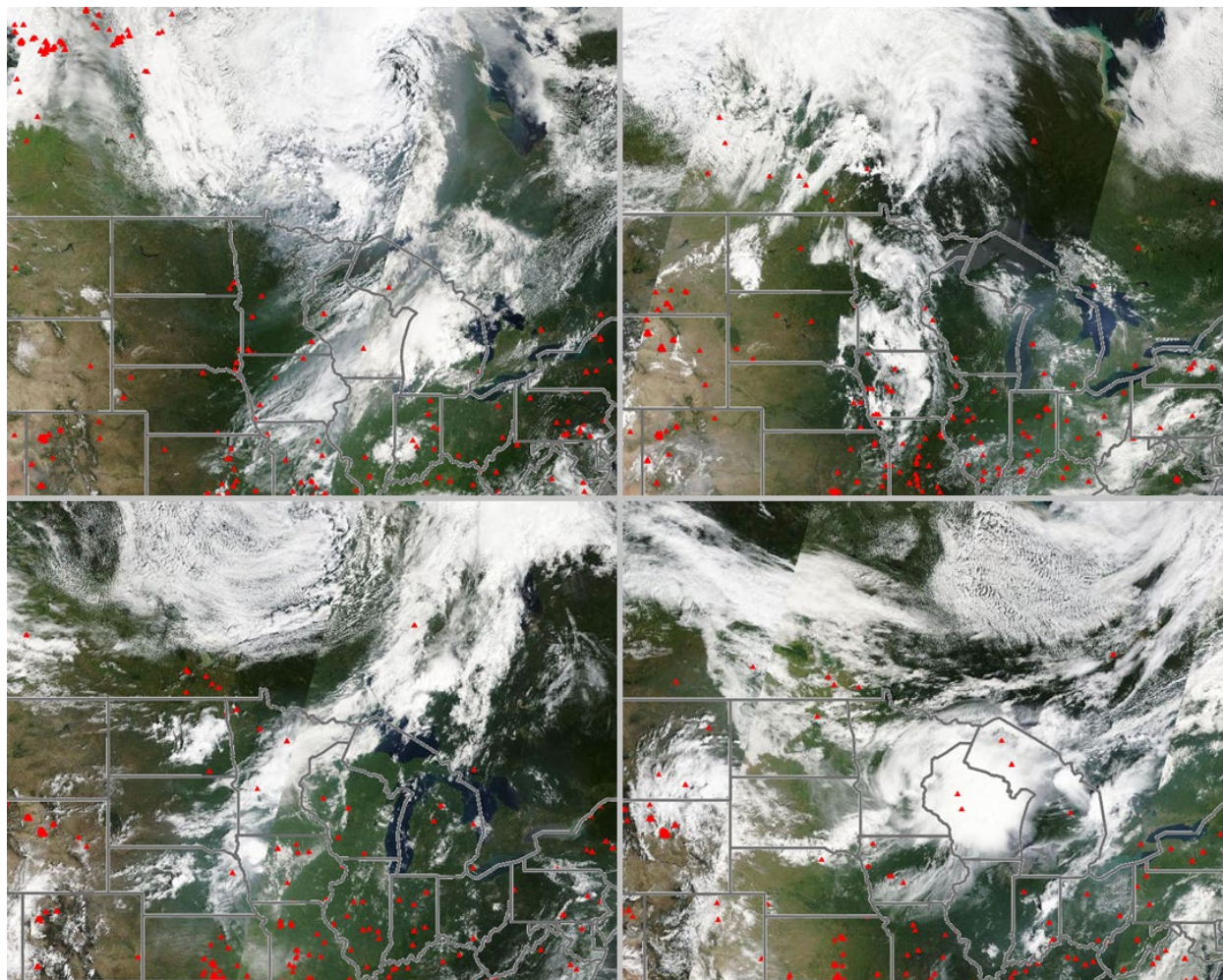


Figure 53. MODIS Terra corrected reflectance true color satellite imagery with daily detected fire locations shown as red triangles for August 12 (top left), August 14 (top right), August 15 (bottom left), and August 16 (bottom right), 2025.



2.9.3. Canadian Wildfires

From May 29 to August 12, 2025, the Manitoba Wildfire Service reported to CIFFC a fire preparedness level 5 for the province. From July 1 to August 14, 2025, the Saskatchewan Public Safety Agency reported to CIFFC a fire preparedness level of 5 for the province⁵⁰. Throughout this period, CWFIS reported high, very high, and extreme fire danger conditions across most of Saskatchewan and Manitoba. Very high and extreme fire danger conditions were also reported during this period for portions of western Ontario, northern Alberta, and central British Columbia.

⁵⁰ <https://ciffc.net/situation/2025-08-14>

3. Clear Causal Relationship

The impacts of these fireworks and wildfire smoke PM_{2.5} episodes on Stark County are clearly seen in satellite imagery, remote sensing products, and surface PM_{2.5} monitors. The figures and information in this section that are used to establish the clear causal relationships between the fireworks displays and Canadian wildfires and the corresponding PM_{2.5} pollution episodes in Stark County show data from AirNowTech.org and U.S. EPA's HYSPLIT for Exceptional Events Tool⁵² and include the following:

- Hazard Mapping System (HMS) smoke layers for all PM_{2.5} episodes
- Air Quality System (AQS) 24-hour and/or hourly average PM_{2.5} surface concentrations for all PM_{2.5} episodes
- HYSPLIT back and forward trajectories between the Canton Fire St8 monitoring site and the smoke source (wildfire, smoke plume, or fireworks display)

NASA Worldview⁵³ data and NOAA HRRR⁵⁴ smoke graphics are also used in this section, and include the following information:

- Aerosol optical depth (AOD) from the MODIS combined Terra and Aqua Multi-Angle Implementation of Atmospheric Correction (MAIAC) Land Aerosol Optical Depth level 2 product, with darker, redder color signifying greater AOD values
- Moderate Resolution Imaging Spectroradiometer (MODIS) Terra/Aqua corrected reflectance (true color) and Suomi NPP Visible Infrared Imaging Radiometer Suite (VIIRS) corrected reflectance (true color) satellite imagery

The clear causal relationships between the fireworks displays and Canadian wildfire smoke events and PM_{2.5} concentrations in Stark County are presented in this section. Clear causal relationship descriptions are presented separately for each PM_{2.5} episode.

⁵² <https://www.epa.gov/air-quality-analysis/hysplit-exceptional-events>

⁵³ <https://worldview.earthdata.nasa.gov>

⁵⁴ <https://rapidrefresh.noaa.gov/hrrr/HRRRsmoke>

3.1. Wildfire Smoke-Driven $PM_{2.5}$ Episode on June 11, 2023

3.1.1. June 11, 2023

The HYSPLIT 72-hour back and 65-hour forward trajectory plots show the origin and transport of the wildfire smoke plumes that caused the high surface $PM_{2.5}$ concentrations in Stark County on June 11, 2023. Figure 56 shows the HYSPLIT 72-hour back trajectory plot for June 11, overlaid on a map of fire locations, monitored 24-hour average surface $PM_{2.5}$ concentrations, and HMS smoke polygons for June 8. Figure 57 shows the HYSPLIT 65-hour forward trajectory plot for June 8, overlaid on a map of fire locations, monitored 24-hour average surface $PM_{2.5}$ concentrations, and HMS smoke polygons for June 11. The wildfires burning 28 km (17.4 mi) east-northeast of Sultan, Ontario coincide with the point (at 1212.7 meters AGL) at 07:00 EST on June 8 of the 200-meter release height back trajectory from Canton and the 1200-meter release height forward trajectory from those wildfires at 07:00 EST on June 8 reaches Canton (at 170.3 meters AGL) at 00:00 EST on June 11. The coincidence of the 72-hour back and 65-hour forward trajectories between the wildfires and Canton serves as clear evidence that the smoke from the wildfires in Ontario caused the high $PM_{2.5}$ concentrations in Stark County on June 11, 2023. The accompanying imagery map for June 11 presented in Figure 58 provides further evidence that dense smoke from the Canadian wildfires was present in Stark County on June 11, 2023, and that this wildfire smoke was the cause of the high concentrations of $PM_{2.5}$ at monitoring sites in Stark County.

Figure 56. HYSPLIT 72-hour back trajectory plot from June 11, 2023, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for June 8, 2023.

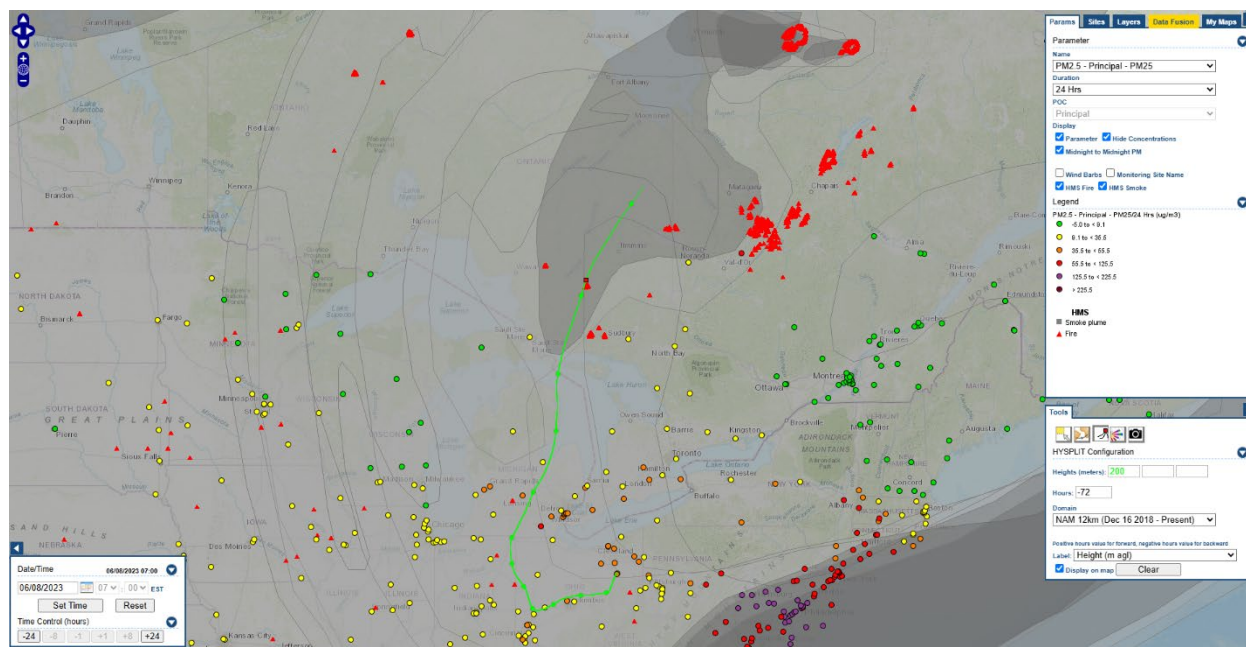


Figure 57. HYSPLIT 65-hour forward trajectory plot from June 8, 2023, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for June 11, 2023.

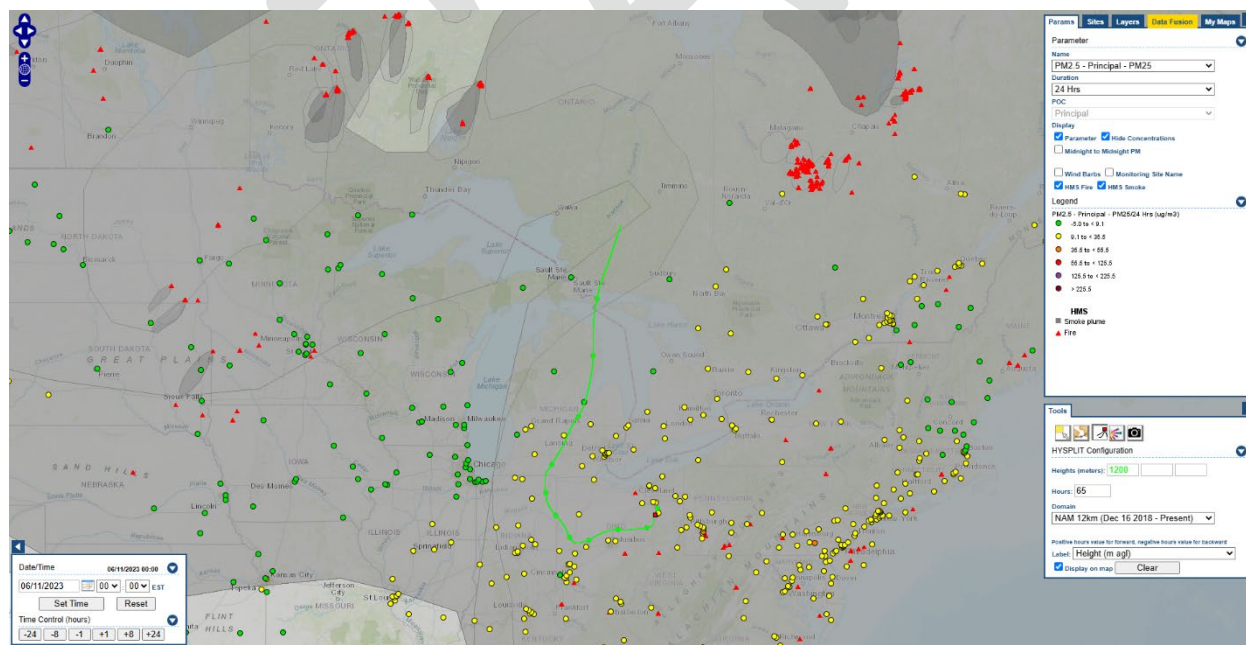


Figure 58. Terra satellite true color imagery of Ohio for June 11, 2023, showing visible wildfire smoke over Northeastern Ohio, including Stark County.

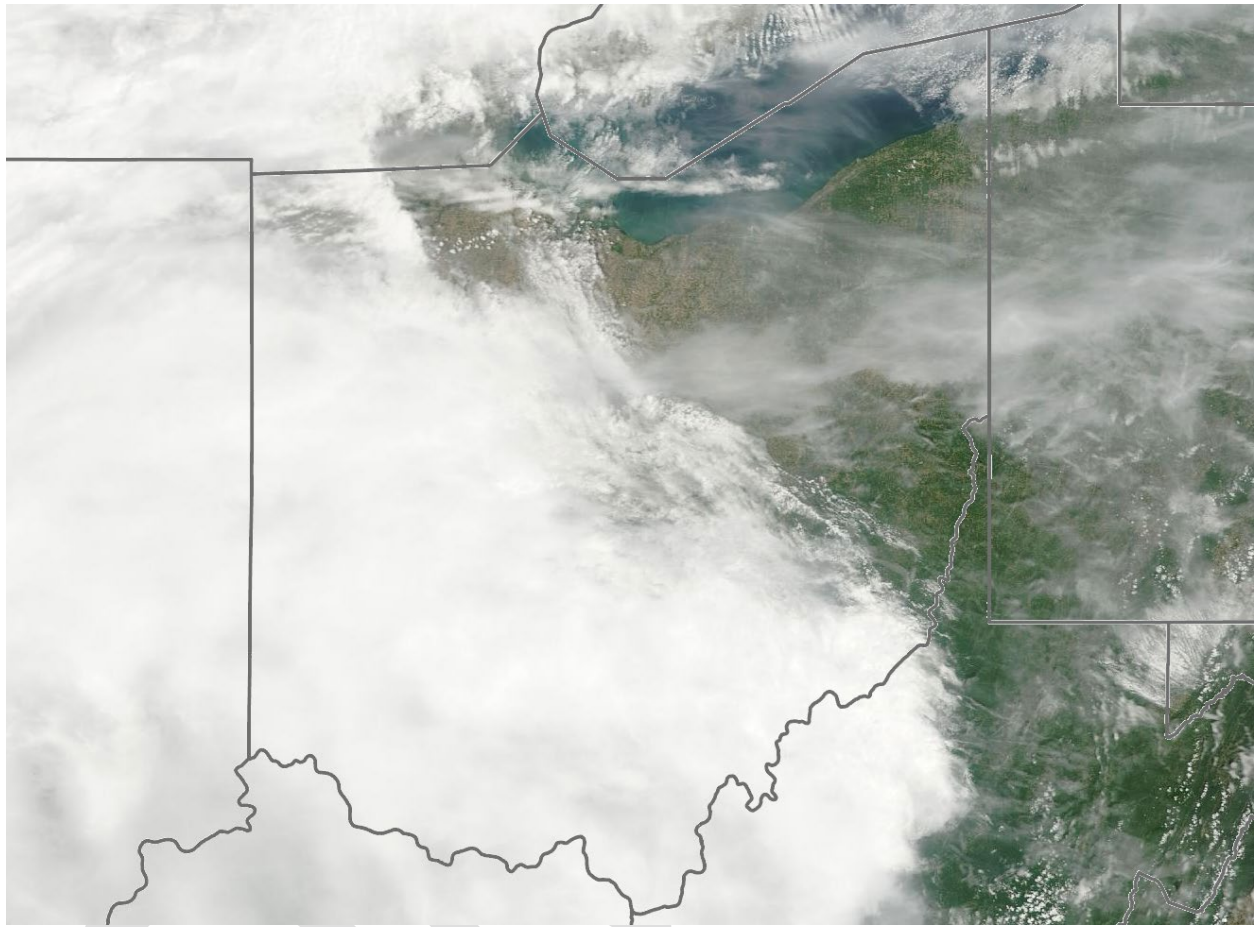


Table 3 and Figure 59 show the hourly average $PM_{2.5}$ concentrations on June 11, 2023, and the 2021-2025 average June concentrations measured by the POC23 Teledyne T640X monitor at the nearby Canton (39-151-0020) monitoring site, located 2.4 km northeast of the Canton Fire St8 (39-151-0017) monitoring site. The hourly average $PM_{2.5}$ concentrations remained elevated throughout the entire 24-hour period, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Stark County on June 11, 2023.

Table 3. Hourly average PM_{2.5} concentration data from the Canton (39-151-0020) monitoring site in Stark County on June 11, 2023.

Hour of Day	2021-2025 Average June Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³)
00:00	11.6	27.4
01:00	11.5	29.4
02:00	11.5	28.8
03:00	11.4	30.1
04:00	11.2	29.0
05:00	11.3	29.3
06:00	11.4	28.2
07:00	10.8	26.8
08:00	10.8	24.2
09:00	11.0	22.9
10:00	10.9	22.9
11:00	10.8	22.8
12:00	10.6	23.7
13:00	10.7	24.1
14:00	10.4	25.5
15:00	10.1	22.1
16:00	9.9	22.5
17:00	9.9	22.0
18:00	10.0	21.2
19:00	9.9	18.7
20:00	10.3	19.6
21:00	10.9	21.4
22:00	11.0	21.2
23:00	11.2	21.5

Figure 59. Plot of hourly average PM_{2.5} concentrations from the Canton (39-151-0020) monitoring site in Stark County on June 11, 2023, and 2021-2025 average June concentrations.

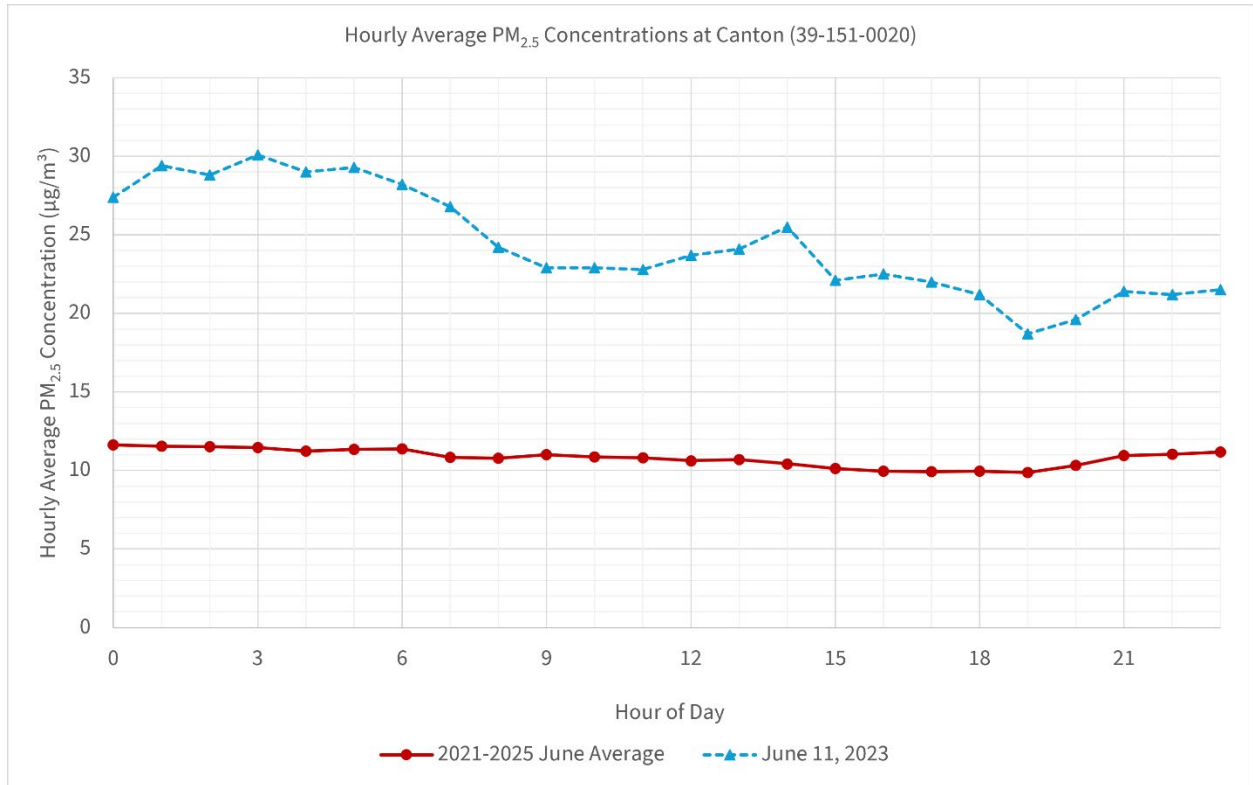
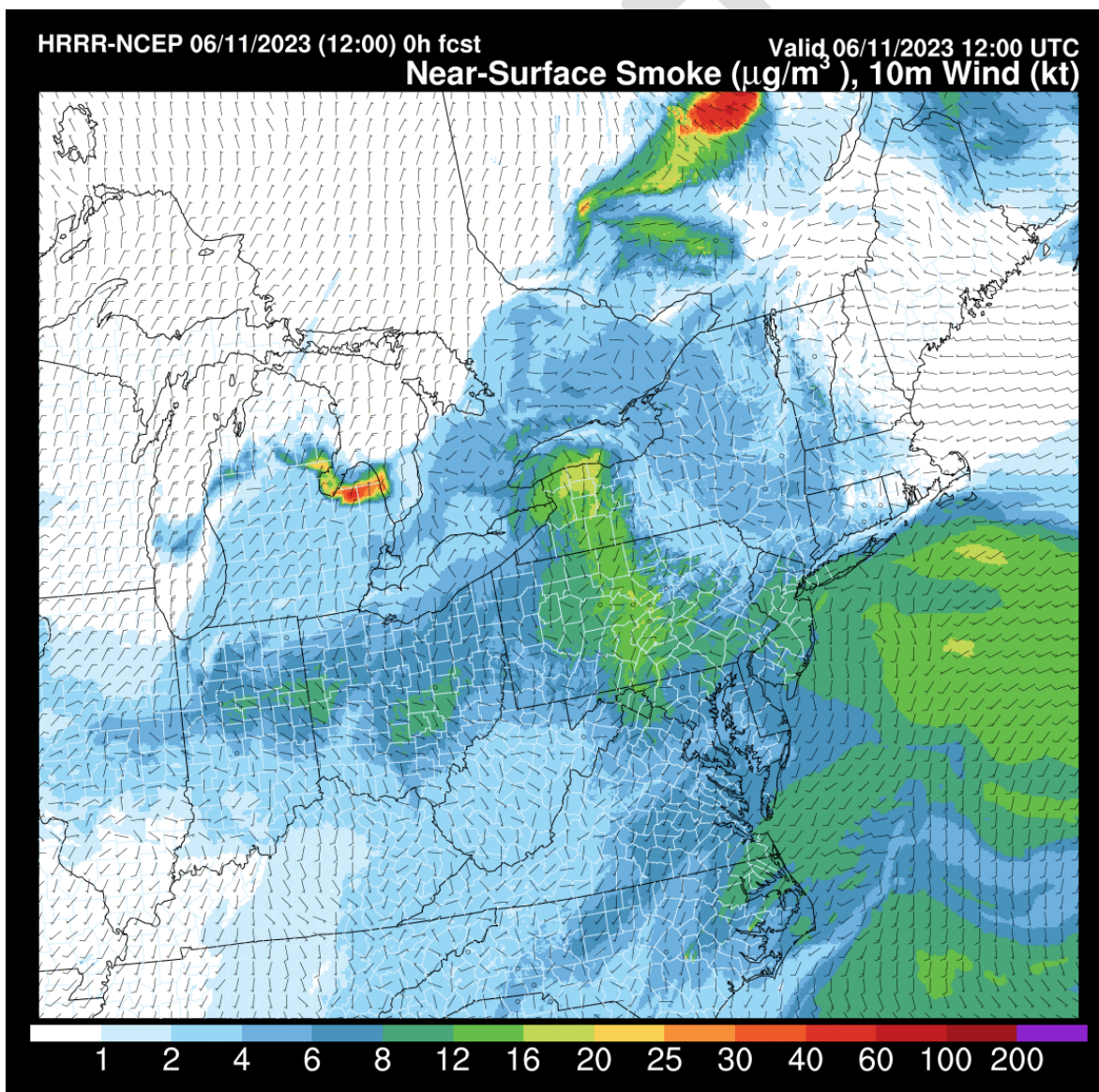


Figure 60 shows the near-surface smoke concentrations over the Northeast from the initialization of the HRRR near-surface smoke density modeling run from 12Z (07:00 EST) on June 11, 2023. The HRRR model initialization showed near-surface smoke across all of Ohio, including near-surface smoke concentrations of approximately 6-8 $\mu\text{g}/\text{m}^3$ at the Canton Fire St8 monitoring site in Stark County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Canton Fire St8 monitoring site on June 11, 2023.

Figure 60. Map of near-surface smoke concentrations over the Northeast from the initialization of the HRRR near-surface smoke density modeling run from 12Z (07:00 EST) on June 11, 2023.



3.2. Wildfire Smoke-Driven PM_{2.5} Episode on July 18, 2023

3.2.1. July 18, 2023

The HYSPLIT 96-hour back trajectory plot shows the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Stark County on July 18, 2023. Figure 61 shows the HYSPLIT 96-hour back trajectory plot for July 18, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for July 15. The wildfires burning 155 km (96.3 mi) west of High Level, Alberta coincide with the point (at 2694.1 meters AGL) at 02:00 EST on July 14 of the 1000-meter release height back trajectory from Canton, composed of a 24-hour back trajectory from the endpoint of the 72-hour back trajectory from Canton at 00:00 EST on July 18, serving as clear evidence that the smoke from the wildfires in Alberta caused the high PM_{2.5} concentrations in Stark County on July 18, 2023. The accompanying imagery map for July 18 presented in Figure 62 provides further evidence that dense smoke from the Canadian wildfires was present in Stark County on July 18, 2023, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Stark County.

Figure 61. HYSPLIT 96-hour back trajectory plot from July 18, 2023, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for July 14, 2023.

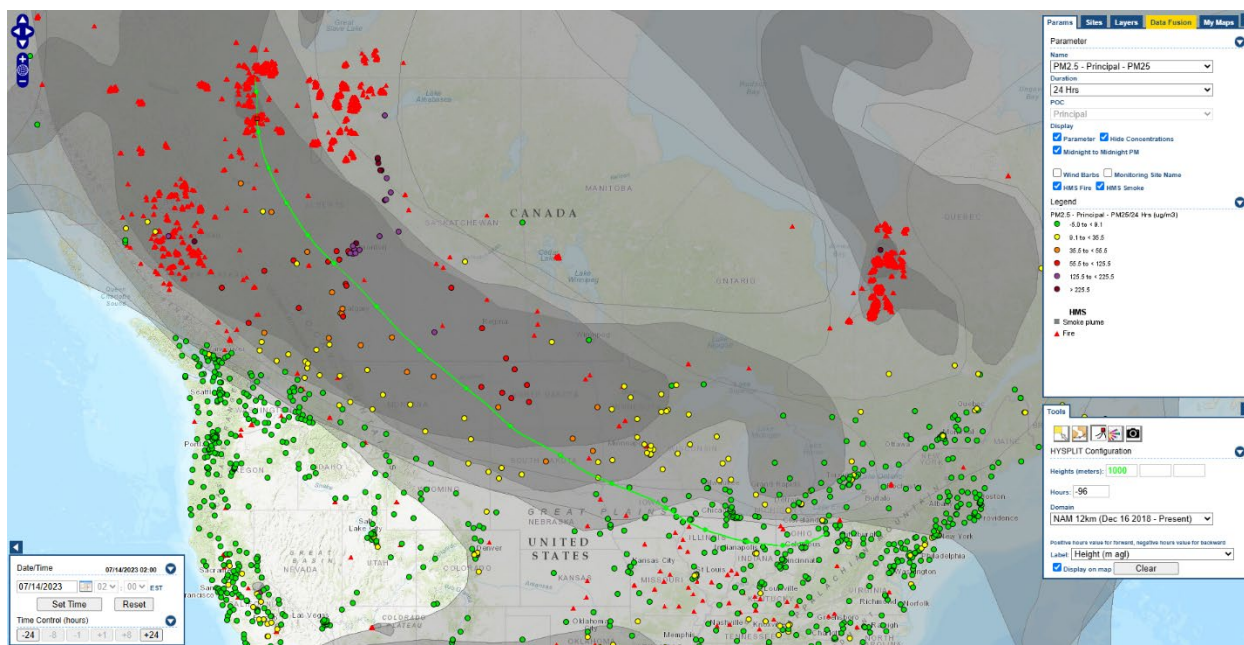


Figure 62. Terra satellite true color imagery of Ohio for July 18, 2023, showing visible wildfire smoke over Ohio, including Stark County.

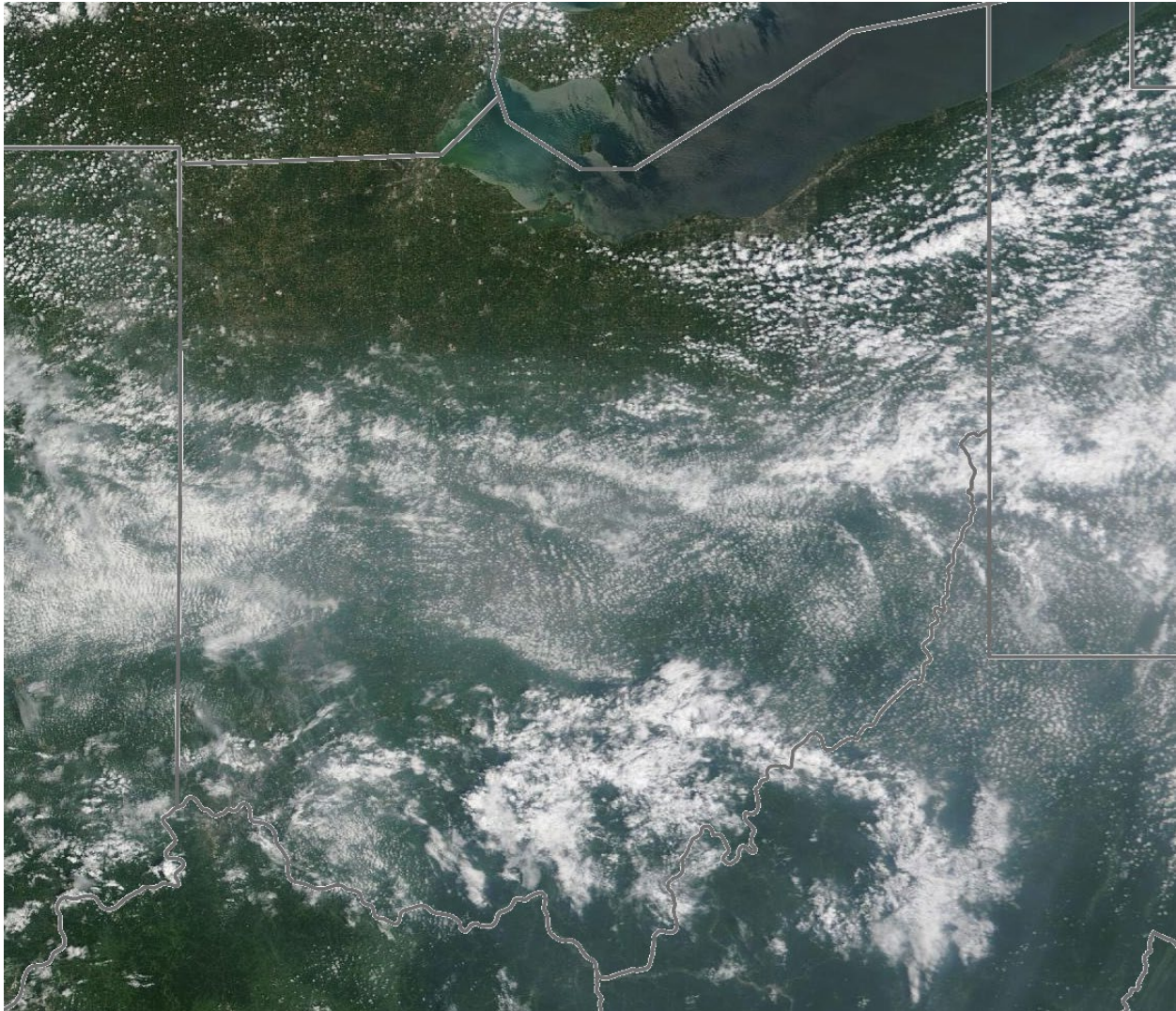


Table 4 and Figure 63 show the hourly average $PM_{2.5}$ concentrations on July 18, 2023, and the 2023-2025 average July concentrations measured by the POC3 Teledyne T640X monitor at the Canton Fire St8 (39-151-0017) monitoring site. The hourly average $PM_{2.5}$ concentrations remained elevated from the lingering wildfire smoke that had been impacting Stark County from July 16 until 20:00 EST on July 18, when a front moved in and pushed out the lingering wildfire smoke, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Stark County on July 18, 2023.

Table 4. Hourly average PM_{2.5} concentration data from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on July 18, 2023, and 2023-2025 average July concentration data.

Hour of Day	2023-2025 Average July Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on July 18, 2023
00:00	13.9	34.4
01:00	13.8	24.9
02:00	13.5	18.8
03:00	13.3	18.7
04:00	13.0	22.1
05:00	13.2	22.4
06:00	13.5	21.8
07:00	12.7	24.2
08:00	12.1	31.3
09:00	11.7	32.3
10:00	11.5	29.0
11:00	11.5	27.2
12:00	11.1	28.6
13:00	10.8	31.8
14:00	10.5	33.6
15:00	10.3	32.5
16:00	10.2	29.5
17:00	10.3	27.3
18:00	10.4	25.8
19:00	10.6	22.8
20:00	12.3	10.7
21:00	15.0	8.6
22:00	15.2	6.3
23:00	14.4	5.8

Figure 63. Plot of hourly average PM_{2.5} concentrations from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on July 18, 2023, and 2023-2025 average July concentrations.

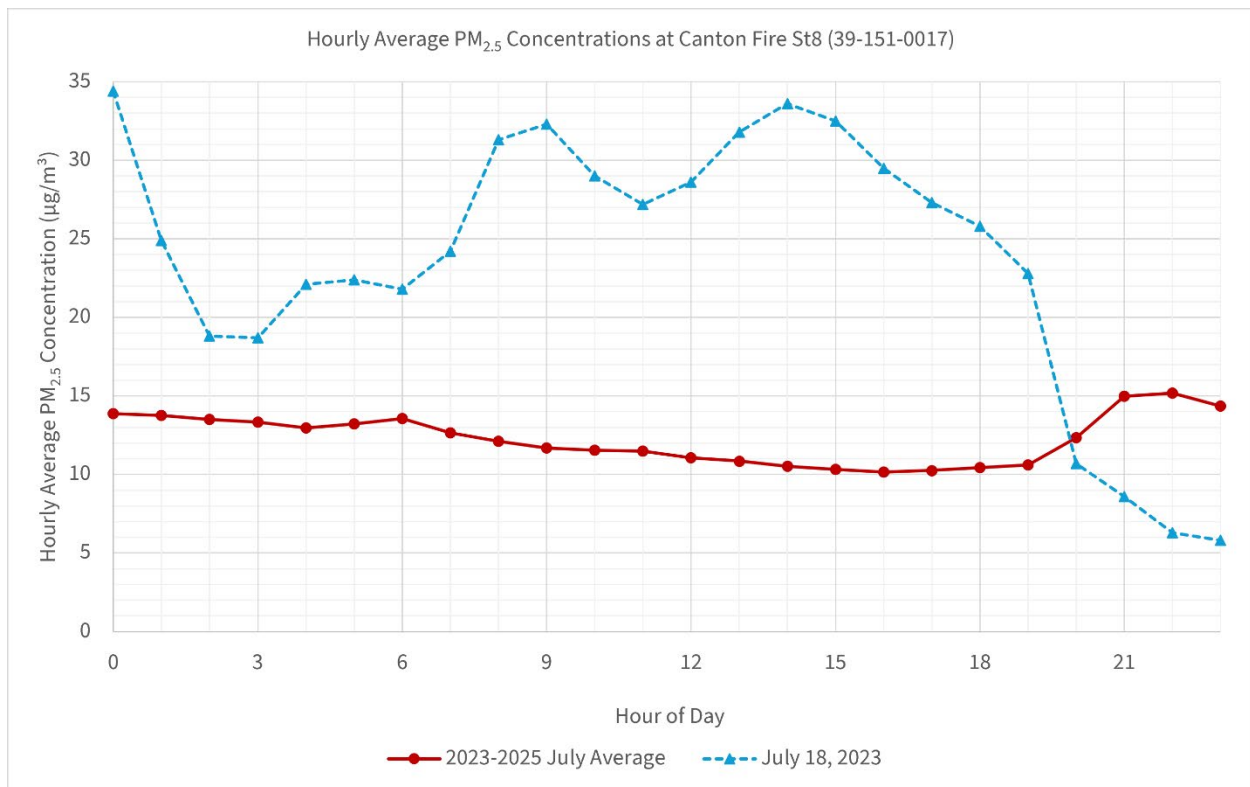
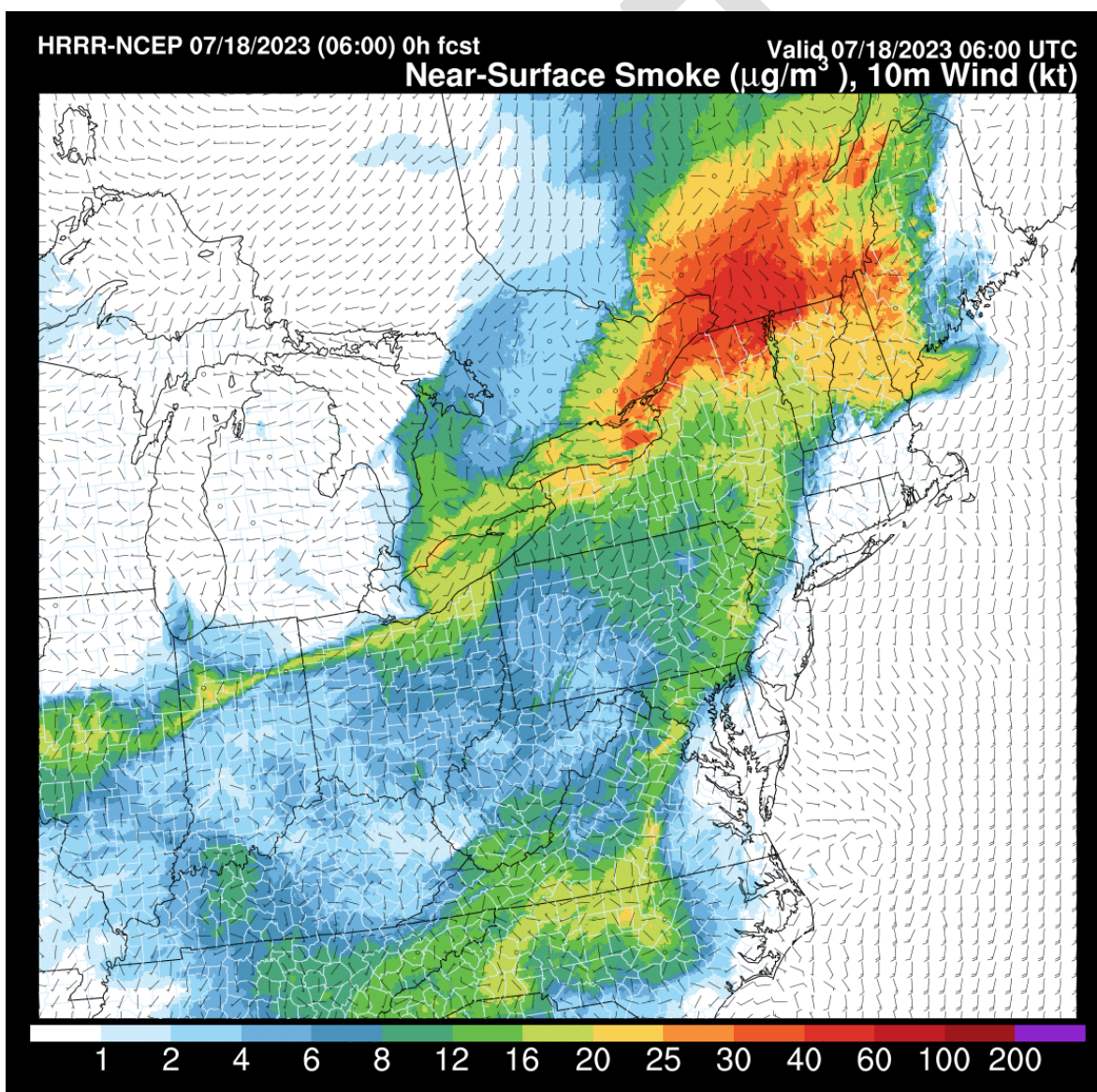


Figure 64 shows the near-surface smoke concentrations over the Northeast from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on July 18, 2023. The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately 8-12 $\mu\text{g}/\text{m}^3$ at the Canton Fire St8 monitoring site in Stark County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Canton Fire St8 monitoring site on July 18, 2023.

Figure 64. Map of near-surface smoke concentrations over the Northeast from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on July 18, 2023.



3.3. Wildfire Smoke-Driven PM_{2.5} Episode from August 1-5, 2023

3.3.1. August 1, 2023

The HYSPLIT 120-hour back and 108-hour forward trajectory plots show the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Stark County on August 1, 2023. Figure 65 shows the HYSPLIT 120-hour back trajectory plot for August 1, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for July 27. Figure 66 shows the HYSPLIT 108-hour forward trajectory plot for July 29, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for August 1. The wildfires burning 95 km (59.0 mi) north of Wollaston Lake, Saskatchewan coincide with the point (at 1374.3 meters AGL) at 12:00 EST on July 27 of the 500-meter release height back trajectory from Canton, composed of a 48-hour back trajectory from the endpoint of the 72-hour back trajectory from Canton. The corresponding 1375-meter release height 108-hour forward trajectory from those wildfires, composed of a 36-hour forward trajectory from the endpoint of the 72-hour forward trajectory from those wildfires at 12:00 EST on July 27, reaches the Canton area (at 486.0 meters AGL) at 00:00 EST on August 1. The coincidence of the back and forward trajectories between the wildfires and Canton serves as clear evidence that the smoke from the wildfires burning north of Wollaston lake, Saskatchewan caused the high PM_{2.5} concentrations in Stark County on August 1, 2023. The accompanying imagery map for August 1 presented in Figure 67 provides further evidence that dense smoke from the Canadian wildfires was present in Stark County on August 1, 2023, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Stark County.

Figure 65. HYSPLIT 120-hour back trajectory plot from August 1, 2023, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for July 27, 2023.

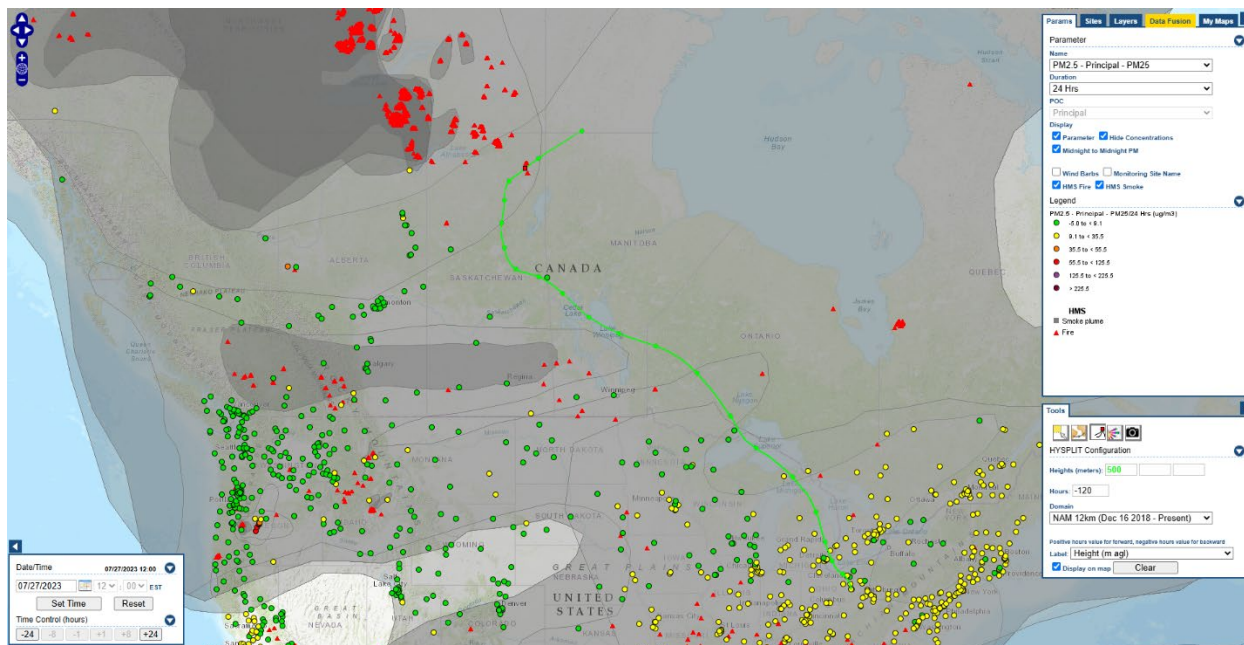


Figure 66. HYSPLIT 108-hour forward trajectory plot from July 27, 2023, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for August 1, 2023.

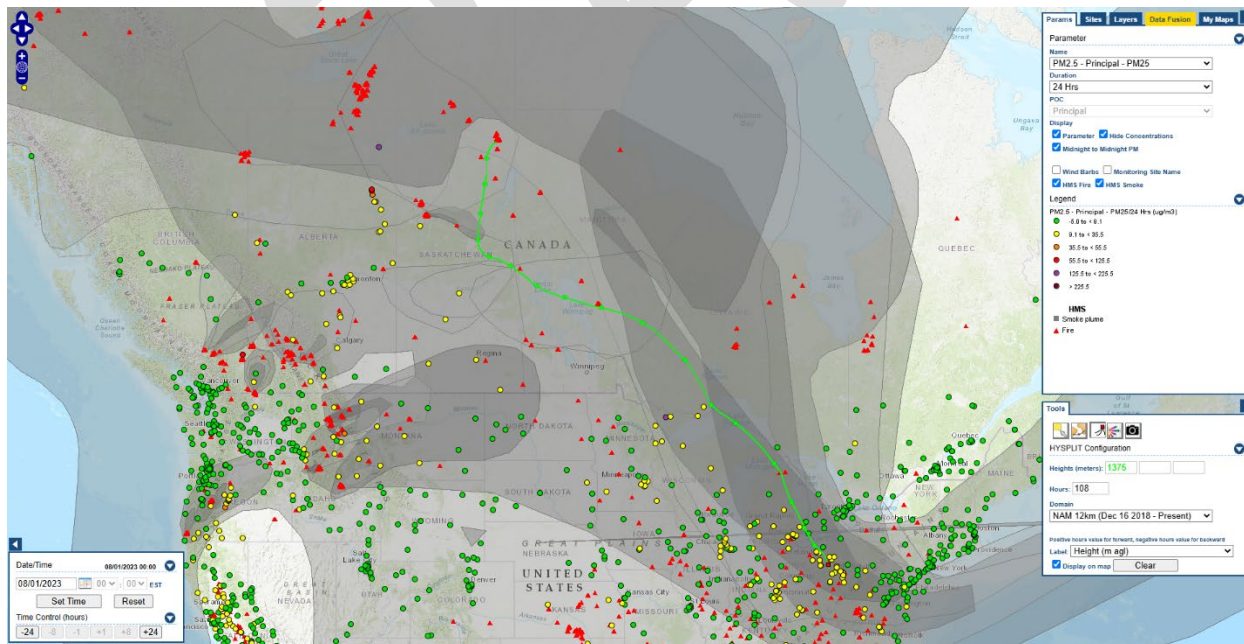


Figure 67. Terra satellite true color imagery of Ohio for August 1, 2023, showing visible wildfire smoke over Ohio, including Stark County.



Table 5 and Figure 68 show the hourly average $PM_{2.5}$ concentrations on August 1, 2023, and the 2023-2025 average August concentrations measured by the POC3 Teledyne T640X monitor at the Canton Fire St8 (39-151-0017) monitoring site. The hourly average $PM_{2.5}$ concentrations rapidly increased to $60.8 \mu\text{g}/\text{m}^3$ at 00:00 EST on August 1 as wildfire smoke descended on Canton, then remained elevated throughout the rest of the day, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Stark County on August 1, 2023.

Table 5. Hourly average PM_{2.5} concentration data from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on August 1, 2023, and 2023-2025 average August concentration data.

Hour of Day	2023-2025 Average August Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on Aug. 1, 2023
00:00	13.1	60.8
01:00	12.5	35.9
02:00	13.3	35.2
03:00	13.2	34.9
04:00	13.2	30.3
05:00	14.2	27.5
06:00	14.0	28.7
07:00	12.8	23.5
08:00	11.1	23.0
09:00	10.6	21.4
10:00	10.3	18.3
11:00	10.1	16.0
12:00	9.9	15.4
13:00	9.9	14.9
14:00	9.9	16.7
15:00	9.8	18.5
16:00	9.7	18.5
17:00	9.9	22.4
18:00	10.0	18.5
19:00	10.7	21.3
20:00	12.2	22.1
21:00	12.8	29.9
22:00	12.2	31.3
23:00	12.2	35.0

Figure 68. Plot of hourly average PM_{2.5} concentrations from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on August 1, 2023, and 2023-2025 average August concentrations.

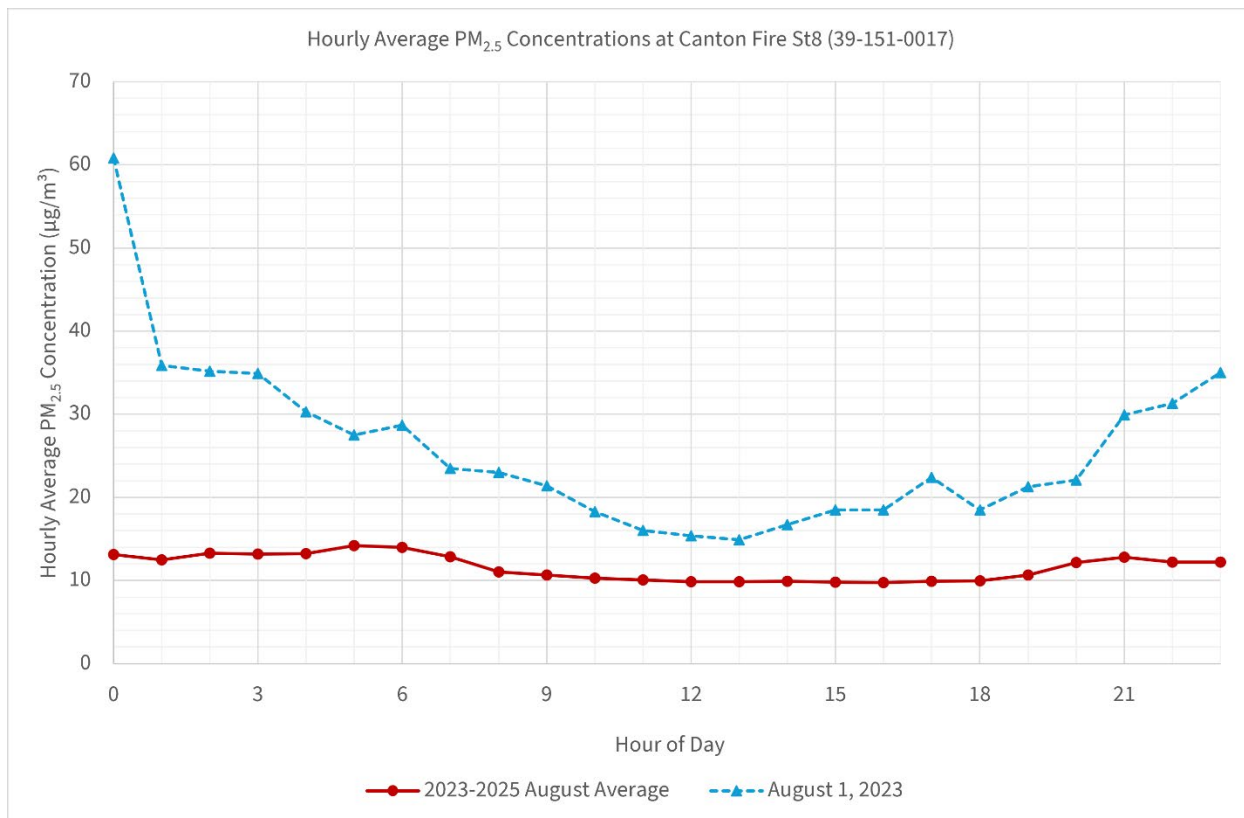


Figure 69 shows the vertically integrated smoke density over the continental United States from the initialization of the HRRR vertically integrated smoke density modeling run from 06Z (01:00 EST) on August 1, 2023. The HRRR model initialization showed a plume of extremely dense vertically integrated smoke stretching from northern Canada down to Maryland, with a vertically integrated smoke density of approximately 50-75 mg/m² at the Canton Fire St8 monitoring site in Stark County. Figure 70 shows the smoke concentration at 6000 ft AGL over the Northeastern United States from the initialization of the HRRR smoke modeling run from 06Z (01:00 EST) on August 1, 2023. The HRRR model initialization showed a smoke concentration at 6000 ft AGL of approximately 4 µg/m³ at the Canton Fire St8 monitoring site in Stark County, at a low enough height to be able to descend upon the surface throughout the day as the typical nighttime inversion breaks and the mixing height increases. The HRRR smoke modeling results provide further evidence that wildfire smoke impacted PM_{2.5} concentrations at the Canton Fire St8 monitoring site on August 1, 2023.

Figure 69. Map of vertically integrated smoke density over the continental United States from the initialization of the HRRR vertically integrated smoke density modeling run from 06Z (01:00 EST) on August 1, 2023.

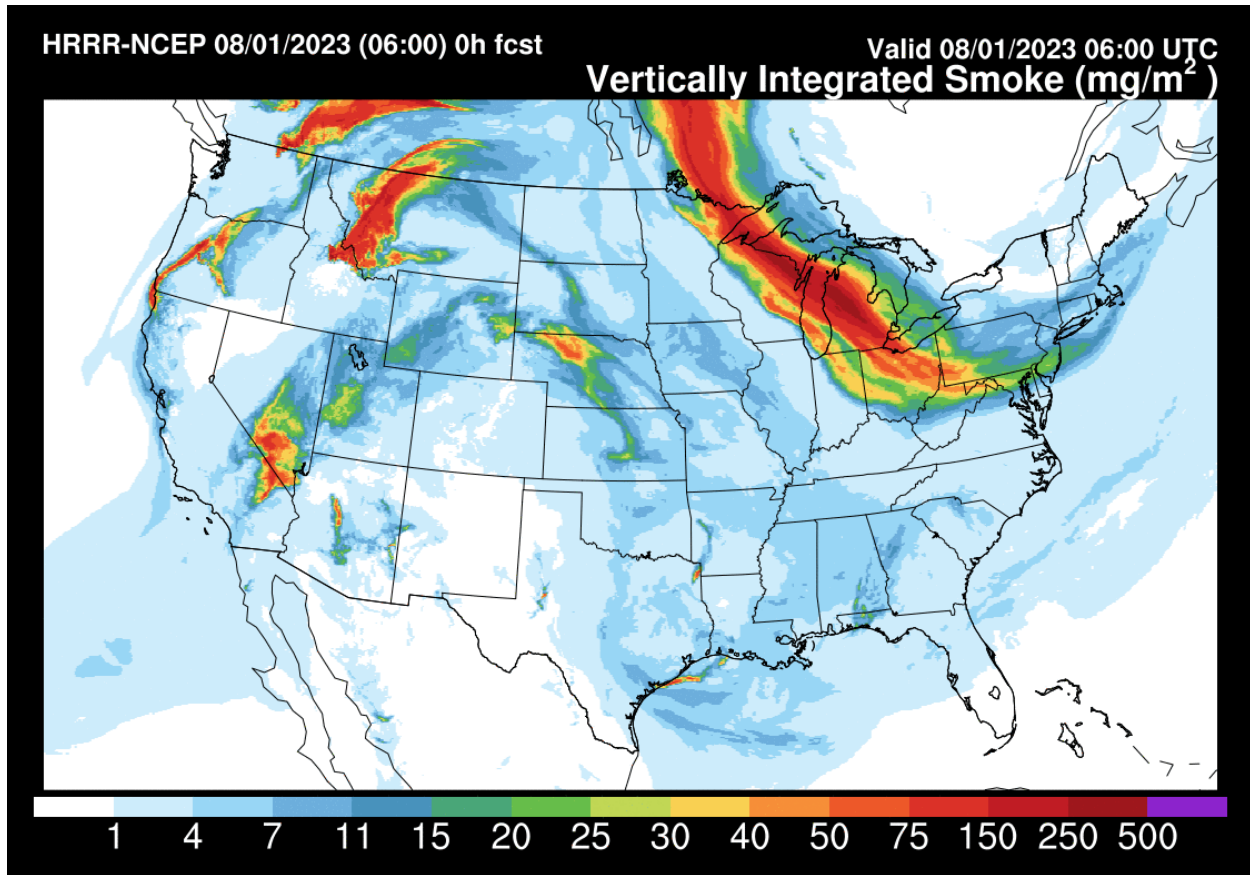
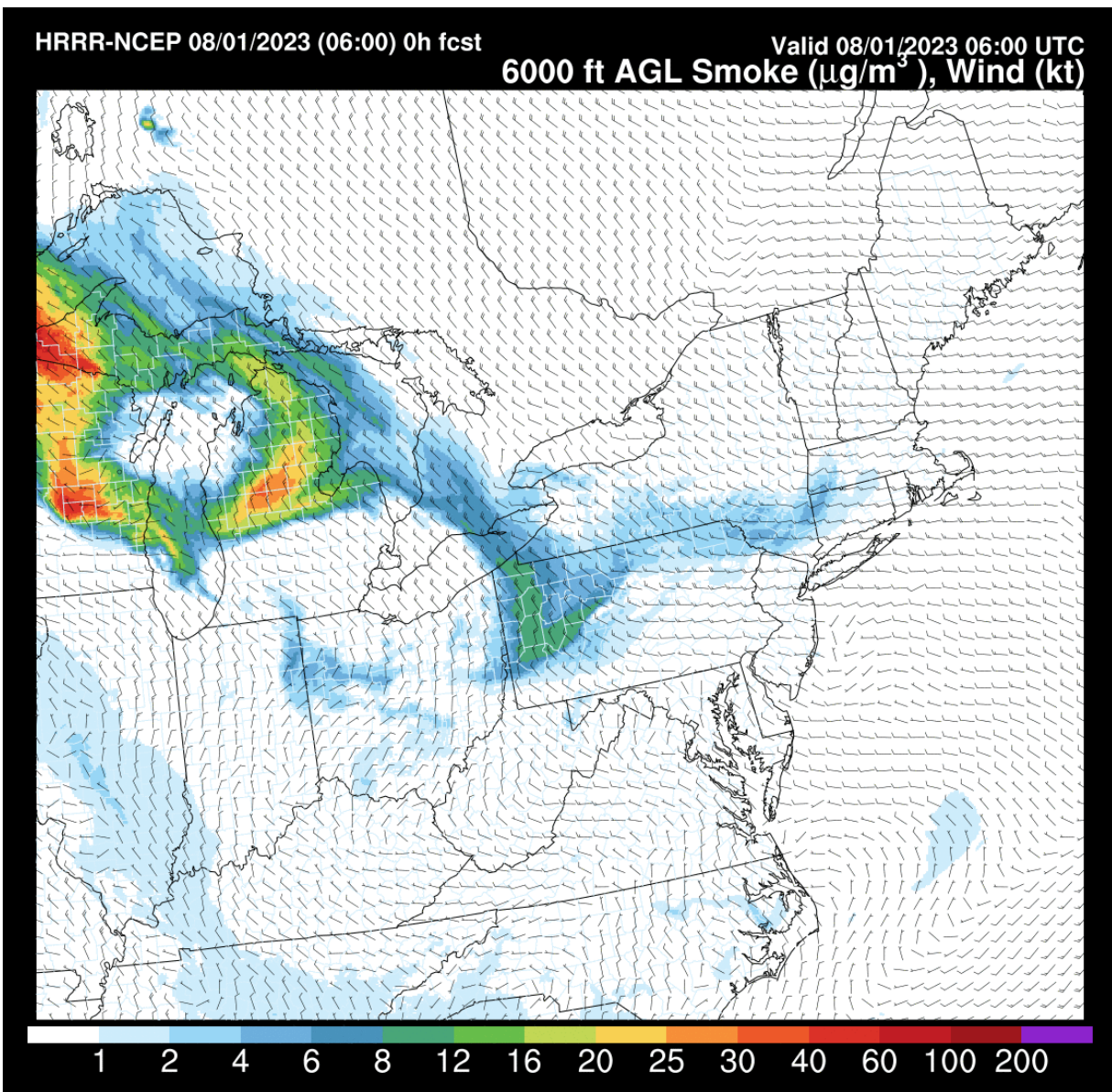


Figure 70. Map of smoke concentration at 6000 ft AGL over the Northeastern United States from the initialization of the HRRR smoke modeling run from 06Z (01:00 EST) on August 1, 2023.



3.3.2. August 4, 2023

The HYSPLIT 120-hour back trajectory plot shows the transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Stark County on August 4, 2023. Figure 71 shows the HYSPLIT 120-hour back trajectory plot from the Canton Fire St8 monitoring site, released at a height of 41.5 m AGL at 00:00 EST on August 4, with circles indicating the current smoke density at every hour along the back trajectory of the air parcel. As discussed in Ohio's Exceptional Events Demonstration for 2023 Wildfire Smoke-Driven PM_{2.5} Episodes in the Canton–Massillon, OH Metropolitan Statistical Area⁵⁵, wildfire smoke from the wildfires burning 65 km (40.4 mi) east-southeast of Poplar River, Manitoba on July 31 was already present and impacting Stark County on August 3, 2023, and regional concurrence was given for the request for exclusion of PM_{2.5} concentration data from August 3. The 120-hour back trajectory between the wildfire smoke plume location and Canton, showing the slow-moving nature of the wildfire smoke-laden airmass present in Stark County on both August 3 and 4, 2023, serves as clear evidence that the smoke from the wildfires burning east-southeast of Poplar River, Manitoba continued to blanket Northeastern Ohio due to a strong, slow-moving high-pressure system trapping the smoke-laden air near the surface, which ultimately caused the high PM_{2.5} concentrations in Stark County on August 4, 2023. The accompanying imagery map for August 4 presented in Figure 72 shows moderate to high AOD values over Northeastern Ohio, providing further evidence that smoke from the Canadian wildfires was present in Stark County on August 4, 2023, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Stark County.

⁵⁵ https://dam.assets.ohio.gov/image/upload/epa.ohio.gov/Portals/27/sip/Main-Documents-EE-Demo-for-the-Canton_Massillon_-OH-MSA-Submittal.pdf

Figure 71. HYSPLIT 120-hour back trajectory plot from the Canton Fire St8 monitoring site at 00:00 EST on August 4, 2023, with red and orange circles respectively indicating heavy and medium smoke intensity.

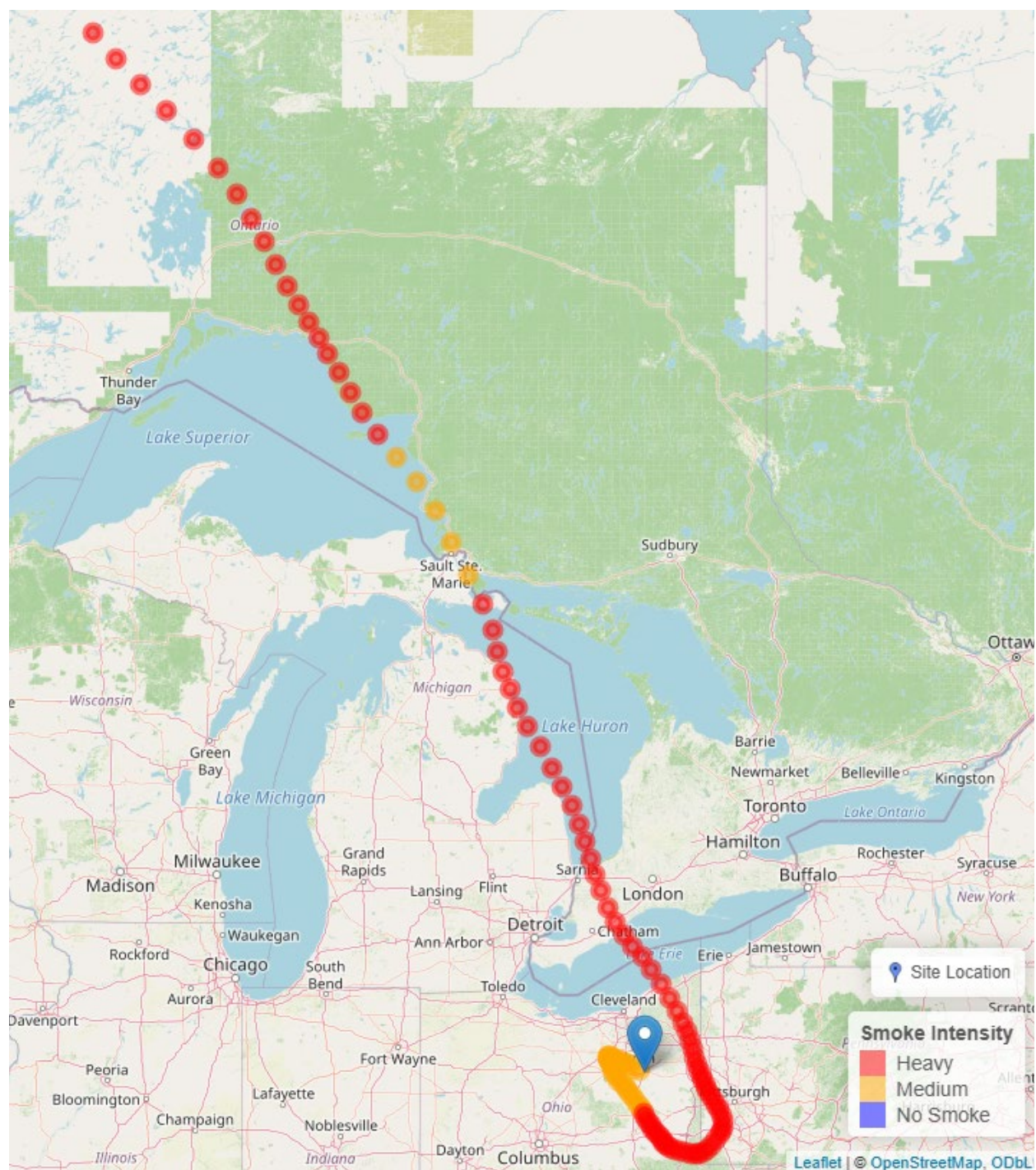


Figure 72. Suomi NPP satellite true color and MAIAC AOD imagery of Ohio and surrounding states for August 4, 2023, showing moderate to high AOD values in Northeastern Ohio, including Stark County.

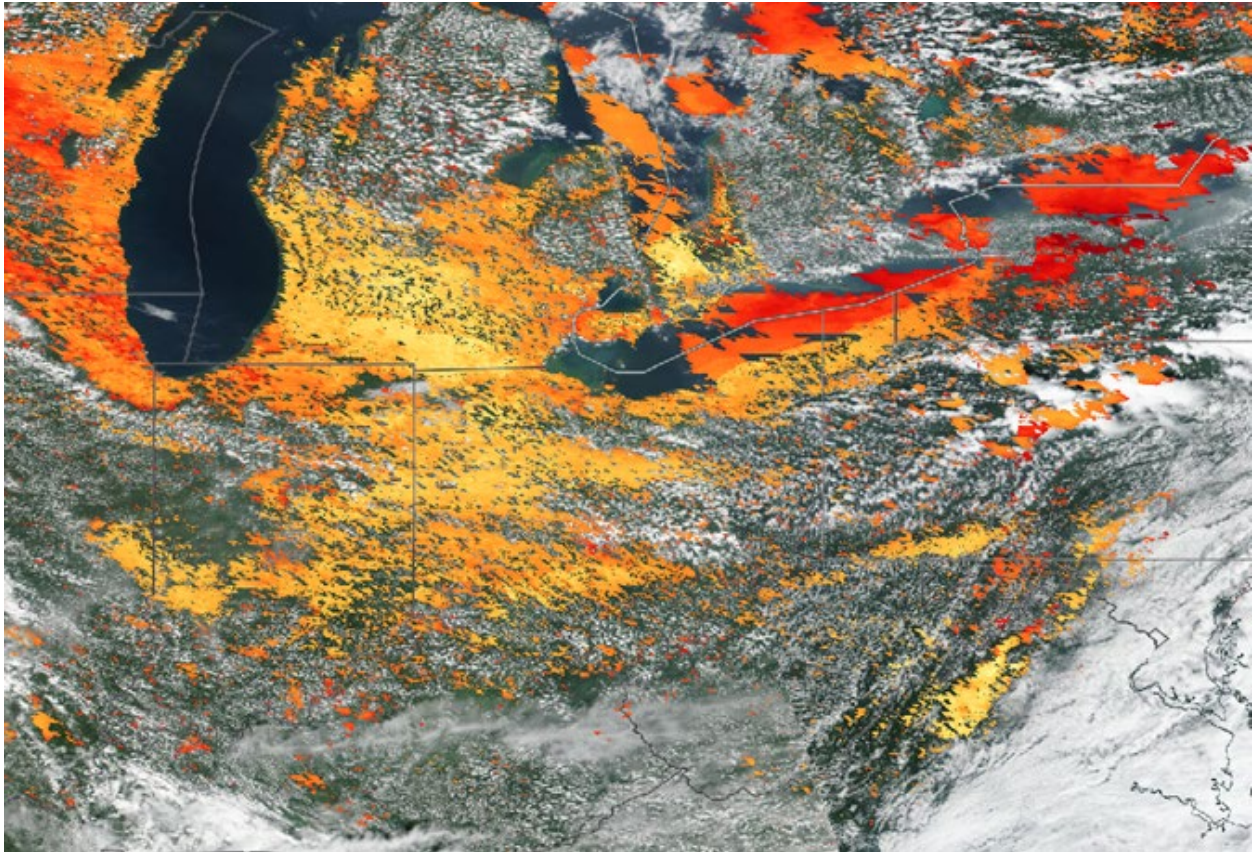


Table 6 and Figure 73 show the hourly average $PM_{2.5}$ concentrations on August 4, 2023, and the 2023-2025 average August concentrations measured by the POC3 Teledyne T640X monitor at the Canton Fire St8 (39-151-0017) monitoring site. The hourly average $PM_{2.5}$ concentrations remained elevated due to continued wildfire smoke presence throughout the entirety of August 4, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Stark County on August 4, 2023.

Table 6. Hourly average PM_{2.5} concentration data from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on August 4, 2023, and 2023-2025 average August concentration data.

Hour of Day	2023-2025 Average August Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on Aug. 4, 2023
00:00	13.1	27.7
01:00	12.5	30.4
02:00	13.3	33.0
03:00	13.2	30.0
04:00	13.2	29.5
05:00	14.2	28.7
06:00	14.0	31.7
07:00	12.8	33.1
08:00	11.1	N/A (Null Code AZ; Quality Control Audit)
09:00	10.6	N/A (Null Code BA; Maintenance/Routine Repairs)
10:00	10.3	N/A (Null Code BA; Maintenance/Routine Repairs)
11:00	10.1	N/A (Null Code AT; Calibration)
12:00	9.9	N/A (Null Code AZ; Quality Control Audit)
13:00	9.9	14.7
14:00	9.9	15.0
15:00	9.8	16.0
16:00	9.7	20.8
17:00	9.9	27.4
18:00	10.0	28.2
19:00	10.7	33.3
20:00	12.2	30.4
21:00	12.8	28.6
22:00	12.2	28.8
23:00	12.2	27.9

Figure 73. Plot of hourly average PM_{2.5} concentrations from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on August 4, 2025, and 2023-2025 average August concentrations.

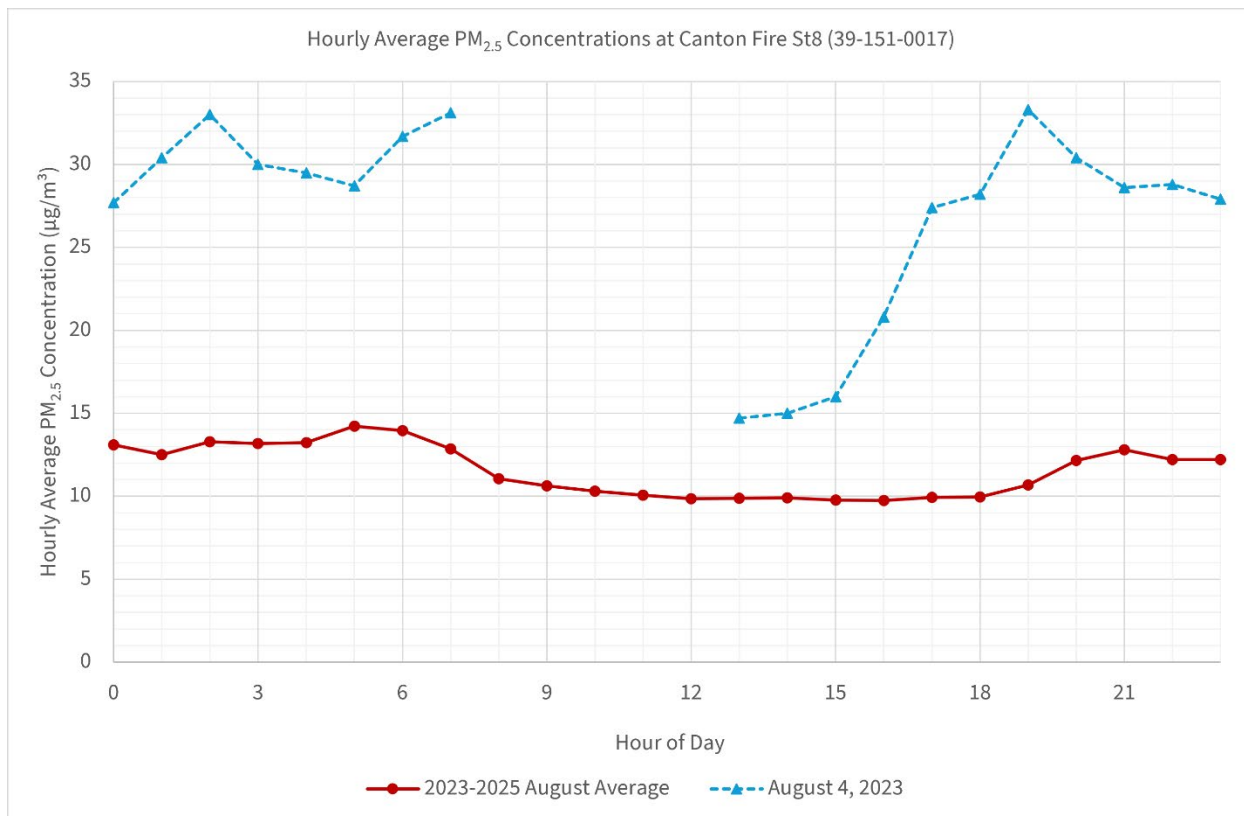
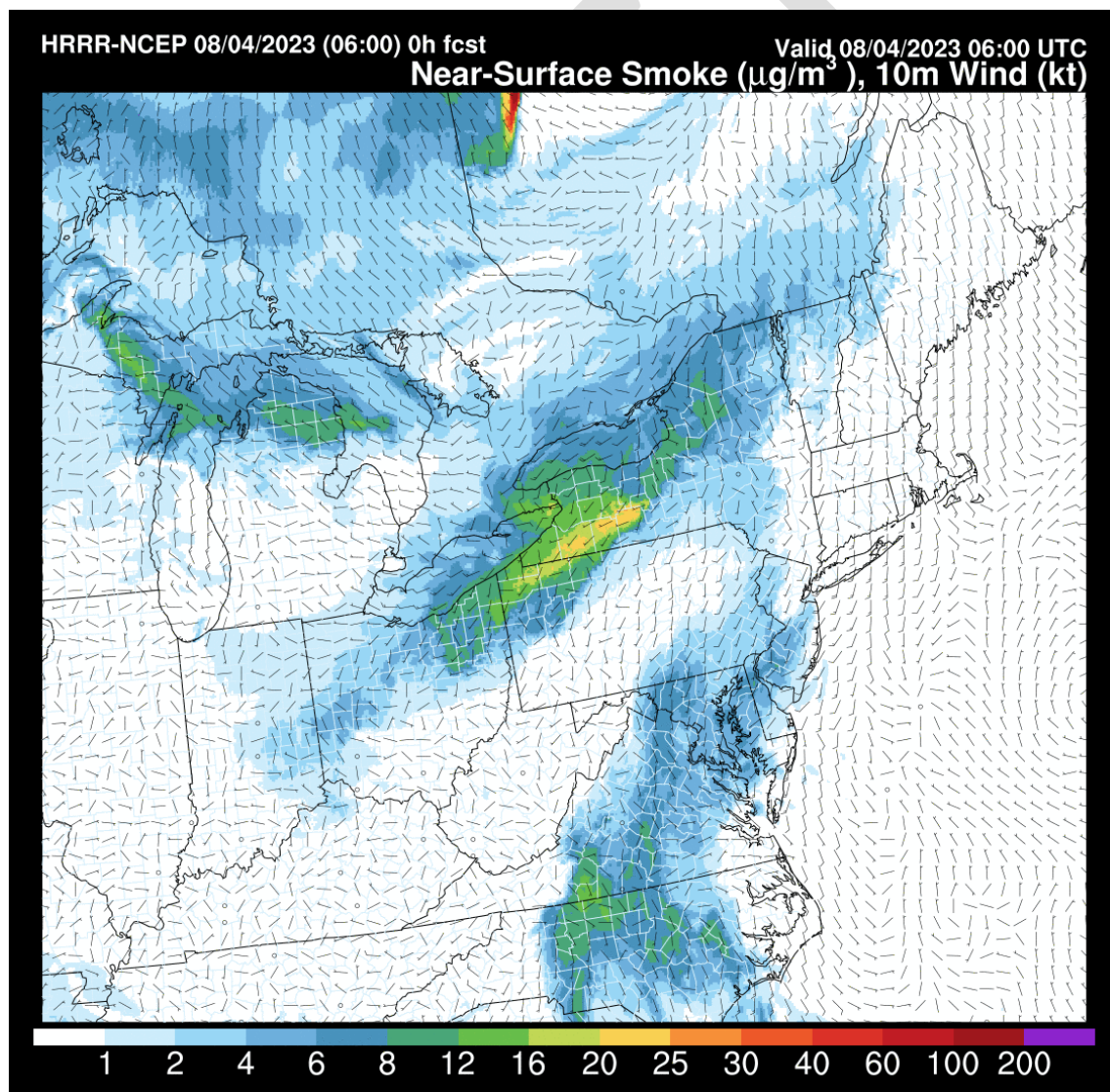


Figure 74 shows the near-surface smoke concentrations over the Northeast from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on August 4, 2023. The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately 8-12 $\mu\text{g}/\text{m}^3$ at the Canton Fire St8 monitoring site in Stark County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Canton Fire St8 monitoring site on August 4, 2023.

Figure 74. Map of near-surface smoke concentrations over the Northeast from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on August 4, 2023.



3.3.3. August 5, 2023

The HYSPLIT 96-hour back trajectory plot shows the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Stark County on August 5, 2023. Figure 75 shows the HYSPLIT 96-hour back trajectory plot for August 5, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for August 2. The wildfires 65 km (40.4 mi) east-southeast of Poplar River, Manitoba coincide with the point (at 156.7 meters AGL) at 00:00 EST on August 2 of the 100-meter release height back trajectory from Canton, composed of a 24-hour back trajectory from the endpoint of the 72-hour back trajectory from Canton, serving as clear evidence that smoke from the wildfires burning east-southeast of Poplar River, Manitoba continued to blanket Northeastern Ohio, causing the high PM_{2.5} concentrations in Stark County on August 5, 2023. The accompanying imagery map for August 5 presented in Figure 76 provides further evidence that smoke from the Canadian wildfires was present in Stark County on August 5, 2023, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Stark County.

Figure 75. HYSPLIT 96-hour back trajectory plot from August 5, 2023, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for August 2, 2023.

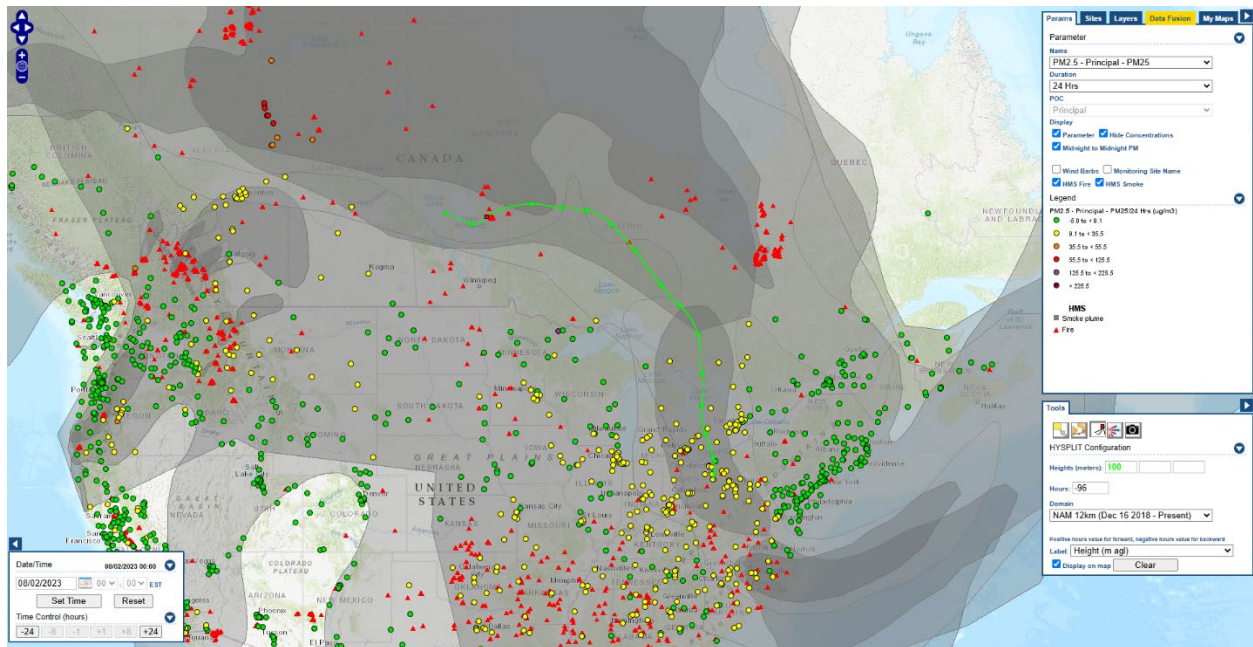


Figure 76. Terra satellite true color imagery for August 5, 2023, showing visible wildfire smoke over Ohio, including Stark County.

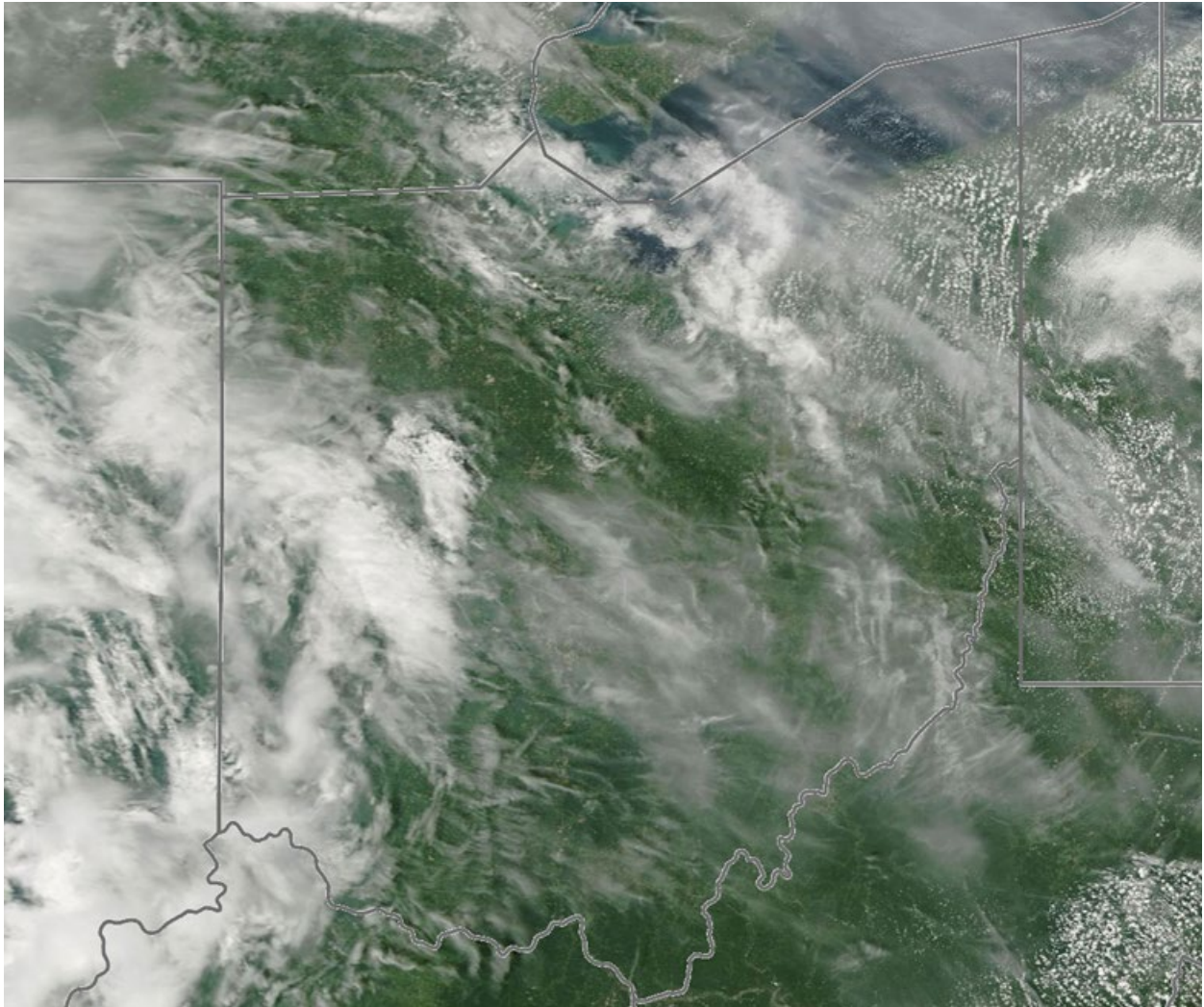


Table 7 and Figure 77 show the hourly average $PM_{2.5}$ concentrations on August 5, 2023, and the 2023-2025 average August concentrations measured by the POC3 Teledyne T640X monitor at the Canton Fire St8 (39-151-0017) monitoring site. The hourly average $PM_{2.5}$ concentrations remained elevated due to the continued presence of wildfire smoke throughout the entirety of August 5, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Stark County on August 5, 2023.

Table 7. Hourly average PM_{2.5} concentration data from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on August 5, 2023, and 2023-2025 average August concentration data.

Hour of Day	2023-2025 Average August Hourly PM_{2.5} Concentration (µg/m³)	Hourly Average PM_{2.5} Concentration (µg/m³) on Aug. 5, 2023
00:00	13.1	26.2
01:00	12.5	31.0
02:00	13.3	30.7
03:00	13.2	39.6
04:00	13.2	41.1
05:00	14.2	34.1
06:00	14.0	33.1
07:00	12.8	20.8
08:00	11.1	19.6
09:00	10.6	19.0
10:00	10.3	17.5
11:00	10.1	16.1
12:00	9.9	16.5
13:00	9.9	17.6
14:00	9.9	17.6
15:00	9.8	17.3
16:00	9.7	17.7
17:00	9.9	18.2
18:00	10.0	21.5
19:00	10.7	23.7
20:00	12.2	20.2
21:00	12.8	22.7
22:00	12.2	24.1
23:00	12.2	24.2

Figure 77. Plot of hourly average PM_{2.5} concentrations from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on August 5, 2025, and 2023-2025 average August concentrations.

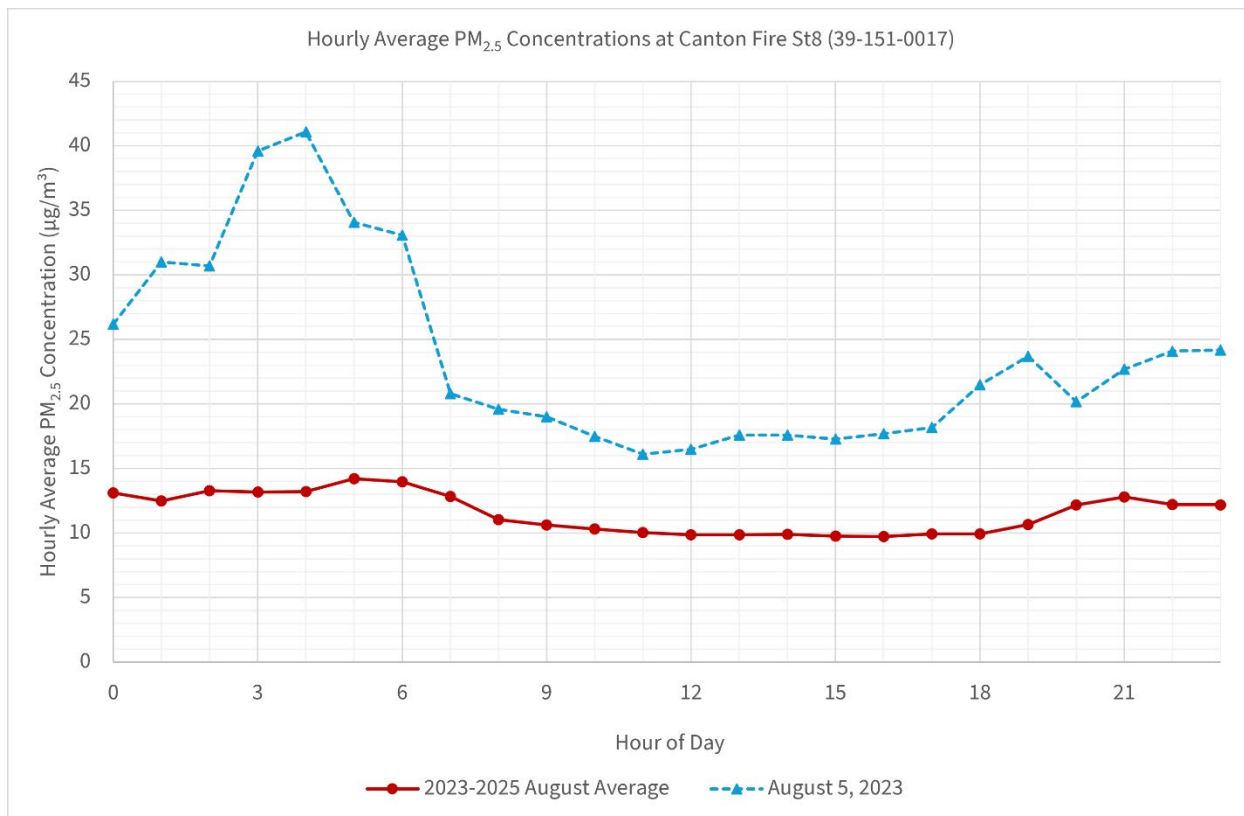
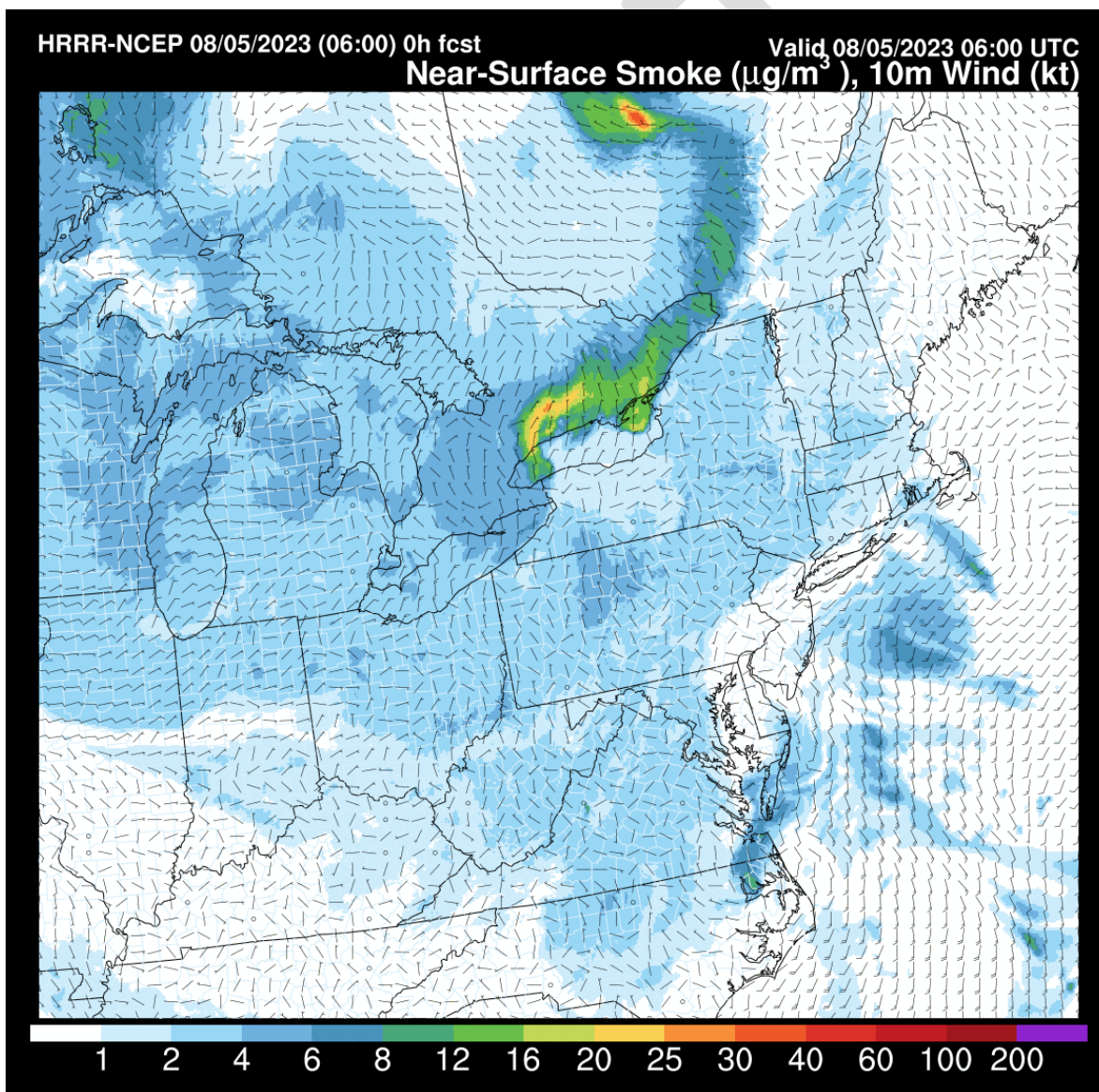


Figure 78 shows the near-surface smoke concentrations over the Northeast from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on August 5, 2023. The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately $4 \mu\text{g}/\text{m}^3$ at the Canton Fire St8 monitoring site in Stark County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Canton Fire St8 monitoring site on August 5, 2023.

Figure 78. Map of near-surface smoke concentrations over the Northeast from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on August 5, 2023.



3.4. Wildfire Smoke-Driven PM_{2.5} Episode from June 4-5, 2025

3.4.1. June 4, 2025

The HYSPLIT 120-hour back and 104-hour forward trajectory plots show the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Stark County on June 4, 2025. Figure 79 shows the HYSPLIT 120-hour back trajectory plot for June 4, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for May 31. Figure 80 shows the HYSPLIT 104-hour forward trajectory plot for May 31, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for June 4. The wildfires burning near Webequie, Ontario coincide with the point (at 2654.2 m AGL) at 04:00 EST on May 31 of the 120-hour back trajectory, composed of a 48-hour back trajectory from the endpoint of the 72-hour back trajectory released from Canton at a height of 100 m AGL at 12:00 EST on June 4, illustrating the transport of this wildfire smoke to Stark County. The corresponding HYSPLIT 104-hour forward trajectory released from these wildfires at 2650 m AGL at 04:00 EST on May 31, composed of a 72-hour forward trajectory from the endpoint of the 32-hour forward trajectory from the wildfires, ultimately reached Canton at a height of 117.0 m AGL at 12:00 EST on June 4. The coincidence of the back and forward trajectories between the wildfires and Canton serves as clear evidence that the smoke from the wildfires burning near Webequie, Ontario caused the high PM_{2.5} concentrations in Stark County on June 4, 2025. The accompanying imagery map for June 4 presented in Figure 81 shows high AOD values over Northeastern Ohio, providing further evidence that smoke from the Canadian wildfires was present in Stark County on June 4, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Stark County.

Figure 79. HYSPLIT 120-hour back trajectory plot from June 4, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for May 31, 2025.

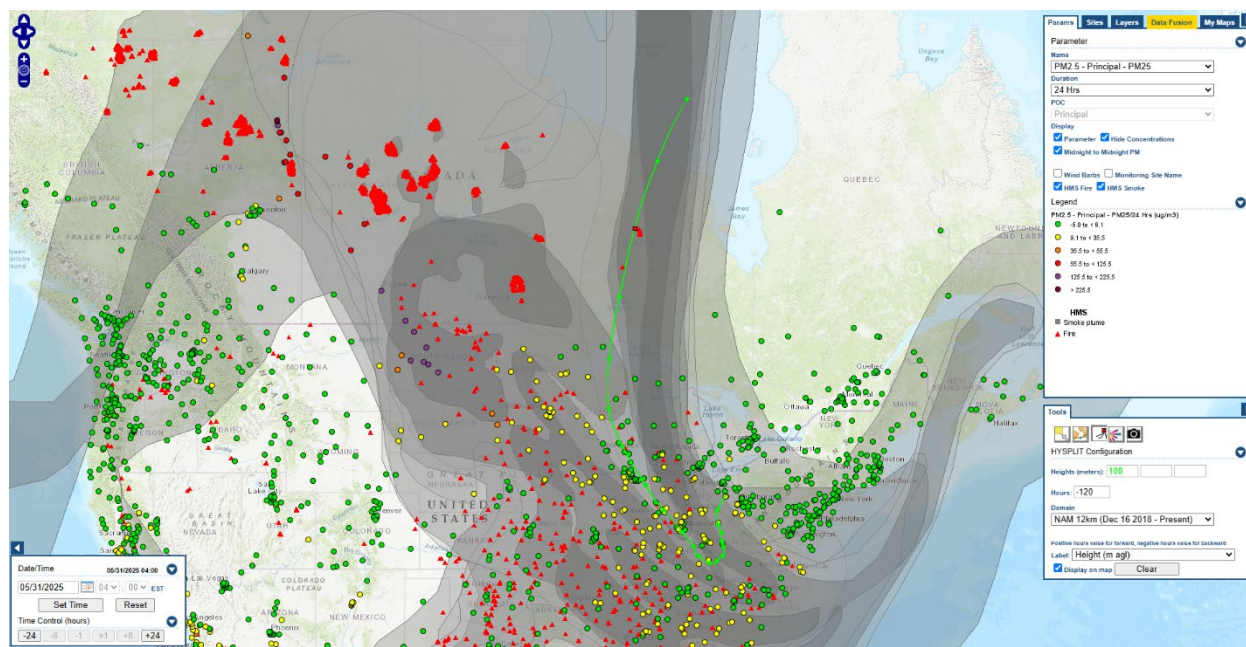


Figure 80. HYSPLIT 104-hour forward trajectory plot from May 31, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for June 4, 2025.

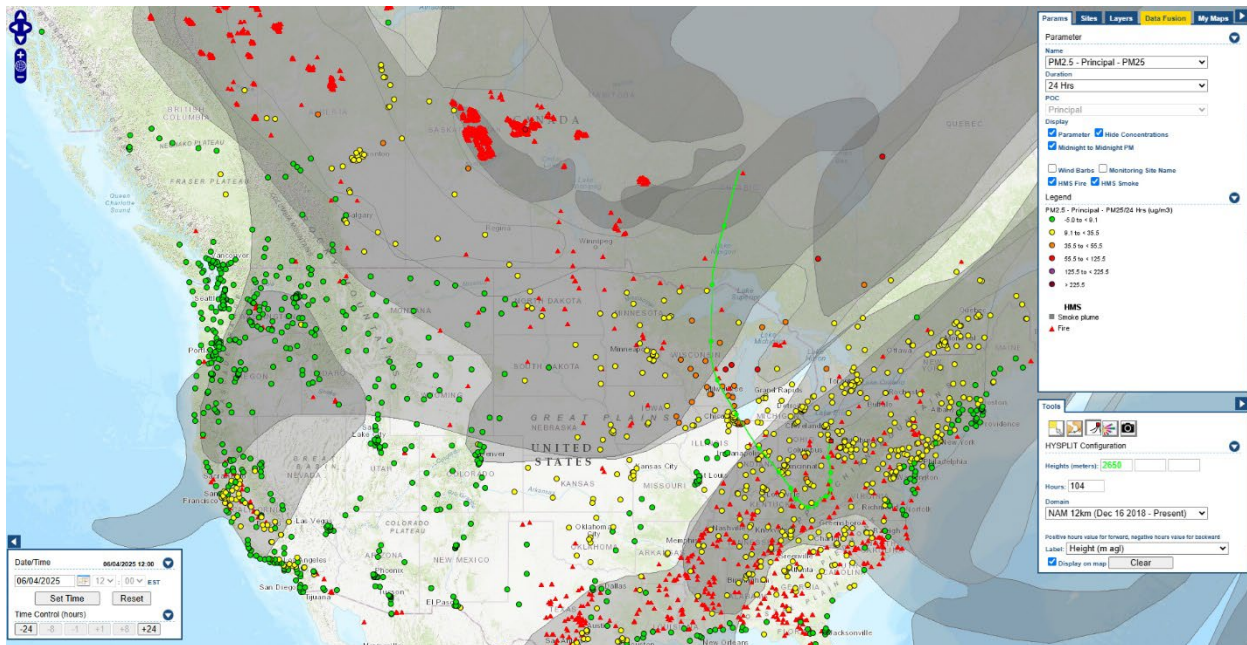


Figure 81. Suomi NPP satellite true color and MAIAC AOD imagery of Ohio for June 4, 2025, showing high AOD values across Ohio, including Stark County.

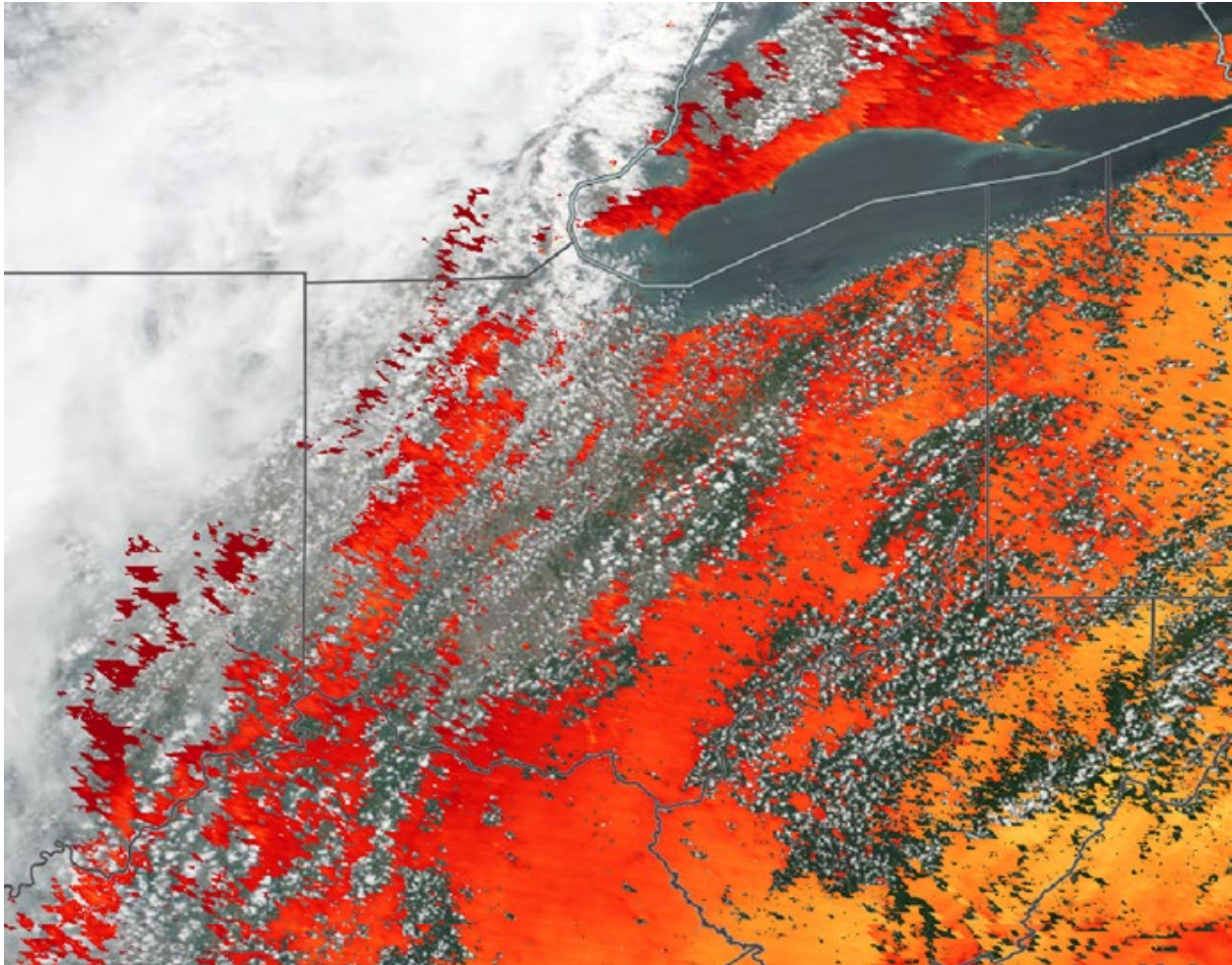


Table 8 and Figure 82 show the hourly average $PM_{2.5}$ concentrations from June 4, 2025, and the 2024-2025 average June concentrations measured by the POC3 Teledyne T640X monitor at the Canton Fire St8 (39-151-0017) monitoring site. The hourly average $PM_{2.5}$ concentrations steadily increased throughout the morning of June 4 and remained elevated the rest of the day, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Stark County on June 4, 2025.

Table 8. Hourly average PM_{2.5} concentration data from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on June 4, 2025, and 2024-2025 average June concentration data.

Hour of Day	2024-2025 Average June Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on June 4, 2025
00:00	13.0	14.0
01:00	13.4	16.7
02:00	13.5	14.5
03:00	12.9	13.7
04:00	12.6	13.9
05:00	13.2	17.9
06:00	12.7	17.1
07:00	12.8	20.7
08:00	12.5	25.3
09:00	13.1	27.4
10:00	12.7	30.1
11:00	12.4	31.5
12:00	12.4	30.1
13:00	12.0	29.3
14:00	11.6	28.7
15:00	10.8	29.9
16:00	10.4	30.5
17:00	10.5	31.3
18:00	10.6	32.0
19:00	11.0	30.9
20:00	12.0	30.6
21:00	12.6	29.6
22:00	13.1	30.6
23:00	13.3	33.6

Figure 82. Plot of hourly average PM_{2.5} concentrations from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on June 4, 2025, and 2024-2025 average June concentrations.

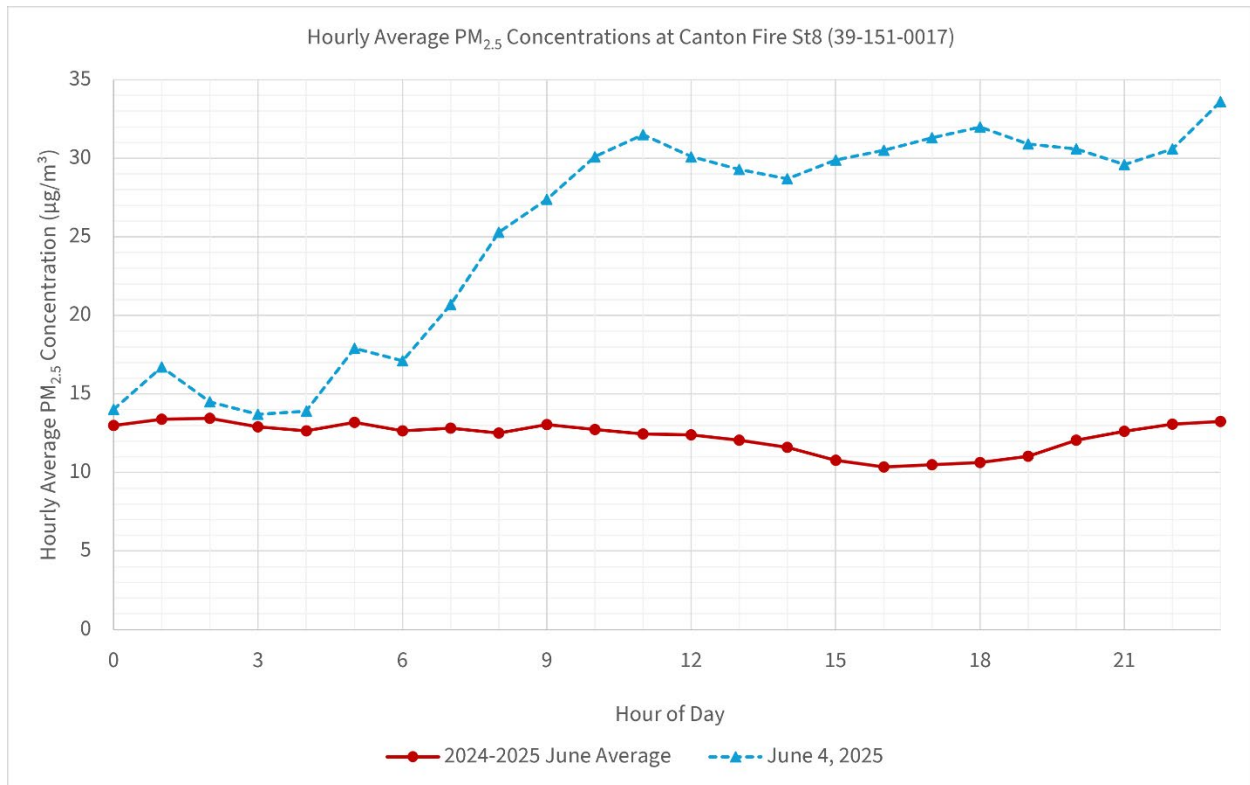
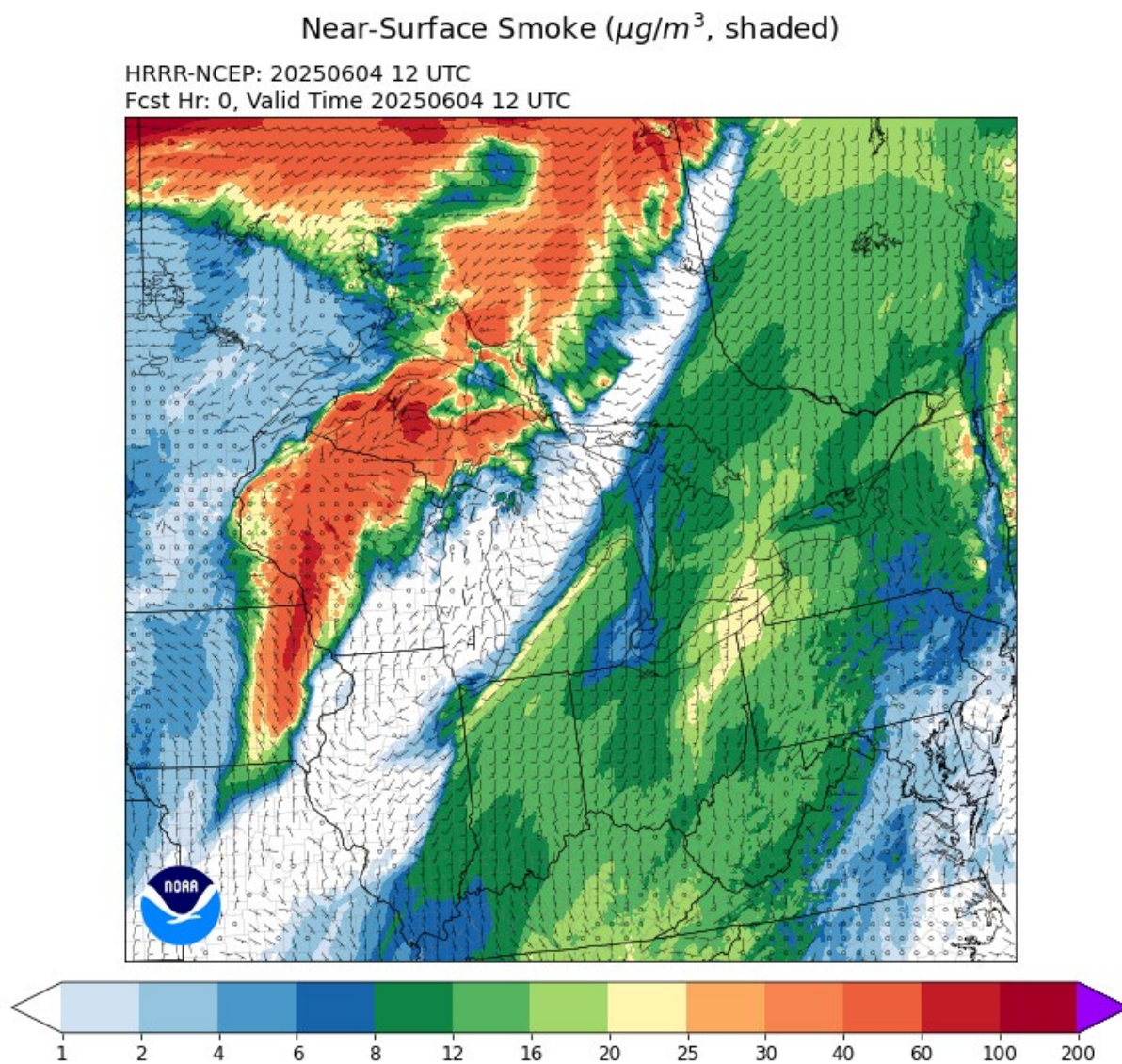


Figure 83 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 12Z (07:00 EST) on June 4, 2025. The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately $16 \mu\text{g}/\text{m}^3$ at the Canton Fire St8 monitoring site in Stark County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Canton Fire St8 monitoring site on June 4, 2025.

Figure 83. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 12Z (07:00 EST) on June 4, 2025.



3.4.2. June 5, 2025

The HYSPLIT 120-hour back trajectory plot shows the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Stark County on June 5, 2025. Figure 84 shows the HYSPLIT 120-hour back trajectory plot from the Canton Fire St8 monitoring site, released at a height of 77.3 m AGL at 00:00 EST on June 5, with circles indicating the current smoke density at every hour along the back trajectory of the air parcel. A heavily wildfire smoke-impacted location 75 km (11.2 mi) west of the wildfires burning near Webequie, Ontario coincides with the point (at 2967.5 m AGL) at 01:00 EST on May 31 of the 120-hour back trajectory from the Canton Fire St8 monitoring site, illustrating the transport of this wildfire smoke to Stark County and serving as clear evidence that the smoke from the wildfires burning near Webequie, Ontario ultimately caused the high PM_{2.5} concentrations in Stark County on June 5, 2025. The accompanying imagery map for June 5 presented in Figure 85 shows moderate to high AOD values over Northeastern Ohio, providing further evidence that smoke from the Canadian wildfires was present in Stark County on June 5, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Stark County.

Figure 84. HYSPLIT 120-hour back trajectory plot from the Canton Fire St8 monitoring site in Stark County on June 5, 2025, with red and orange circles respectively indicating heavy and medium smoke intensity.

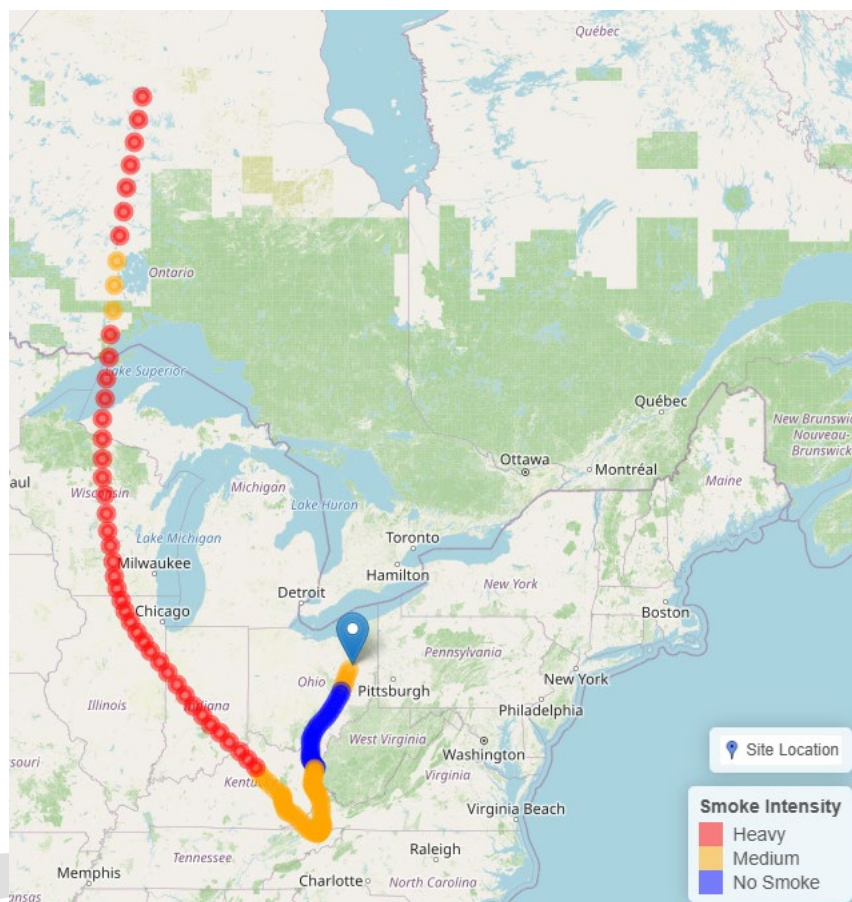


Figure 85. Suomi NPP satellite true color and MAIAC AOD imagery of Ohio and surrounding states for June 5, 2025, showing high AOD values across Eastern Ohio, including Stark County.

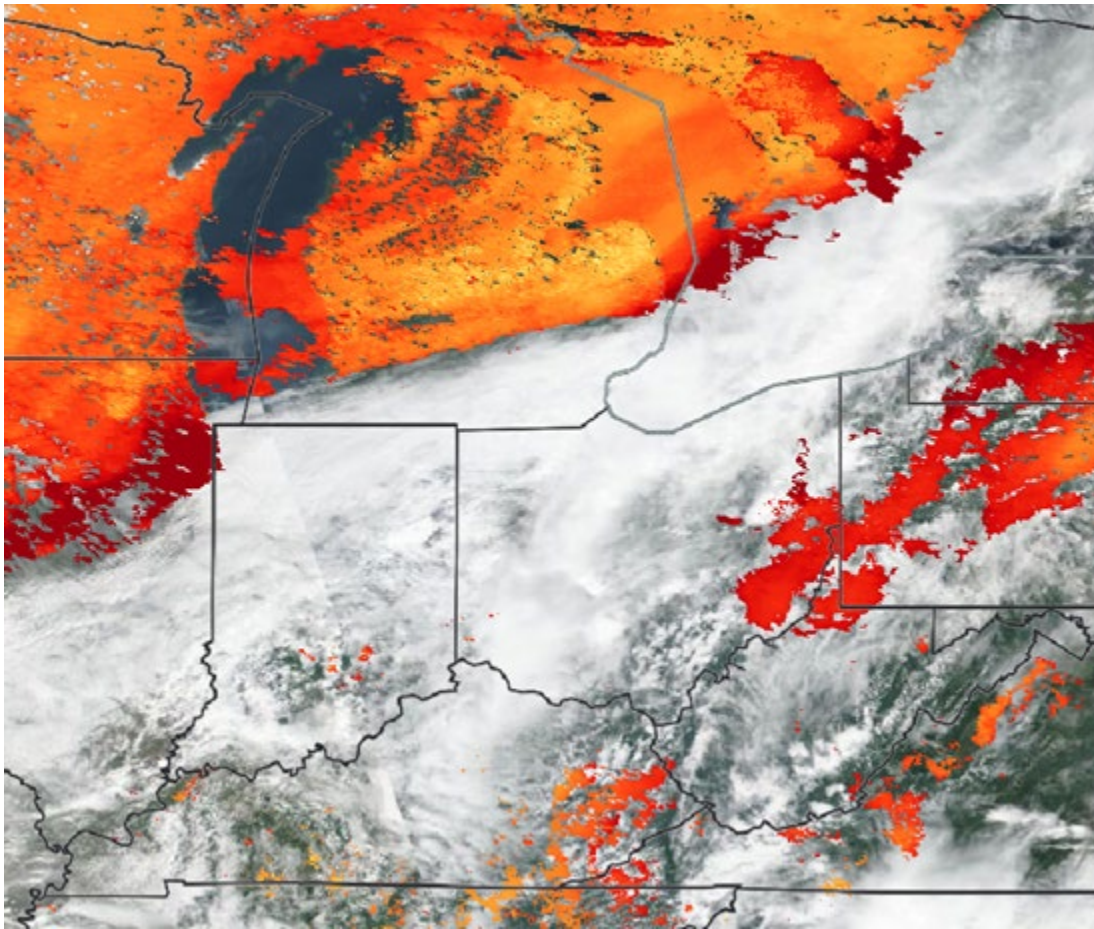


Table 9 and Figure 86 show the hourly average $PM_{2.5}$ concentrations from June 5, 2025, and the 2024-2025 average June concentrations measured by the POC3 Teledyne T640X monitor at the Canton Fire St8 (39-151-0017) monitoring site. The hourly average $PM_{2.5}$ concentrations remained elevated due to lingering wildfire smoke until rain began to push through around 16:00 EST on June 5, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Stark County on June 5, 2025.

Table 9. Hourly average PM_{2.5} concentration data from the Canton Fire St8 (39-151-0017) monitoring site in Stark County from June 5, 2025, and 2024-2025 average June concentration data.

Hour of Day	2024-2025 Average June Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on June 5, 2025
00:00	13.0	34.5
01:00	13.4	31.8
02:00	13.5	33.1
03:00	12.9	28.7
04:00	12.6	27.8
05:00	13.2	32.3
06:00	12.7	29.5
07:00	12.8	29.9
08:00	12.5	31.4
09:00	13.1	29.9
10:00	12.7	28.7
11:00	12.4	27.5
12:00	12.4	25.8
13:00	12.0	26.6
14:00	11.6	27.5
15:00	10.8	20.5
16:00	10.4	9.8
17:00	10.5	11.7
18:00	10.6	7.4
19:00	11.0	6.2
20:00	12.0	6.8
21:00	12.6	9.1
22:00	13.1	8.7
23:00	13.3	8.9

Figure 86. Plot of hourly average PM_{2.5} concentrations from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on June 5, 2025, and 2024-2025 average June concentrations.

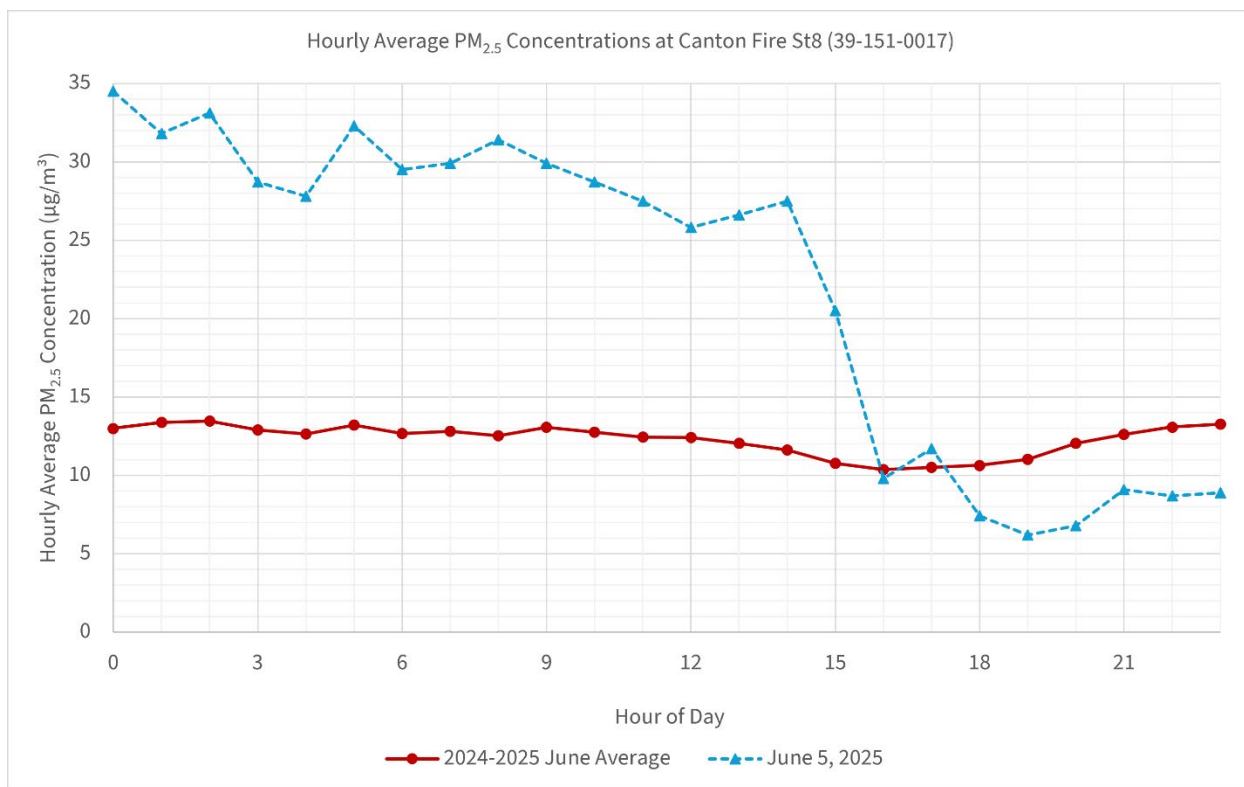
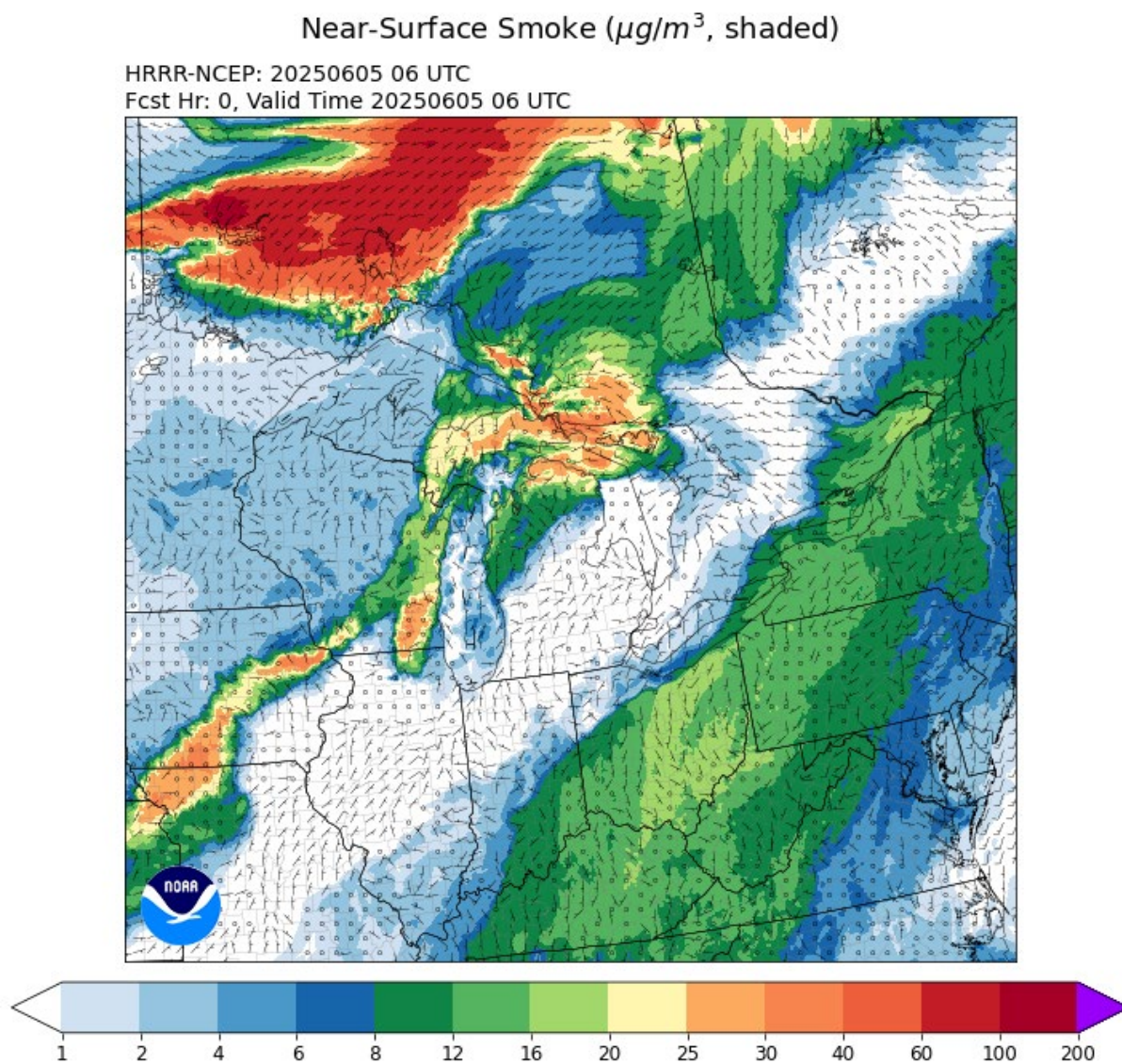


Figure 87 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 5, 2025. The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately $16 \mu\text{g}/\text{m}^3$ at the Canton Fire St8 monitoring site in Stark County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Canton Fire St8 monitoring site on June 5, 2025.

Figure 87. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 5, 2025.



3.5. Wildfire Smoke-Driven $PM_{2.5}$ Episode from June 7-8, 2025

3.5.1. June 7, 2025

The HYSPLIT 120-hour back trajectory plot shows the origin and transport of the wildfire smoke plumes that caused the high surface $PM_{2.5}$ concentrations in Stark County on June 7, 2025. Figure 88 shows the HYSPLIT 120-hour back trajectory plot from the Canton Fire St8 monitoring site, released at a height of 129.0 m AGL at 00:00 EST on June 7, with circles indicating the current smoke density at every hour along the back trajectory of the air parcel. Figure 89 shows the June 2 portion of the back trajectory plot with smoke plumes and wildfire locations overlaid on the map. Figure 90 shows the HYSPLIT 110-hour forward trajectory plot from 10:00 EST on June 2, overlaid on a map of fire locations, monitored 24-hour average surface $PM_{2.5}$ concentrations, and HMS smoke polygons for June 7. A heavily wildfire smoke-impacted location 50 km (31.1 mi) north of Candle Lake, Saskatchewan within a massive wildfire complex northeast of Prince Albert National Park coincides with the point (at 1987.3 m AGL) at 10:00 EST on June 2 of the 120-hour back trajectory from Canton, illustrating the transport of this wildfire smoke to Northeastern Ohio. The HYSPLIT 110-hour forward trajectory, composed of a 38-hour forward trajectory from the endpoint of the 72-hour forward trajectory from the wildfire complex, released at 2000 m AGL at 10:00 EST on June 2 ultimately reached the Canton area at a height of 52.5 m AGL at 00:00 EST on June 7. The coincidence of the 120-hour back and 110-hour forward trajectories between the wildfires and Canton serves as clear evidence that the smoke from the wildfire complex burning north of Candle Lake, Saskatchewan ultimately caused the high $PM_{2.5}$ concentrations in Stark County on June 7, 2025. The accompanying imagery map for June 7 presented in Figure 91 provides further evidence that smoke from the Canadian wildfires was present in Stark County on June 7, 2025, and that this wildfire smoke was the cause of the high concentrations of $PM_{2.5}$ at monitoring sites in Stark County.

Figure 88. HYSPLIT 120-hour back trajectory plot from the Canton Fire St8 monitoring site at 00:00 EST on June 7, 2025, with red and orange circles respectively indicating heavy and medium smoke intensity.

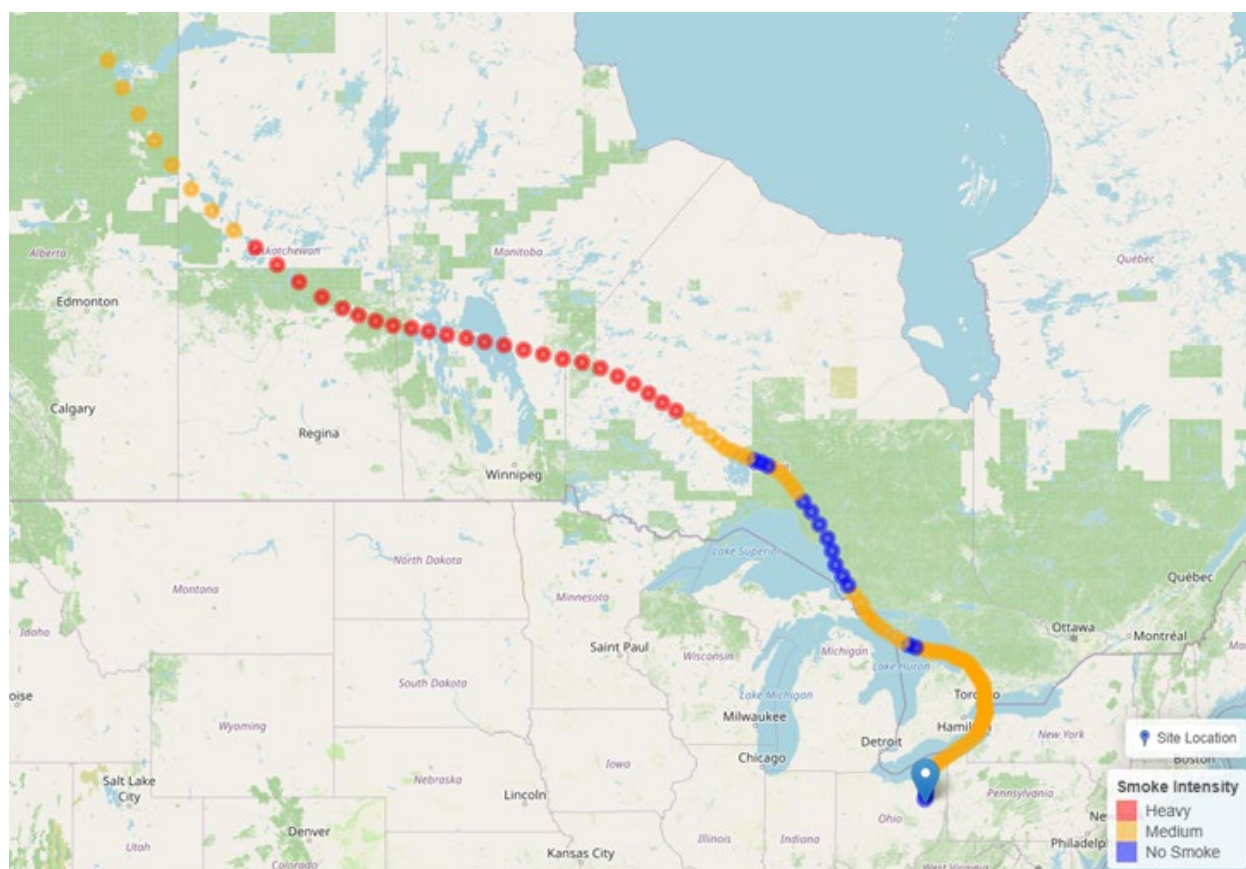


Figure 89. The June 2 portion of the HYSPLIT 120-hour back trajectory plot from the Canton Fire St8 (39-151-0017) monitoring site in Stark County, with overlaid smoke plumes and wildfire locations.

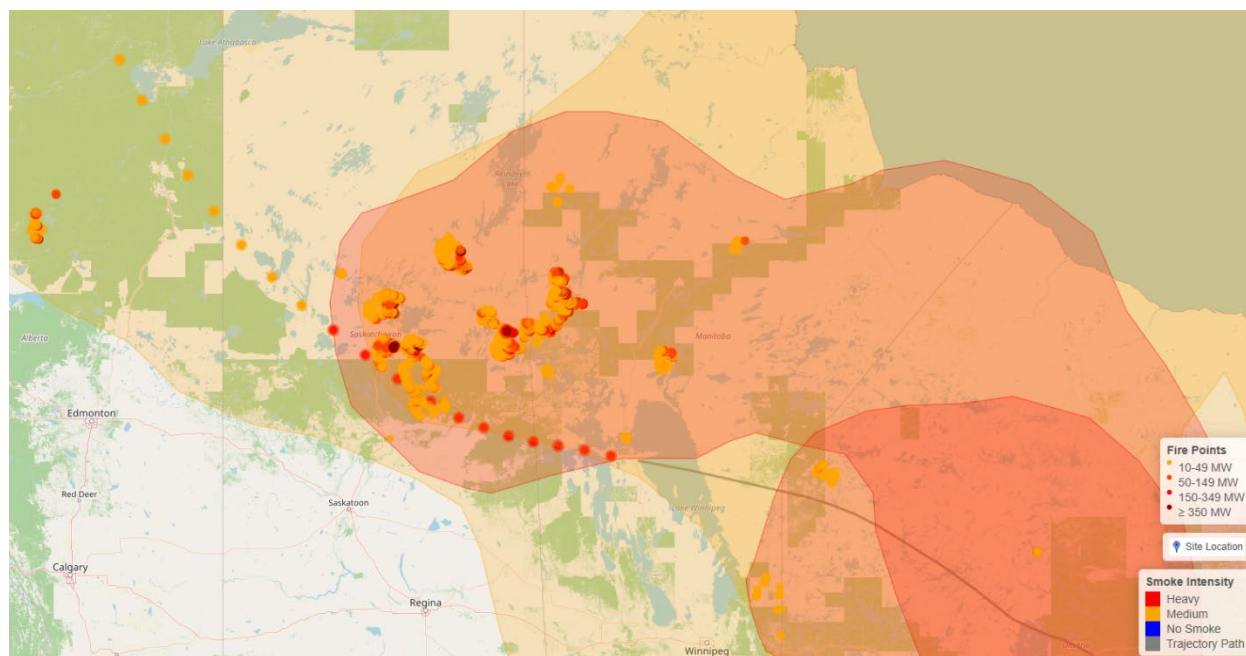


Figure 90. HYSPLIT 110-hour forward trajectory plot from 10:00 EST on June 2, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for June 7, 2025.

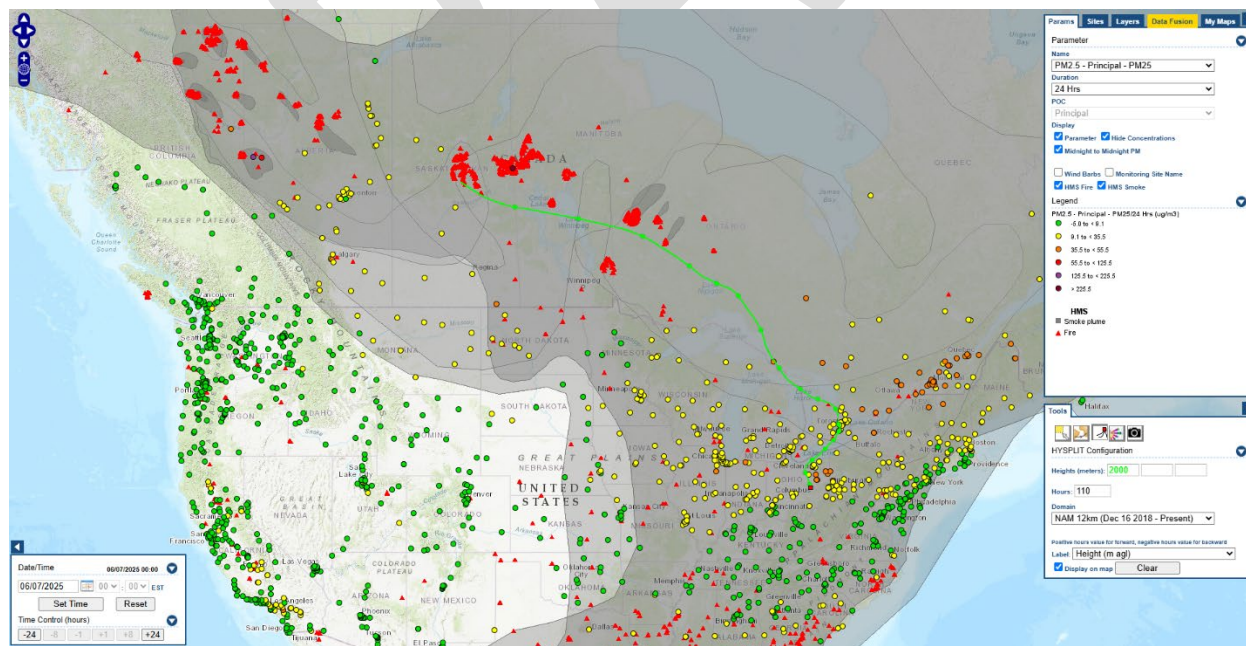


Figure 91. Terra satellite true color imagery for June 7, 2025, showing visible wildfire smoke over northern Ohio, including Stark County.

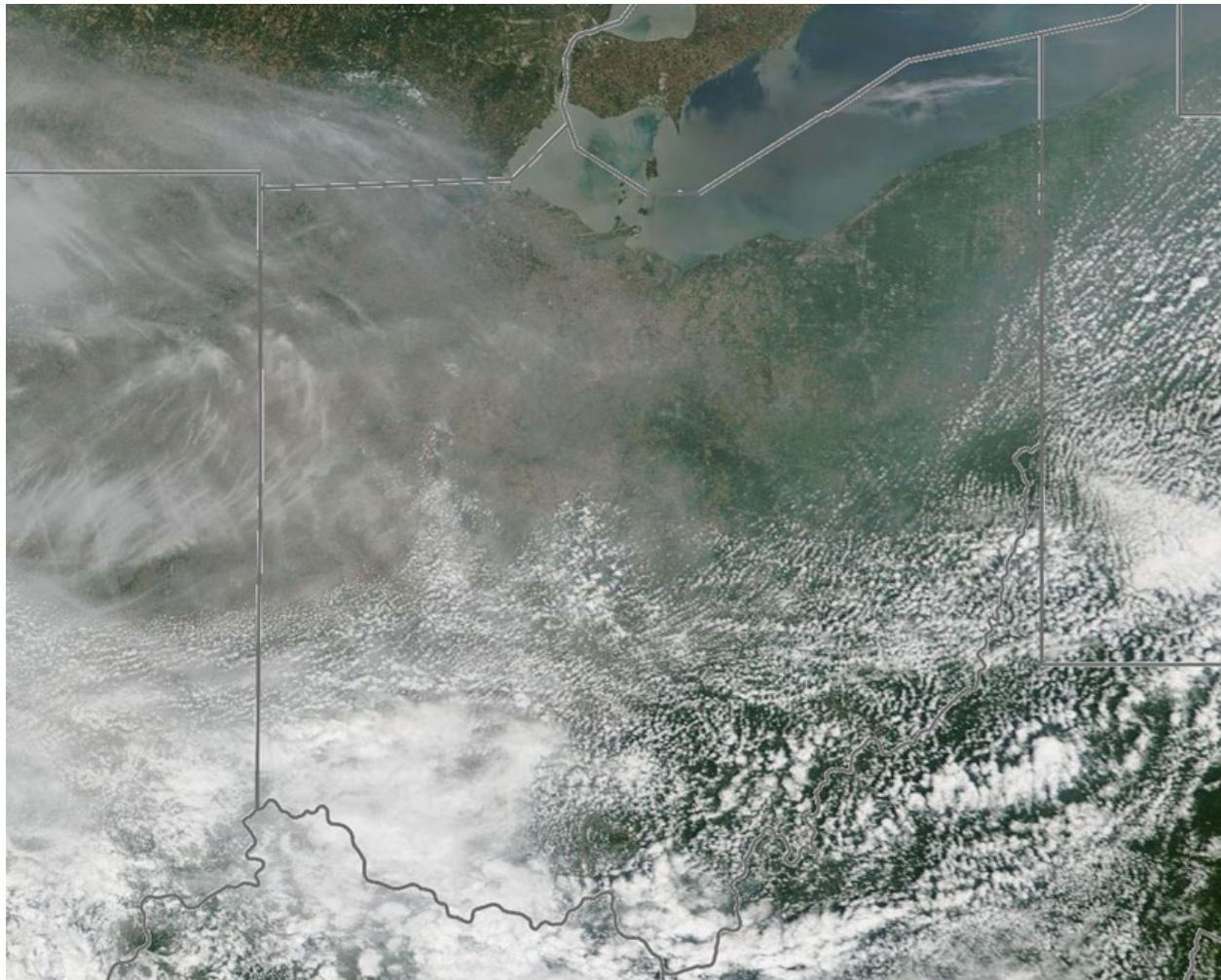


Table 10 and Figure 92 show the hourly average $PM_{2.5}$ concentrations on June 7, 2025, and the 2024-2025 average June concentrations measured by the POC3 Teledyne T640X monitor at the Canton Fire St8 (39-151-0017) monitoring site. The hourly average $PM_{2.5}$ concentrations remained elevated due to the presence of wildfire smoke throughout the entirety of June 7, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Stark County on June 7, 2025.

Table 10. Hourly average PM_{2.5} concentration data from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on June 7, 2025, and 2024-2025 average June concentration data.

Hour of Day	2024-2025 Average June Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on June 7, 2025
00:00	13.0	21.5
01:00	13.4	35.2
02:00	13.5	41.4
03:00	12.9	42.6
04:00	12.6	40.1
05:00	13.2	37.6
06:00	12.7	38.1
07:00	12.8	40.5
08:00	12.5	49.0
09:00	13.1	59.1
10:00	12.7	48.2
11:00	12.4	53.1
12:00	12.4	56.6
13:00	12.0	55.1
14:00	11.6	50.0
15:00	10.8	47.9
16:00	10.4	47.6
17:00	10.5	43.3
18:00	10.6	43.7
19:00	11.0	44.6
20:00	12.0	51.9
21:00	12.6	49.5
22:00	13.1	44.2
23:00	13.3	36.2

Figure 92. Plot of hourly average PM_{2.5} concentrations from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on June 7, 2025, and 2024-2025 average June concentrations.

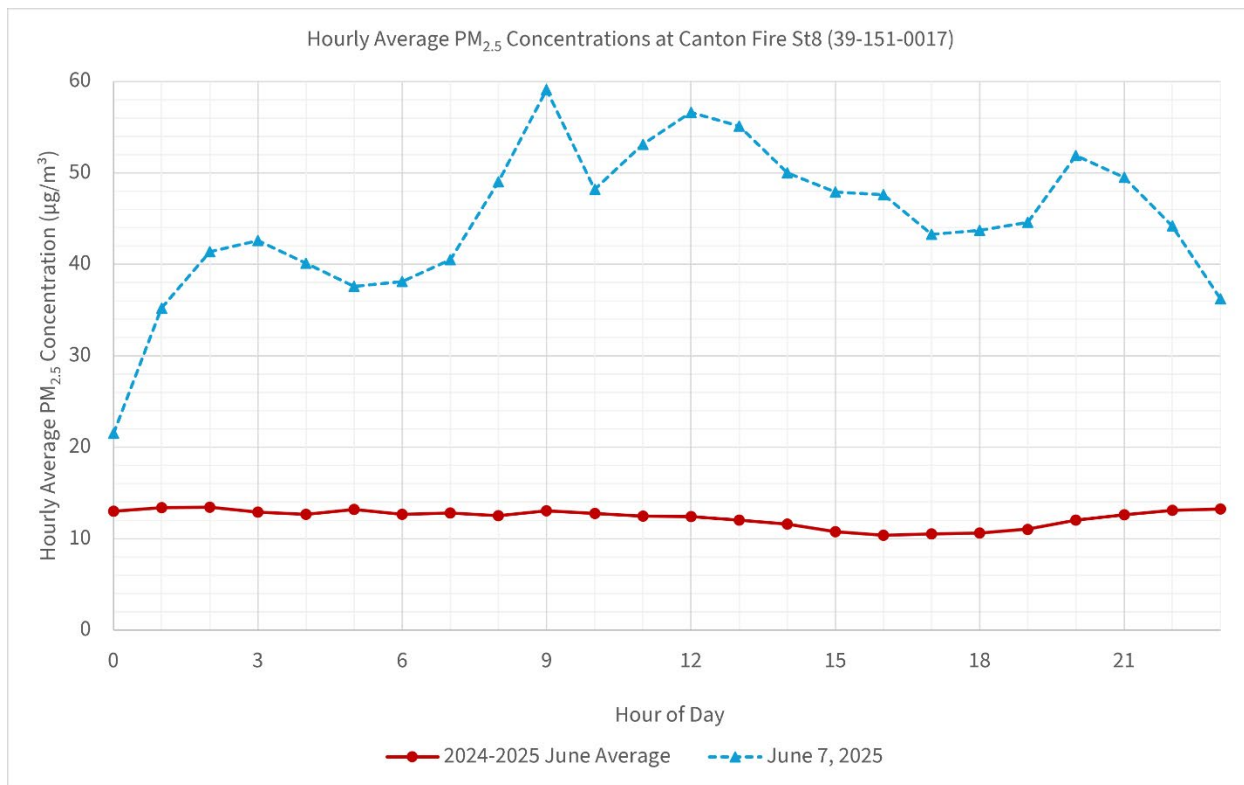
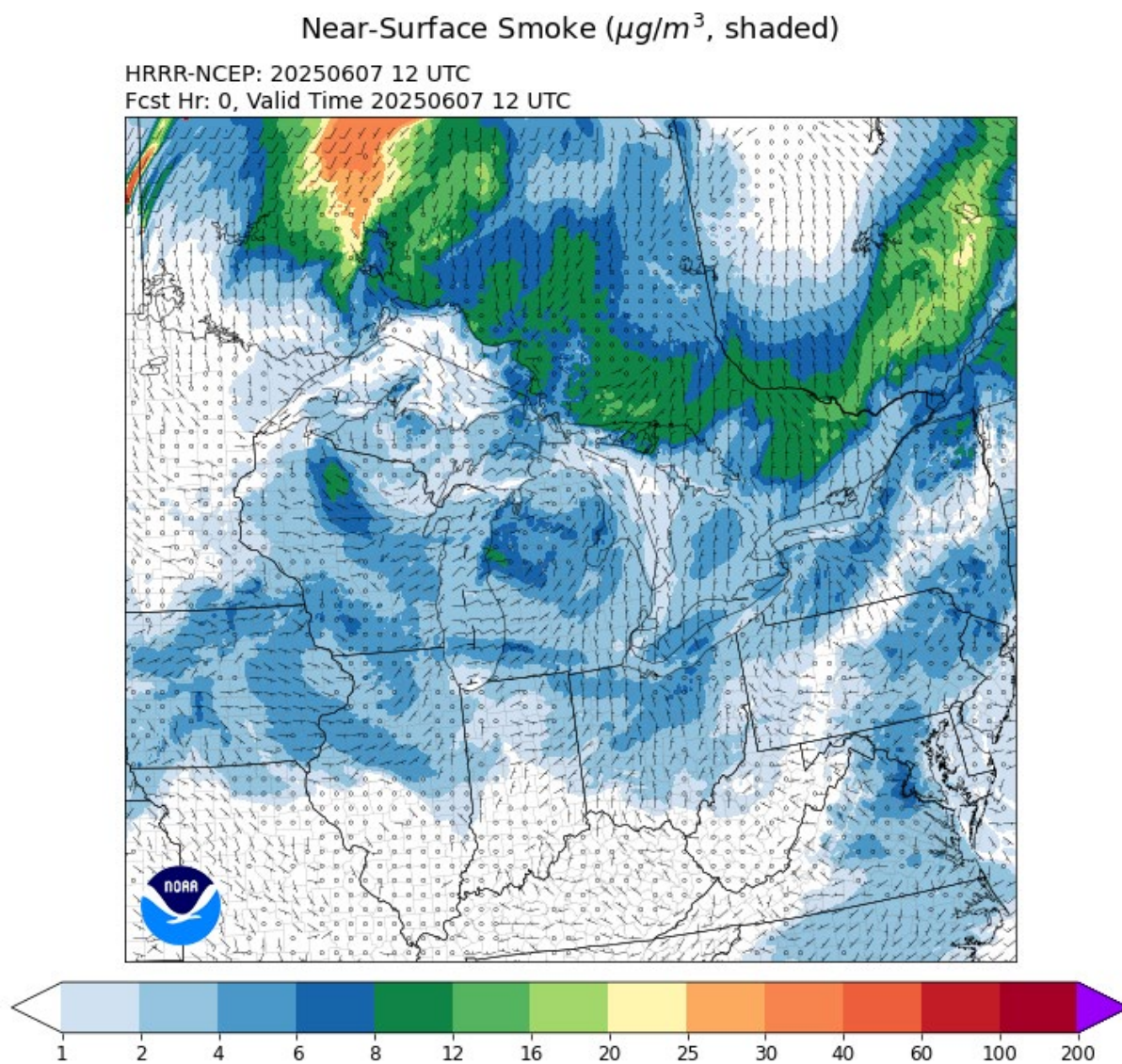


Figure 93 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 12Z (07:00 EST) on June 7, 2025. The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately $6 \mu\text{g}/\text{m}^3$ at the Canton Fire St8 monitoring site in Stark County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Canton Fire St8 monitoring site on June 7, 2025.

Figure 93. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 12Z (07:00 EST) on June 7, 2025.



3.5.2. June 8, 2025

The HYSPLIT 144-hour back and forward trajectory plots show the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Stark County on June 8, 2025. Figure 94 shows the HYSPLIT 144-hour back trajectory plot for June 8, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for June 2. The wildfires burning 110 km (68.4 mi) west of Fort Nelson, British Columbia coincide with the point (at 607.4 meters AGL) at 04:00 EST on June 2 of the 100-meter release height back trajectory from Canton, composed of back-to-back 72-hour back trajectories, released from Canton at 00:00 EST on June 8, serving as clear evidence that the smoke from the wildfires burning west of Fort Nelson, British Columbia ultimately caused the high PM_{2.5} concentrations in Stark County on June 8, 2025. The accompanying imagery map for June 8 presented in Figure 95 shows high AOD values over Northern Ohio, providing further evidence that smoke from the Canadian wildfires was present in Stark County on June 8, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Stark County.

Figure 94. HYSPLIT 144-hour back trajectory plot from June 8, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for June 2, 2025.

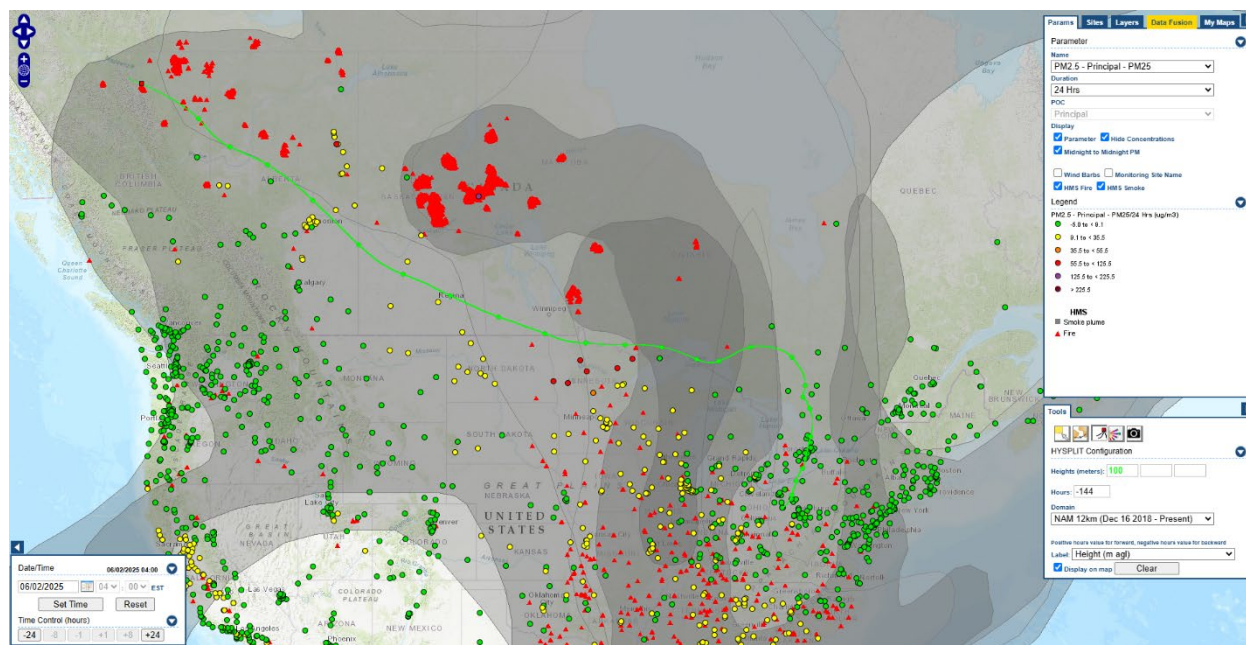


Figure 95. Suomi NPP satellite true color and MAIAC AOD imagery of Ohio and surrounding states for June 8, 2025, showing high AOD values across Northern Ohio and cloud cover from the front that ultimately pushed the wildfire smoke out of Stark County.

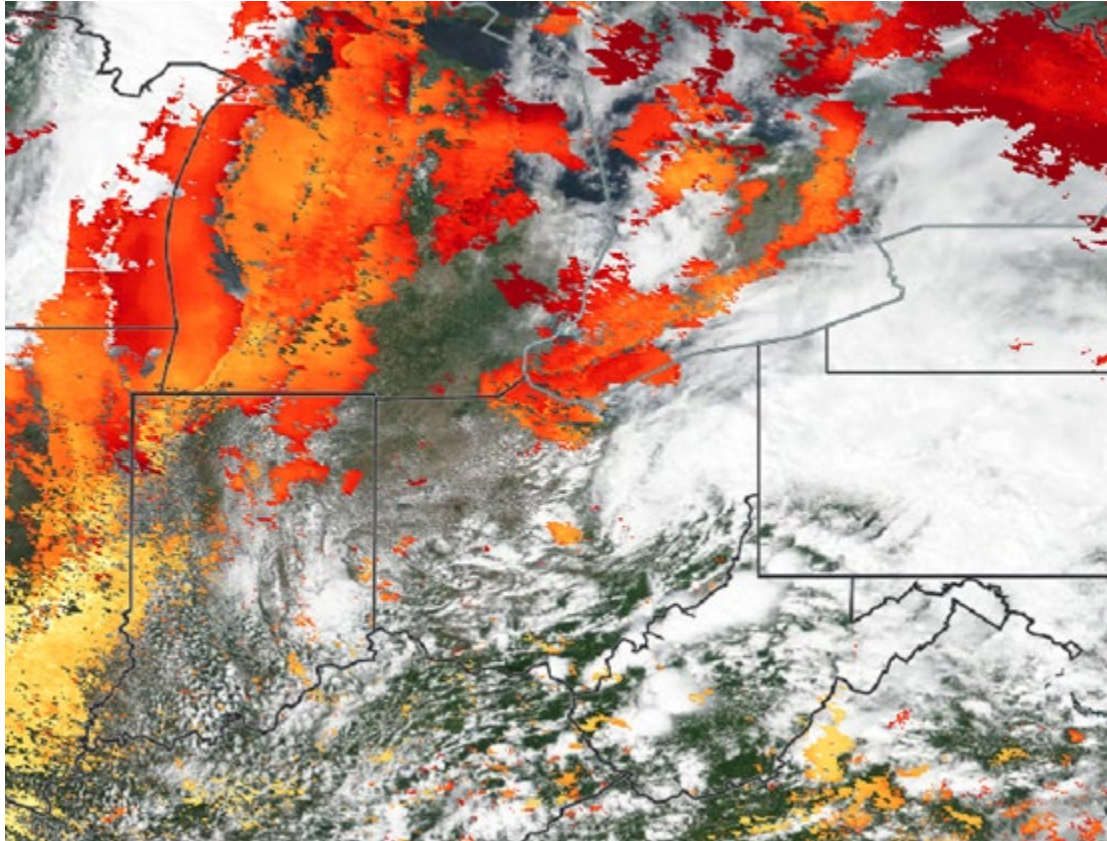


Table 11 and Figure 96 show the hourly average $PM_{2.5}$ concentrations from June 8, 2025, and the 2024-2025 average June concentrations measured by the POC3 Teledyne T640X monitor at the Canton Fire St8 (39-151-0017) monitoring site. The hourly average $PM_{2.5}$ concentrations remained elevated due to the continued presence of wildfire smoke until rain began to push through around 12:00 EST, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Stark County on June 8, 2025.

Table 11. Hourly average PM_{2.5} concentration data from the Canton Fire St8 (39-151-0017) monitoring site in Stark County from June 8, 2025, and 2024-2025 average June concentration data.

Hour of Day	2024-2025 Average June Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on June 8, 2025
00:00	13.0	34.4
01:00	13.4	33.1
02:00	13.5	31.9
03:00	12.9	31.6
04:00	12.6	30.7
05:00	13.2	33.3
06:00	12.7	37.4
07:00	12.8	40.8
08:00	12.5	43.7
09:00	13.1	41.5
10:00	12.7	37.8
11:00	12.4	31.2
12:00	12.4	19.8
13:00	12.0	13.1
14:00	11.6	12.9
15:00	10.8	9.4
16:00	10.4	5.3
17:00	10.5	5.0
18:00	10.6	7.1
19:00	11.0	9.7
20:00	12.0	11.6
21:00	12.6	13.3
22:00	13.1	12.9
23:00	13.3	10.9

Figure 96. Plot of hourly average PM_{2.5} concentrations from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on June 8, 2025, and 2024-2025 average June concentrations.

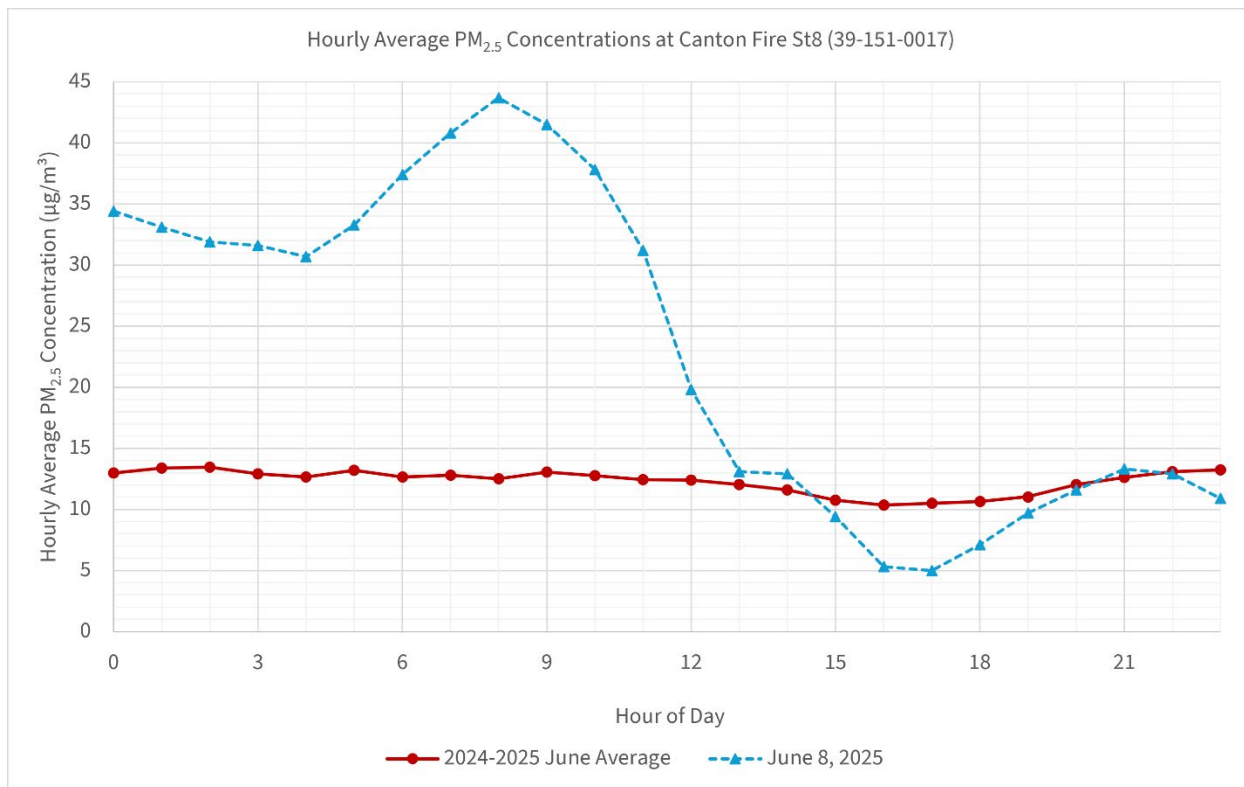
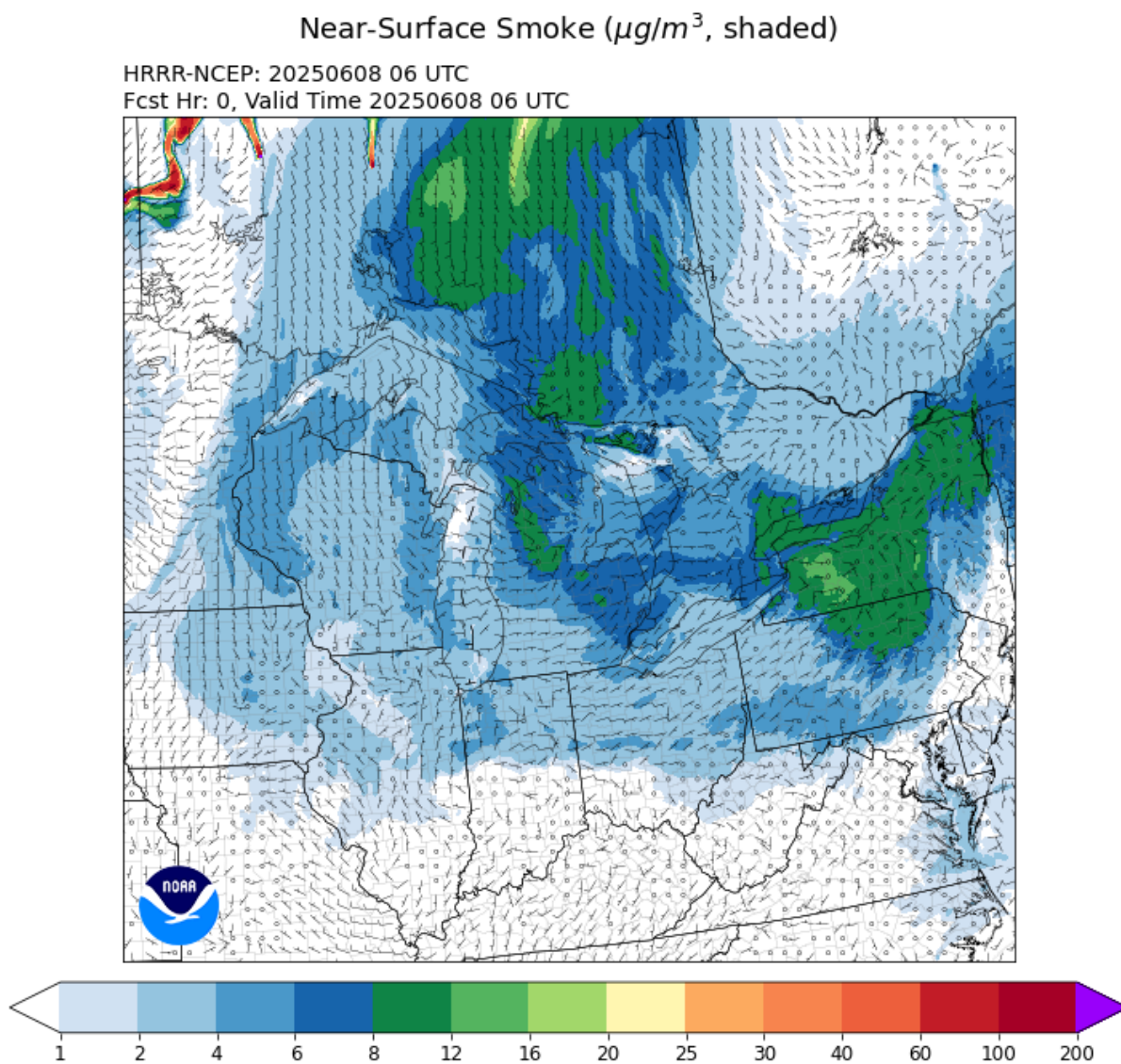


Figure 97 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 8, 2025. The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately $4 \mu\text{g}/\text{m}^3$ at the Canton Fire St8 monitoring site in Stark County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Canton Fire St8 monitoring site on June 8, 2025.

Figure 97. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 8, 2025.



3.6. Wildfire Smoke-Driven PM_{2.5} Episode on June 12-13, 2025

3.6.1. June 12, 2025

The HYSPLIT 72-hour back and forward trajectory plots show the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Stark County on June 12, 2025. Figure 98 shows the HYSPLIT 72-hour back trajectory plot for June 12, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for June 9. Figure 99 shows the HYSPLIT 72-hour forward trajectory plot for June 9, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for June 12. Cyclonic rotation from a low-pressure system centered over the Upper Midwest on June 9, combined with a stationary front forming over Saskatchewan and Manitoba, allowed smoke from wildfires burning 24 km (14.9 mi) north-northwest of Creighton, Saskatchewan to be transported along the trailing edge of the low-pressure system into Ohio. These wildfires coincide with the point (at 3163 meters AGL) at 01:00 EST on June 9 of the 1000-meter release height back trajectory from Canton and the 3250-meter release height forward trajectory from that wildfire smoke-impacted location at 01:00 EST on June 6 reaches Canton (at 930 meters AGL) at 01:00 EST on June 9. The coincidence of the 72-hour back and forward trajectories between the wildfire smoke location and Canton serves as clear evidence that the smoke from the wildfires burning north-northwest of Creighton, Saskatchewan ultimately caused the high PM_{2.5} concentrations in Stark County on June 12, 2025. The accompanying imagery map for June 12 presented in Figure 100 provides further evidence that smoke from the Canadian wildfires was present in Stark County on June 12, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Stark County.

Figure 98. HYSPLIT 72-hour back trajectory plot from June 12, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for June 9, 2025.

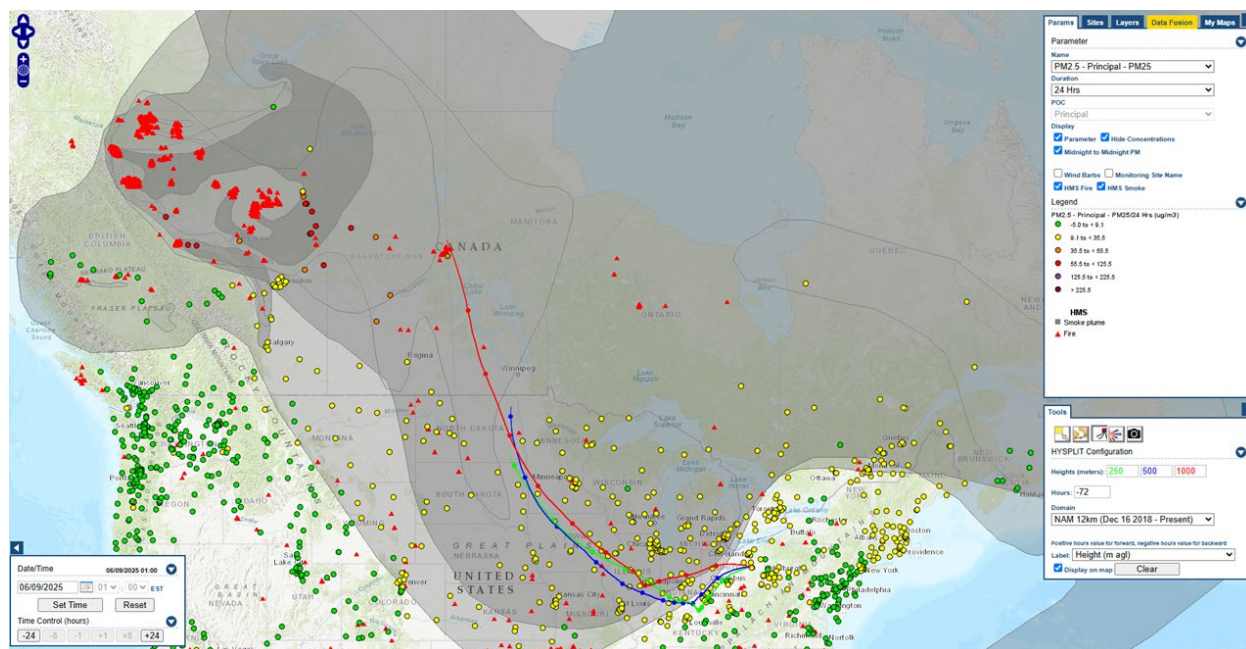


Figure 99. HYSPLIT 72-hour forward trajectory plot from June 9, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for June 12, 2025.

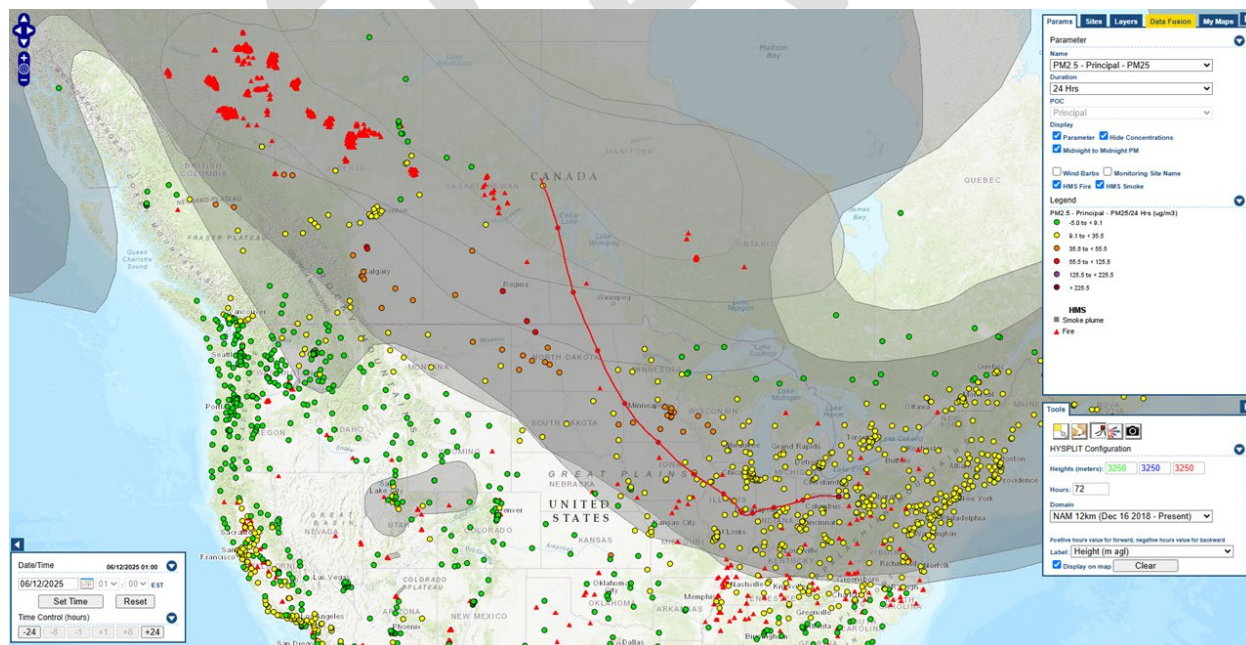


Figure 100. Terra satellite true color imagery of Ohio for June 12, 2025, showing visible wildfire smoke over Northern Ohio, including Stark County.

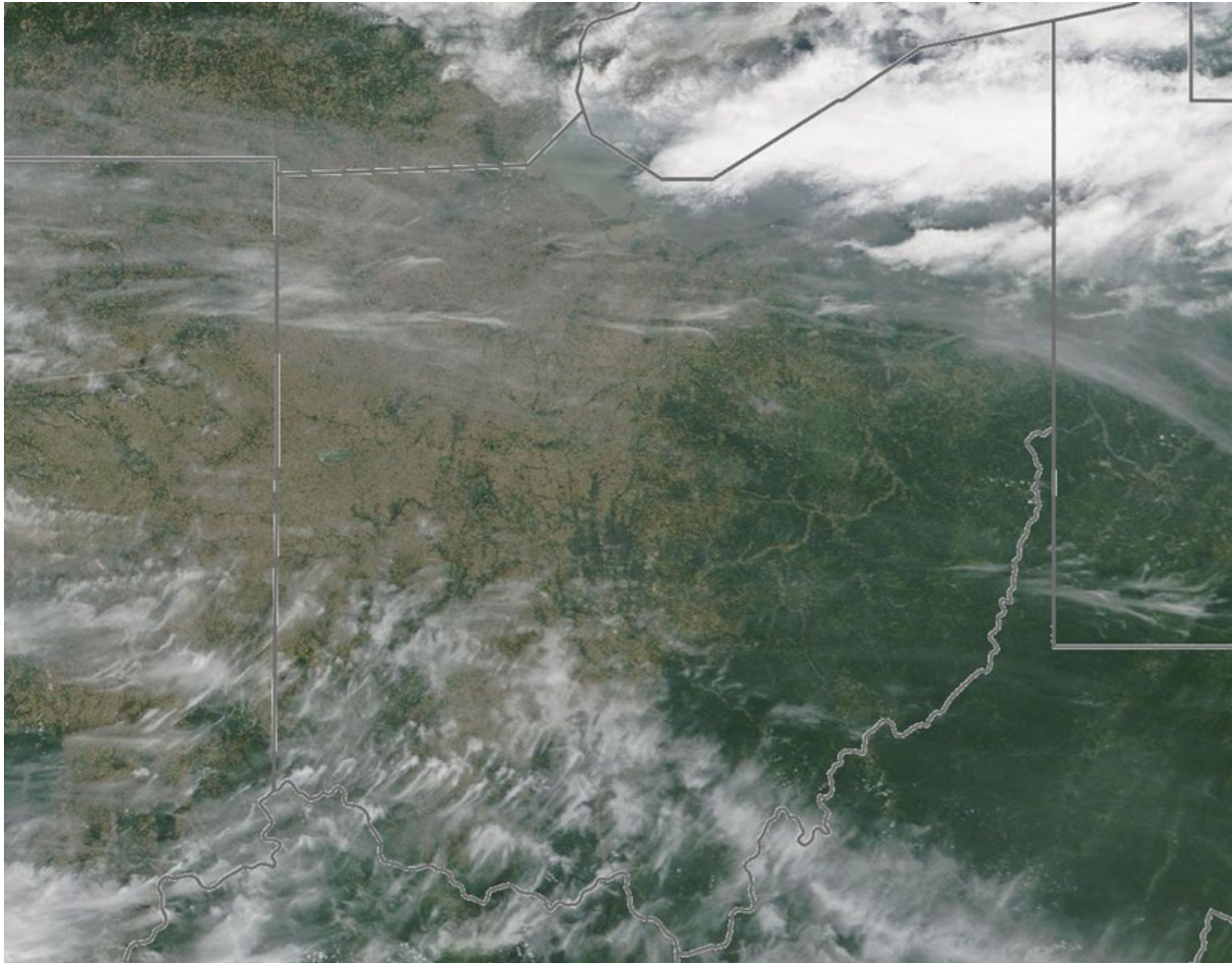


Table 12 and Figure 101 show the hourly average $PM_{2.5}$ concentrations on June 12, 2025, and the 2024-2025 average June concentrations measured by the POC3 Teledyne T640X monitor at the Canton Fire St8 (39-151-0017) monitoring site. The hourly average $PM_{2.5}$ concentrations increased as the surface warmed and the mixing height rose, allowing transported wildfire smoke to make its way to the surface by 09:00 EST, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Stark County on June 12, 2025.

Table 12. Hourly average PM_{2.5} concentration data from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on June 12, 2025, and 2024-2025 average June concentration data.

Hour of Day	2024-2025 Average June Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on June 12, 2025
00:00	13.0	16.6
01:00	13.4	15.6
02:00	13.5	15.7
03:00	12.9	15.3
04:00	12.6	15.1
05:00	13.2	19.9
06:00	12.7	19.2
07:00	12.8	20.8
08:00	12.5	N/A (Null Code AZ; Quality Control Audit)
09:00	13.1	27.4
10:00	12.7	30.2
11:00	12.4	30.6
12:00	12.4	30.0
13:00	12.0	28.6
14:00	11.6	29.6
15:00	10.8	30.8
16:00	10.4	29.5
17:00	10.5	29.7
18:00	10.6	29.7
19:00	11.0	30.9
20:00	12.0	27.3
21:00	12.6	26.0
22:00	13.1	24.8
23:00	13.3	25.0

Figure 101. Plot of hourly average PM_{2.5} concentrations from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on June 12, 2025, and 2024-2025 average June concentrations.

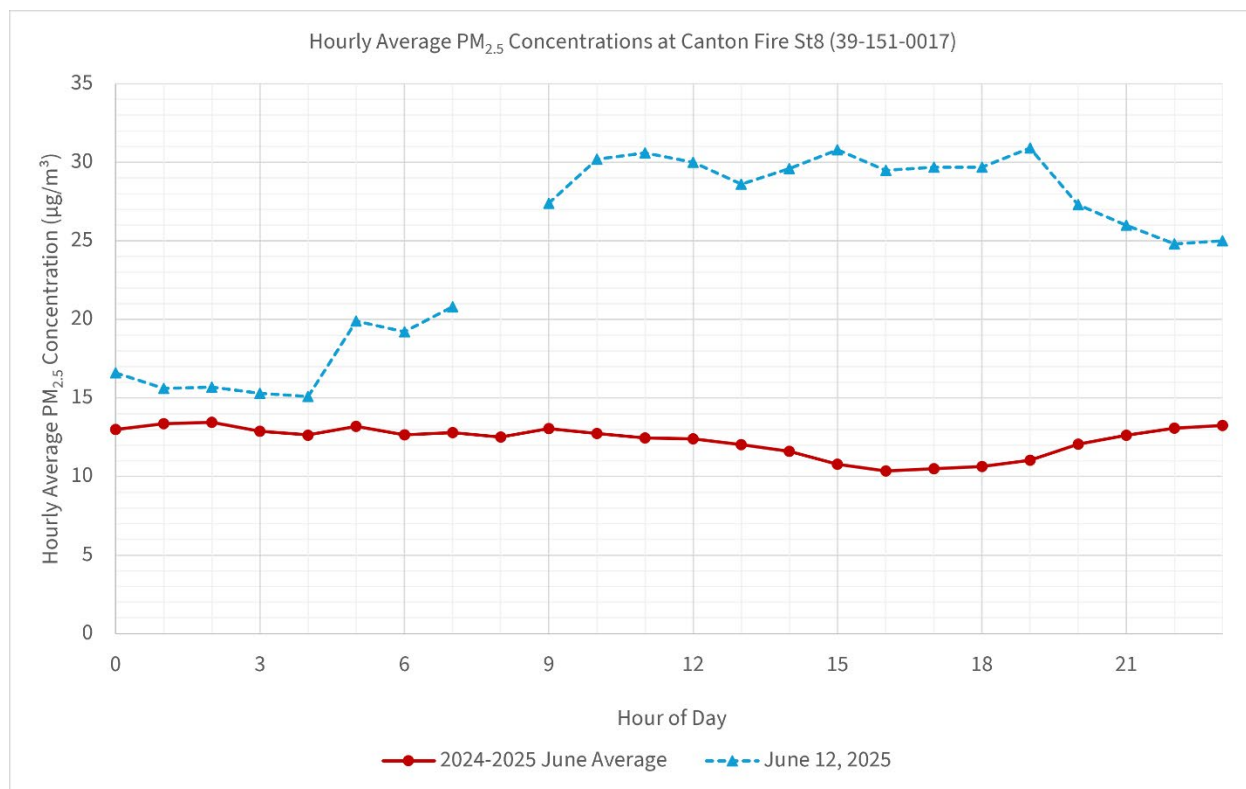
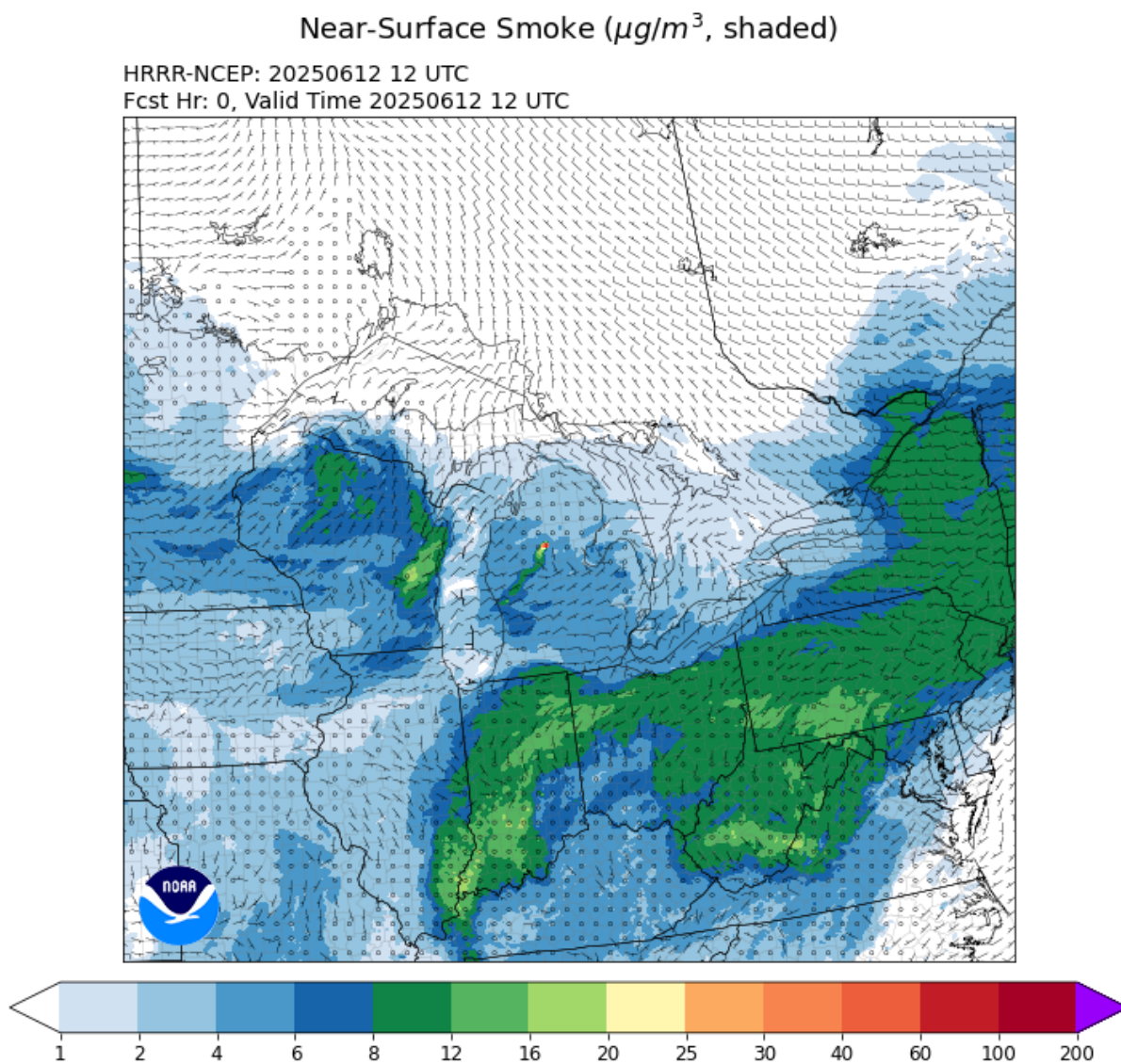


Figure 102 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 12Z (07:00 EST) on June 12, 2025. The HRRR model initialization showed near-surface smoke across all of Ohio, including near-surface smoke concentrations of approximately 8-12 $\mu\text{g}/\text{m}^3$ at the Canton Fire St8 monitoring site in Stark County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Canton Fire St8 monitoring site on June 12, 2025.

Figure 102. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 12Z (07:00 EST) on June 12, 2025.



3.6.2. June 13, 2025

The HYSPLIT back and forward trajectory plots show the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Stark County on June 13, 2025. Figure 103 shows the HYSPLIT 72-hour back trajectory plot from 00:00 EST on June 13, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for June 10. Figure 104 shows the HYSPLIT 55-hour forward trajectory plot from the wildfires burning north-northwest of Creighton, Saskatchewan at 20:00 EST on June 10, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for June 13. A stationary front that formed over Saskatchewan and Manitoba on June 10 allowed smoke from wildfires burning north-northwest of Creighton, Saskatchewan to build up and be slowly transported into Ohio, allowing wildfire smoke to be present in Canton through June 13. The 500-m back trajectory from Canton released at 00:00 EST of June 13 passed over the wildfires burning 24 km (14.9 mi) north-northwest of Creighton, Saskatchewan at a height of 2730.1 m AGL at 17:00 EST on June 10, and the 2725-meter release height from those wildfires at 17:00 EST on June 10 reaches Canton (at 382.6 m AGL) at 00:00 EST on June 13. The coincidence of the back and forward trajectories between the wildfire locations and Canton serves as clear evidence that the smoke from the wildfires burning north-northwest of Creighton, Saskatchewan ultimately caused the high PM_{2.5} concentrations in Stark County on June 13, 2025. It should be noted that although wildfire smoke was present over Ohio on June 13, cloud cover from the front pushing through prevented satellites from detecting smoke plumes, so no HMS smoke polygons appeared over Ohio on this date. The accompanying imagery map for June 13 presented in Figure 105 provides further evidence that smoke from the Canadian wildfires was present in Stark County on June 13, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Stark County.

Figure 103. HYSPLIT 72-hour back trajectory plot from 00:00 EST on June 10, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for June 13, 2025.

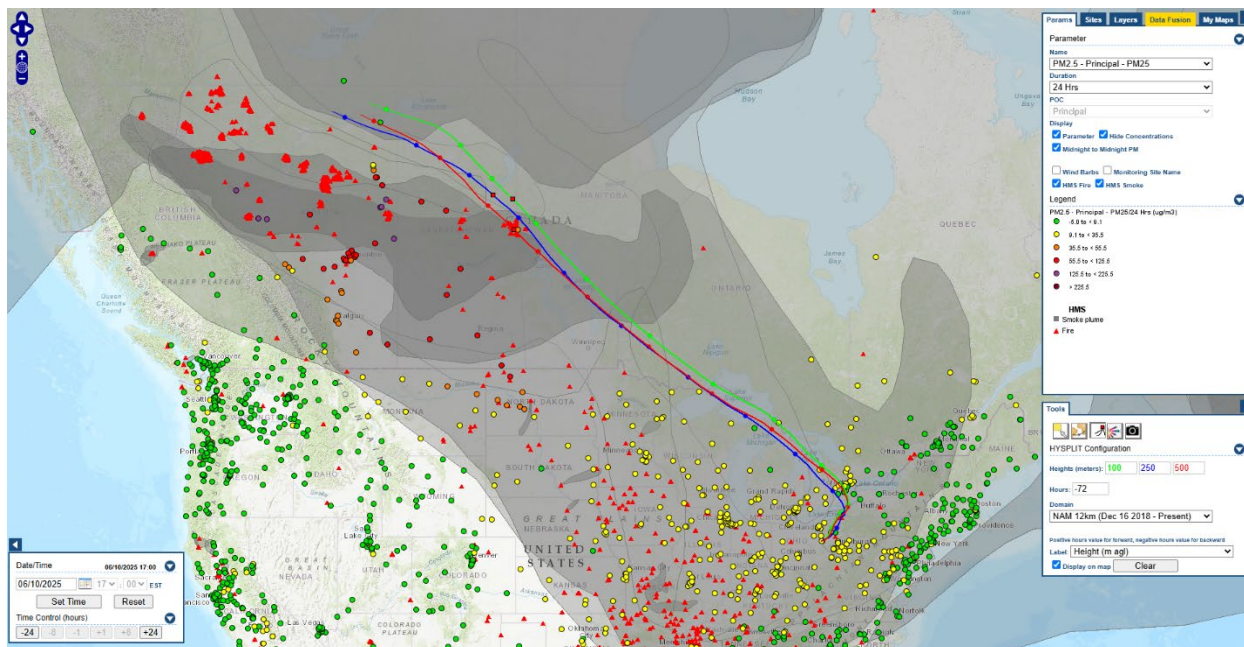


Figure 104. HYSPLIT 55-hour forward trajectory plot from 17:00 EST on June 10, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for June 13, 2025.

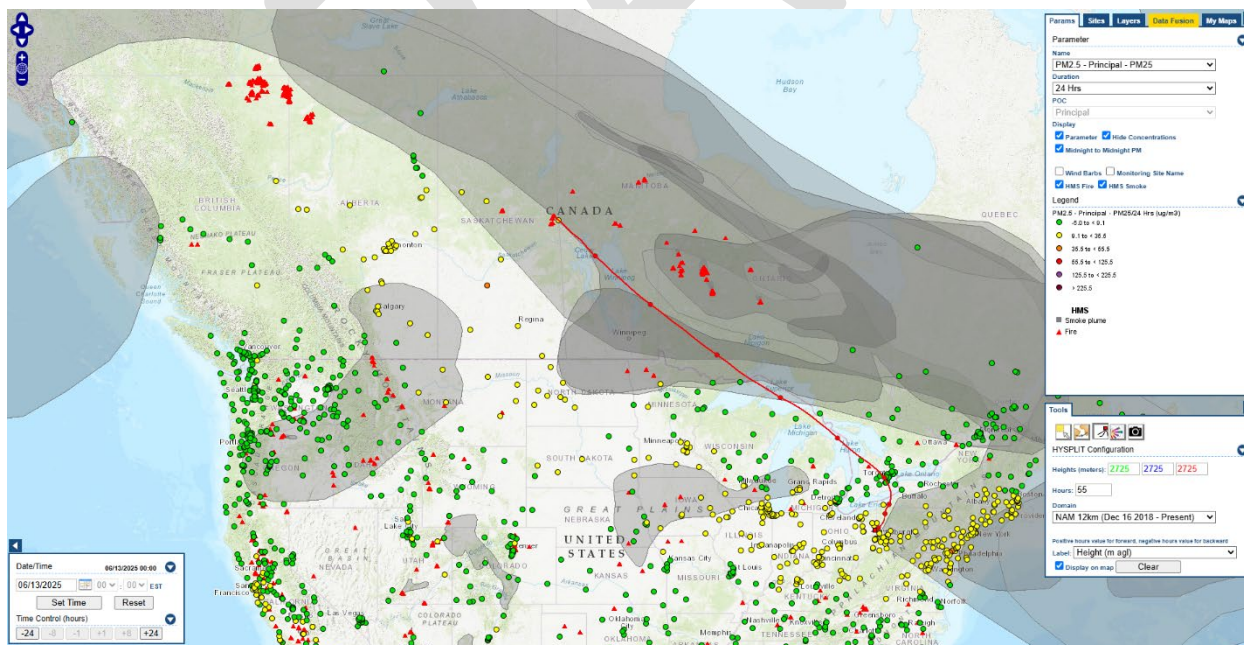


Figure 105. Terra satellite true color imagery of Ohio for June 13, 2025, showing pockets of visible wildfire smoke through cloud cover over Northeastern Ohio, including Stark County.

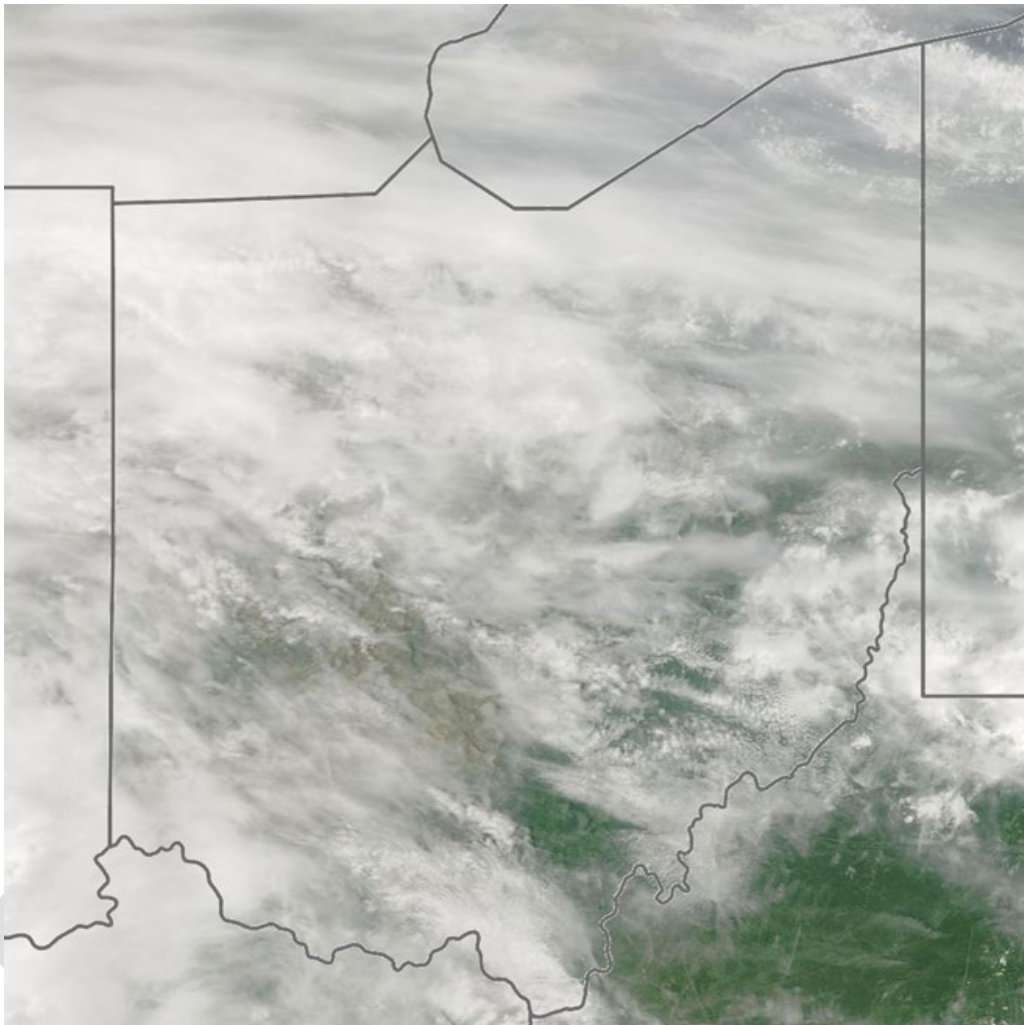


Table 13 and Figure 106 show the hourly average $PM_{2.5}$ concentrations on June 13, 2025, and the 2024-2025 average June concentration data measured by the POC3 Teledyne T640X monitor at the Canton Fire St8 (39-151-0017) monitoring site. The hourly average $PM_{2.5}$ concentrations continued to remain elevated throughout June 13 as more smoke from wildfires burning near Creighton, Saskatchewan continued to feed into the already smoke-laden air circulating over Canton, persisting until precipitation arrived in Northern Ohio in the morning of June 14, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Stark County on June 13, 2025.

Table 13. Hourly average PM_{2.5} concentration data from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on June 13, 2025, and 2024-2025 average June concentration data.

Hour of Day	2024-2025 Average June Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on June 13, 2025
00:00	13.0	25.0
01:00	13.4	24.5
02:00	13.5	24.9
03:00	12.9	24.0
04:00	12.6	24.8
05:00	13.2	25.6
06:00	12.7	26.1
07:00	12.8	27.7
08:00	12.5	28.0
09:00	13.1	29.8
10:00	12.7	31.4
11:00	12.4	29.2
12:00	12.4	26.9
13:00	12.0	28.5
14:00	11.6	27.2
15:00	10.8	19.8
16:00	10.4	21.8
17:00	10.5	20.7
18:00	10.6	16.6
19:00	11.0	18.4
20:00	12.0	21.9
21:00	12.6	21.3
22:00	13.1	23.5
23:00	13.3	22.5

Figure 106. Plot of hourly average PM_{2.5} concentrations from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on June 13, 2025, and 2024-2025 average June concentrations.

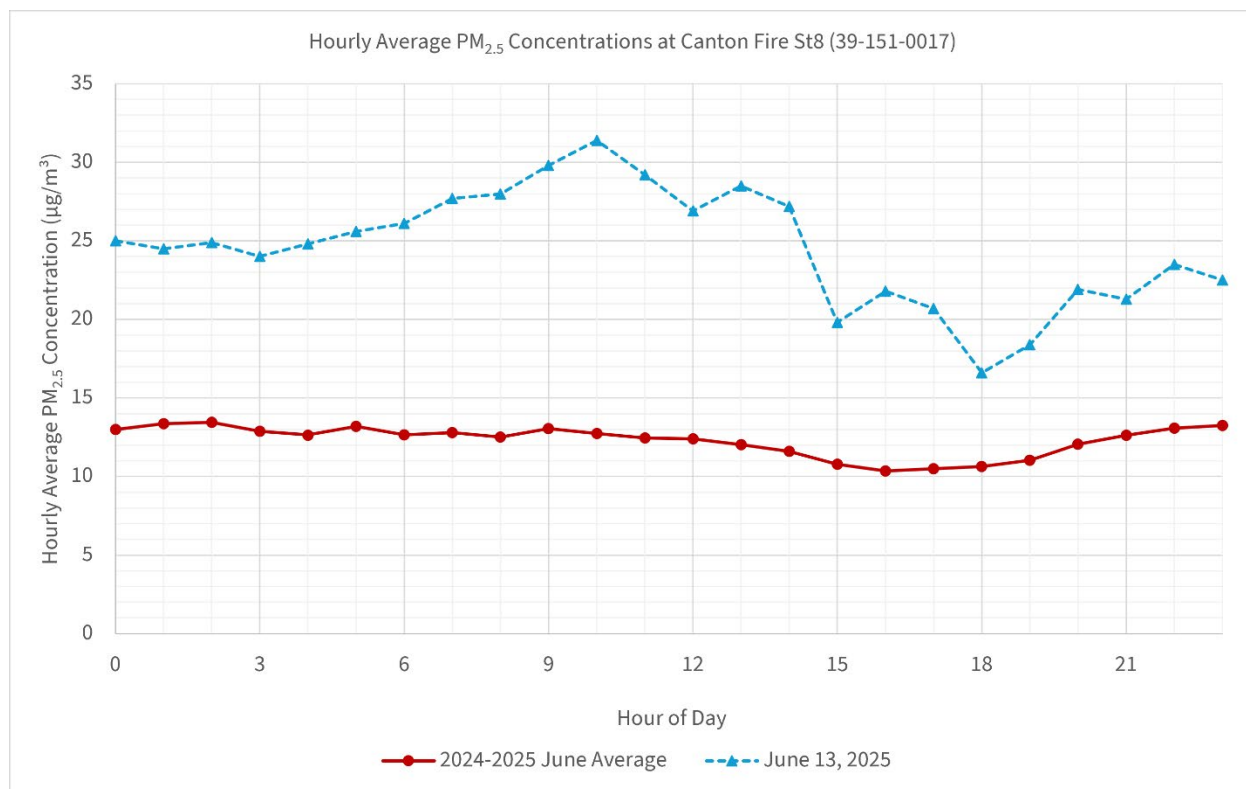
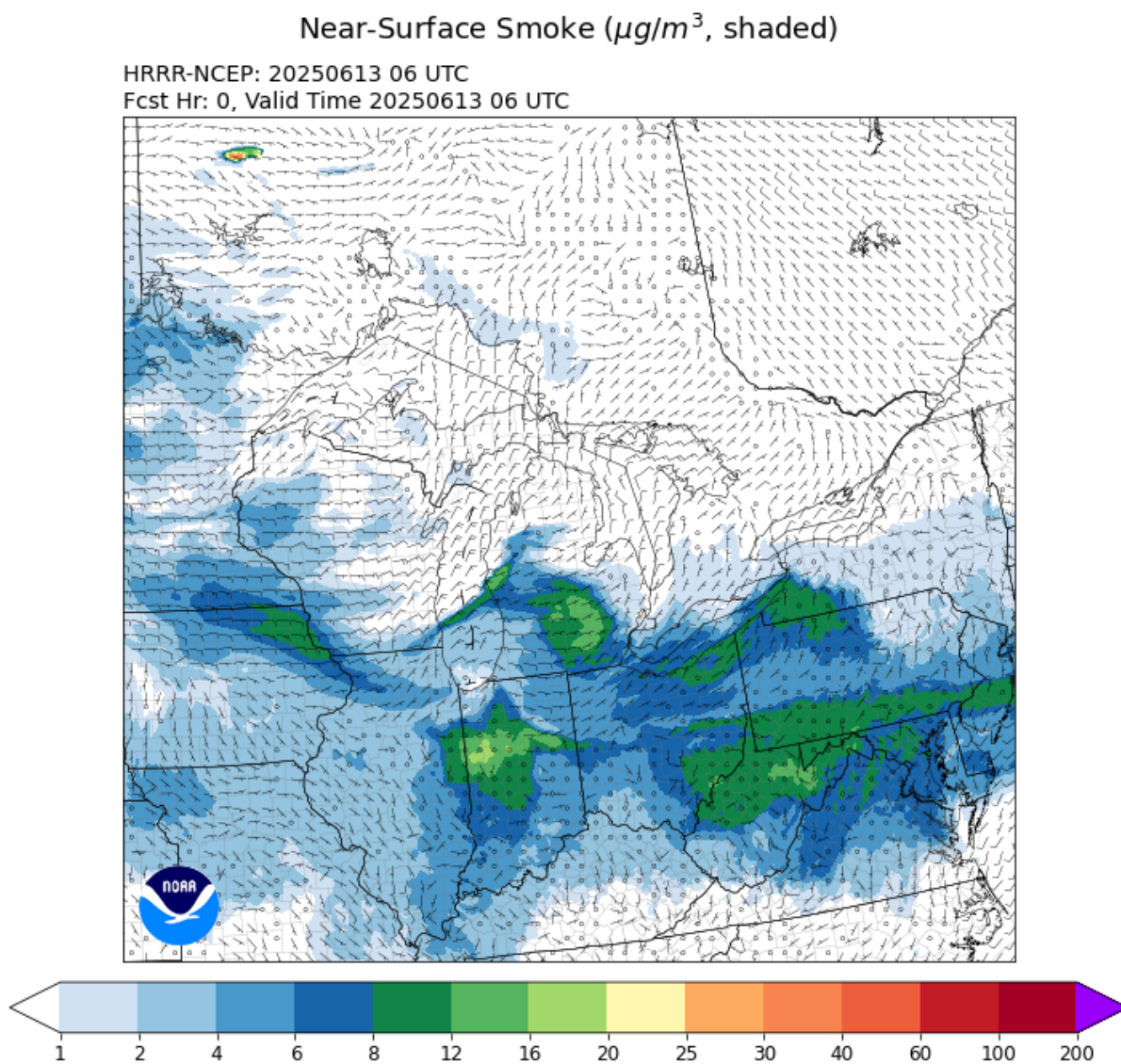


Figure 107 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 13, 2025. The HRRR model initialization showed near-surface smoke across all of Ohio, including near-surface smoke concentrations of approximately $8 \mu\text{g}/\text{m}^3$ at the Canton Fire St8 monitoring site in Stark County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Canton Fire St8 monitoring site on June 13, 2025.

Figure 107. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on June 13, 2025.



3.7. Fireworks Smoke-Driven PM_{2.5} Episode on July 4-5, 2025

3.7.1. July 4-5, 2025

The smoke from the various nearby Fourth of July holiday celebration-related fireworks displays caused high surface PM_{2.5} concentrations at the Canton Fire St8 monitoring site in Stark County on July 4-5, 2025. Figure 108 shows Terra satellite true color and MAIAC AOD imagery of Ohio and surrounding states for July 4, 2025, with Terra and Aqua satellite daytime orbital tracks and overpass times in UTC, in which moderate AOD values occur across Ohio, including Stark County. On July 4, 2025, the Terra satellite had its closest daytime orbit track overpass of Canton at 10:32 EST and the Aqua satellite had its closest daytime orbit track overpass of Canton at 14:13 EST, so the moderate and high AOD values observed by the Terra satellite over Stark County on July 4 would have represented lingering smoke from fireworks displays prior to the mixing height increasing enough in the afternoon to allow for the fireworks smoke to dissipate. Figure 109 shows Terra satellite true color and MAIAC AOD imagery of Ohio and surrounding states for July 5, 2025, with Terra and Aqua satellite daytime orbital tracks and overpass times in UTC, in which moderate AOD values occur across Ohio, including Stark County. On July 5, 2025, the Terra satellite had its closest daytime orbit track overpass of Canton at 09:33 EST and the Aqua satellite had its closest daytime orbit track overpass of Canton at 14:52 EST, so the moderate AOD values observed by the Terra satellite over Stark County on July 5 would have represented lingering smoke from fireworks displays prior to the mixing height increasing enough in the afternoon to allow for the fireworks smoke to dissipate. Figures 110 to 117 show the wind barbs and hourly average PM_{2.5} concentrations measured at monitoring sites across the region at 21:00 EST on July 3, 00:00 EST on July 4, 03:00 EST on July 4, 06:00 EST on July 4, 21:00 EST on July 4, 00:00 EST on July 5, 03:00 EST on July 5, and 06:00 EST on July 5, respectively, illustrating the lingering nature of the smoke near the surface due to widespread Fourth of July holiday celebration-related fireworks displays. The moderate and high AOD values observed over Ohio, including Stark County, the large number of fireworks displays across the area, the calm or very light winds in the Canton area overnight, and the widespread elevated PM_{2.5} concentrations at monitoring sites across the region, serve as clear evidence that the smoke from several fireworks displays across the area ultimately caused the high PM_{2.5} concentrations at the Canton Fire St8 monitoring site in Stark County on July 4-5, 2025.

Figure 108. Terra satellite true color and MAIAC AOD imagery of Ohio and surrounding states for July 4, 2025, with Terra and Aqua satellite daytime orbital tracks and overpass times in UTC, showing moderate and high AOD values across Ohio, including Stark County, due to lingering fireworks smoke.

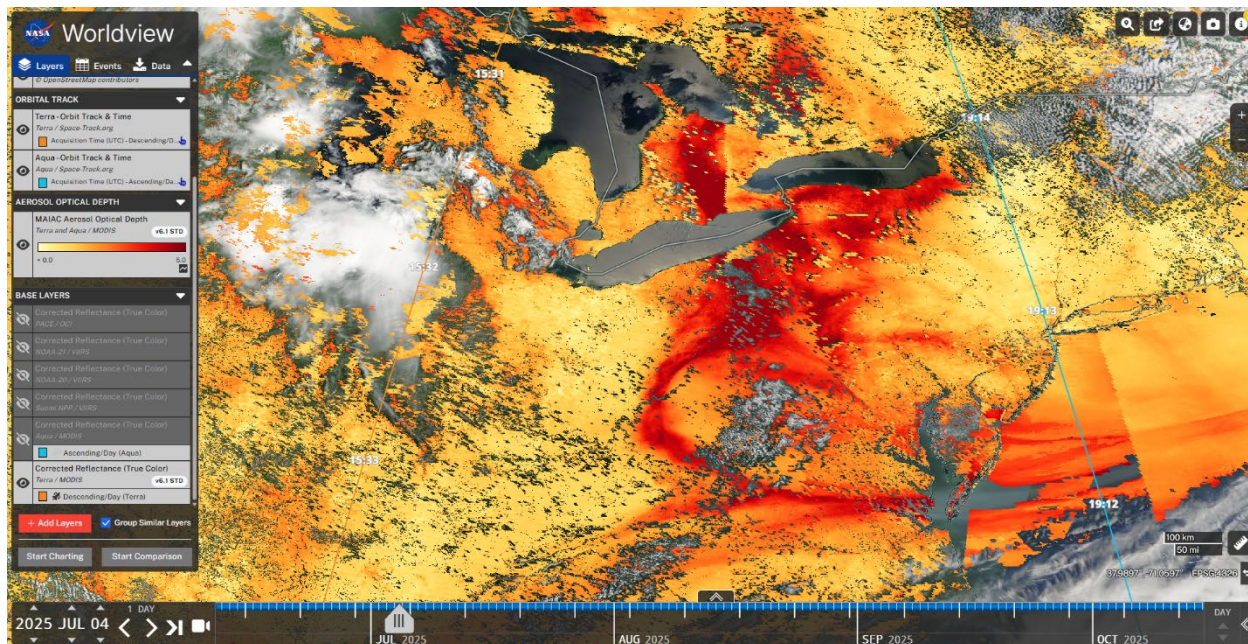


Figure 109. Terra satellite true color and MAIAC AOD imagery of Ohio and surrounding states for July 5, 2025, with Terra and Aqua satellite daytime orbital tracks and overpass times in UTC, showing moderate AOD values across Ohio, including Stark County, due to lingering fireworks smoke.

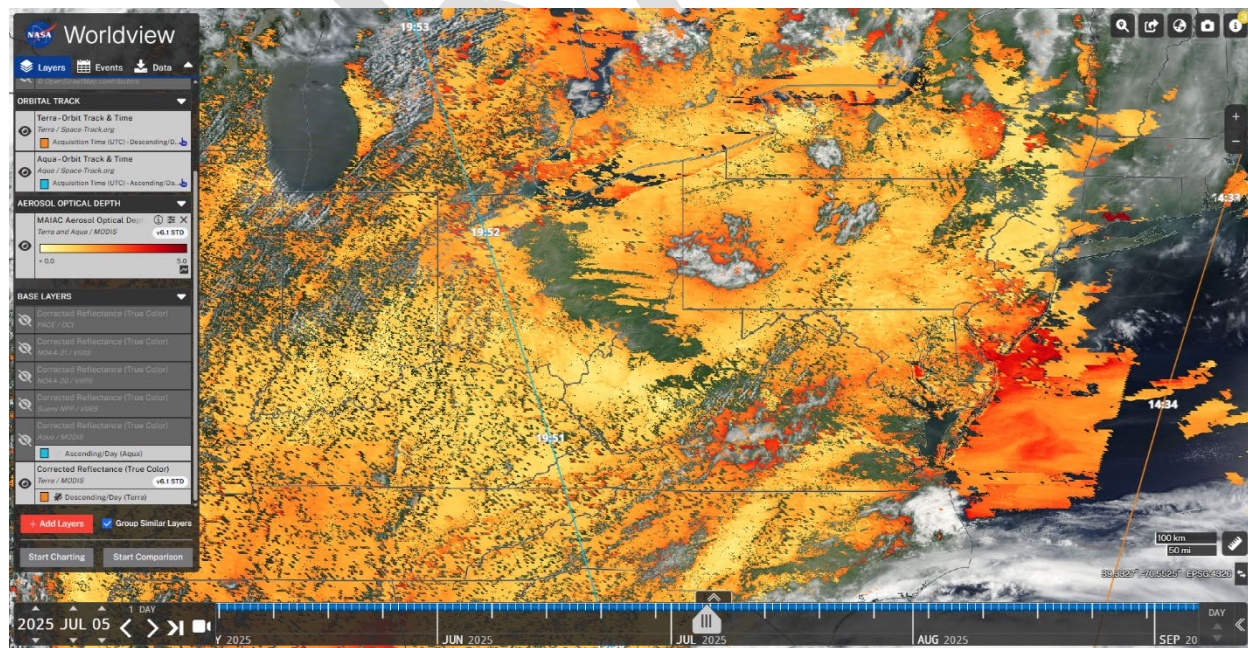


Figure 110. Map of wind barbs and hourly average PM_{2.5} concentrations measured at monitoring sites across the region at 21:00 EST on July 3, 2025.

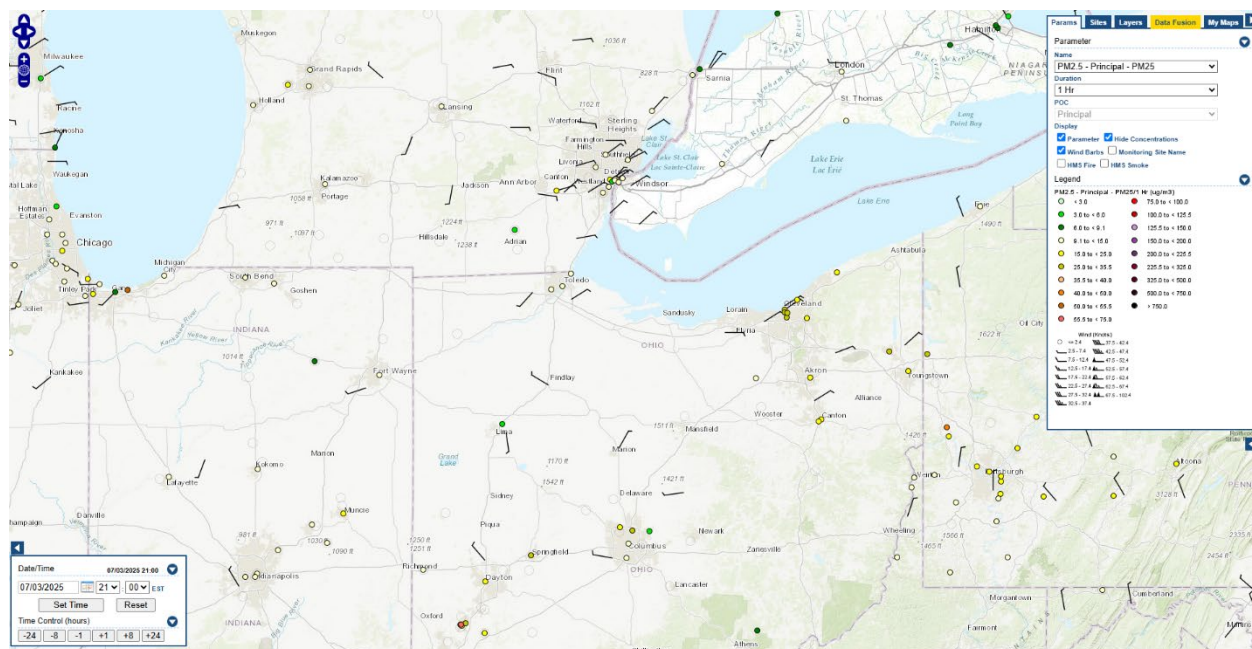


Figure 111. Map of wind barbs and hourly average PM_{2.5} concentrations measured at monitoring sites across the region at 00:00 EST on July 4, 2025.

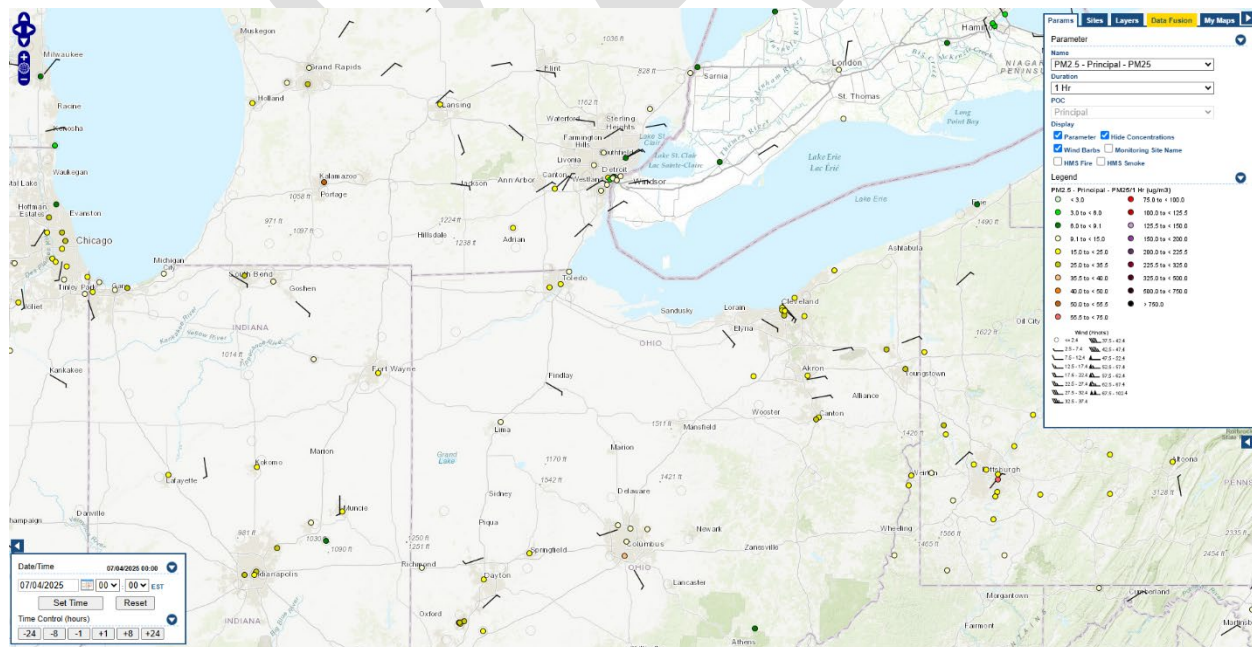


Figure 112. Map of wind barbs and hourly average PM_{2.5} concentrations measured at monitoring sites across the region at 03:00 EST on July 4, 2025.

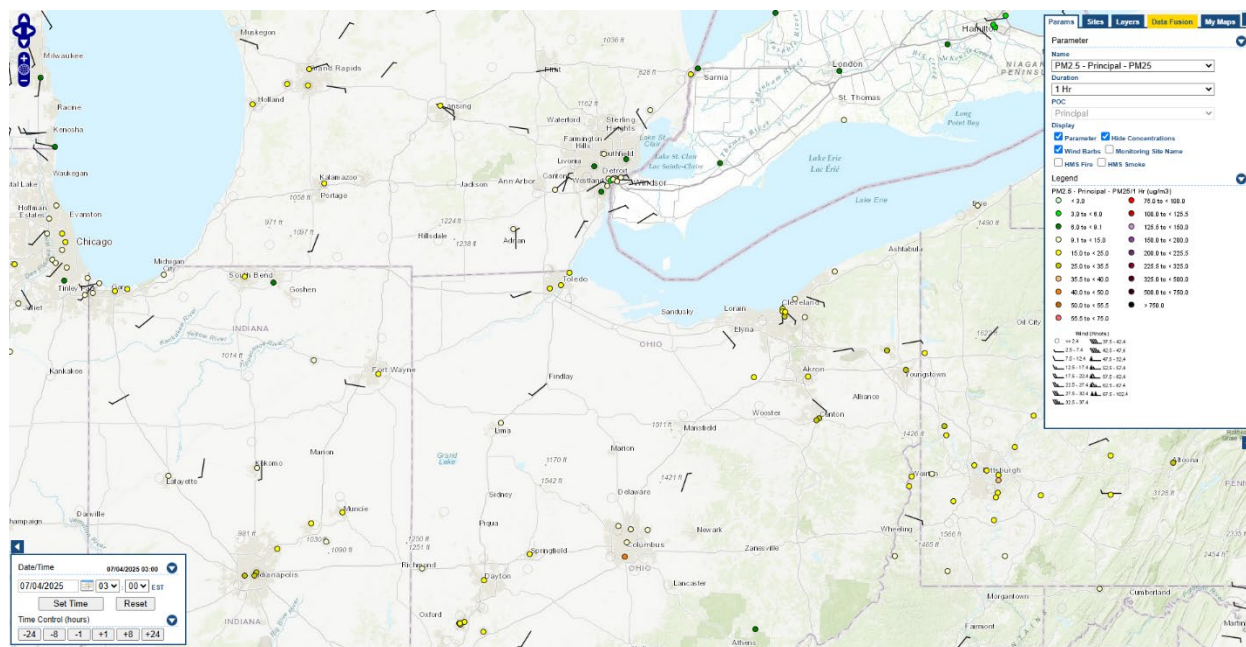


Figure 113. Map of wind barbs and hourly average PM_{2.5} concentrations measured at monitoring sites across the region at 06:00 EST on July 4, 2025.

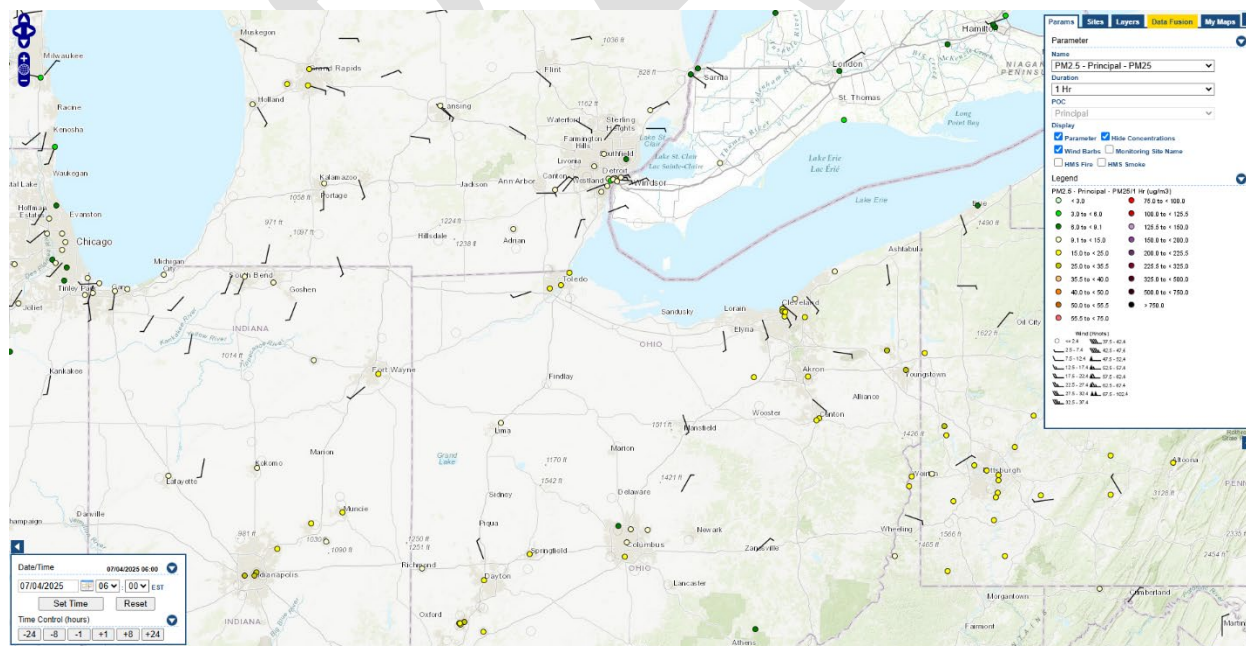


Figure 114. Map of wind barbs and hourly average PM_{2.5} concentrations measured at monitoring sites across the region at 21:00 EST on July 4, 2025.

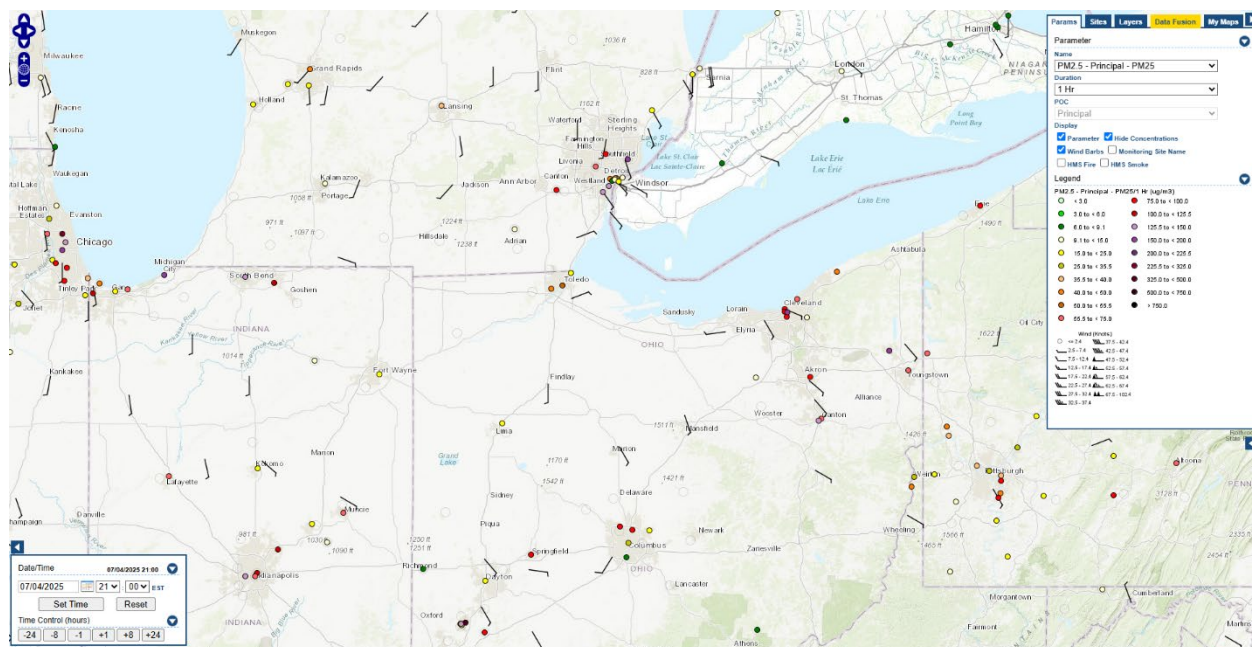


Figure 115. Map of wind barbs and hourly average PM_{2.5} concentrations measured at monitoring sites across the region at 00:00 EST on July 5, 2025.

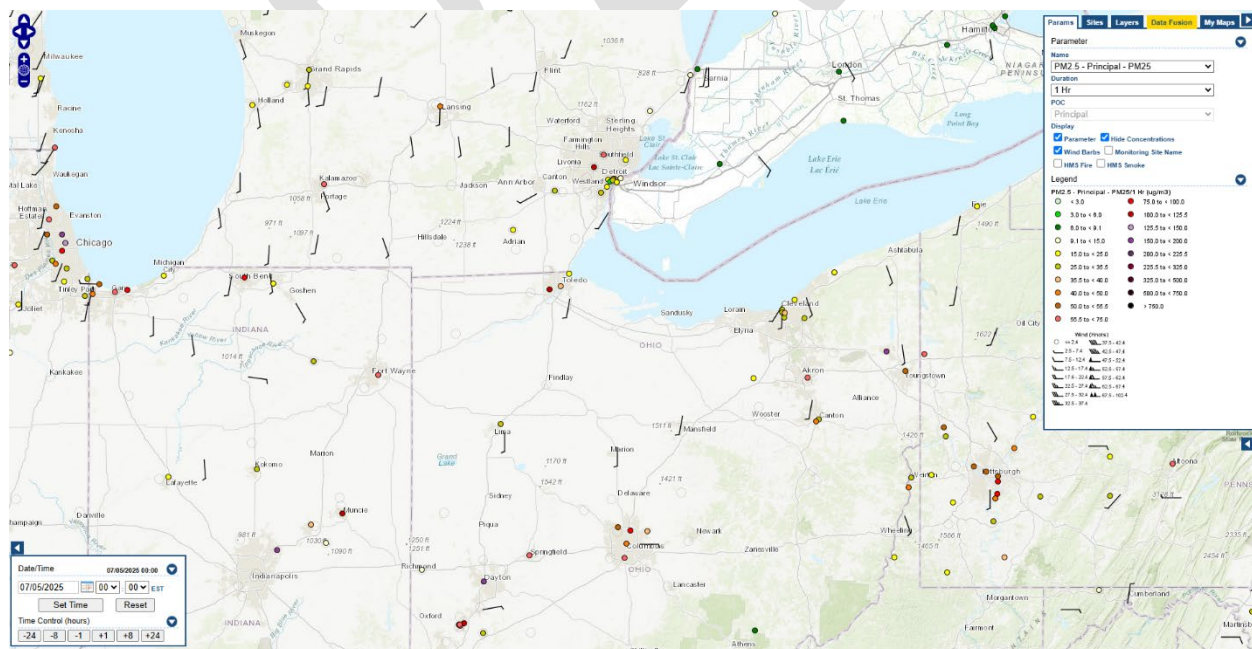


Figure 116. Map of wind barbs and hourly average PM_{2.5} concentrations measured at monitoring sites across the region at 03:00 EST on July 5, 2025.

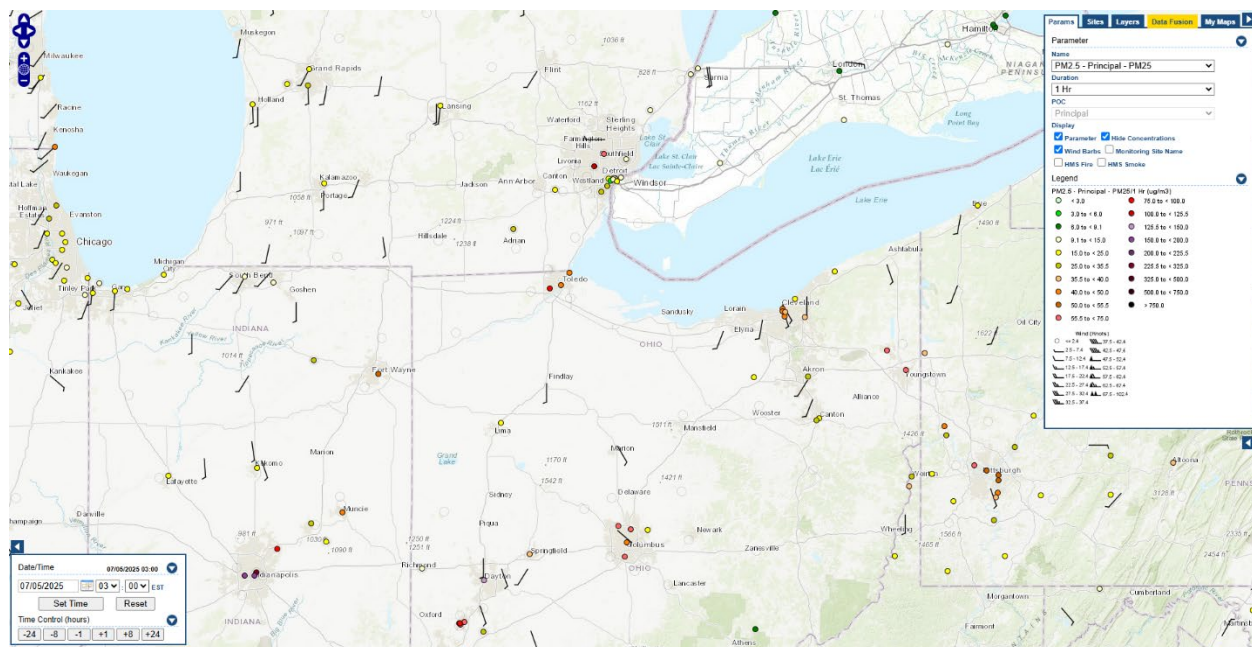


Figure 117. Map of wind barbs and hourly average PM_{2.5} concentrations measured at monitoring sites across the region at 06:00 EST on July 5, 2025.

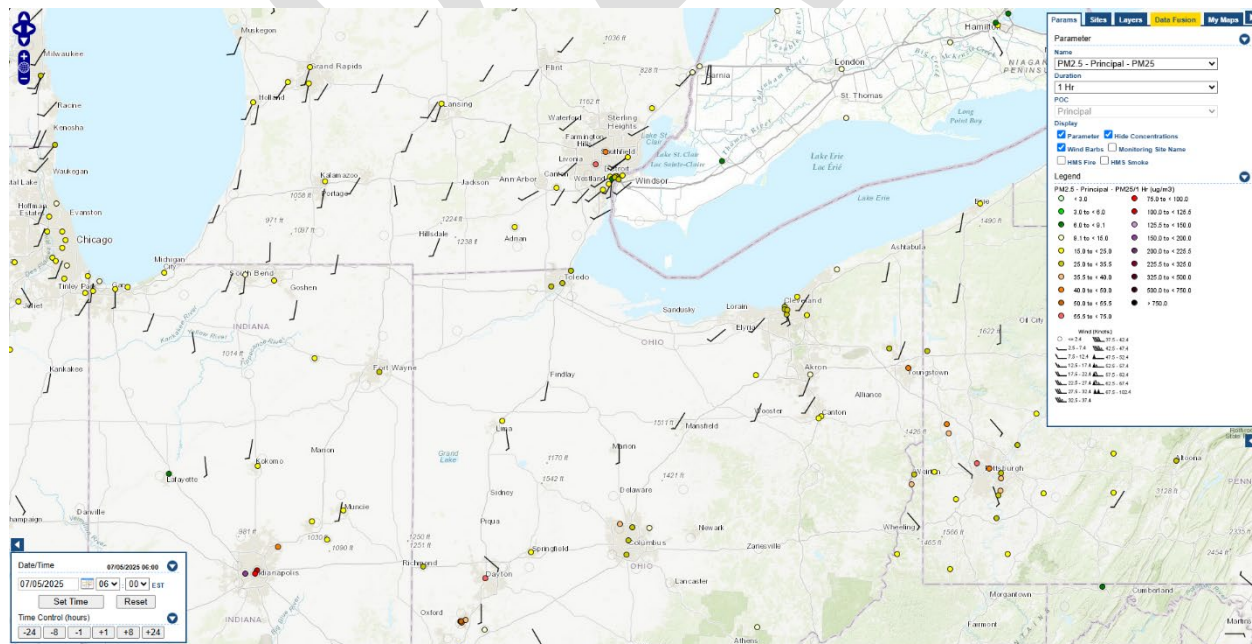
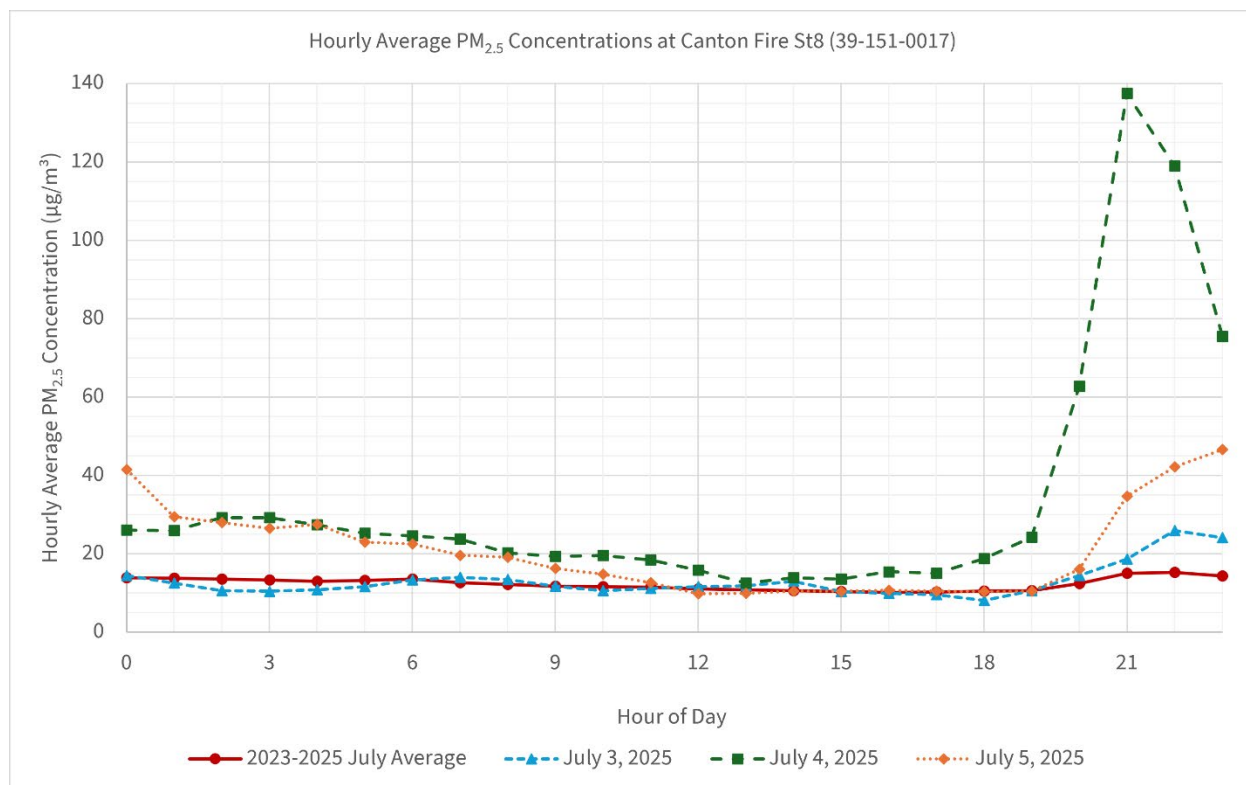


Table 14 and Figure 118 show the hourly average $PM_{2.5}$ concentrations from July 3-5, 2025, and the 2023-2025 average July concentrations measured by the POC3 Teledyne T640X monitor at the Canton Fire St8 (39-151-0017) monitoring site. The hourly average $PM_{2.5}$ concentrations increased as local fireworks displays began around 20:00 EST on July 3, with concentrations remaining elevated through the morning of July 4, only to rapidly increase again with more fireworks displays beginning by 19:00 EST on July 4, providing further evidence that smoke of several fireworks displays across the area impacted $PM_{2.5}$ concentrations in Stark County on July 4, 2025.

Table 14. Hourly average PM_{2.5} concentration data from the Canton Fire St8 (39-151-0017) monitoring site in Stark County from July 3-5, 2025, and 2023-2025 average July concentration data.

Hour of Day	2023-2025 Average July Hourly PM_{2.5} Concentration (µg/m³)	Hourly Average PM_{2.5} Concentration (µg/m³) on July 3, 2025	Hourly Average PM_{2.5} Concentration (µg/m³) on July 4, 2025	Hourly Average PM_{2.5} Concentration (µg/m³) on July 5, 2025
00:00	13.9	14.4	26.0	41.5
01:00	13.8	12.5	25.9	29.4
02:00	13.5	10.6	29.2	28.0
03:00	13.3	10.4	29.2	26.5
04:00	13.0	10.8	27.4	27.5
05:00	13.2	11.6	25.2	22.9
06:00	13.5	13.3	24.5	22.5
07:00	12.7	14.0	23.7	19.6
08:00	12.1	13.4	20.2	19.1
09:00	11.7	11.7	19.3	16.3
10:00	11.5	10.6	19.5	14.8
11:00	11.5	11.1	18.4	12.6
12:00	11.1	11.6	15.8	9.8
13:00	10.8	11.8	12.5	9.9
14:00	10.5	13.0	13.9	10.5
15:00	10.3	10.3	13.5	10.4
16:00	10.2	9.9	15.4	10.7
17:00	10.3	9.5	15.0	10.5
18:00	10.4	8.1	18.8	10.3
19:00	10.6	10.6	24.2	10.5
20:00	12.3	14.4	62.7	16.0
21:00	15.0	18.6	137.5	34.7
22:00	15.2	25.9	118.9	42.2
23:00	14.4	24.1	75.4	46.6

Figure 118. Plot of hourly average PM_{2.5} concentrations from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on July 3-5, 2025, and 2023-2025 average July concentrations.



3.8. Wildfire Smoke-Driven PM_{2.5} Episode on July 15, 2025

3.8.1. July 15, 2025

The HYSPLIT 120-hour back trajectory plot shows the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Stark County on July 15, 2025. Figure 119 shows the HYSPLIT 120-hour back trajectory plot from 00:00 EST on July 15, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for July 11. Figure 120 shows the HYSPLIT 92-hour forward trajectory plot from 04:00 EST on July 11, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for July 15. The wildfires burning 105 km (65.2 mi) north-northwest of La Ronge, Saskatchewan coincide with the point (at 4950.6 m AGL) at 04:00 EST on July 11 of the 120-hour 500-meter release height back trajectory, composed of a 48-hour back trajectory from the endpoint of the 72-hour back trajectory from the Canton Fire St8 monitoring site, illustrating the transport of this wildfire smoke to Northeastern Ohio. The corresponding 4950-meter release height forward trajectory, composed of a 20-hour forward trajectory from the endpoint of the 72-hour forward trajectory from those wildfires at 04:00 EST on July 11, reaches the Canton area (at 617.0 m AGL) at 00:00 EST on July 15, serving as clear evidence that the smoke from the wildfires burning north-northwest of La Ronge, Saskatchewan ultimately caused the high PM_{2.5} concentrations in Stark County on July 15, 2025. The accompanying imagery map for July 15 presented in Figure 121 provides further evidence that smoke from the Canadian wildfires was present in Stark County on July 15, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Stark County.

Figure 119. HYSPLIT 120-hour back trajectory plot from 00:00 EST on July 15, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for July 11, 2025.

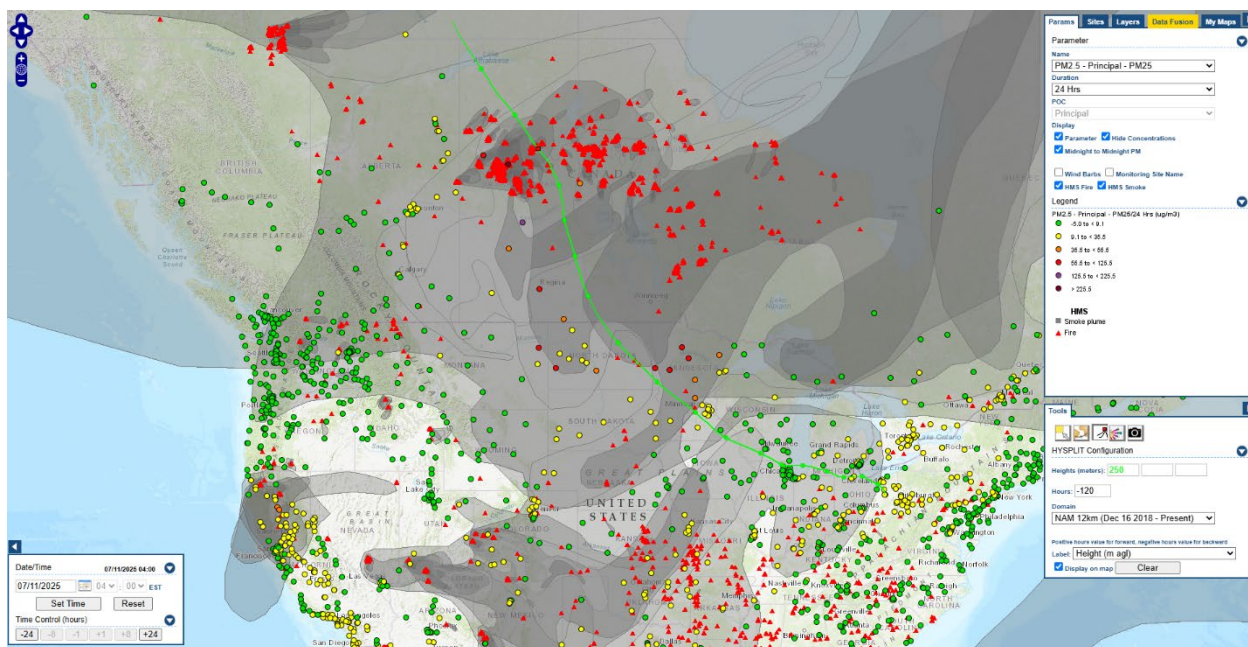


Figure 120. HYSPLIT 92-hour forward trajectory plot from 04:00 EST on July 11, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for July 15, 2025.

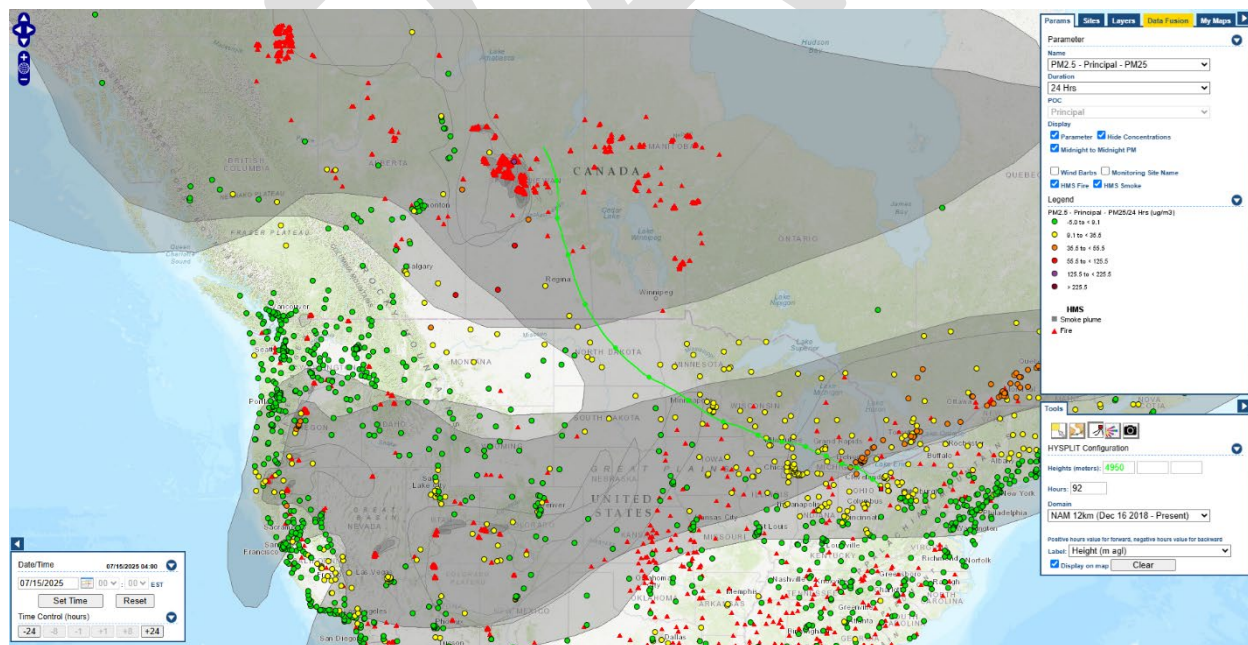


Figure 121. Suomi NPP satellite true color imagery and MAIAC AOD imagery of Ohio for July 15, 2025, showing moderate to high AOD values and some visible wildfire smoke over Northern and Eastern Ohio, including Stark County.

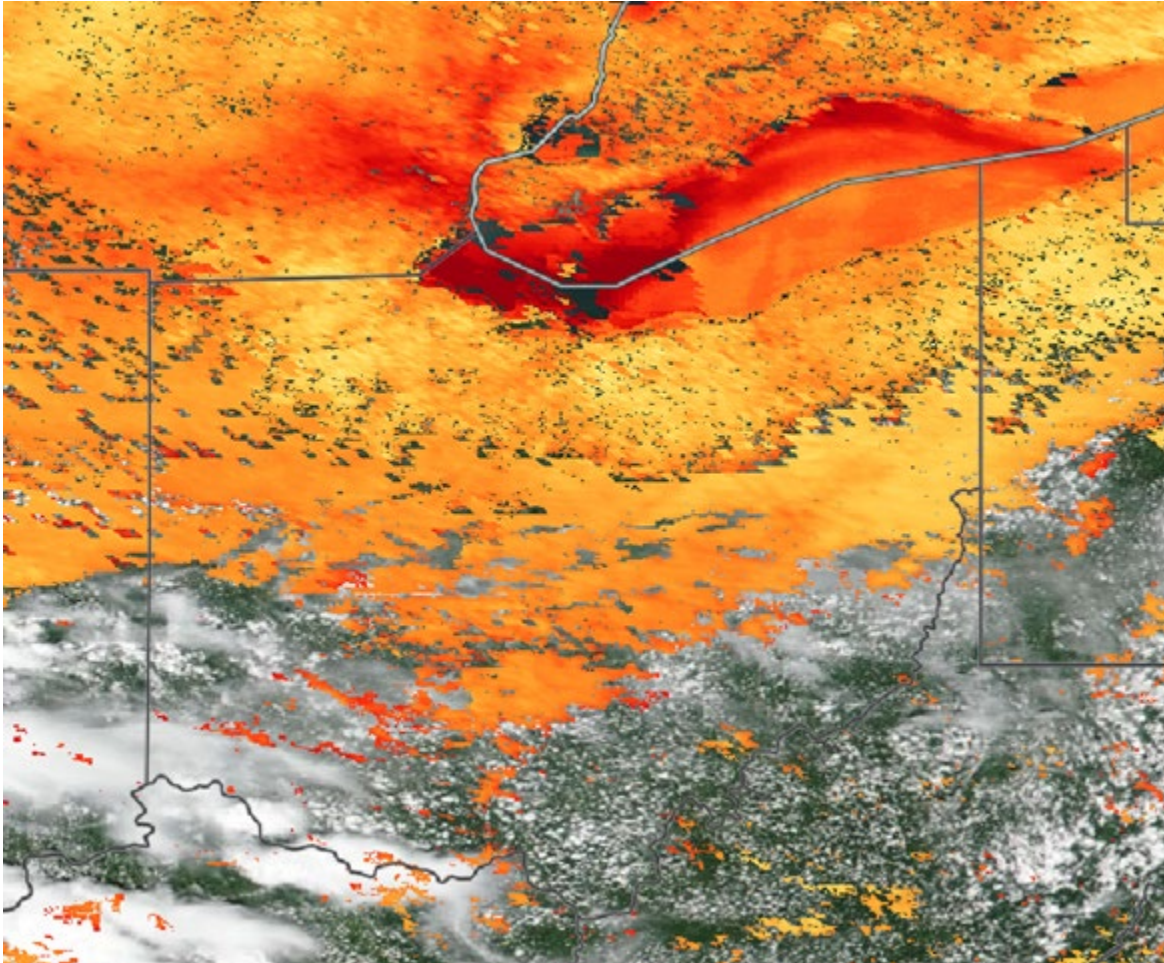


Table 15 and Figure 122 show the hourly average $PM_{2.5}$ concentrations on July 15, 2025, and the 2023-2025 average July concentrations measured by the POC3 Teledyne T640X monitor at the Canton Fire St8 (39-151-0017) monitoring site. The hourly average $PM_{2.5}$ concentrations remained elevated throughout the entirety of July 15 as wildfire smoke continued to be transported to Canton and descend on the surface, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Stark County on July 15, 2025.

Table 15. Hourly average PM_{2.5} concentration data from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on July 15, 2025, and 2023-2025 average July concentrations.

Hour of Day	2023-2025 Average July Hourly PM_{2.5} Concentration (µg/m³)	Hourly Average PM_{2.5} Concentration (µg/m³) on July 15, 2025
00:00	13.9	28.9
01:00	13.8	37.6
02:00	13.5	38.7
03:00	13.3	29.4
04:00	13.0	26.7
05:00	13.2	33.0
06:00	13.5	30.8
07:00	12.7	27.1
08:00	12.1	24.6
09:00	11.7	24.5
10:00	11.5	23.4
11:00	11.5	23.8
12:00	11.1	22.8
13:00	10.8	21.9
14:00	10.5	20.1
15:00	10.3	17.5
16:00	10.2	19.4
17:00	10.3	22.3
18:00	10.4	20.1
19:00	10.6	20.8
20:00	12.3	25.4
21:00	15.0	32.0
22:00	15.2	24.3
23:00	14.4	26.3

Figure 122. Plot of hourly average PM_{2.5} concentrations from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on July 15, 2025, and 2023-2025 average July concentrations.

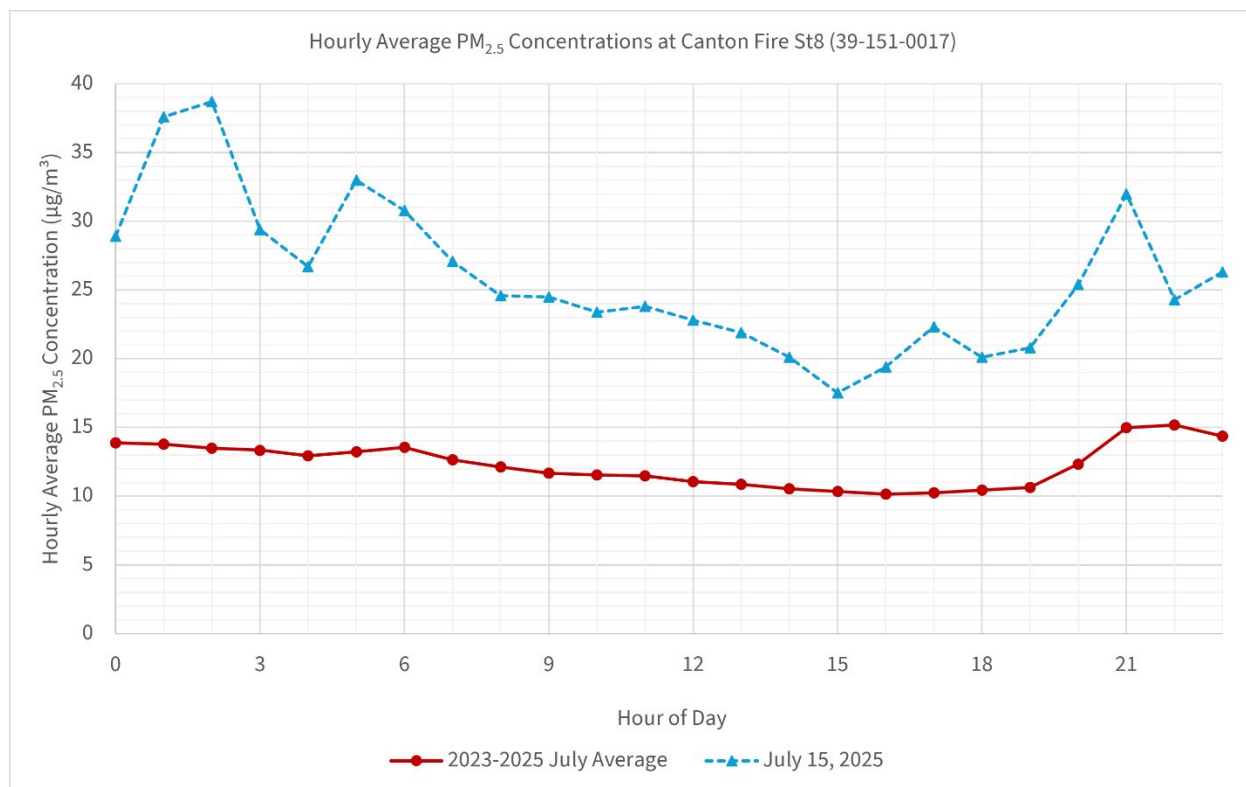
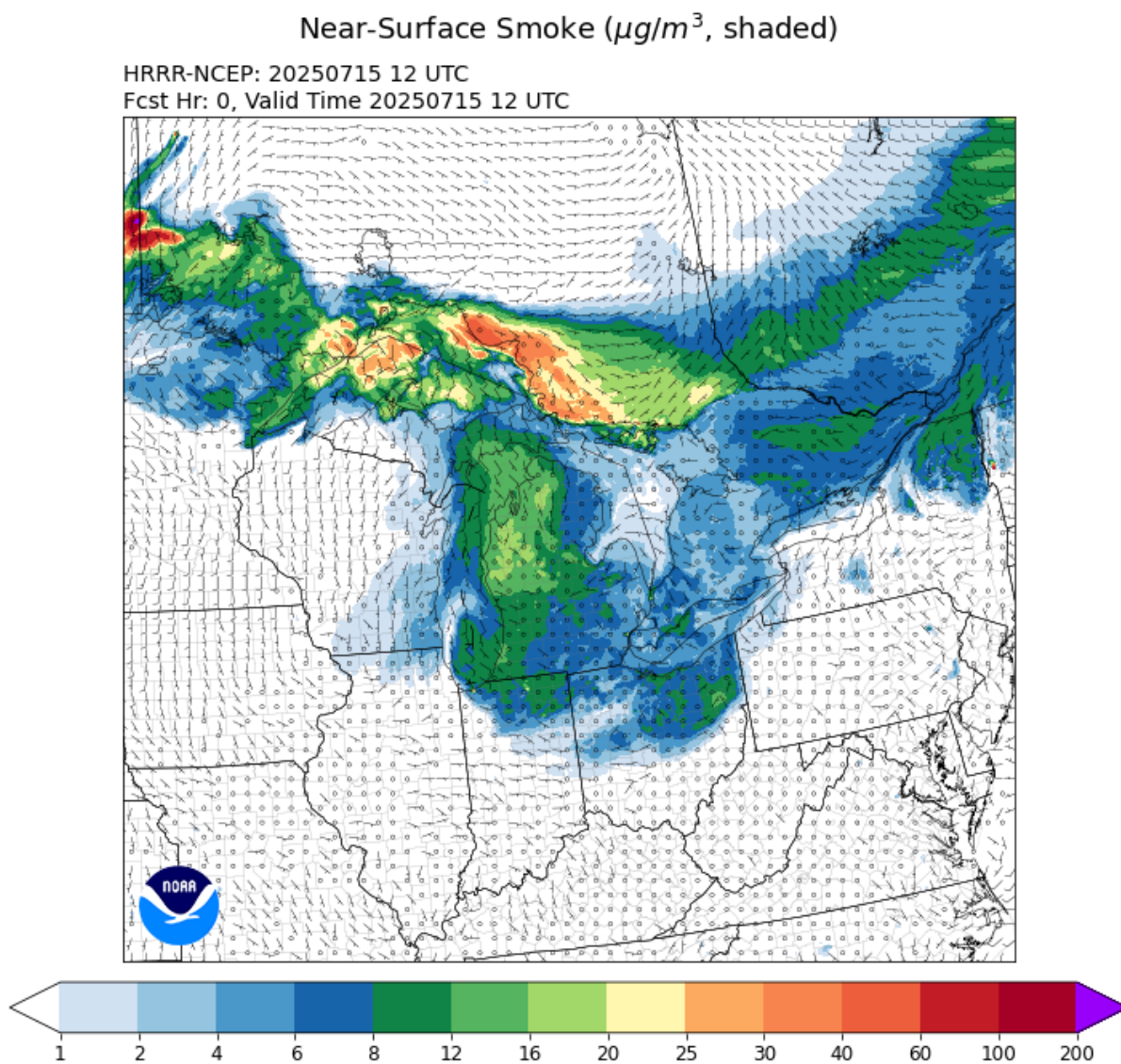


Figure 123 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 12Z (07:00 EST) on July 15, 2025. The HRRR model initialization showed near-surface smoke across Northern Ohio, including near-surface smoke concentrations of approximately 8-12 $\mu\text{g}/\text{m}^3$ at the Canton Fire St8 monitoring site in Stark County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Canton Fire St8 monitoring site on July 15, 2025.

Figure 123. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 12Z (07:00 EST) on July 15, 2025.



3.9. Wildfire Smoke-Driven PM_{2.5} Episode on August 15-16, 2025

3.9.1. August 15, 2025

The HYSPLIT 84-hour back and 76-hour forward trajectory plots show the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Stark County on August 15, 2025. Figure 124 shows the HYSPLIT 84-hour back trajectory plot from 00:00 EST August 15, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for August 11. Figure 125 shows the HYSPLIT 76-hour forward trajectory plot from 20:00 EST on August 12, overlaid on a map of fire locations, monitored 24-hour average surface PM_{2.5} concentrations, and HMS smoke polygons for August 15. The wildfires burning 45 km (28.0 mi) west-northwest of Pelican Narrows, Saskatchewan, coincide with the point (at 3610.3 m AGL) at 20:00 EST on August 11 of the 500-meter release height back trajectory, composed of a 12-hour back trajectory from the endpoint of the 72-hour back trajectory from Canton, and the 3600-meter release height 76-hour forward trajectory, composed of a 10-hour forward trajectory from the endpoint of the 66-hour forward trajectory from the wildfires at 20:00 EST on August 11, reaches the Canton area (at 519.7 meters AGL) at 00:00 EST on August 15. The coincidence of the 72-hour back and forward trajectories between the wildfires and Canton serves as clear evidence that the smoke from the wildfires burning west-northwest of Pelican Narrows, Saskatchewan ultimately caused the high PM_{2.5} concentrations in Stark County on August 15, 2025. The accompanying imagery map for August 15 presented in Figure 126 provides further evidence that smoke from the Canadian wildfires was present in Stark County on August 15, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Stark County.

Figure 124. HYSPLIT 84-hour back trajectory plot from August 15, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for August 11, 2025.

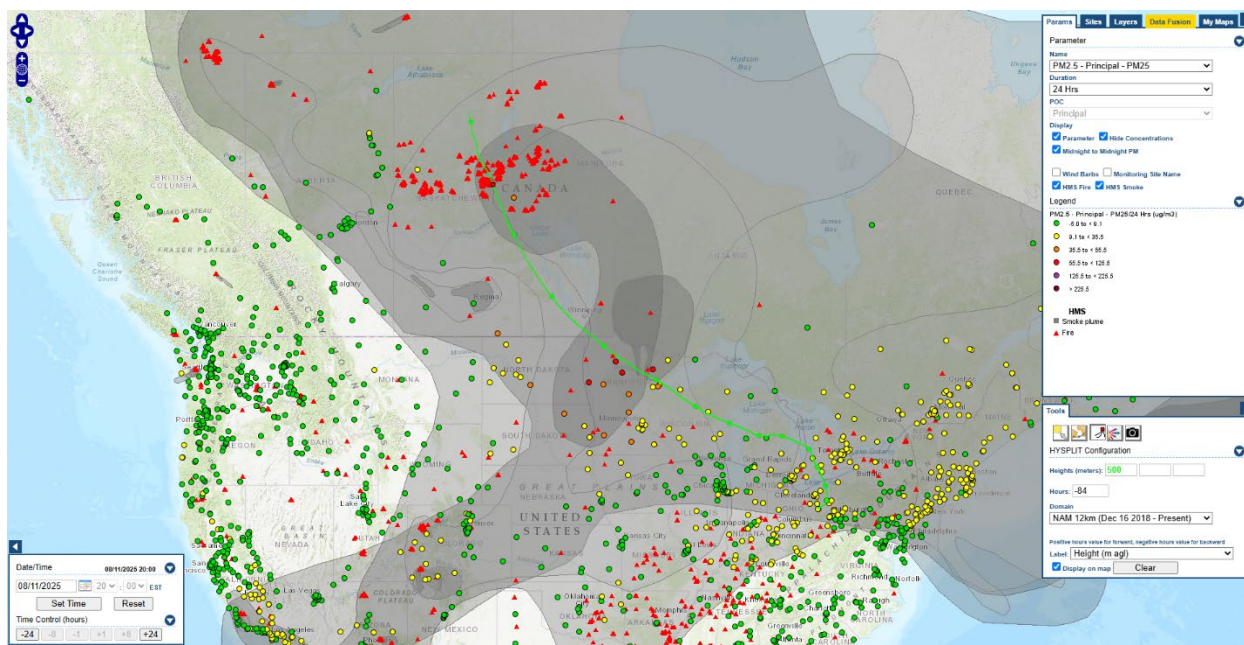


Figure 125. HYSPLIT 76-hour forward trajectory plot from 20:00 EST on August 11, 2025, with fire locations, monitored surface PM_{2.5} concentrations, and HMS smoke polygons for August 15, 2025.

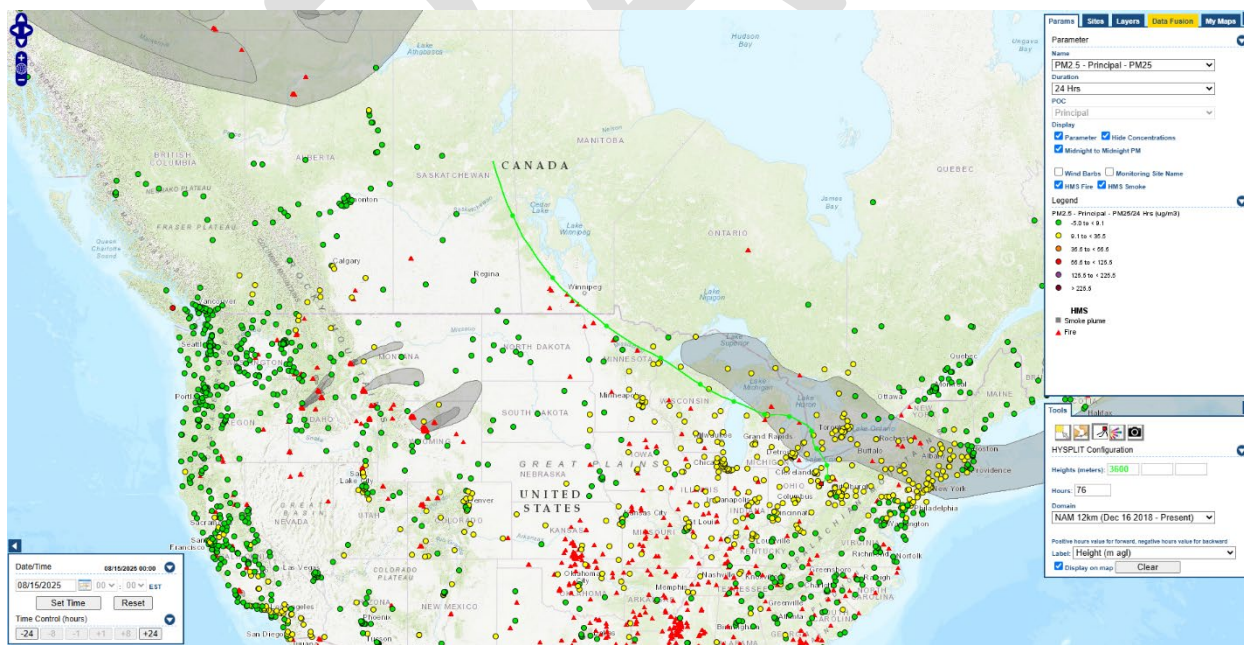


Figure 126. Suomi NPP satellite true color imagery and MAIAC AOD imagery of Ohio for August 15, 2025, showing moderate to high AOD values over Ohio, including Stark County.

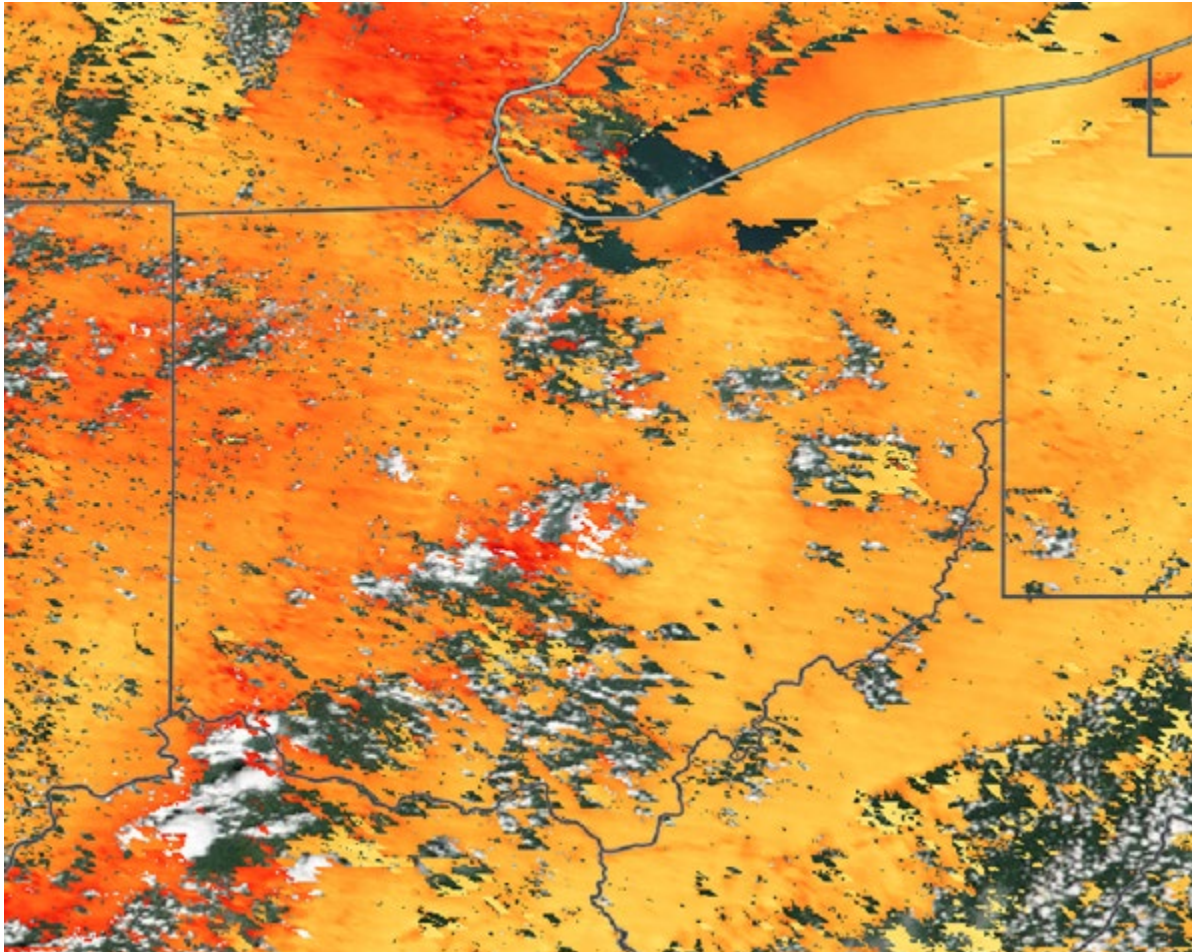


Table 16 and Figure 127 show the hourly average $PM_{2.5}$ concentrations on August 15, 2025, measured by the POC3 Teledyne T640X monitor at the Canton Fire St8 (39-151-0017) monitoring site. The hourly average $PM_{2.5}$ concentrations increased as wildfire smoke-laden air moved into Canton overnight, then remained elevated throughout the entirety of August 15, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Stark County on August 15, 2025.

Table 16. Hourly average PM_{2.5} concentration data from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on August 15, 2025, and 2023-2025 average August concentrations.

Hour of Day	2023-2025 Average August Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on Aug. 15, 2025
00:00	13.1	24.0
01:00	12.5	20.9
02:00	13.3	21.6
03:00	13.2	22.1
04:00	13.2	23.4
05:00	14.2	25.4
06:00	14.0	27.9
07:00	12.8	29.1
08:00	11.1	26.3
09:00	10.6	24.7
10:00	10.3	21.6
11:00	10.1	18.2
12:00	9.9	18.6
13:00	9.9	19.7
14:00	9.9	17.9
15:00	9.8	15.0
16:00	9.7	14.7
17:00	9.9	16.6
18:00	10.0	15.4
19:00	10.7	16.8
20:00	12.2	18.8
21:00	12.8	24.7
22:00	12.2	21.0
23:00	12.2	22.3

Figure 127. Plot of hourly average PM_{2.5} concentrations from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on August 15, 2025, and 2023-2025 average August concentrations.

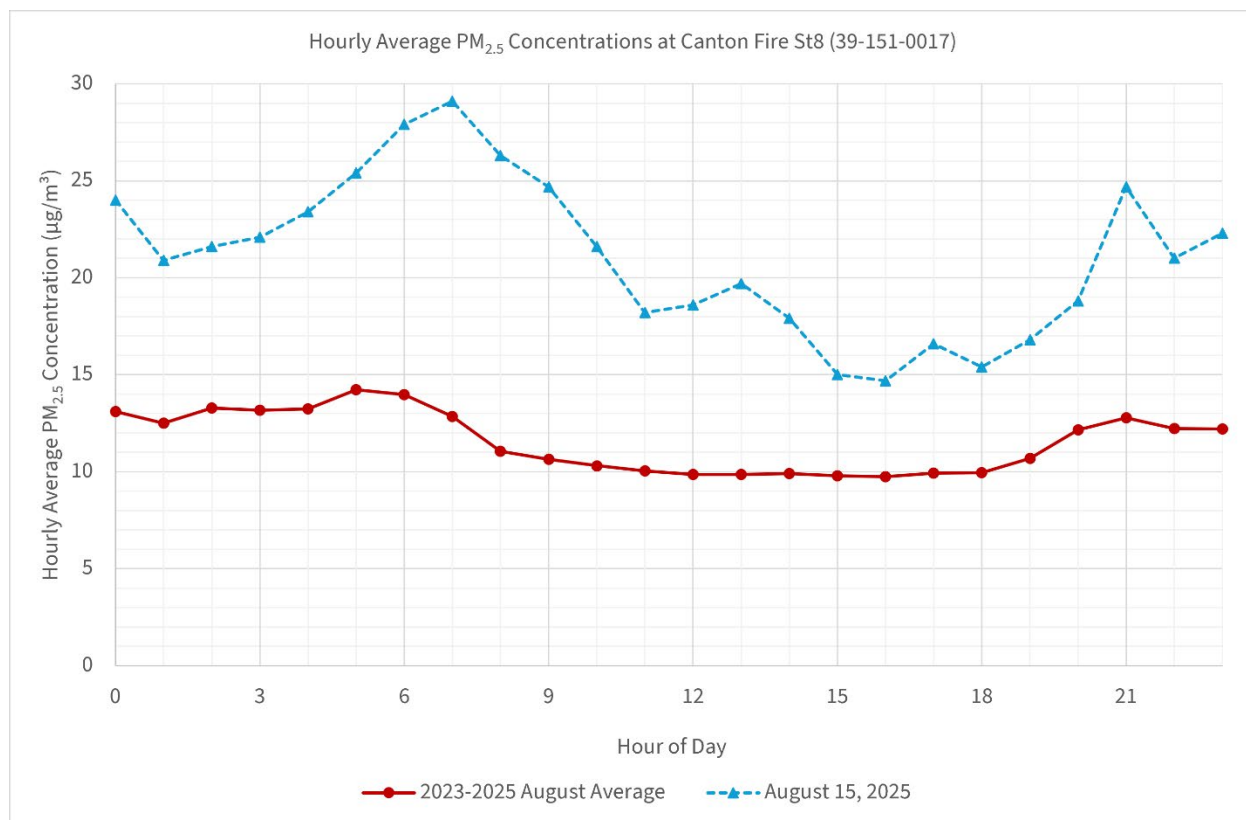
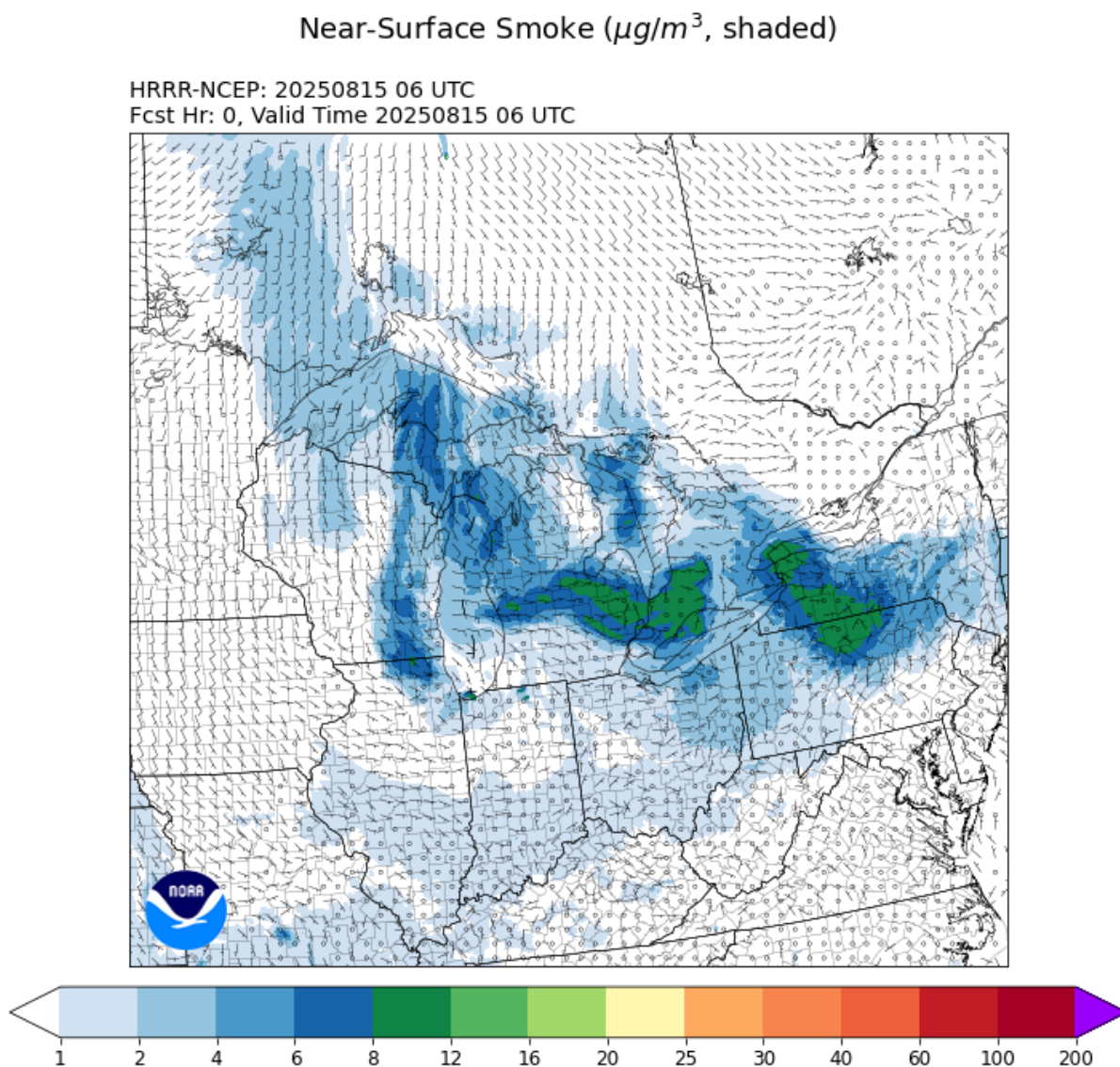


Figure 128 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on August 15, 2025. The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately $4 \mu\text{g}/\text{m}^3$ at the Canton Fire St8 monitoring site in Stark County, providing further evidence that wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Canton Fire St8 monitoring site on August 15, 2025.

Figure 128. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on August 15, 2025.



3.9.2. August 16, 2025

The HYSPLIT 120-hour back trajectory plot shows the origin and transport of the wildfire smoke plumes that caused the high surface PM_{2.5} concentrations in Stark County on August 16, 2025. Figure 129 shows the HYSPLIT 120-hour back trajectory plot from the Canton Fire St8 monitoring site, released at a height of 37 m AGL at 00:00 EST on August 16, with circles indicating the current smoke density at every hour along the back trajectory of the air parcel. Figure 130 shows the August 11 portion of the back trajectory plot with smoke plumes and wildfire locations overlaid on the map. The location 15 km (9.3 mi) north-northeast of Pelican Narrows, Saskatchewan, heavily impacted by smoke from the nearby wildfires burning 45 km (28.0 mi) west-northwest of Pelican Narrows, Saskatchewan, coincides with the point (at 1403 m AGL) at 16:00 EST on August 11 of the 120-hour back trajectory from the Canton Fire St8 monitoring site, illustrating the transport of this wildfire smoke to Northeastern Ohio and serving as clear evidence that the smoke from the wildfires burning west-northwest of Pelican Narrows, Saskatchewan ultimately caused the high PM_{2.5} concentrations in Stark County on August 16, 2025. The accompanying imagery map for August 16 presented in Figure 131 provides further evidence that smoke from the Canadian wildfires was present in Stark County on August 16, 2025, and that this wildfire smoke was the cause of the high concentrations of PM_{2.5} at monitoring sites in Stark County.

Figure 129. HYSPLIT 120-hour back trajectory plot from the Canton Fire St8 monitoring site at 00:00 EST on August 16, 2025, with red and orange circles respectively indicating heavy and medium smoke intensity.



Figure 130. The August 11 portion of the HYSPLIT 120-hour back trajectory plot from the Canton Fire St8 (39-151-0017) monitoring site in Stark County, with overlaid smoke plumes and wildfire locations.

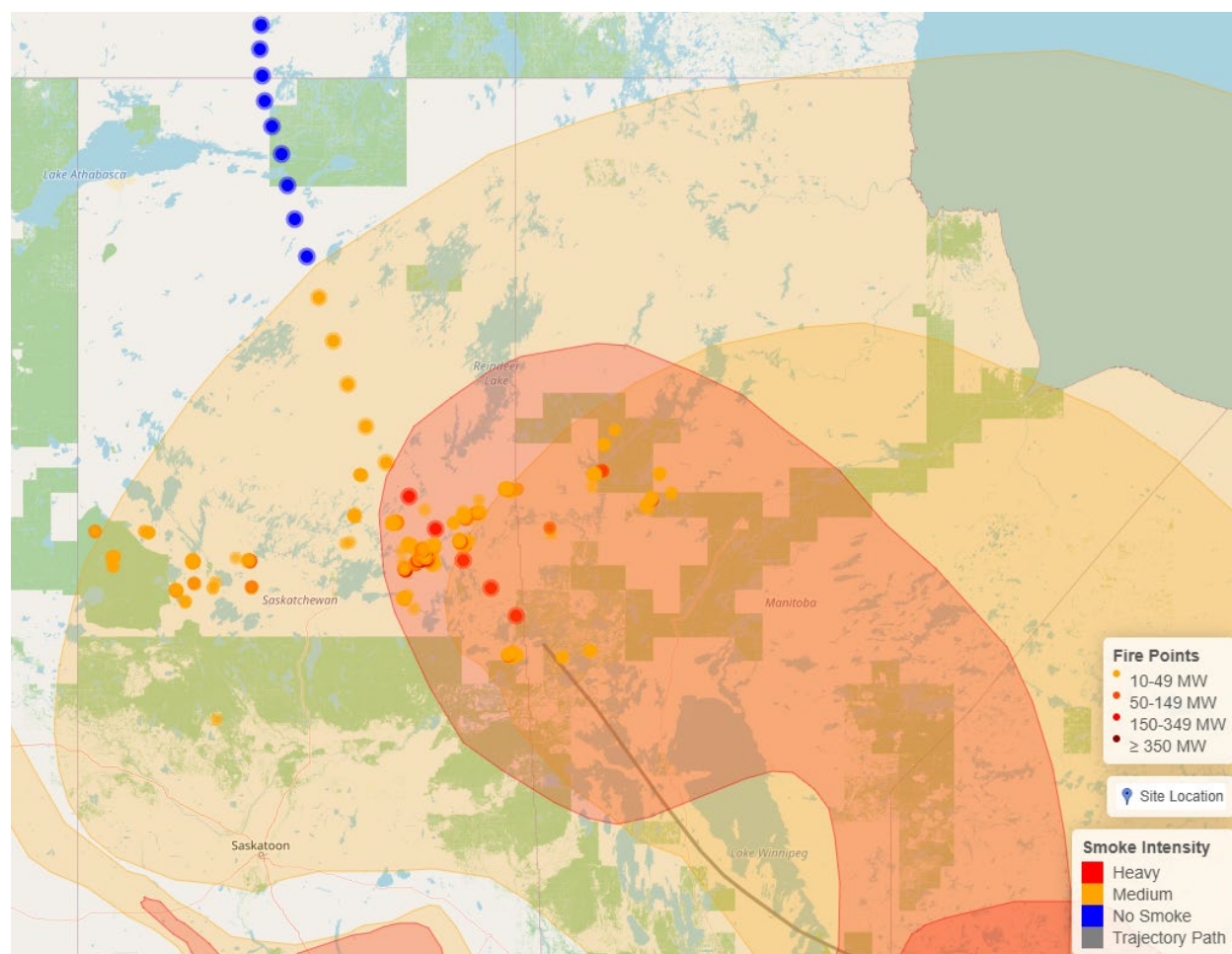


Figure 131. Terra satellite true color imagery of Ohio for August 16, 2025, showing visible wildfire smoke over Ohio, including Stark County.

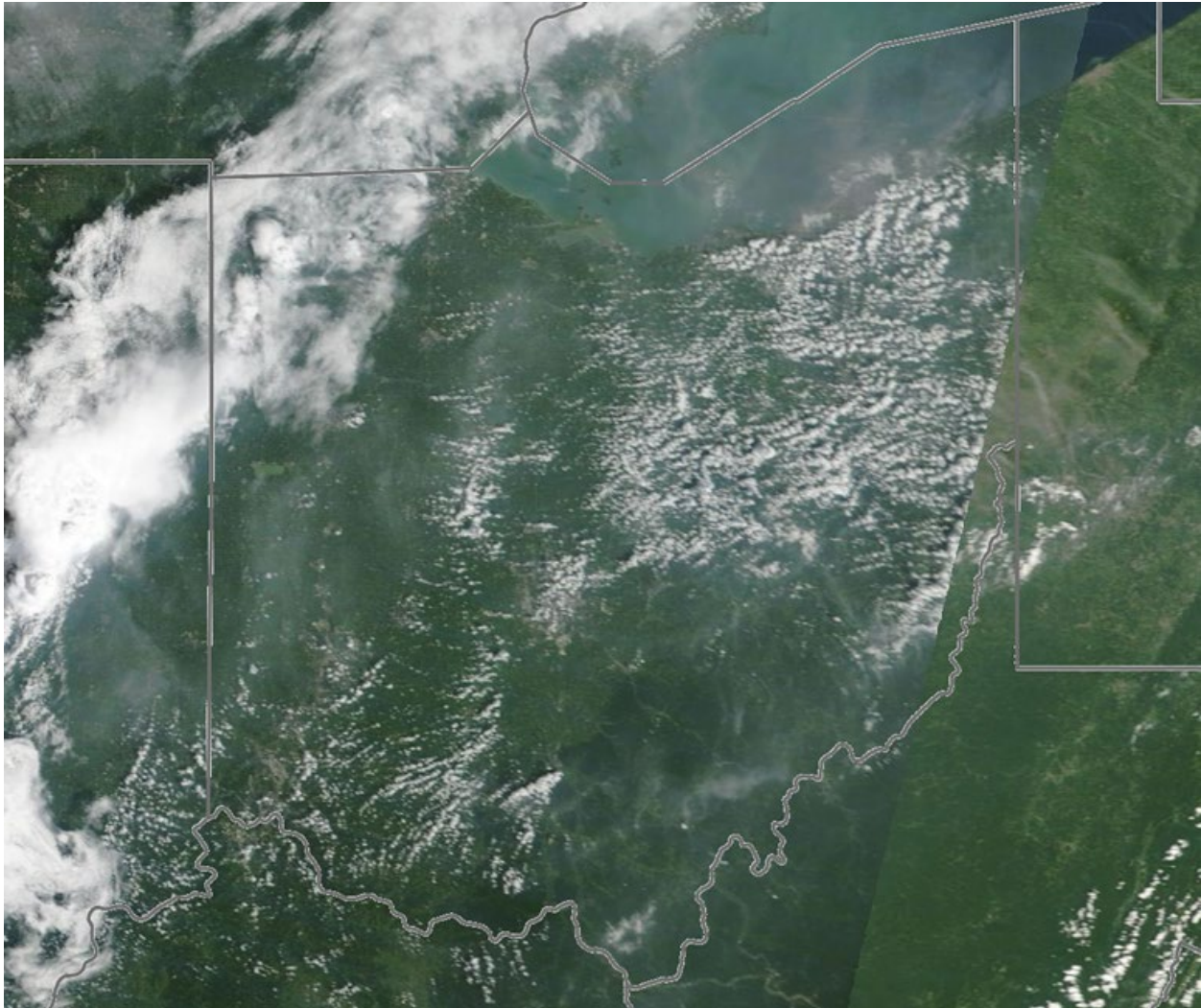


Table 17 and Figure 132 show the hourly average $PM_{2.5}$ concentrations on August 16, 2025, and the 2023-2025 average August concentrations measured by the POC3 Teledyne T640X monitor at the Canton Fire St8 (39-151-0017) monitoring site. The hourly average $PM_{2.5}$ concentrations remained elevated on August 16 as wildfire smoke-laden air continued to circulate around Canton, providing further evidence that wildfire smoke impacted $PM_{2.5}$ concentrations in Stark County on August 16, 2025.

Table 17. Hourly average PM_{2.5} concentration data from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on August 16, 2025, and 2023-2025 average August concentration data.

Hour of Day	2023-2025 Average August Hourly PM _{2.5} Concentration (µg/m ³)	Hourly Average PM _{2.5} Concentration (µg/m ³) on Aug. 16, 2025
00:00	13.1	25.3
01:00	12.5	24.1
02:00	13.3	25.7
03:00	13.2	23.8
04:00	13.2	24.6
05:00	14.2	22.8
06:00	14.0	45.5
07:00	12.8	34.3
08:00	11.1	26.4
09:00	10.6	21.2
10:00	10.3	16.6
11:00	10.1	15.8
12:00	9.9	15.4
13:00	9.9	13.8
14:00	9.9	12.9
15:00	9.8	13.2
16:00	9.7	12.7
17:00	9.9	14.2
18:00	10.0	14.4
19:00	10.7	15.7
20:00	12.2	19.5
21:00	12.8	21.3
22:00	12.2	22.2
23:00	12.2	22.9

Figure 132. Plot of hourly average PM_{2.5} concentrations from the Canton Fire St8 (39-151-0017) monitoring site in Stark County on August 16, 2025, and 2023-2025 average August concentrations.

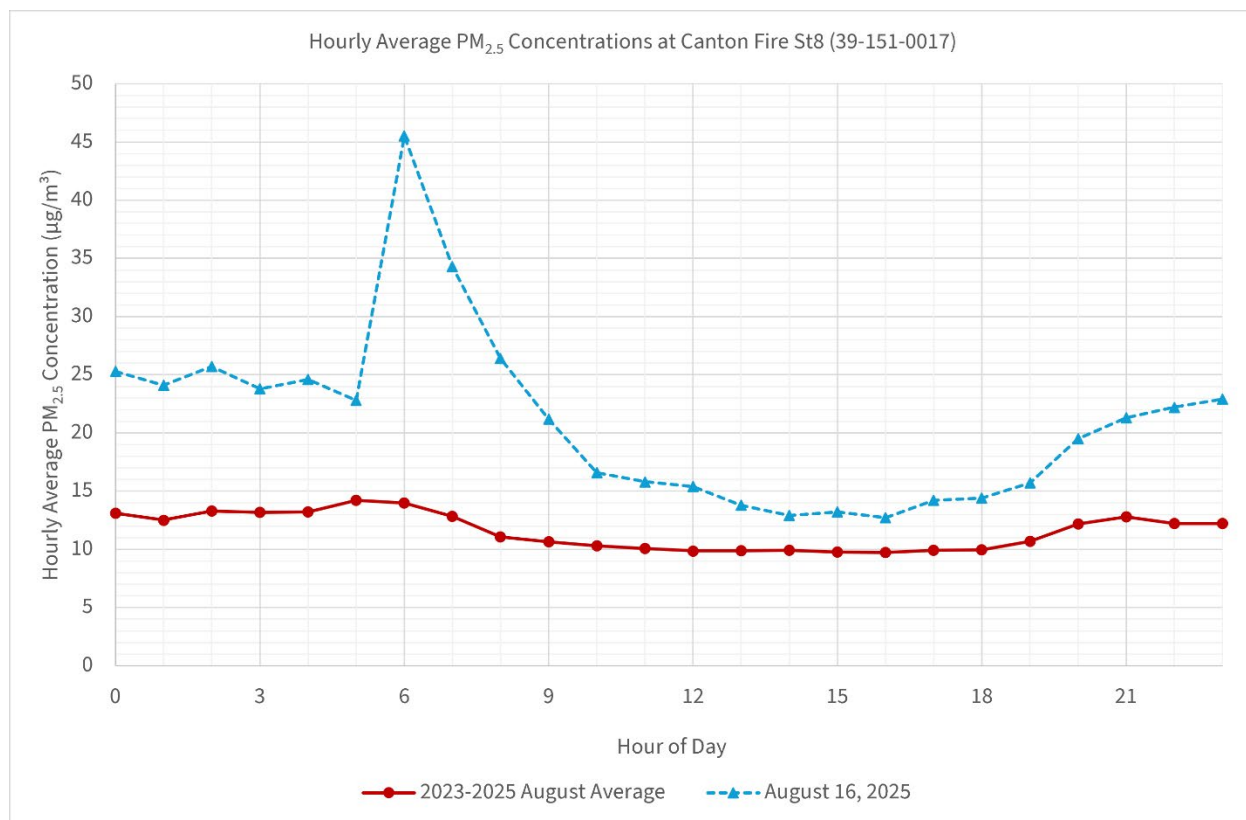
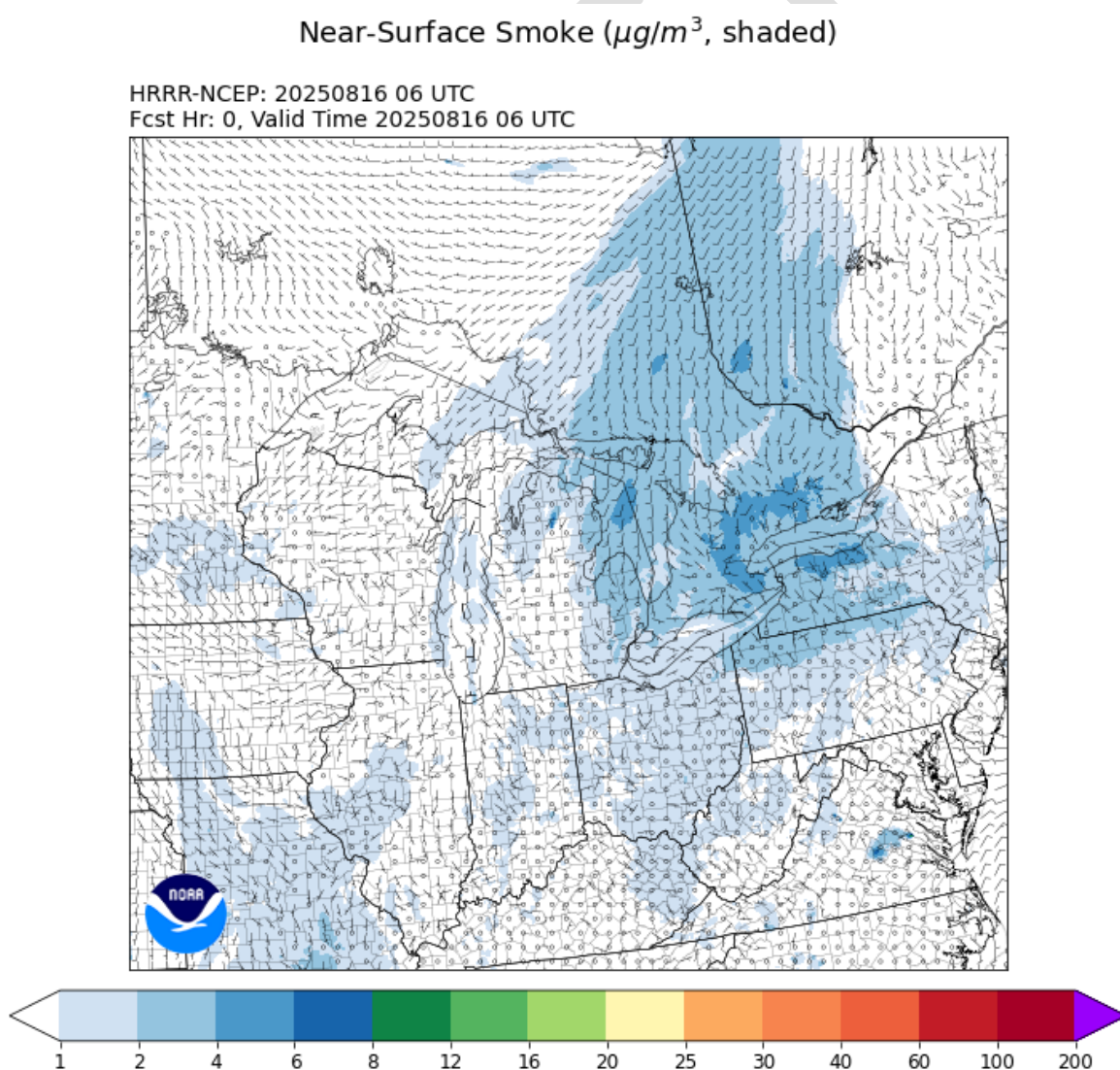


Figure 133 shows the near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on August 16, 2025. The HRRR model initialization showed near-surface smoke across most of Ohio, including near-surface smoke concentrations of approximately $2 \mu\text{g}/\text{m}^3$ at the Canton Fire St8 monitoring site in Stark County, providing further evidence that lingering wildfire smoke impacted $\text{PM}_{2.5}$ concentrations at the Canton Fire St8 monitoring site on August 16, 2025.

Figure 133. Map of near-surface smoke concentrations over the Great Lakes region from the initialization of the HRRR near-surface smoke density modeling run from 06Z (01:00 EST) on August 16, 2025.



4. Fireworks Display or Not Reasonably Controllable and Not Reasonably Preventable

40 CFR 50.14 (c)(3)(iv)(D) requires a demonstration that the event was both not reasonably controllable and not reasonably preventable, or that the event was a fireworks display consistent with 40 CFR 50.14(b)(2). It has been demonstrated that widespread Fourth of July holiday celebration-related fireworks displays generated smoke that impacted $PM_{2.5}$ concentrations at the Canton Fire St8 monitoring site in Stark County on July 4-5, 2025. For wildfires, it is presumed according to 40 CFR 50.14(b)(4) that wildfires on wildland will satisfy both factors unless there is evidence that demonstrates otherwise. 40 CFR 50.1(n) defines a wildfire as “any fire started by an unplanned ignition caused by lightning; volcanoes; other acts of nature; unauthorized activity; or accidental, human-caused actions, or a prescribed fire that has developed into a wildfire”. 40 CFR 50.1(o) defines wildland as “an area in which human activity and development are essentially non-existent, except for roads, railroads, power lines, and similar transportation facilities. Structures, if any, are widely scattered”. Figures 134 to 145 show satellite imagery of the wildland areas on which wildfires generated plumes of smoke that ultimately impacted Stark County for each of the previously detailed wildfire-smoke driven $PM_{2.5}$ episodes.

Figure 134. Satellite imagery of the wildland areas 28 km (17.4 mi) east-northeast of Sultan, Ontario, with circles and stars/squares respectively marking the active wildfires and recent hotspots on June 8, 2023, that resulted in the wildfire smoke-driven $PM_{2.5}$ episode in Stark County on June 11, 2023.

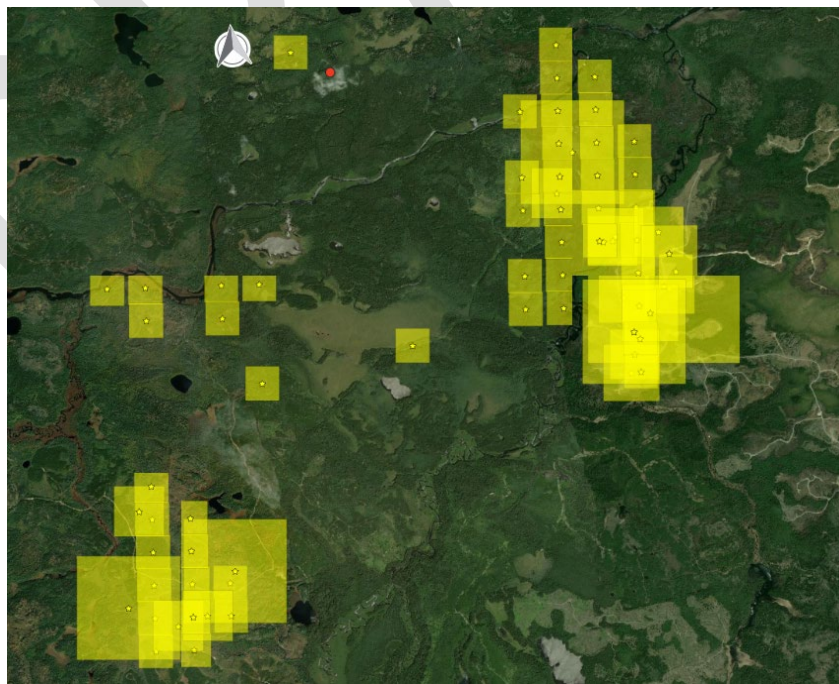


Figure 135. Satellite imagery of the wildland areas 155 km (17.4 mi) west of High Level, Alberta, with circles and stars/squares respectively marking the active wildfires and recent hotspots on July 14, 2023, that resulted in the wildfire smoke-driven PM_{2.5} episode in Stark County on July 18, 2023.

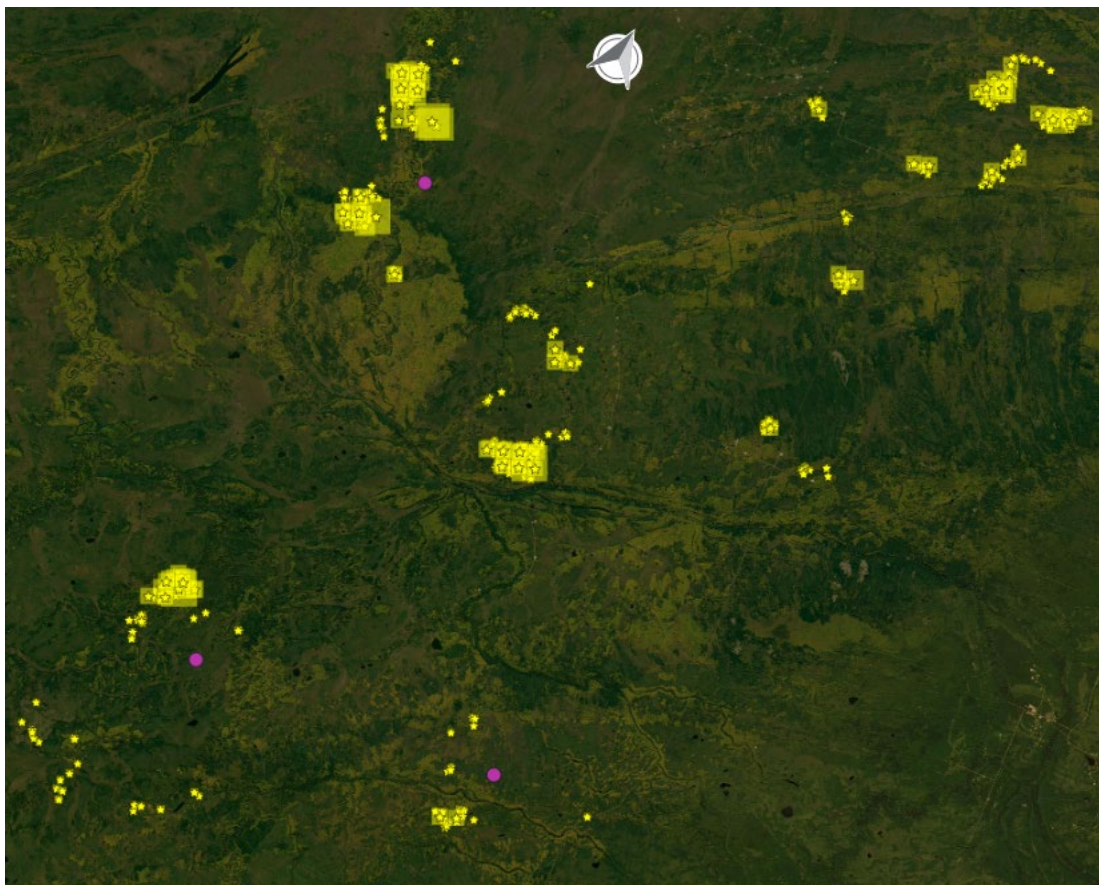


Figure 136. Satellite imagery of the wildland areas 95 km (59.0 mi) north of Wollaston Lake, Saskatchewan, with circles and stars/squares respectively marking the active wildfires and recent hotspots on July 27, 2023, that resulted in the wildfire smoke-driven PM_{2.5} episode in Stark County on August 1, 2023.

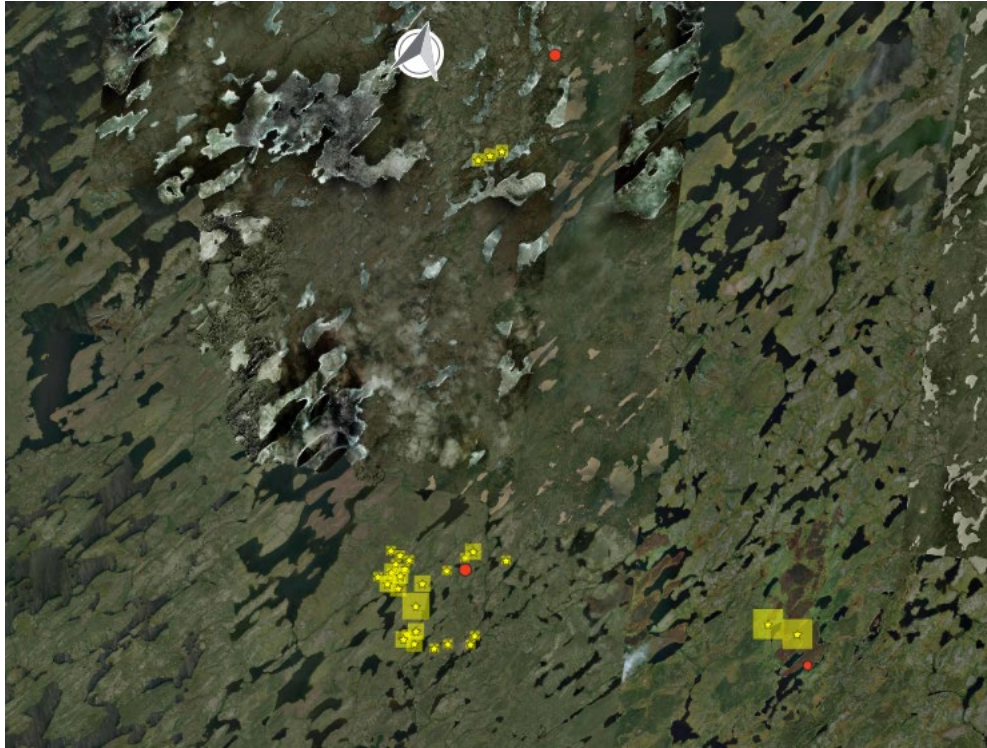


Figure 137. Satellite imagery of the wildland areas 65 km (40.4 mi) east-southeast of Poplar River, Manitoba, with circles and stars/squares respectively marking the active wildfires and recent hotspots on July 31, 2023, that resulted in the wildfire smoke-driven PM_{2.5} episode in Stark County on August 4, 2023.

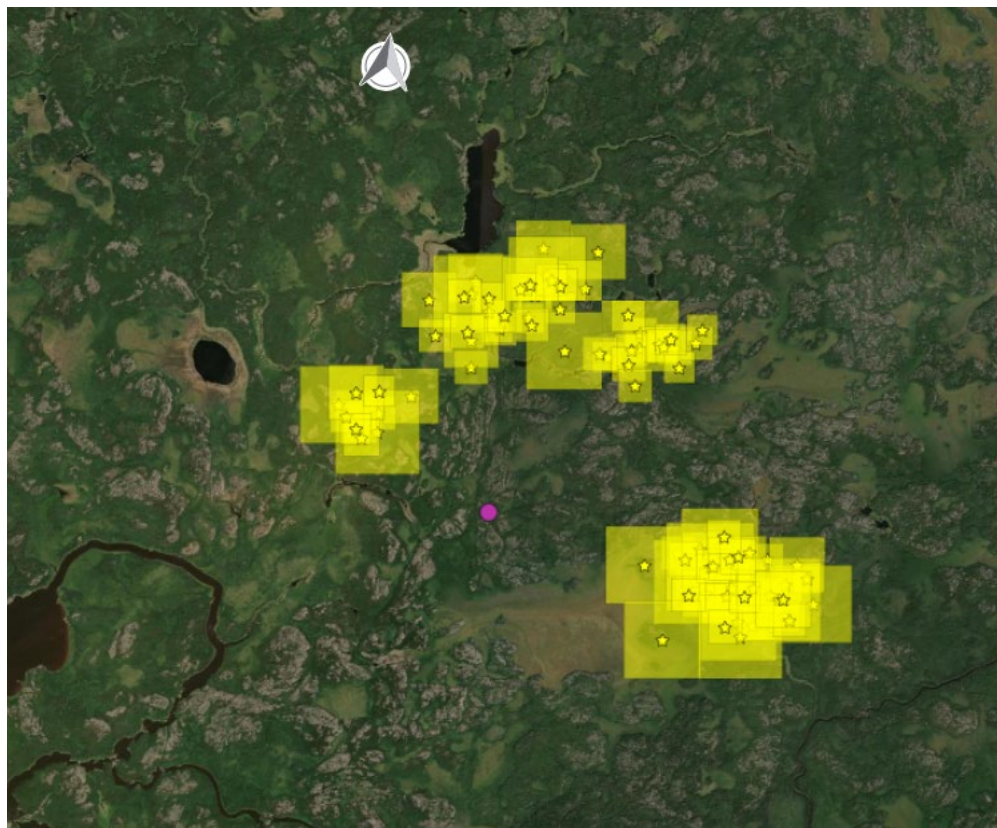


Figure 138. Satellite imagery of the wildland areas 65 km (40.4 mi) east-southeast of Poplar River, Manitoba, with circles and stars/squares respectively marking the active wildfires and recent hotspots on August 2, 2023, that resulted in the wildfire smoke-driven PM_{2.5} episode in Stark County on August 5, 2023.

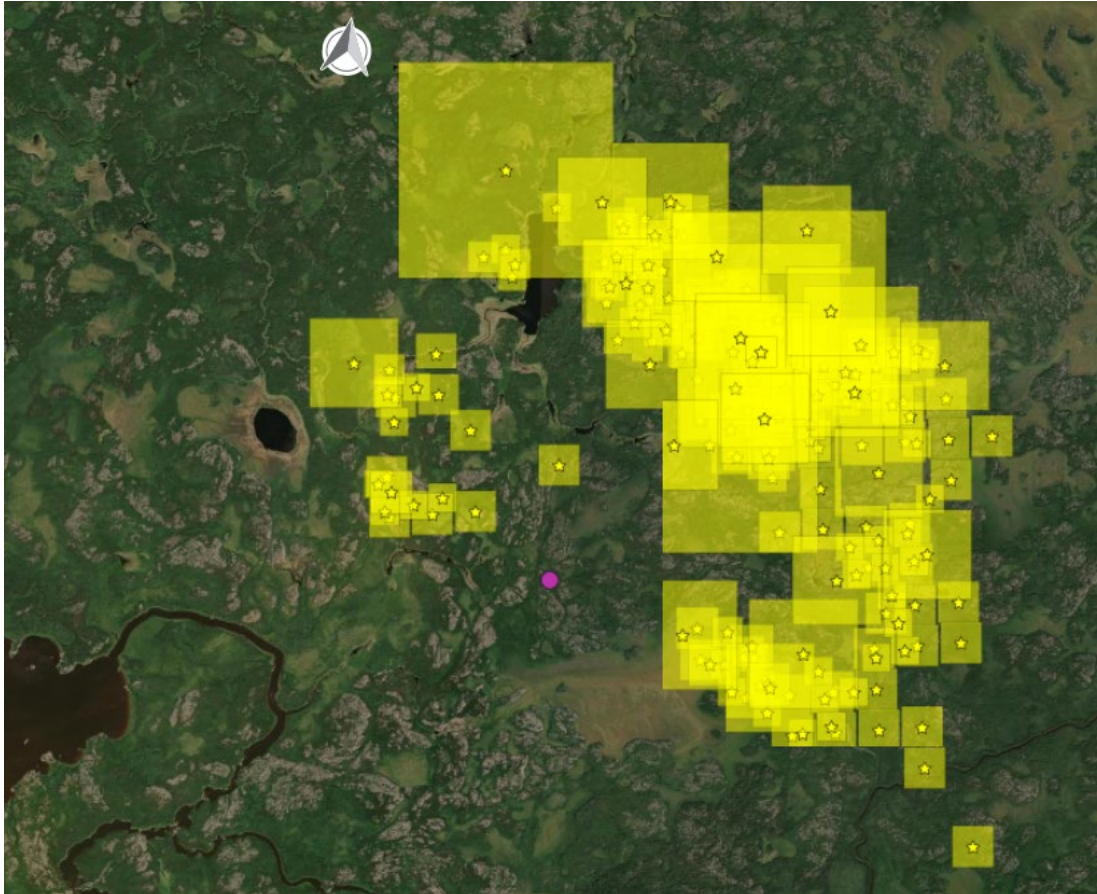


Figure 139. Satellite imagery of the wildland areas near Webequie, Ontario, with circles and stars/squares respectively marking the active wildfires and recent hotspots on May 31, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Stark County from June 4-5, 2025.

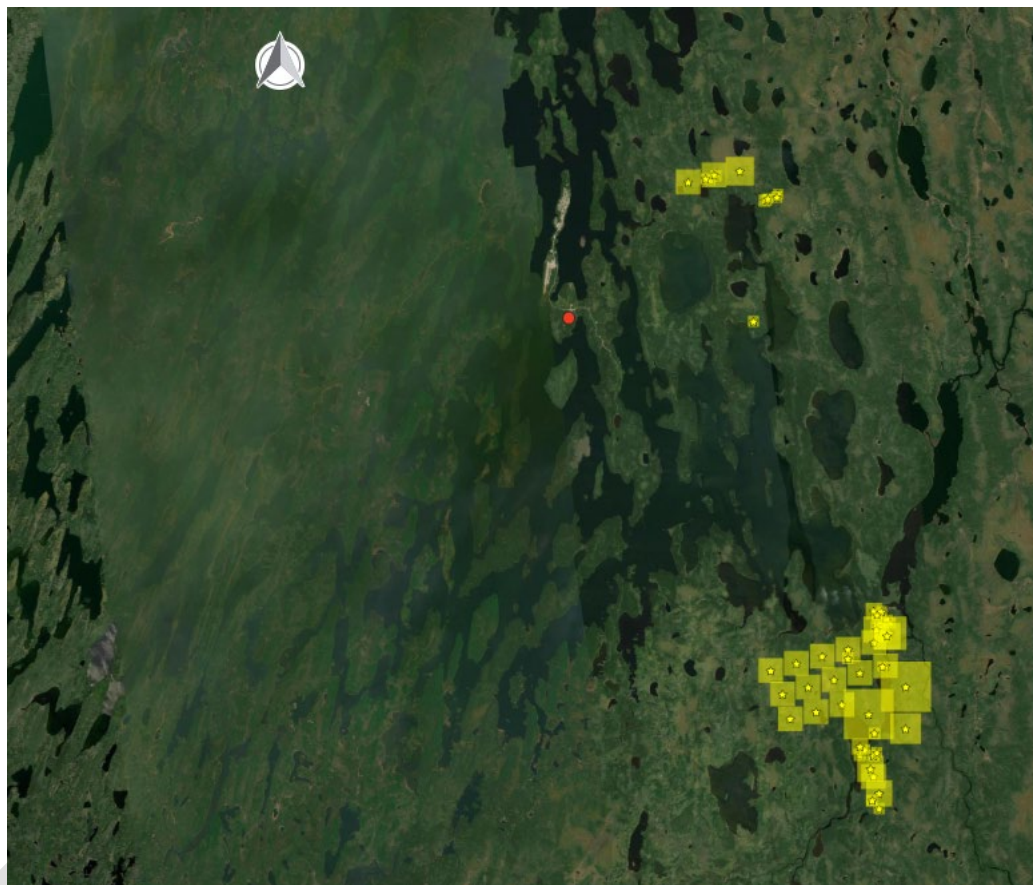


Figure 140. Satellite imagery of the wildland areas 50 km (31.1 mi) north of Candle Lake, Saskatchewan, with circles and stars/squares respectively marking the active wildfires and recent hotspots on June 2, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Stark County on June 7, 2025.

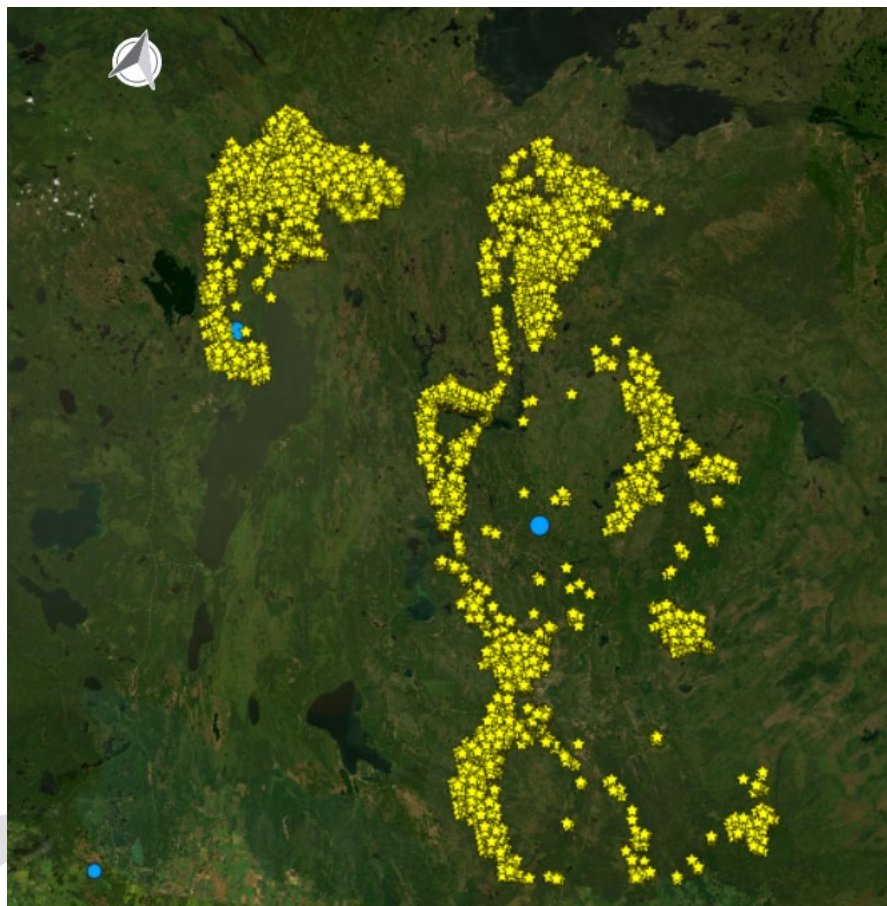


Figure 141. Satellite imagery of the wildland areas 110 km (68.4 mi) west of Fort Nelson, British Columbia, with circles and stars/squares respectively marking the active wildfires and recent hotspots on June 2, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Stark County on June 8, 2025.

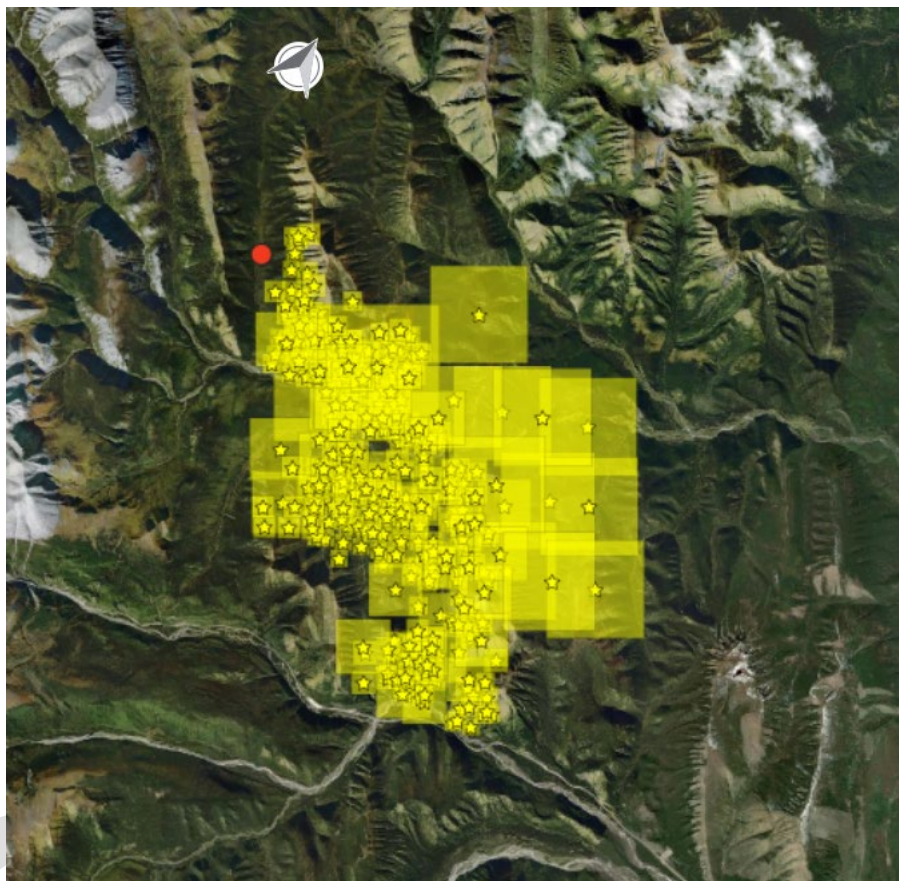


Figure 142. Satellite imagery of the wildland areas 24 km (14.9 mi) north-northwest of Creighton, Saskatchewan, with circles and stars/squares respectively marking the active wildfires and recent hotspots on June 9, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Stark County on June 12, 2025.

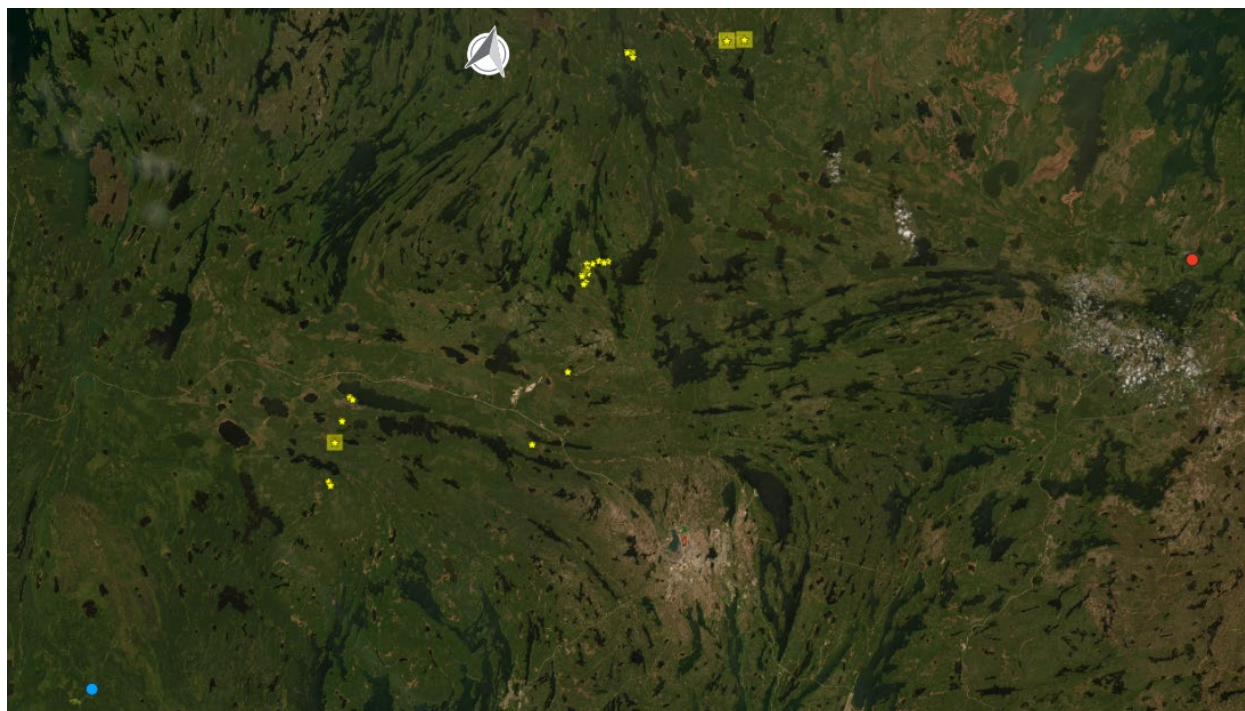


Figure 143. Satellite imagery of the wildland areas 24 km (14.9 mi) north-northwest of Creighton, Saskatchewan, with circles and stars/squares respectively marking the active wildfires and recent hotspots on June 10, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Stark County on June 13, 2025.

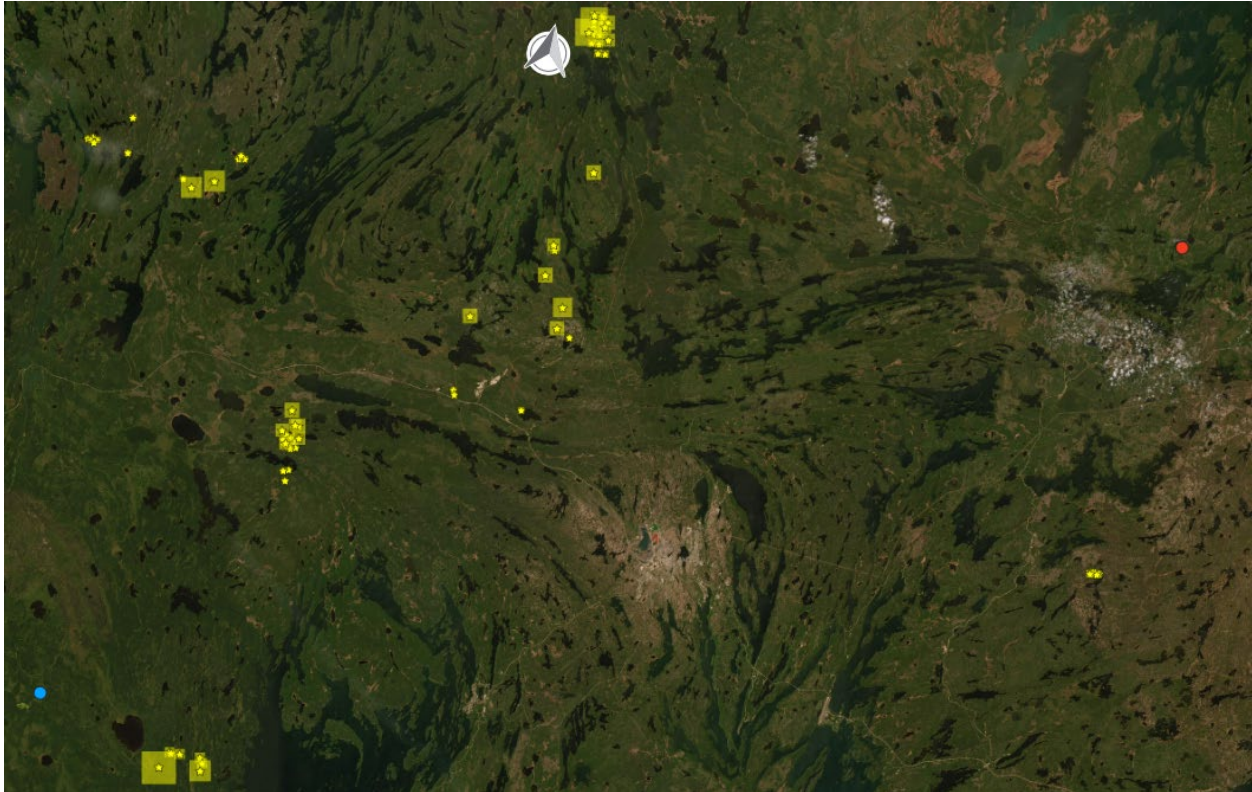


Figure 144. Satellite imagery of the wildland areas 105 km (65.2 mi) north-northwest of La Ronge, Saskatchewan, with circles and stars/squares respectively marking the active wildfires and recent hotspots on July 11, 2025, that resulted in the wildfire smoke-driven $PM_{2.5}$ episode in Stark County on July 15, 2025.

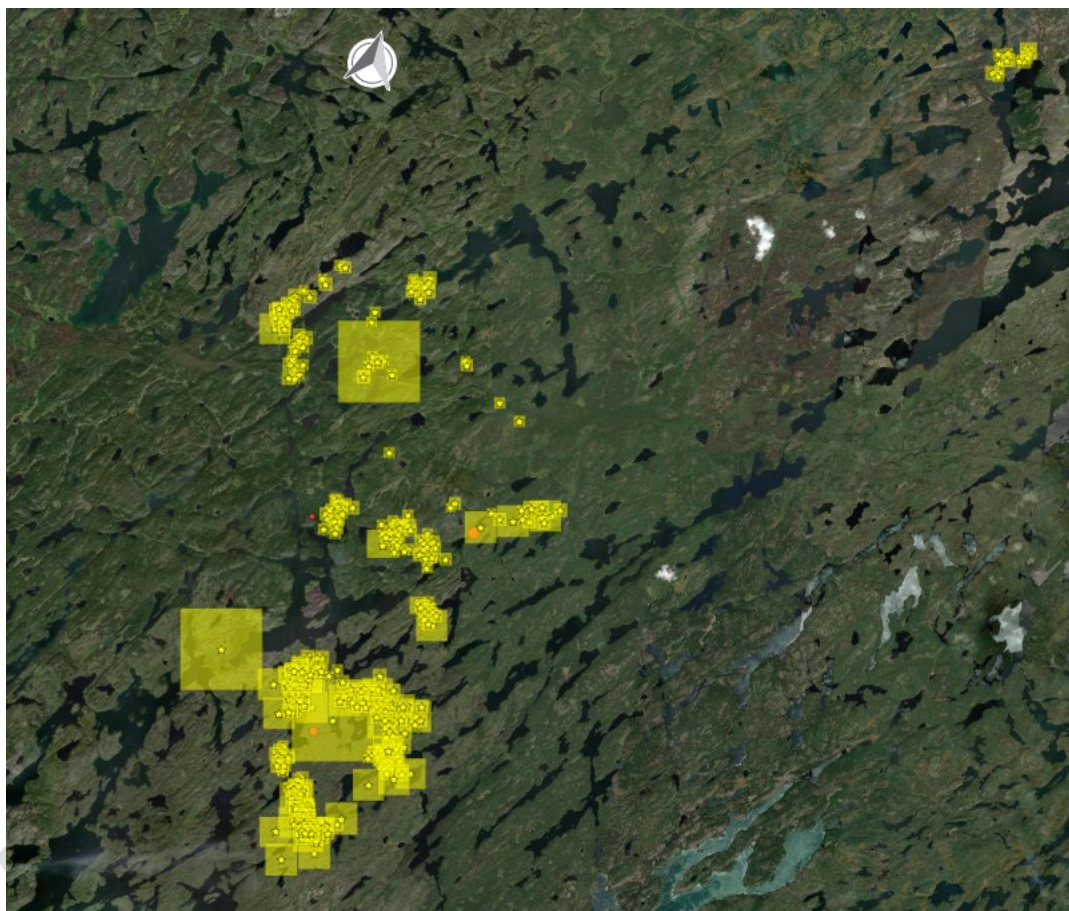
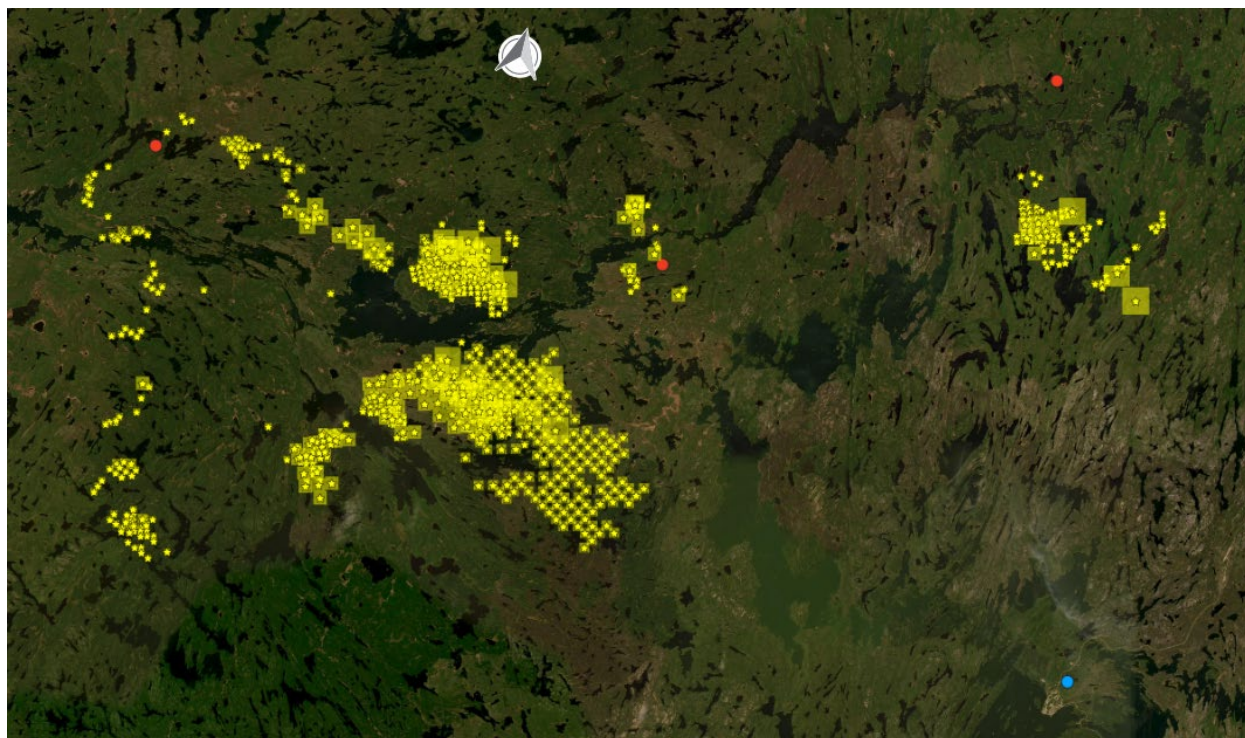


Figure 145. Satellite imagery of the wildland areas 45 km (28.0 mi) west-northwest of Pelican Narrows, Saskatchewan, with circles and stars/squares respectively marking the active wildfires and recent hotspots on August 11, 2025, that resulted in the wildfire smoke-driven PM_{2.5} episode in Stark County from August 15-16, 2025.



Extensive wildfire activity occurred on wildlands across Canada during the late spring and summer of both 2023 and 2025. The Canadian government estimates that on average 67% of the area burned in Canada from wildfires is due to lightning-caused fires⁵⁶. CIFCC⁵⁷ reported that on June 1, 2023, “a major lightning strike hit Quebec, igniting 182 forest fires in a single day”. These wildfires ultimately led to the smoke plumes that impacted Stark County on June 11, 2023. On July 5, Alberta Wildfire informed CIFCC that increased fire behavior was to be expected over the next week or so, along with continued increased risks of fire hazard

⁵⁶ <https://natural-resources.canada.ca/our-natural-resources/forests/wildland-fires-insects-disturbances/forest-fires/fire-behaviour/13145>

⁵⁷ https://cifcc.ca/sites/default/files/2024-03/03.07.24_CIFCC_2023CanadaReport%20%281%29.pdf

conditions⁵⁸. On July 8, Alberta Wildfire reported to CIFFC that an additional 7 new wildfires of natural causes had started across the province the previous day, with increased fire activity in northern Alberta leading to challenges in controlling new fire starts⁵⁹. The naturally occurring wildfires, likely started by lightning strikes, grew rapidly across northern Alberta over the first two weeks of July, with the large increase in burned forested areas resulting in the smoke plumes that ultimately resulted in the July 18, 2023, PM_{2.5} episode in Stark County. These wildfires continued to burn, with new wildfires started by lightning strikes occurring across northern Alberta and northern Saskatchewan over the next two weeks, resulting in the smoke plumes that affected Stark County on August 1 and 4-5, 2023. On June 1, 2025, Parks Canada⁶⁰ reported to CIFFC a higher concern due to fire danger conditions in and near Prince Albert National Park in Saskatchewan⁶¹. On June 5, 2025, OMNRF-AFFES reported to CIFFC that battling holdover fires caused by recent lightning were the primary concern⁶². On July 3, 2025, the Saskatchewan Public Safety Agency reported to CIFFC that lightning strikes starting new wildfires are a major concern in the western half of the province⁶³. This concern was relayed again to CIFFC on July 20, 2025⁶⁴. On August 3, 2025, OMNRF-AFFES, Alberta Wildfire, and the Saskatchewan Public Safety Agency all reported to CIFFC increased concern regarding lightning strikes starting new wildfires⁶⁵.

As the June, July, and August 2023 and 2025 fires on wildlands in Canada were reported to have been started by natural causes, namely unplanned ignitions caused by lightning strikes, they are considered wildfires as defined in 40 CFR 50.1(n). Since these wildfires occurred predominantly on wildlands, they meet the not reasonably controllable and not reasonably preventable criterion in the Exceptional Events Rule. The wildfires burning in June, July, and August 2023 and 2025 could not have been prevented and could not have been controlled by

⁵⁸ <https://ciffc.net/situation/2023-07-05>

⁵⁹ <https://ciffc.net/situation/2023-07-08>

⁶⁰ <https://parks.canada.ca/nature/science/conservation/feu-fire/incendies-wildfires>

⁶¹ <https://ciffc.net/situation/2025-06-01>

⁶² <https://ciffc.net/situation/2025-06-05>

⁶³ <https://ciffc.net/situation/2025-07-03>

⁶⁴ <https://ciffc.net/situation/2025-07-20>

⁶⁵ <https://ciffc.net/situation/2025-08-03>

state or federal natural resources managers in the United States. The excessive wildfire smoke emissions in 2023 and 2025 that contributed to monitored violations of the 2024 revised annual PM_{2.5} NAAQS at the Canton Fire St8 monitoring site in Stark County were caused by the wildfires and not the result of emissions from anthropogenic sources.

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5. Fireworks Display, Natural Event, or Human Activity Unlikely to Recur at a Particular Location

40 CFR 50.14(c)(3)(iv)(E) requires a demonstration that the event was a natural event or human activity that is unlikely to recur at a particular location, or that the event was a fireworks display consistent with 40 CFR 50.14(b)(2). 40 CFR 50.1(k) defines a natural event as “an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role”, and further states that for purposes of this definition, “anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions”. Additionally, 40 CFR 50.1(n) states that a “wildfire that predominantly occurs on wildland is a natural event”.

As described in this document, the origin and evolution of the June, July, and August 2023 and 2025 wildfires occurred predominantly on wildlands across Canada. It has also been demonstrated that widespread Fourth of July holiday celebration-related fireworks displays generated smoke that impacted PM_{2.5} concentrations at the Canton Fire St8 monitoring site in Stark County on July 4-5, 2025. Based on the documentation provided in this demonstration, the relevant June, July, and August 2023 and 2025 events qualify as wildfires because lightning most likely caused these unplanned wildfire events. As these wildfire events occurred on wildlands and were caused by lightning, they were natural and should be considered for treatment as exceptional events.

6. Public Notification

Ohio EPA maintains a public alert system as well as publicly available information via the Ohio EPA website⁶⁶ to keep residents informed of potential wildfire smoke impacts. As required by 40 CFR Part 58, Appendix D, Ohio EPA and partner public health and air pollution control agencies in the state install, operate, and maintain a network of instruments to measure ambient air quality at monitoring sites across the state. Figures 146 and 147 show the locations of active and recently active PM_{2.5} monitoring sites in the state of Ohio and in Stark County, respectively.

⁶⁶ <https://epa.ohio.gov>

Figure 146. Map of active and recently active PM_{2.5} monitoring sites in the state of Ohio.

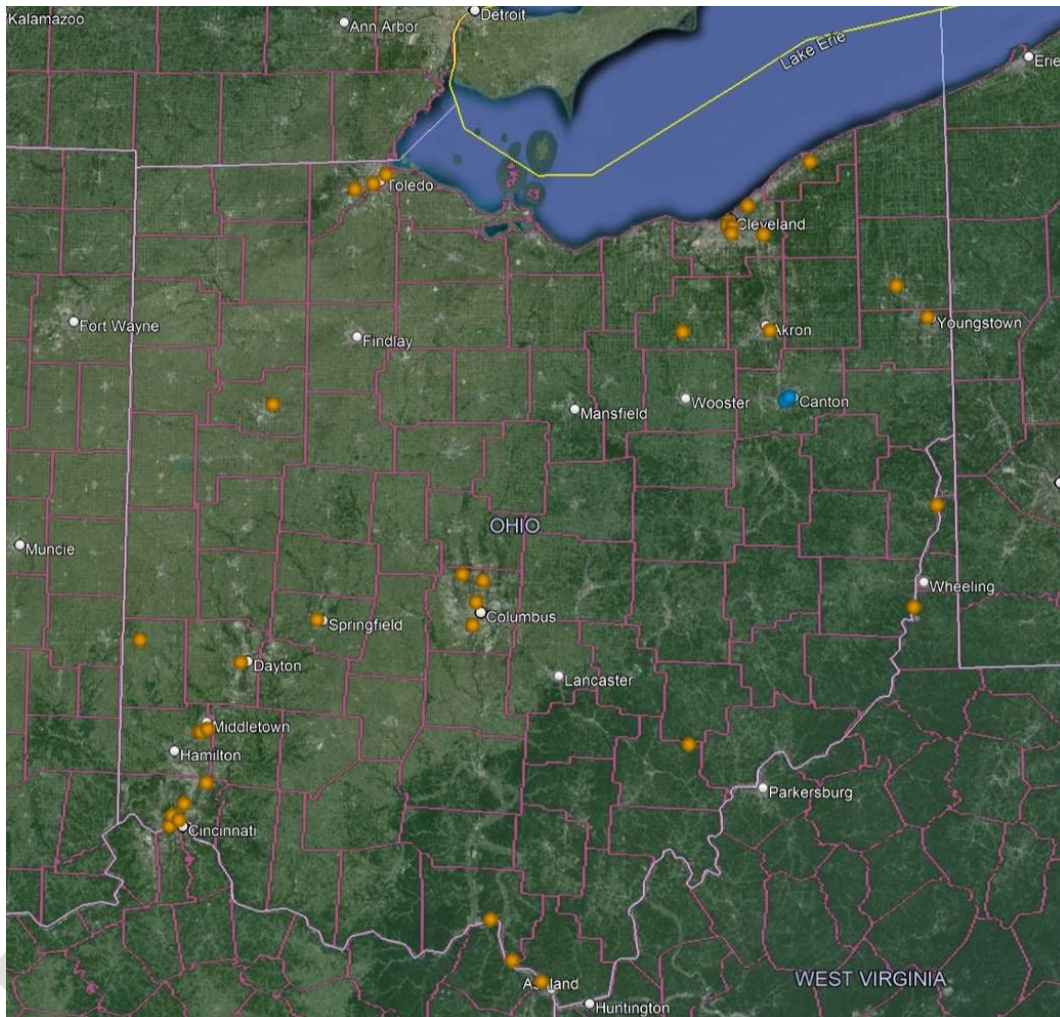
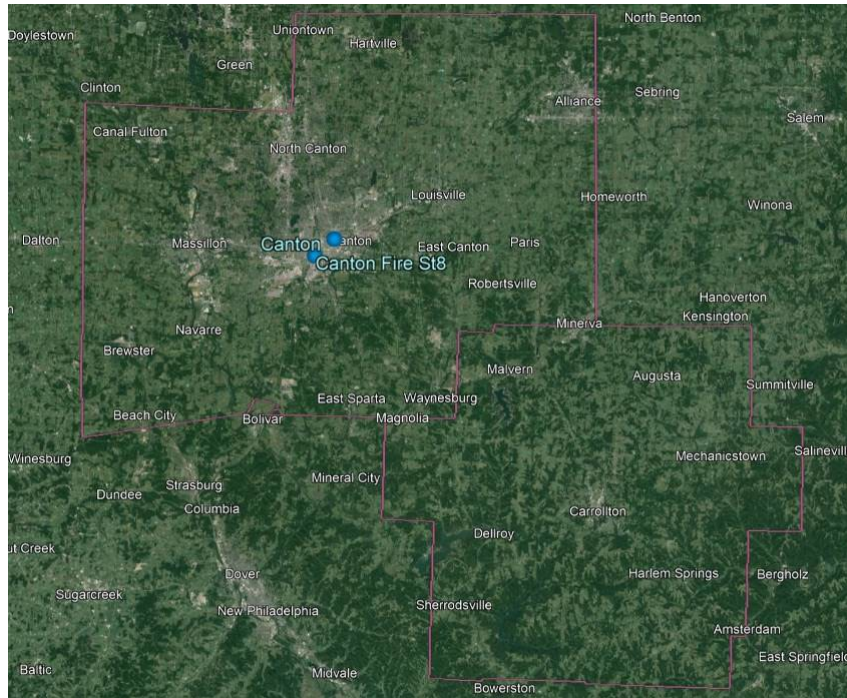


Figure 147. Map of active PM_{2.5} monitoring sites in Stark County.



The Canton Fire St8 monitoring site in Stark County was operational and collected ambient PM_{2.5} measurements throughout 2023 and 2025, including during the nine PM_{2.5} episodes detailed in this demonstration. Ohio EPA reported these data in real time to U.S. EPA for inclusion in the AirNow⁶⁷ system, which triggers EnviroFlash notifications upon the Air Quality Index reaching the “Unhealthy for Sensitive Groups” category for those registered to receive such notifications. The PM_{2.5} ambient concentration data from the Canton Fire St8 monitoring site were also publicly accessible through the Ohio EPA Division of Air Pollution Control website⁶⁸.

Data collected from the network of monitoring sites are used by Ohio EPA and partner agencies, such as public health departments, local air pollution control agencies, and metropolitan planning organizations, to notify the public when air pollution may reach levels that are potentially harmful to public health. Table 18 lists the public notices issued for

⁶⁷ <https://www.airnow.gov/>

⁶⁸ <https://epa.ohio.gov/divisions-and-offices/air-pollution-control/reports-and-data/airohio-air-monitoring-data>

Northeastern Ohio by agencies such as the Canton City Public Health Department⁶⁹ (CCPH) and the Northeast Ohio Areawide Coordinating Agency⁷⁰ (NOACA) regarding the wildfire smoke-driven PM_{2.5} episodes impacting the Canton Fire St8 monitoring site in Stark County on dates requested for PM_{2.5} data exclusion in this demonstration. It should be noted that for most dates requested for PM_{2.5} data exclusion in this demonstration, no air quality alerts or advisories were issued, as the impacts from wildfire smoke on PM_{2.5} concentrations, although significant, were not expected to result in increased health risks to the public or 24-hour average concentrations exceeding the relevant NAAQS value of 35 µg/m³.

Table 18. Public notices issued for Northeastern Ohio regarding the wildfire smoke-driven PM_{2.5} episodes impacting the Canton Fire St8 monitoring site in Stark County on dates requested for PM_{2.5} data exclusion in this demonstration.

Date Issued	Date(s) Covered	Issued By	Counties Covered	Type of Notice
July 17, 2023	July 17-18, 2023	CCPH	Stark	Air Quality Alert ⁷¹
July 17, 2023	July 18, 2023	NOACA	Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, Summit	Air Quality Advisory ⁷²
Aug. 3, 2023	Aug. 4, 2023	NOACA	Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, Summit	Air Quality Advisory ⁷³

⁶⁹ <https://www.cantonohio.gov/health>

⁷⁰ <https://www.noaca.org/home>

⁷¹ <https://www.cantonohio.gov/DocumentCenter/View/5761/7172023-Air-Quality-Alert-PM25-PDF>

⁷² https://x.com/NOACA_MPO/status/1681076957755199489

⁷³ https://x.com/NOACA_MPO/status/1681076957755199489

7. Public Participation

In accordance with the requirements of 40 CFR 50.14(c)(2)(i), on August 13, 2026, Ohio formally notified U.S. EPA of its intent to request the exclusion of data due to exceptional events. A copy of the initial notification form submitted to U.S. EPA regarding exceptional events in Stark County is included as Appendix A. Ohio published solicitation for public comment concerning the draft Exceptional Events Demonstration for 2023 and 2025 PM_{2.5} Episodes in Stark County, OH on September 17, 2026. The public comment period closed on October 19, 2026. Appendix B includes a copy of the public notice, a copy of the public comments received, and a copy of Ohio's responses to the public comments received.

8. Summary

This exceptional events demonstration shows that wildfires in Canada adversely affected ambient PM_{2.5} concentrations measured by the Canton Fire St8 (39-151-0017) monitoring site in Stark County, Ohio on June 11, July 18, August 1, August 4, and August 5 in 2023, as well as on June 4, June 5, June 7, June 8, June 12, June 13, July 15, August 15, and August 16 in 2025. Additionally, this exceptional events demonstration shows that smoke from Fourth of July holiday celebration-related fireworks displays adversely affected ambient PM_{2.5} concentrations measured by the Canton Fire St8 monitoring site in Stark County on July 4 and July 5, 2025. The ambient PM_{2.5} concentrations measured at the Canton Fire St8 (39-151-0017) monitoring site in Stark County on these 16 dates have been shown to have contributed to a monitored violation of the 2024 annual PM_{2.5} NAAQS, and it has been demonstrated that the exclusion of the ambient PM_{2.5} concentrations measured at the Canton Fire St8 monitoring site on these 16 dates would result in a 2023-2025 annual PM_{2.5} design value that is at or below the 2024 annual PM_{2.5} NAAQS value of 9.0 µg/m³, which will help preclude Stark County from being designated a nonattainment area for the 2024 annual PM_{2.5} NAAQS, proving regulatory significance. Therefore, Ohio EPA requests that U.S. EPA exclude the PM_{2.5} data from the five identified dates in 2023 (June 11, July 18, August 1, August 4, and August 5) and the 11 identified dates in 2025 (June 4, June 5, June 7, June 8, June 12, June 13, July 4, July 5, July 15, August 15, and August 16) from the Canton Fire St8 (39-151-0017) monitoring site in Stark County, Ohio from regulatory determinations, including calculations of annual PM_{2.5} design values, due to the influence of exceptional events, namely Canadian wildfire smoke or smoke from Fourth of July holiday celebration-related fireworks displays, on the monitored PM_{2.5} concentrations during those 16 dates.

This exceptional events demonstration includes all the required elements of wildfire smoke-driven PM_{2.5} exceptional events demonstrations as described in the Exceptional Events Rule. These included elements meet all applicable requirements of the Exceptional Events Rule and clearly demonstrate that wildfire smoke from Canada and smoke from Fourth of July holiday celebration-related fireworks displays had significant adverse impacts on ambient PM_{2.5} concentrations measured at the Canton Fire St8 (39-151-0017) monitoring site in Stark County, Ohio on the 16 identified dates.