GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

DRAFT Canadian Wildfire Exceptional Event Demonstration for the 2024 Annual $PM_{2.5}$ NAAQS at Forest Park, GA in 2022-2024

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1. Introduction

The current annual and 24-hour $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS) are 9.0 $\mu g/m^3$ and 35 $\mu g/m^3$, respectively. Federal Reference Method (FRM) monitors collect $PM_{2.5}$ samples for 24 hours on filters while Federal Equivalent Method (FEM) monitors measure hourly $PM_{2.5}$ concentrations continuously. For the purpose of this document, an "exceedance" is defined as a measured 24-hour $PM_{2.5}$ concentration that is greater than the level (9.0 $\mu g/m^3$) of the 2024 annual $PM_{2.5}$ NAAQS. Please note that "exceedance" as defined in this document (based on an averaging time of 24-hours) is not an actual exceedance of the 2024 annual $PM_{2.5}$ NAAQS since an exceedance of a NAAQS must be based on the averaging time for the NAAQS (in this case, annual) in addition to the level of the NAAQS (in this case, 9.0 $\mu g/m^3$).

From January 9, 1999, to February 20, 2024, a $PM_{2.5}$ FRM monitor collected data at the Forest Park site (Air Quality System (AQS) ID: 13-063-0091) on a one-in-three day schedule. From February 21, 2024, to July 21, 2024, a continuous $PM_{2.5}$ FEM monitor replaced the $PM_{2.5}$ FRM monitor. On July 22, 2024, the $PM_{2.5}$ FRM monitor was redeployed on a one-in-three day schedule and replaced the continuous $PM_{2.5}$ FEM monitor. The Atlanta-Sandy Springs-Roswell Metropolitan Statistical Area (MSA) is in attainment of the 2012 $PM_{2.5}$ NAAQS.

This document discusses six different days from 2022-2024 that qualify for exceptional event demonstrations (Table 1) for the Forest Park air monitoring site located in Forest Park (Clayton County) in the state of Georgia, all of which were due to Canadian wildfires. These six exceedances resulted from the transport of wildfire smoke that originated in Canada. Therefore, they qualify for removal under the Exceptional Events Rule (EER). Design values (DVs) of the Forest Park site with and without U.S. Environmental Protection Agency (EPA) concurrence are shown in Table 2. DVs are calculated using 24-hour $PM_{2.5}$ measurements from 2022-2024. For each year, these measurements are first averaged into quarterly values, then to a yearly value. The average of these yearly values is reported as the DV. Inclusion of these events produces a DV of 9.1 $\mu g/m^3$, which violates the new 2024 $PM_{2.5}$ annual NAAQS; however, exclusion reduces the DV to 9.0 $\mu g/m^3$.

On July 30, 2025, the Georgia Environmental Protection Division (EPD) submitted an Initial Notification for these events to EPA. The request indicated that the data identified in Table 1 was impacted by smoke from Canadian wildfires and asked for review of the events under the case-by-case provision at 40 CFR 50.14(a)(1)(i)(F). Georgia EPD formally requests that the EPA concur with the exclusion of these events.

Table 1. Exceedances observed at the Forest Park site in Forest Park, GA in 2022-2024 that qualify for removal under the EER.

#	Date	24-hour $PM_{2.5}$ ($\mu g/m^3$)	Tier	Cause of Exceedance
1	06/08/23	20.4	2	Canadian wildfires
2	06/29/23	34.2	1	Canadian wildfires
3	07/20/23	16.6	2	Canadian wildfires
4	07/26/23	16.6	2	Canadian wildfires
5	08/22/23	18.4	2	Canadian wildfires
6	08/25/23	19.3	2	Canadian wildfires

Table 2. DVs at the Forest Park site for the 2024 annual $PM_{2.5}$ NAAQS.

Monitor Site (AQS ID)	2022-2024 DV without EPA Concurrence ($\mu g/m^3$)	2022-2024 DV with EPA Concurrence ($\mu g/m^3$)
Forest Park (13-021-0007)	9.1	9.0

EPA has outlined requirements for demonstrations of wildfire events in the 2016 document *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations* and, pertinent to this demonstration, the 2024 supplementary document *$PM_{2.5}$ Wildland Fire Exceptional Events Tiering Document*. This demonstration will describe how the proposed wildfire events meet the requirements of the EER as described in regulation and the guidance documents, as applicable.

2. Narrative Conceptual Model

The EER requires that demonstrations include a narrative conceptual model describing the events. This section describes the 2023 Canadian wildfires that impacted the air quality monitor in Forest Park, GA. Estimates from the National Oceanic and Atmospheric Administration (NOAA) Hybrid Single-Particle Lagrangian Integrated Trajectory model (HYSPLIT) model are used to describe the transport of wildfire smoke to the area and around the state which ultimately led to enhancements of $PM_{2.5}$ concentrations that exceeded the NAAQS level.

Canadian wildfires during the 2023 wildfire season were well documented and impacted much of the geography of the United States. This season started ahead of the typical Canadian wildfire season, lasting from mid-April to late October (seasons are usually from May – September)[1]. Temperatures and land aridity across Canada were unusually high and resulted in the burning of a record-breaking amount of land area (≥156,000 km^2)[2]. The land area burned during this season far exceeded the average[3] of 21,000 km^2, with the most active burns situated in the eastern province of Quebec in June and July.

Figures in Appendix A are provided to show active Canadian wildfires on the days of the exceedances and for three days beforehand via the Natural Resources Canada Interactive Map[4]. On the dates listed in Table 1 (Figures A1-A5), when the exceedances were recorded at the

[1] https://doi.org/10.1038/s41467-024-51154-7
[2] https://doi.org/10.1007/s00376-023-3241-0
[3] https://cwfis.cfs.nrcan.gc.ca/ha/nfdb
[4] https://cwfis.cfs.nrcan.gc.ca/interactive-map

relevant site, Canadian wildfires were on-going across the country, the majority of which had each consumed >1,000 hectares. These fires were similarly as intense up to three days prior to the recorded exceptional events.

Shown in Section 4, these wildfires resulted in the United States being blanketed in smoke and impacted $PM_{2.5}$ surface level concentrations across the country. Pertinent to this demonstration, concentrations were impacted across the southeast of the country, often simultaneously and in conjunction with the arrival of air masses either from Canada or circulated from smoke-laden areas within the United States. Air mass back-trajectories from NOAA's HYSPLIT model indicate that the plumes responsible for the summertime events were emitted from fires in the Canadian provinces of British Columbia, Alberta, Saskatchewan, and Quebec. They then traveled along multiple routes either originating in Canada or by circulating smoke from Canadian wildfires from other (western and/or midwestern) regions of the United States.

This conceptual model describes how emissions from wildfires in Canada and environmental conditions contributed to the events dated in Table 1. Smoke emissions transported to the Forest Park site enhanced observed $PM_{2.5}$ concentrations and caused an exceedance. Georgia EPD requests EPA's concurrence on these dates for exclusion from regulatory decision making, specifically state attainment determinations.

3. Public Notification

As described in 40 CFR 51.930(a), states requesting to exclude data due to exceptional events must take appropriate and reasonable actions to protect public health from exceedances or violations of the NAAQS. These include providing for, at a minimum, prompt public notification whenever concentrations are expected to exceed a NAAQS, public education on actions individuals may take to reduce exposures to unhealthy air quality during events, and implementation of appropriate measures to protect public health from event-caused exceedances or violations of the NAAQS.

With respect to public notification and public education, the Georgia Forestry Commission (GFC) has a public website[5] with an interactive wildfire and burn permit map that contains the current Air Quality Index at all sites in Georgia with the option to add the following layers: (1) burn restrictions, (2) daily burn permits, (3) $PM_{2.5}$, (4) NOAA Hazard Mapping System (HMS) smoke plumes, (5) wind vectors, and (6) smoke forecast. The public can zoom in to see if smoke may impact their location. The Georgia EPD website[6] has a link to the GFC interactive burn permit map. Also, the Georgia EPD website has a link to EPA's AirNow Fire and Smoke Map[7], EPA's AirNow When Smoke is in the Air[8], EPA's AirNow Prepare for Fire Season[9], and the EPA's Smoke-Ready Toolbox for Wildfires[10]. These websites identify several protective measures that individuals should take to reduce smoke exposure as needed, including limiting outdoor activities, avoiding strenuous outdoor activity and remaining indoors, and considering

[5] https://georgiafc.firesponse.com/public/
[6] https://epd.georgia.gov/air-protection-branch/open-burning-rules-georgia
[7] https://fire.airnow.gov/
[8] https://www.airnow.gov/wildfires/when-smoke-is-in-the-air/
[9] https://www.airnow.gov/sites/default/files/2020-10/prepare-for-fire-season.pdf
[10] https://www.epa.gov/air-research/smoke-ready-toolbox-wildfires

temporarily relocating or closing all doors and windows during smoke events. In addition, the Georgia EPD Ambient Air Monitoring Program website[11] provides near real-time ambient air concentrations of multiple criteria pollutants (O_3, $PM_{2.5}$, SO_2, NO_2, and CO) across the state.

Georgia EPD, in conjunction with the Georgia Institute of Technology, provides a daily forecast email that includes messaging concerning health advisories and smog alerts to Georgia Commute Options and the Atlanta Regional Commission for distribution. Each forecast email includes a reminder stating: "If you see or smell smoke and have respiratory concerns you may need to move indoors, close windows and doors. You can see the current air quality at https://airgeorgia.org or https://airnow.gov to help you determine when to continue outdoor activities."

Outside Georgia EPD and GFC, there was additional notification provided by various news outlets to the public about the potential for elevated air quality impacts from Canadian wildfires. Some examples include:

- https://www.wsbtv.com/news/local/atlanta/expect-flight-delays-into-atlanta-thanks-canada-wildfire-smoke/RX2WTAWHTBGEVGQAMWFRLYCEJU/ (North Georgia/Metro Atlanta, 6/7/2023)
- https://www.13wmaz.com/article/weather/smoke-from-wildfire-to-central-georgia/93-87f7b552-98fd-4b86-8f99-94140c76d38d (Macon/Central Georgia, 6/7/2023)
- https://www.youtube.com/watch?v=sZkxex_jpQw (Central Georgia, 6/7/2023)
- https://www.wsbradio.com/weather/wildfire-smoke-drifting-south-canada-into-north-georgia/OKNENTCA6JGGJPYQ76VCO6LF5Q/ (Metro Atlanta/Birmingham, Alabama, 6/7/2023)
- https://www.gpb.org/news/the-picture-show/2023/06/07/photos-extreme-canadian-wildfire-smoke-shrouds-parts-of-us (North and South Carolina, 6/7/2023)
- https://www.atlantanewsfirst.com/2023/06/08/air-quality-georgia-will-smoke-wildfires-reach-us/ (Greater Metro Atlanta, 6/8/2023)
- https://patch.com/georgia/atlanta/code-orange-alert-what-know-air-quality-ga (Atlanta, 6/8/2023)
- https://www.walb.com/2023/06/08/canadian-wildfire-smoke-arrives-south-ga-effects-are-minimal/ (Albany/South Georgia, 6/8/2023)
- https://abcnews.go.com/US/canadian-wildfire-dangers-prompt-proactive-mitigation-government-experts/story?id=100478859 (Predicts plume will migrate to Georgia, 7/1/2023)
- https://www.11alive.com/article/weather/stormtracker/wildfire-smoke-north-georgia/85-b4670fee-4608-4f99-9904-bbdbcf924375 (North Georgia, 7/17/2023)
- https://foxchattanooga.com/weather/stormtrack-9-blog/canadian-wildfire-smoke-impacts-tennessee-georgia-air-quality-once-again (Chattanooga, 7/17/2023)
- https://www.nytimes.com/2023/07/18/us/smoke-wildfires-nc-georgia.html (Georgia, 7/18/2023)
- https://www.fox5atlanta.com/news/code-orange-alert-metro-atlanta-canadian-wildfire-smoke (Georgia, 7/18/2023)

[11] https://airgeorgia.org/

- https://www.atlantanewsfirst.com/2023/07/18/canadian-wildfires-bring-poor-air-quality-north-georgia/ (Metro Atlanta/North Georgia, 7/18/2023)
- https://www.cnn.com/2023/07/17/weather/canada-wildfires-shatter-burning-records/index.html (North Georgia, 7/18/2023)
- https://www.iqair.com/us/newsroom/atlanta-air-quality-alert (Atlanta 7/18/2023)
- https://www.houstonchronicle.com/news/houston-texas/environment/article/houston-pollution-canadian-wildfire-saharan-dust-18206844.php (Atlanta/Georgia, 7/18/2023)
- https://www.wsfa.com/2023/07/18/details-behind-canadian-wildfire-smoke-alabamas-sky/ (Montgomery/Alabama, 7/18/2023)
- https://news.gatech.edu/news/2023/07/19/canadian-wildfire-smoke-affects-atlanta-2 (Atlanta, 7/19/2023)
- https://www.gpb.org/news/2023/07/26/macon-had-georgias-worst-air-quality-last-week-thanks-canadian-wildfires-heat-dome (Macon, 7/26/2023)
- https://www.savannahnow.com/story/weather/2023/10/03/savannah-ga-air-quality-canadian-wildfire-smoke-moves-down-u-s-coast/71045920007/ (Savannah, 10/3/2023)
- https://www.gpb.org/news/2023/10/04/have-you-noticed-haze-in-the-air-heres-why-georgia-dealing-smoke (South/Middle Georgia, 10/4/2023)

4. Clear Causal Relationship and Supporting Analyses

This section addresses the EER requirements at 40 CFR 50.14(c)(3)(iv)(B) by showing that the events affected air quality in such a way that there exists a clear, causal relationship between the specific events and the monitored exceedance, and at 40 CFR 50.14(c)(3)(iv)(C) by providing analyses comparing the claimed event-influenced concentrations to concentrations at the same monitoring site at other times. The *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations* and *$PM_{2.5}$ Wildland Fire Exceptional Events Tiering Document* outlines the expected components of a clear causal relationship portion of a demonstration. These include evidence that emissions from wildfires were transported to the site, evidence that wildfire emissions affected the monitor, and a comparison of the event-related concentration to historical concentrations.

Figures B1-B5 (Appendix B) show smoke from the NOAA Hazard Mapping System (HMS), plotted via the AirNow Navigator[12]. Active fires and smoke are shown for the day the event was registered as well as up to three days beforehand. During the exceptional events, smoke pervaded the air throughout much of the eastern half of the United States, if not the entire country.

The historical data analysis section of this demonstration focuses on 2020-2024 $PM_{2.5}$ FRM data at the Forest Park site. Table 3 contains a comparison of exceptional event concentrations to historic 2020-2024 concentrations for the site. Generally, the exceptional event concentrations are nearly double the 5-year annual average, quarterly average, and monthly average, and in some cases can be almost four times greater.

[12] https://airnowtech.org/navigator/

Table 3. Comparison of exceptional event concentrations to historic 2020-2024 concentrations at the Forest Park site.

EE Date	EE Concentration (µg/m^3)	5-Year Annual Average (µg/m^3)	5-Year Quarterly Average (µg/m^3)	5-Year Monthly Average (µg/m^3)	Ratio EE to 5-Year Annual Average	Ratio EE to 5-Year Quarterly Average	Ratio EE to 5-Year Monthly Average
06/08/2023	20.4	8.9	9.22	10.49	2.3	2.2	1.9
06/29/2023	34.2	8.9	9.22	10.49	3.8	3.7	3.3
07/20/2023	16.6	8.9	9.26	9.82	1.9	1.8	1.7
07/26/2023	16.6	8.9	9.26	9.82	1.9	1.8	1.7
08/22/2023	18.4	8.9	9.26	9.22	2.1	2.0	2.0
08/25/2023	19.3	8.9	9.26	9.22	2.2	2.1	2.1

Figure 1 plots the 24-hour $PM_{2.5}$ concentrations for 2020-2024. Exceedances caused by wildfires are delineated by marker shape and color. One of the selected exceptional events is above the Tier 1 threshold of 23.55 µg/m^3, and the remaining five fall within the Tier 2 range. Tier 1 events are 1.5 times greater than the highest 98th percentile of data over the last 5 years. Tier 2 events are greater than or equal to a threshold of the minimum annual 98th percentile for 24-hour $PM_{2.5}$ data over the previous 5-years, but less than 1.5 times this threshold, per the EPA's Tiering Tool.

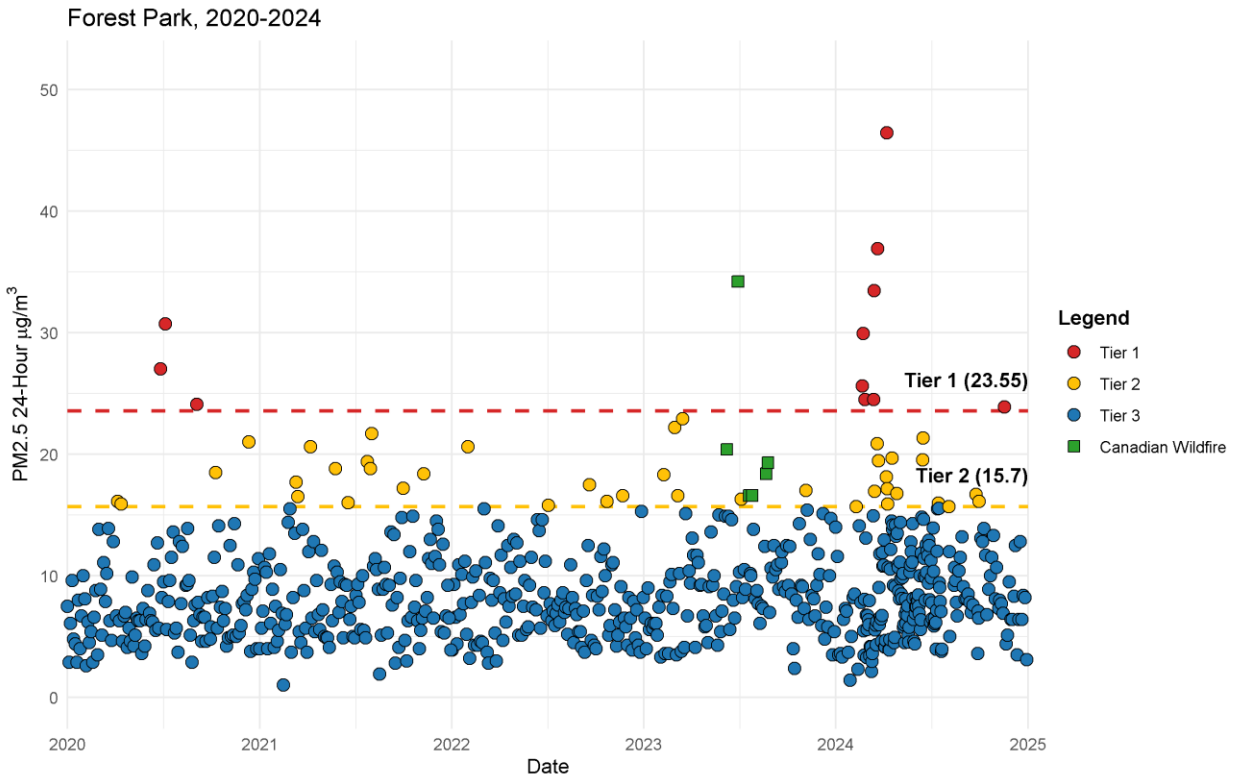


Figure 1. 24-hour $PM_{2.5}$ concentrations for 2020-2024 observed at the Forest Park site. Exceedances not related to fires are demarcated by color with Tier 1 in red, Tier 2 in yellow, and Tier 3 in blue. Canadian wildfires (green squares) are additionally differentiated.

Maps from the AirNow Navigator are provided in Appendix C for each exceedance event in Table 3. The maps include NOAA HMS satellite detected fires, HMS smoke plumes, 24-hour $PM_{2.5}$ concentrations across the United States, and HYSPLIT back-trajectories. These trajectories originate at the Forest Park site's geographic location and extend 72 hours back in time. Three different starting times were modeled with HYSPLIT for each day: (1) midnight at the start of the exceedance day, (2) noon of the exceedance day, and (3) midnight at the end of the exceedance day. Each trajectory starts at a different elevation above ground level (100 m, 1500 m, and 3000 m). The 1500 m and 3000 m tails are used to estimate the trajectories of smoke transported over a long range. The 100 m tail, nearer to the surface, is used to show local transport. Additionally, these values are chosen to estimate vertical transport near-surface and up to several hundred meters above the planetary boundary layer. Figures in Appendix D are provided to show ground level, daily $PM_{2.5}$ concentrations, and air quality indices (AQIs) in the southeast of the United States. Forest Park only provides daily $PM_{2.5}$ measurements once every three days. As such, time series (Appendix E) are not available. Figures in Appendix F show upper air maps from the Storm Prediction Center[13] for the event day and three days prior. Maps are displayed at pressures of either 850 millibar (mb), equivalent to 1170-1590 m above mean sea level (MSL), or 700 mb, equivalent to 2350-3150 m MSL[14], at 00 Coordinated Universal Time (UTC) or 12 UTC for each day. These pressure values are chosen to correspond with the 1500-m and 3000-m heights of the HYSPLIT trajectories. A specific pressure value is determined on a case-by-case basis depending on how clearly the corresponding upper air maps explain the sequence of events that led to the relevant exceedance.

June 8, 2023

Fires in Canada had been on-going for months at the time the exceedance was measured, and their emissions were likely mixed throughout the air column. Shown in Figure C1, back-trajectories indicate that smoke plumes traveled for more than 72 hours from either side of Canada and through the Midwest of the United States. As a result, the plume detected at the site is a mixture of emissions from fires in the provinces of British Columbia, Alberta, Saskatchewan, Ontario, and Quebec. This resulted in the observed, daily $PM_{2.5}$ concentrations increasing to 20.4 $\mu g/m^3$. Figure D1 shows that similar enhancements occurred synchronously at other sites across the southeast, which follows from the large blanket of smoke over this region (Figure B1).

June 29, 2023

Fires in Canada had been on-going for months at the time the exceedance was measured, and their emissions were likely mixed throughout the air column. Shown in Figure C2, the 1500 m back-trajectory indicates that smoke was transported for greater than 72 hours through the Midwest of the United States. As a result, the plume detected at the site is a mixture of emissions from fires in the provinces of British Columbia, Alberta, Saskatchewan, Ontario, and Quebec. The 100 and 1500 m back-trajectories converge before descending to near-surface level where the observed, daily $PM_{2.5}$ concentration increased to 34.2 $\mu g/m^3$. Figure D2 shows that similar enhancements occurred synchronously at other sites across the southeast, which follows from the large blanket of smoke over this region (Figure B2).

[13] https://www.spc.noaa.gov/obswx/maps/
[14] https://www.noaa.gov/jetstream/upper-air-charts

July 20, 2023

Fires in Canada had been on-going for months at the time the exceedance was measured, and their emissions were likely mixed throughout the air column. Shown in Figure C3, back-trajectories indicate that smoke was circulated from southern states to the west of Georgia. Wildfires were active largely in western Canada at this time. Wind barbs and isoheights from Figures F1-F4 (spanning a timeframe of July 17-20) show a synoptic-scale eastward and northeastward advection of air masses from the southwest to the east coast, indicating emissions from these fires were directed along this path. Wind barbs from these figures also indicate a northward advection from the middle south of the United States, which then joins the larger eastward advection and corroborates the clockwise HYSPLIT trajectories. Therefore, wildfire smoke was transported from western Canada to the southwest of the United States and was then circulated over the south of the country and ultimately arrived at the Forest Park site. As a result, the plume detected at the site is a mixture of emissions from fires in the provinces of British Columbia, Alberta, and Saskatchewan. This led to the observed, daily $PM_{2.5}$ concentration increasing to 16.6 $\mu g/m^3$. Figure D3 shows that similar enhancements occurred synchronously at other sites across the southeast, which follows from the large blanket of smoke over this region (Figure B3).

July 26, 2023

Fires in Canada had been on-going for months at the time the exceedance was measured, and their emissions were likely mixed throughout the air column. Shown in Figure C4, the 3000 m back-trajectory indicates that smoke was transported for greater than 72 hours through the Midwest of the United States. Wildfires were active largely in western Canada at this time. As a result, the plume detected at the site is a mixture of emissions from fires in the provinces of Alberta and Saskatchewan. The 100 m and 1500 m HYSPLIT tails indicate a more local transport of wildfire smoke (inferred from Figure C4 where sites reported $PM_{2.5}$ exceedances on a regional scale) from states west of Georgia. This led to the observed, daily $PM_{2.5}$ concentration increasing to 16.6 $\mu g/m^3$. Figure D4 shows that similar enhancements occurred synchronously at other sites across the southeast, which follows from the large blanket of smoke over this region (Figure B4).

August 22, 2023

Fires in Canada had been on-going for months at the time the exceedance was measured, and their emissions were likely mixed throughout the air column. Wildfires were active in western Canada at this time. Shown in Figure C5, the 1500 and 3000 m back-trajectories indicate that a synoptic-scale, clockwise vortex circulated wildfire smoke over much of the United States, primarily impacting sites in the Midwest and the southeast. As a result, the plume detected at the site is a mixture of emissions from fires in the provinces of British Columbia, Alberta, and Saskatchewan. The observed, daily $PM_{2.5}$ concentration increased to 18.4 $\mu g/m^3$. Figure D5 shows that similar enhancements occurred synchronously at other sites across the southeast, which follows from the large blanket of smoke over this region (Figure B5).

August 25, 2023

Fires in Canada had been on-going for months at the time the exceedance was measured, and their emissions were likely mixed throughout the air column. Shown in Figure C6, back-trajectories indicate that wildfire smoke was circulated from states to the northwest of Georgia.

Wind bards from Figures F5-F8 (spanning a timeframe of August 22-25) show a synoptic-scale, clockwise vortex covering much of the United States. This indicates emissions from these fires were directed along this path and corroborates the clockwise HYSPLIT trajectories. Therefore, wildfire smoke was circulated from western Canada to the southeast of the United States and ultimately arrived at the Forest Park site. Wildfires were active in western Canada at this time. As a result, the plume detected at the site is a mixture of emissions from fires in the provinces of British Columbia, Alberta, and Saskatchewan. The observed, daily $PM_{2.5}$ concentration increased to 19.3 $\mu g/m^3$. Figure D6 shows that similar enhancements occurred synchronously at other sites across the southeast, which follows from the large blanket of smoke over this region (Figure B6).

The comparisons and analyses, provided in this demonstration support Georgia EPD's position that the fire event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance for the dates described in Table 1 and thus satisfies the clear causal relationship criterion.

5. Not reasonably Controllable or Preventable

This section satisfies the EER requirements at 40 CFR 50.14(c)(3)(iv)(A), CFR 50.1(j), 40 CFR 50.14(c)(3)(iv)(D), and 40 CFR 50.14(b)(4): The event was caused by a natural event; an exceptional event is one that is not reasonably controllable or preventable. Stated in section 40 CFR 50.14 (a)(8)(vii), the Administrator shall not require a State to provide case-specific justification to support the not reasonably controllable or preventable criterion for emissions-generating activity that occurs outside of the State's jurisdictional boundaries within which the concentration at issue was monitored.

6. Human Activity Unlikely to Recur at a Particular Location or Natural Event

This section satisfies the EER requirement at 40 CFR 50.14(c)(3)(iv)(E): A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event. The definition of wildfire in the EER is: "…any fire started by an unplanned ignition caused by lightning; accidental, human causes actions, or a prescribed fire that has developed into a wildfire. A wildfire that predominately occurs on wildland is a natural event." As stated in sections 2 and 4, the origin and evolution of the wildfires described in this demonstration occurred in Canada.

Based on the documentation provided in Sections 2 and 4 of this demonstration, these events qualify as natural events as they spread uncontrolled through remote, natural (i.e., non-agricultural or silvicultural) lands. The National Aeronautics and Space Administration noted that many of the Canadian fires were ignited by summer lightning storms and largely burned in deeply wooded areas[15]. EPA generally considers the emissions of $PM_{2.5}$ from wildfires to meet the regulatory definition of a natural event, defined as one "in which human activity plays little or no direct causal role" (40 CFR 50.1(k)). As Georgia EPD has shown that the demonstrated exceedances resulted from natural events, they should be considered for treatment as exceptional events.

[15] https://earthobservatory.nasa.gov/images/151985/tracking-canadas-extreme-2023-fire-season

7. Public Comment Period

Georgia EPD will hold a public comment period to receive public input regarding the Exceptional Event Demonstration. Notification of the public comment period will be posted on the Georgia EPD website and emailed to interested stakeholders. Public comments received will be included in Appendix G of this demonstration, along with Georgia EPD's responses to these comments in Appendix H.

Appendix A: Active Wildfires in Canada

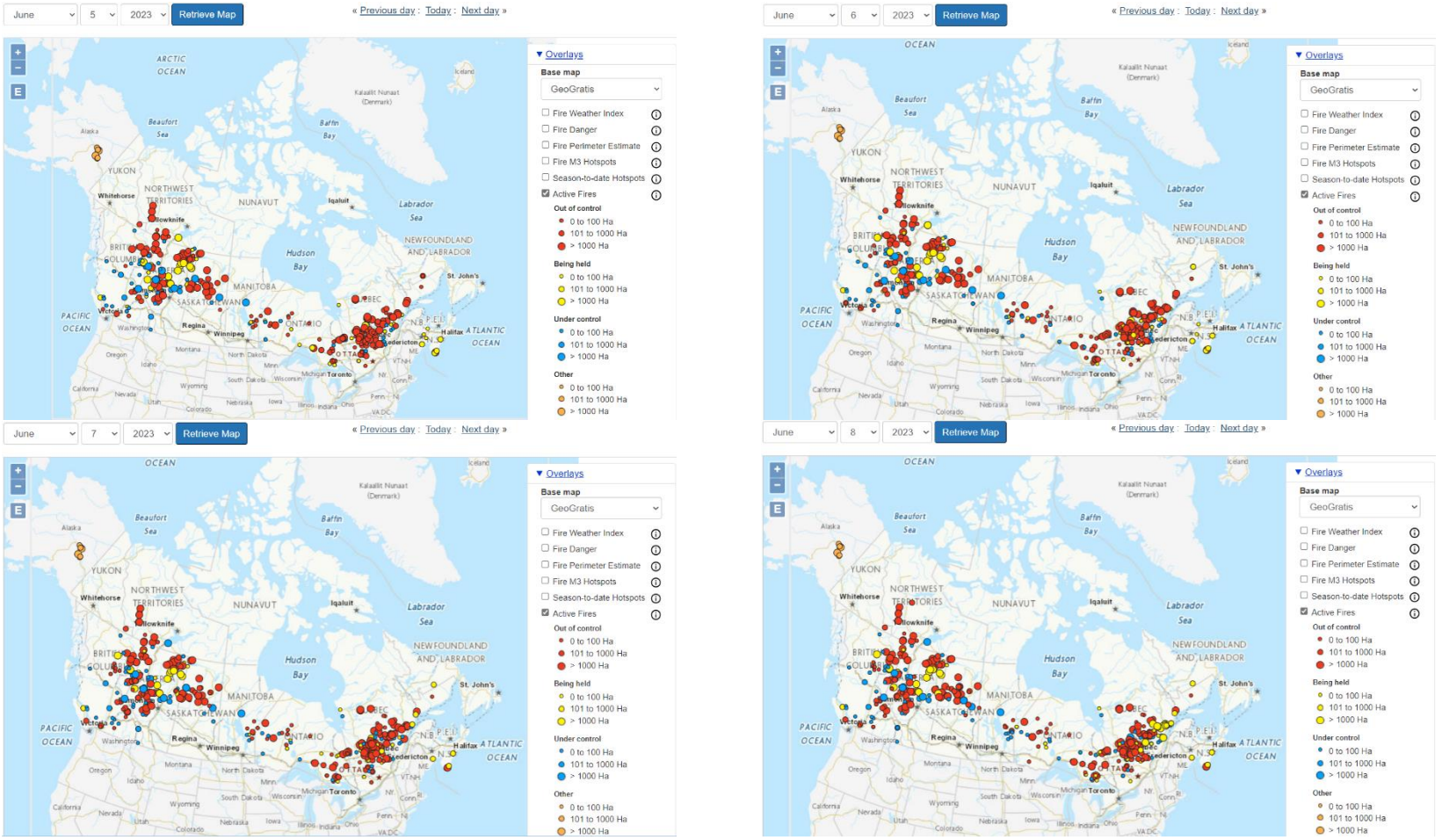


Figure A1. Active wildfires in Canada on June 5-8, 2023.

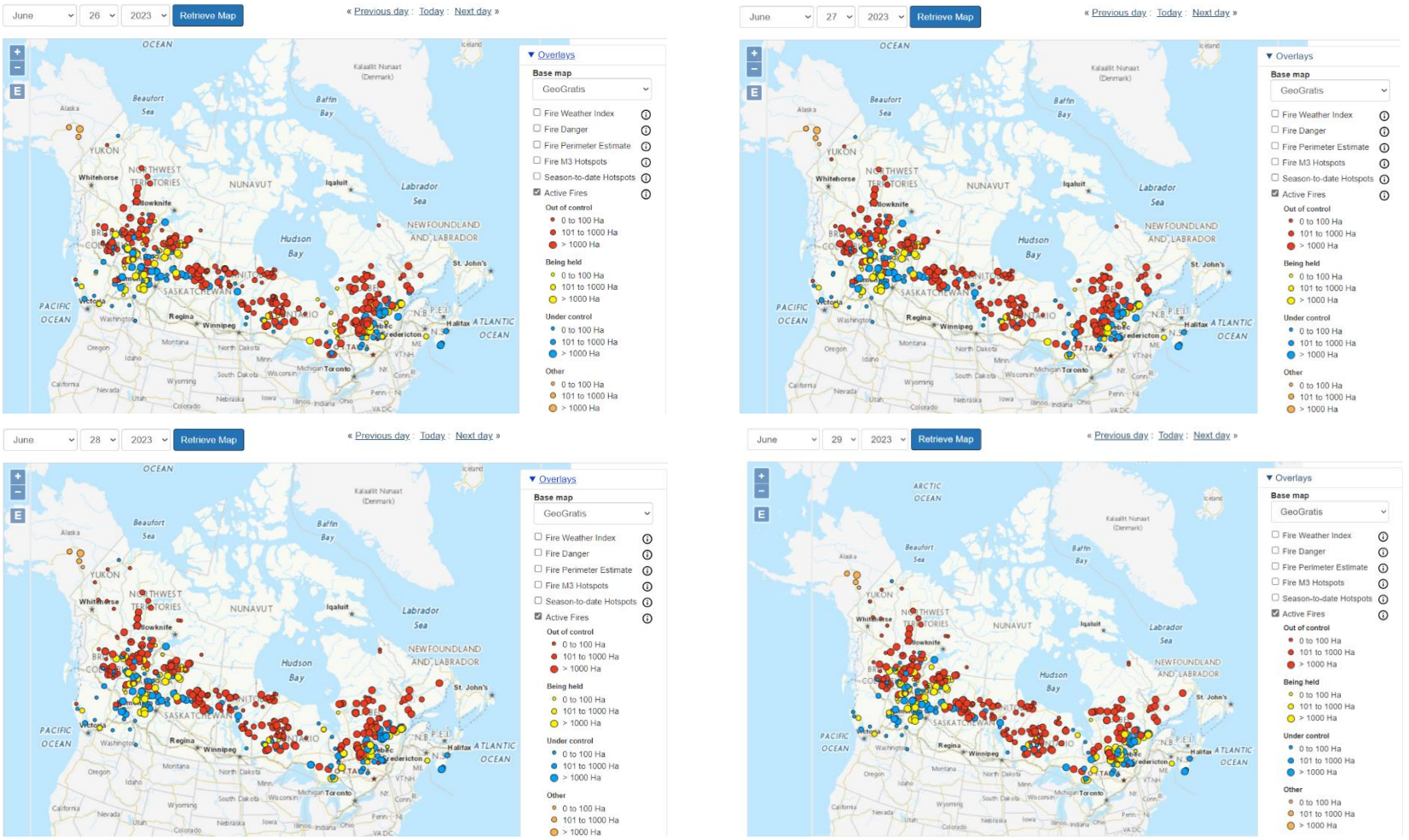


Figure A2. Active wildfires in Canada on June 26-29, 2023.

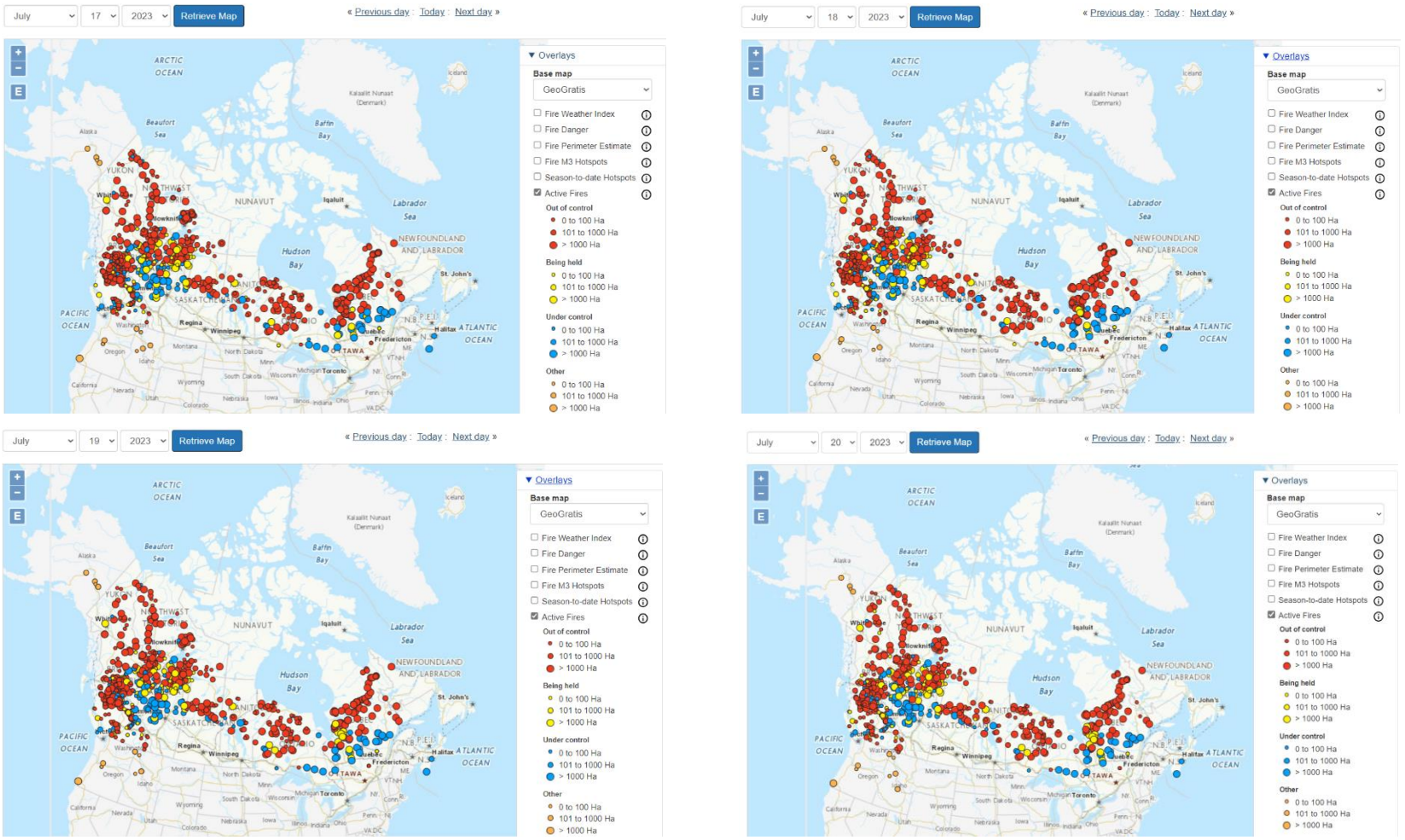


Figure A3. Active wildfires in Canada on July 17-20, 2023.

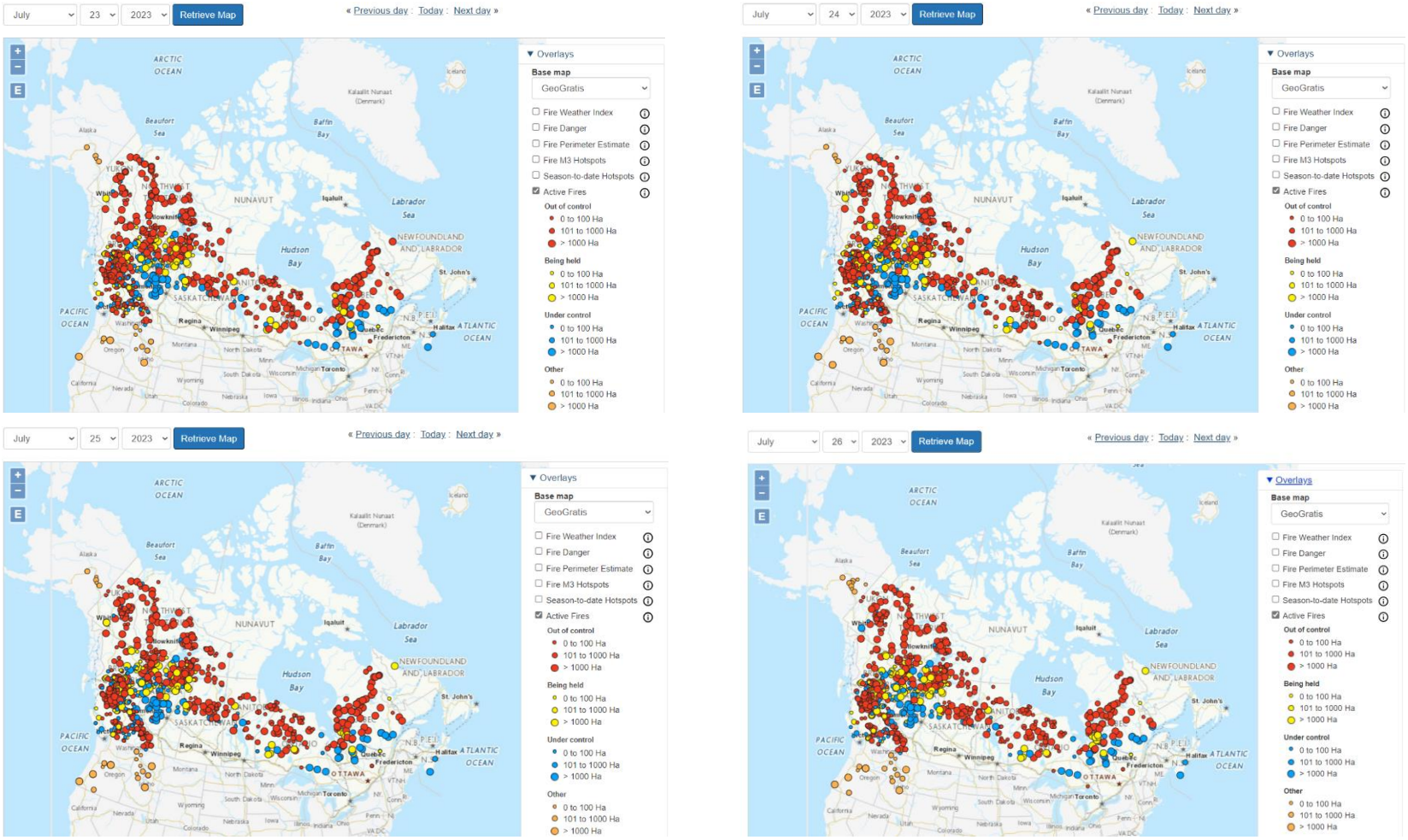


Figure A4. Active wildfires in Canada on July 23-26, 2023.

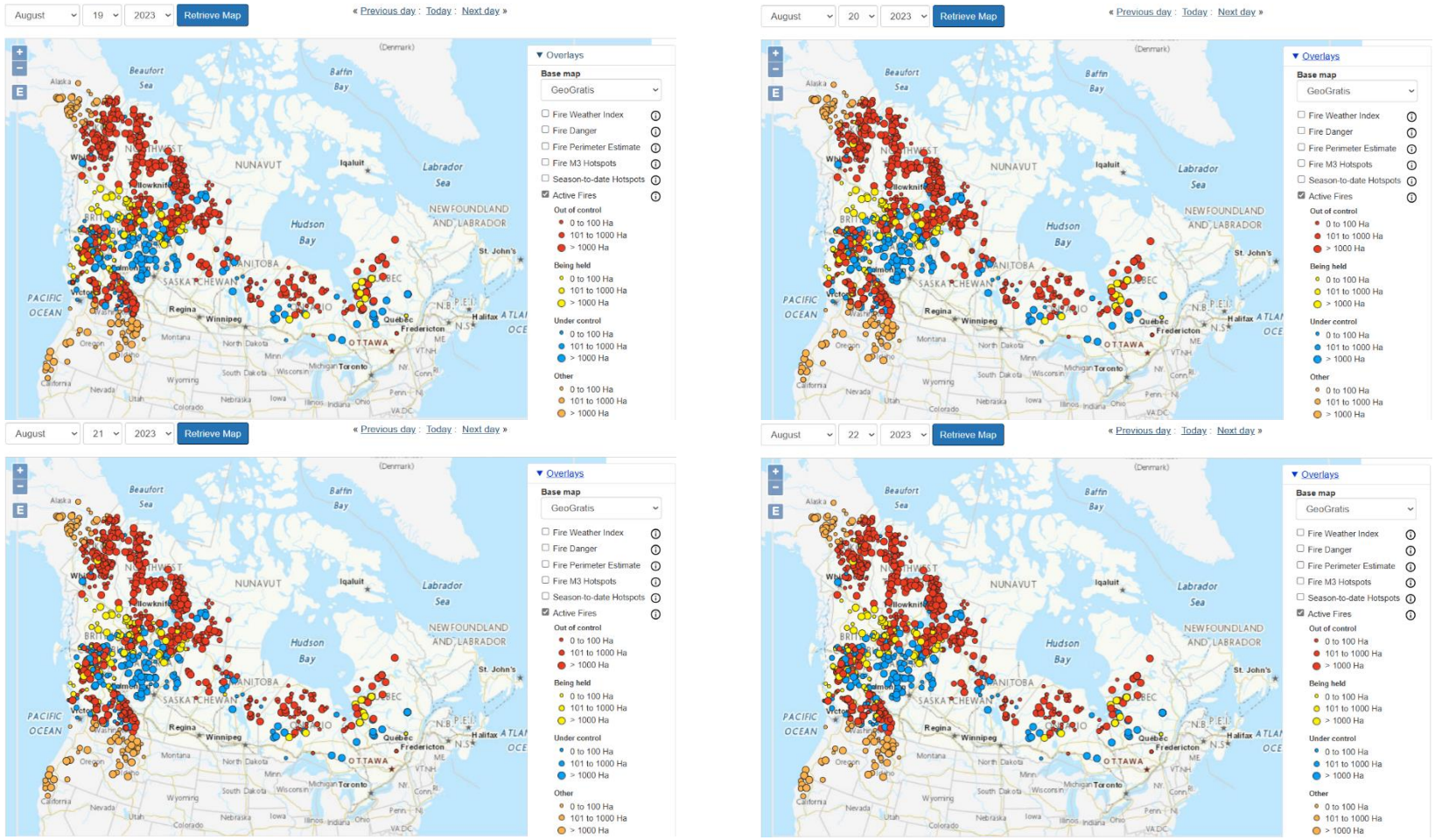


Figure A5. Active wildfires in Canada on August 19-22, 2023.

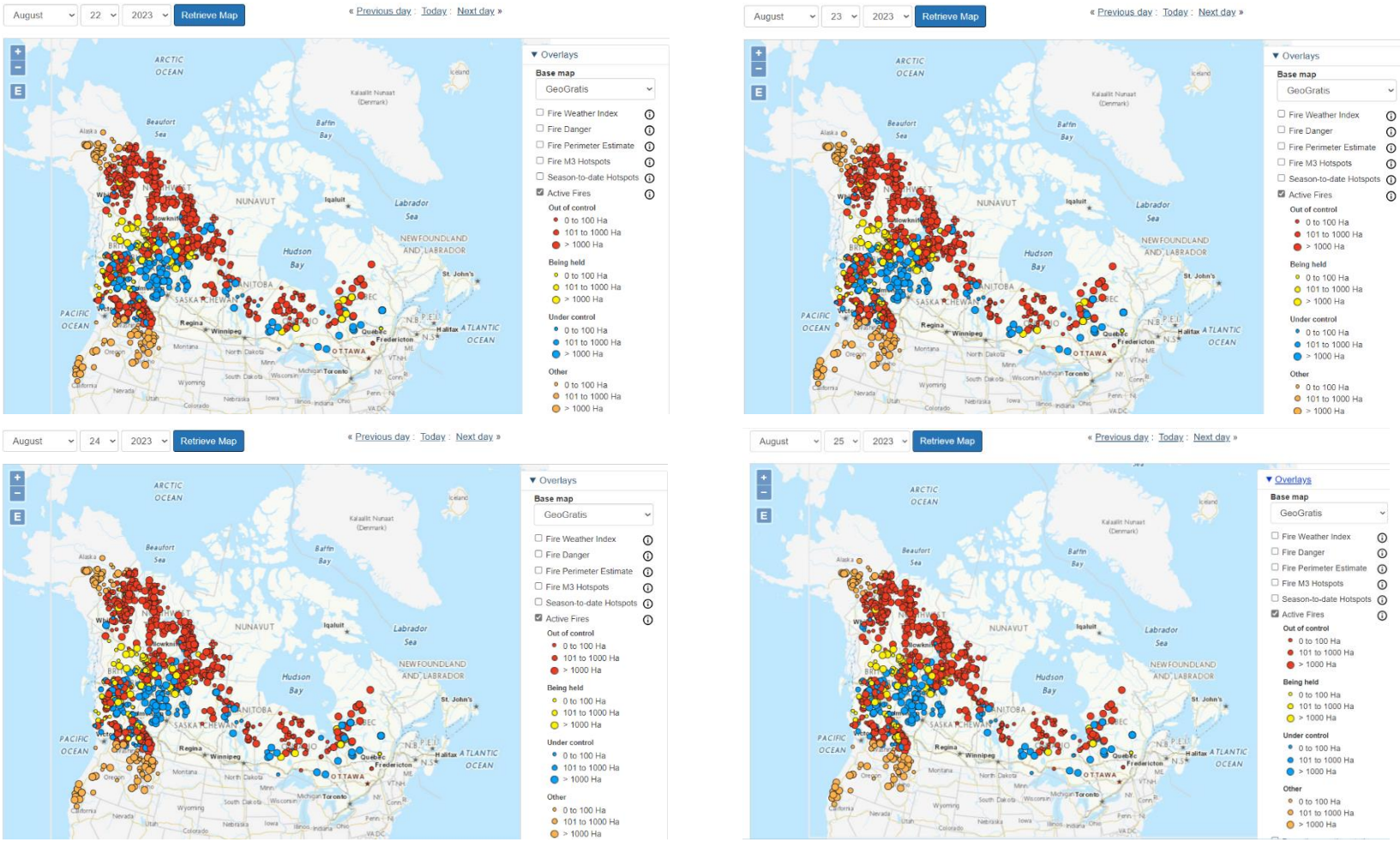


Figure A6. Active wildfires in Canada on August 22-25, 2023.

Appendix B: HMS Smoke and Active Fires

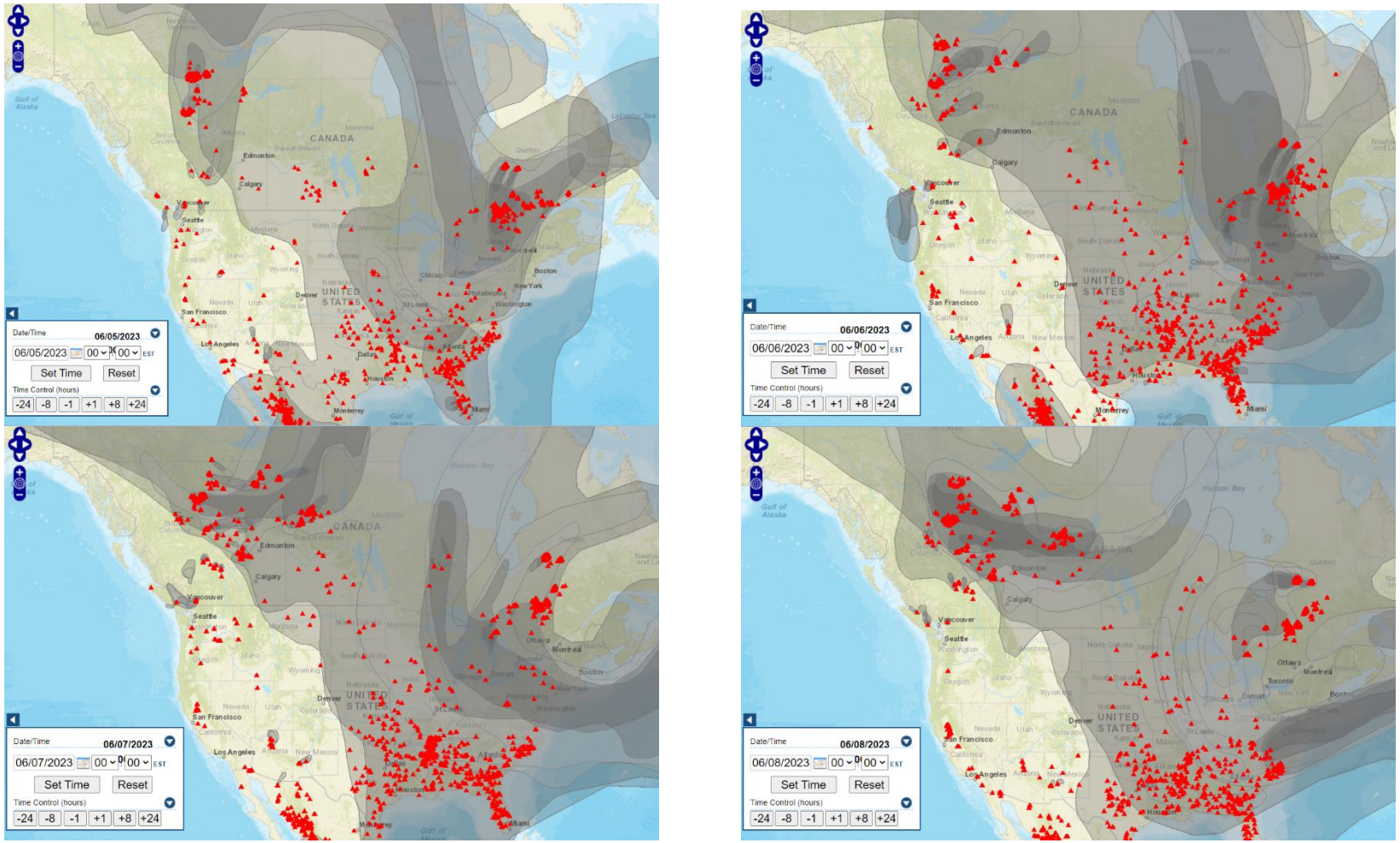


Figure B1. Map from the AirNow Navigator showing active fires (red) and smoke (grey) on June 5-8, 2023, plotted using the NOAA HMS over North America.

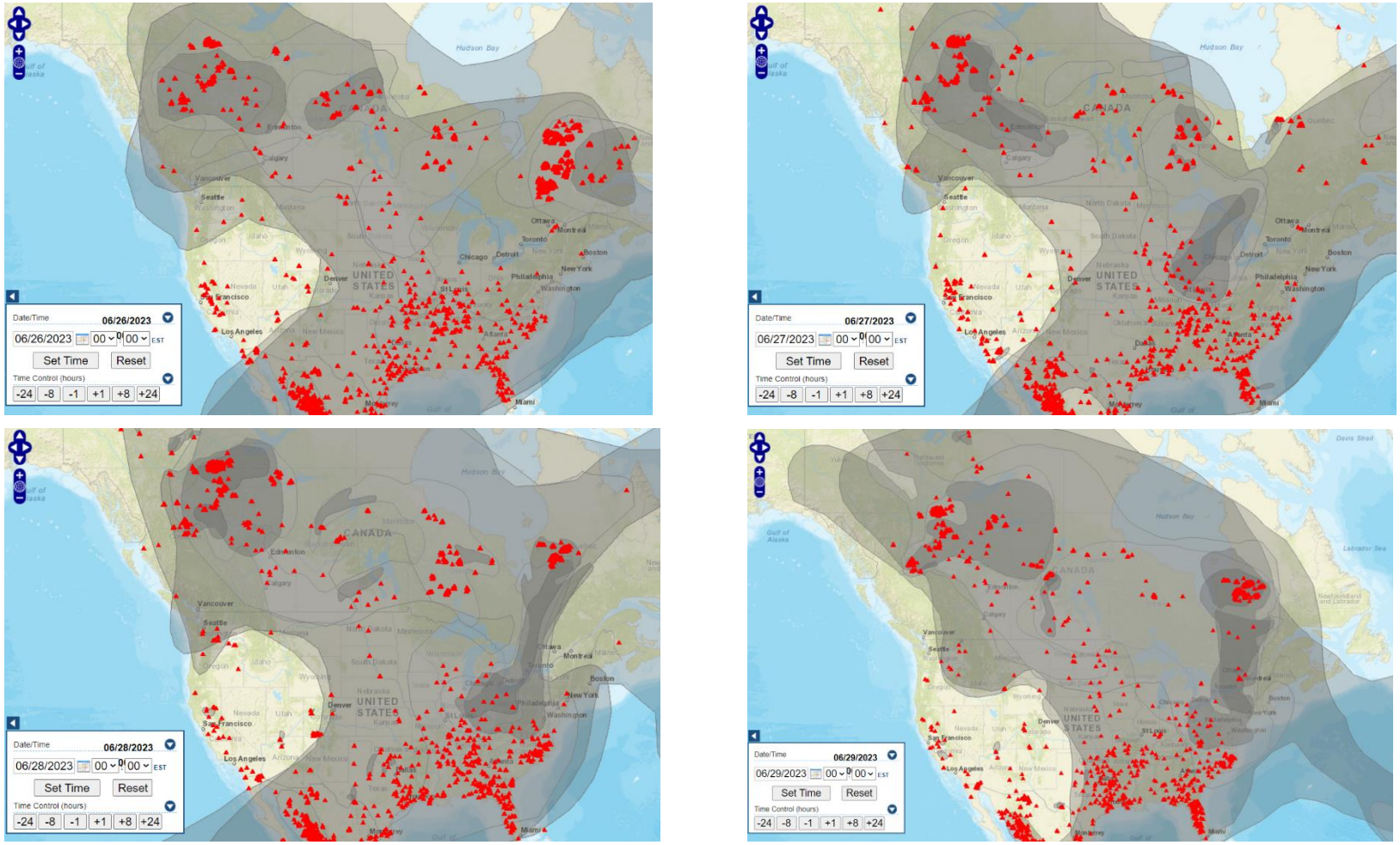


Figure B2. Map from the AirNow Navigator showing active fires (red) and smoke (grey) on June 26-29, 2023, plotted using the NOAA HMS over North America.

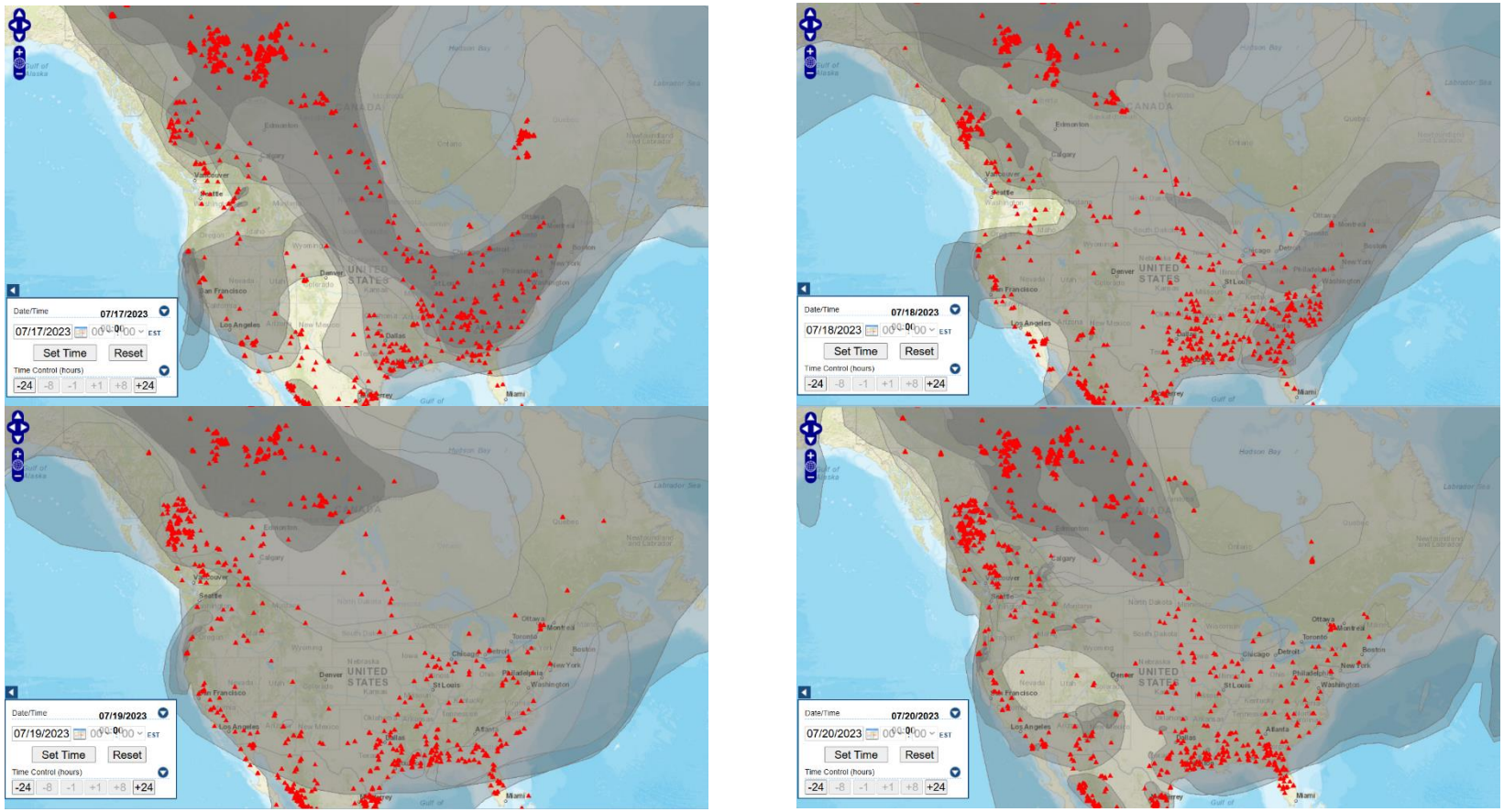


Figure B3. Map from the AirNow Navigator showing active fires (red) and smoke (grey) on July 17-20, 2023, plotted using the NOAA HMS over North America.

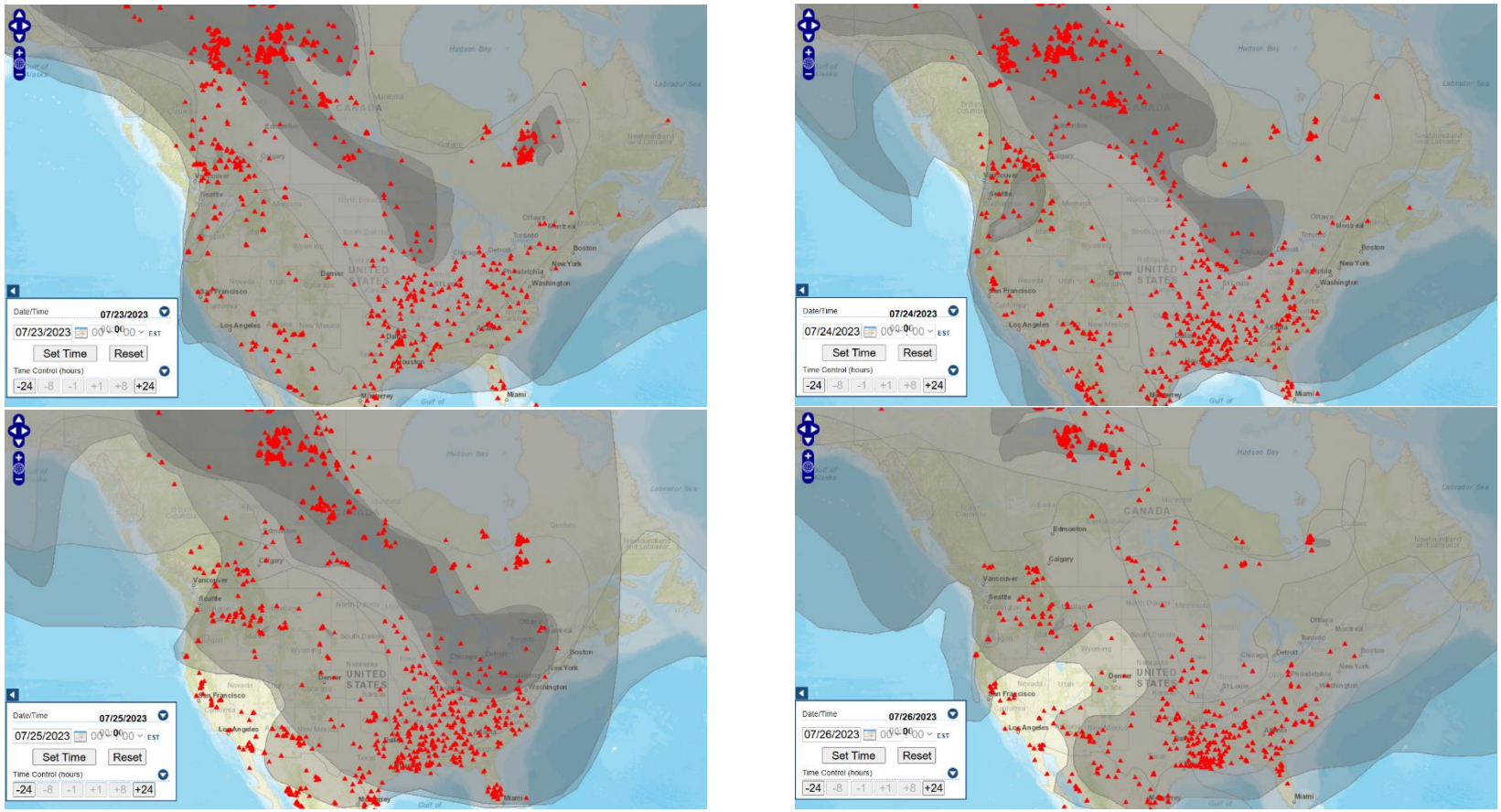


Figure B4. Map from the AirNow Navigator showing active fires (red) and smoke (grey) on July 23-26, 2023, plotted using the NOAA HMS over North America.

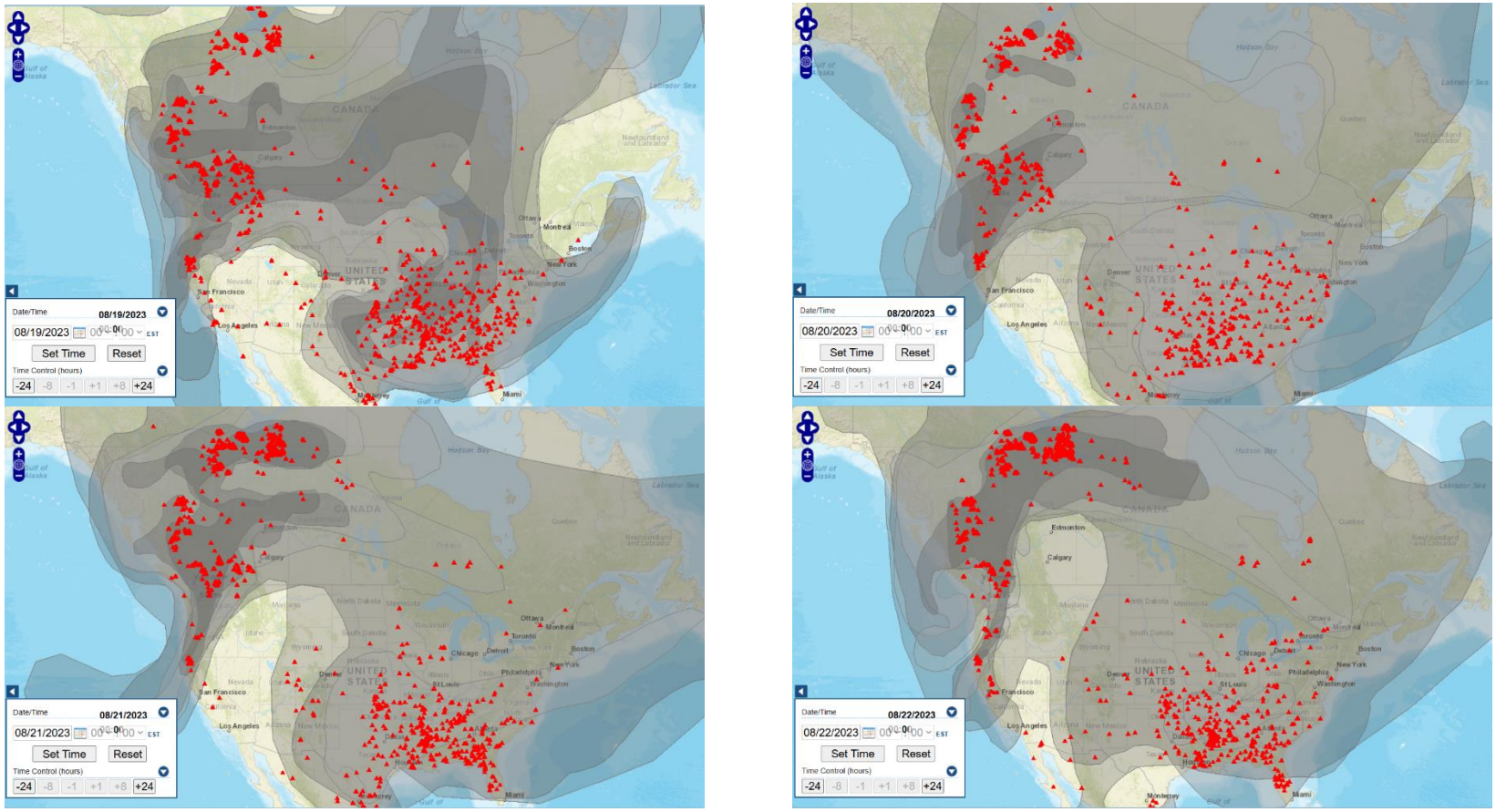


Figure B5. Map from the AirNow Navigator showing active fires (red) and smoke (grey) on August 19-22, 2023, plotted using the NOAA HMS over North America.

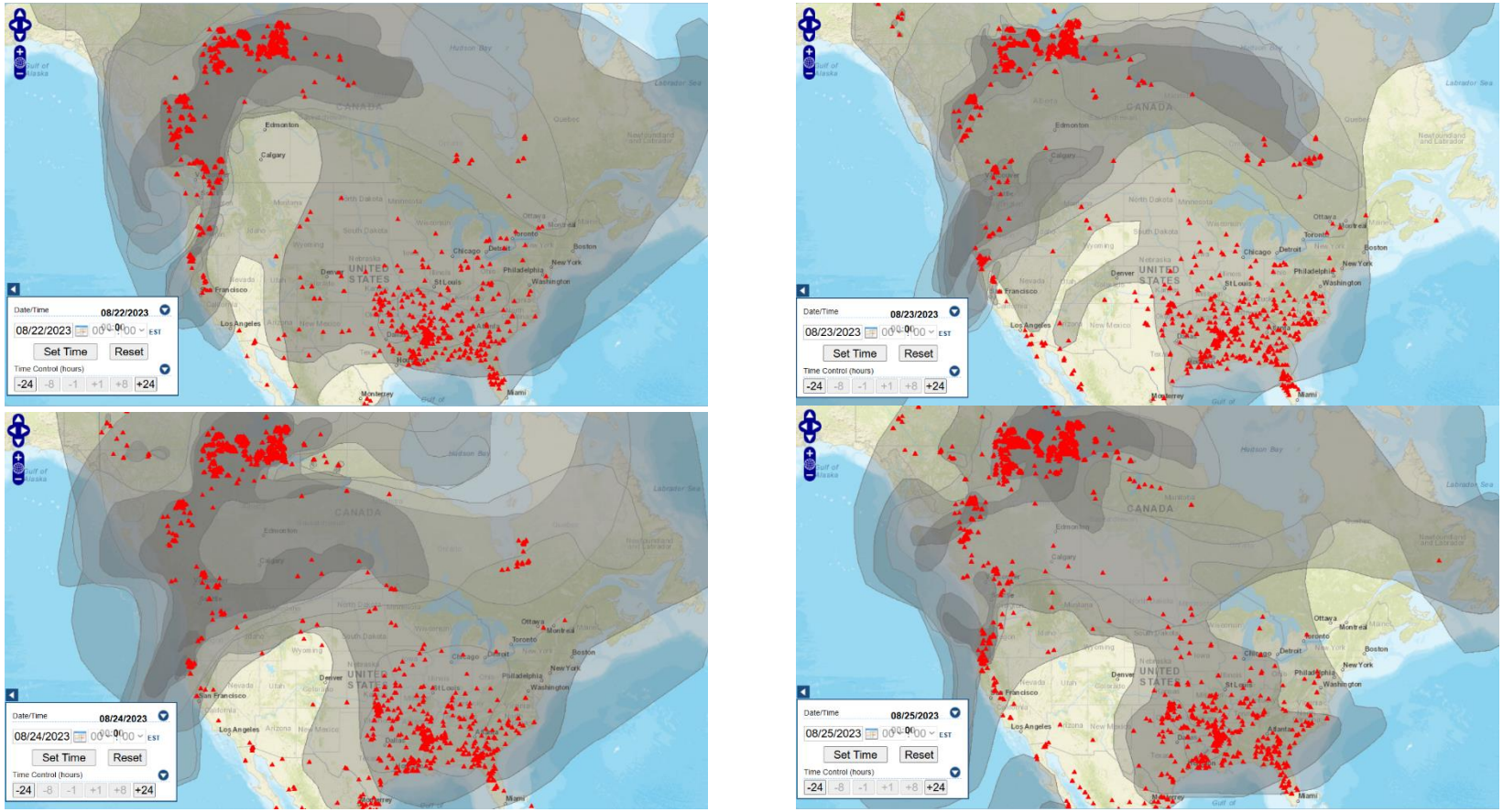


Figure B6. Map from the AirNow Navigator showing active fires (red) and smoke (grey) on August 22-25, 2023, plotted using the NOAA HMS over North America.

Appendix C: HYSPLIT Back-Trajectory Maps

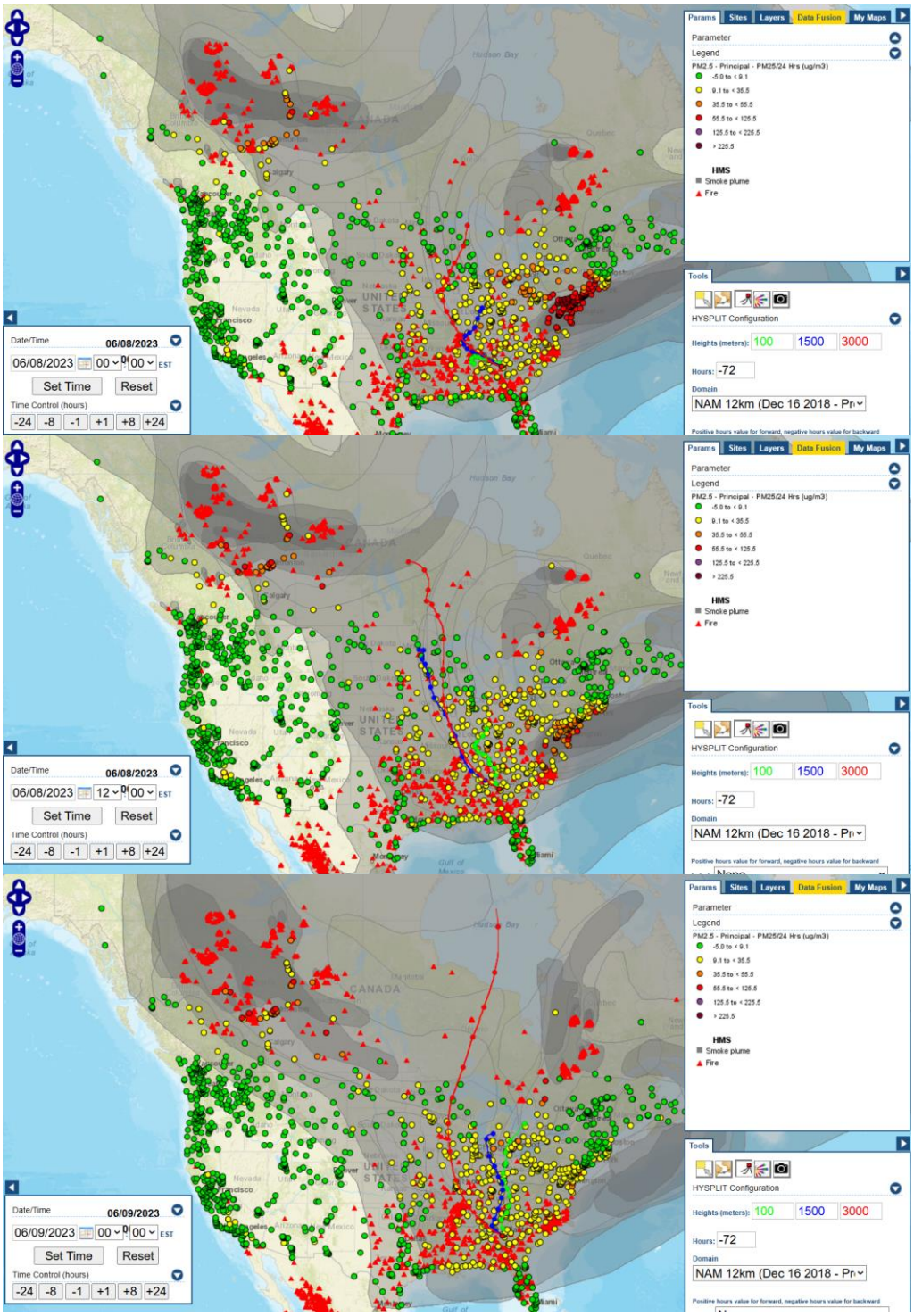


Figure C1. Map of HMS smoke plumes (grey polygons) and fires (red triangles), daily $PM_{2.5}$ concentrations (circles), and HYSPLIT back-trajectories of release heights at 100 m (green lines), 1500 m (blue lines), and 3000 m (red lines) for 0 AM EST on June 8, 2023 (top), 12 PM EST on June 8, 2023 (middle), and 0 AM EST on June 9, 2023 (bottom).

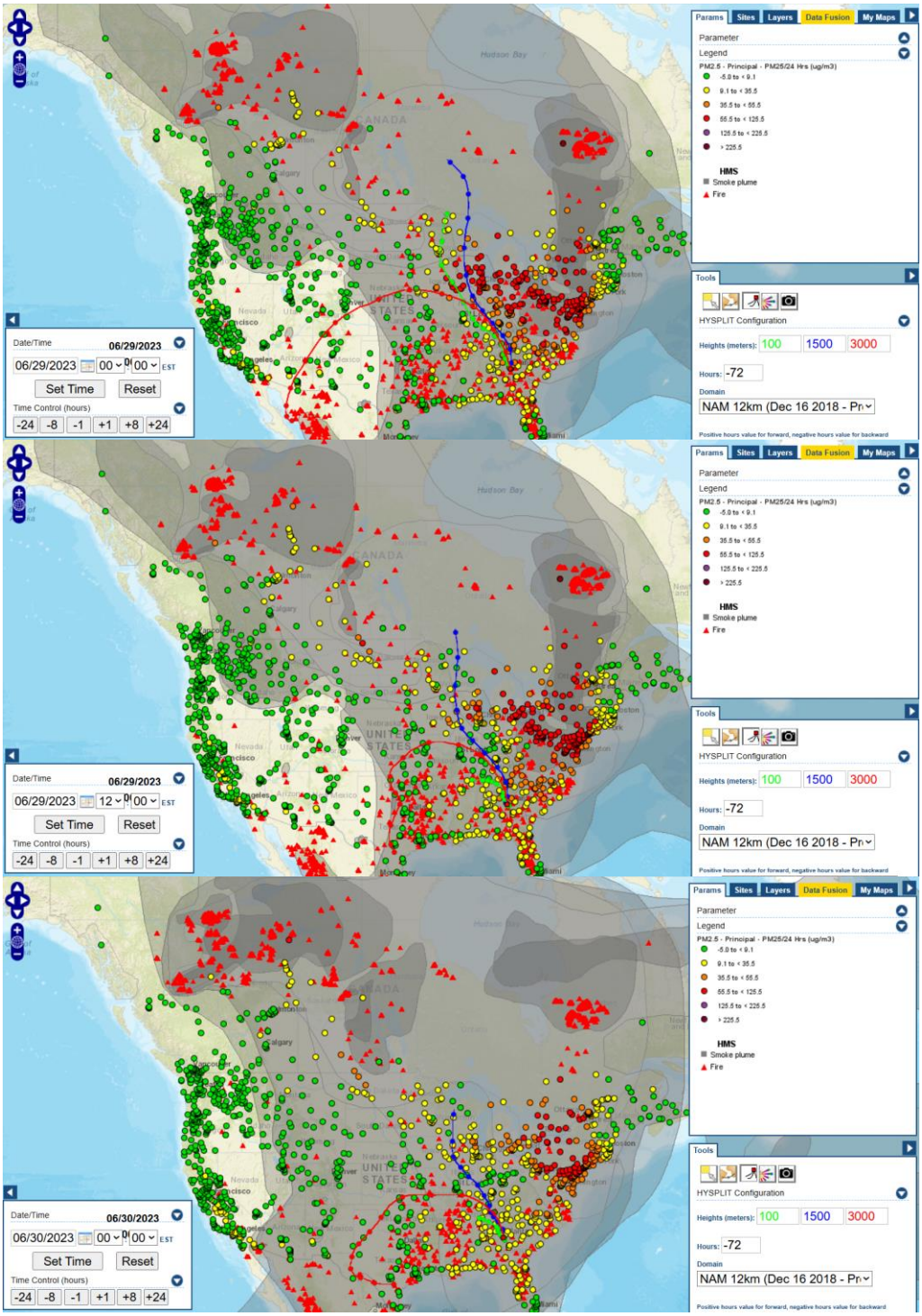


Figure C2. Map of HMS smoke plumes (grey polygons) and fires (red triangles), daily $PM_{2.5}$ concentrations (circles), and HYSPLIT back-trajectories of release heights at 100 m (green lines), 1500 m (blue lines), and 3000 m (red lines) for 0 AM EST on June 29, 2023 (top), 12 PM EST on June 29, 2023 (middle), and 0 AM EST on June 30, 2023 (bottom).

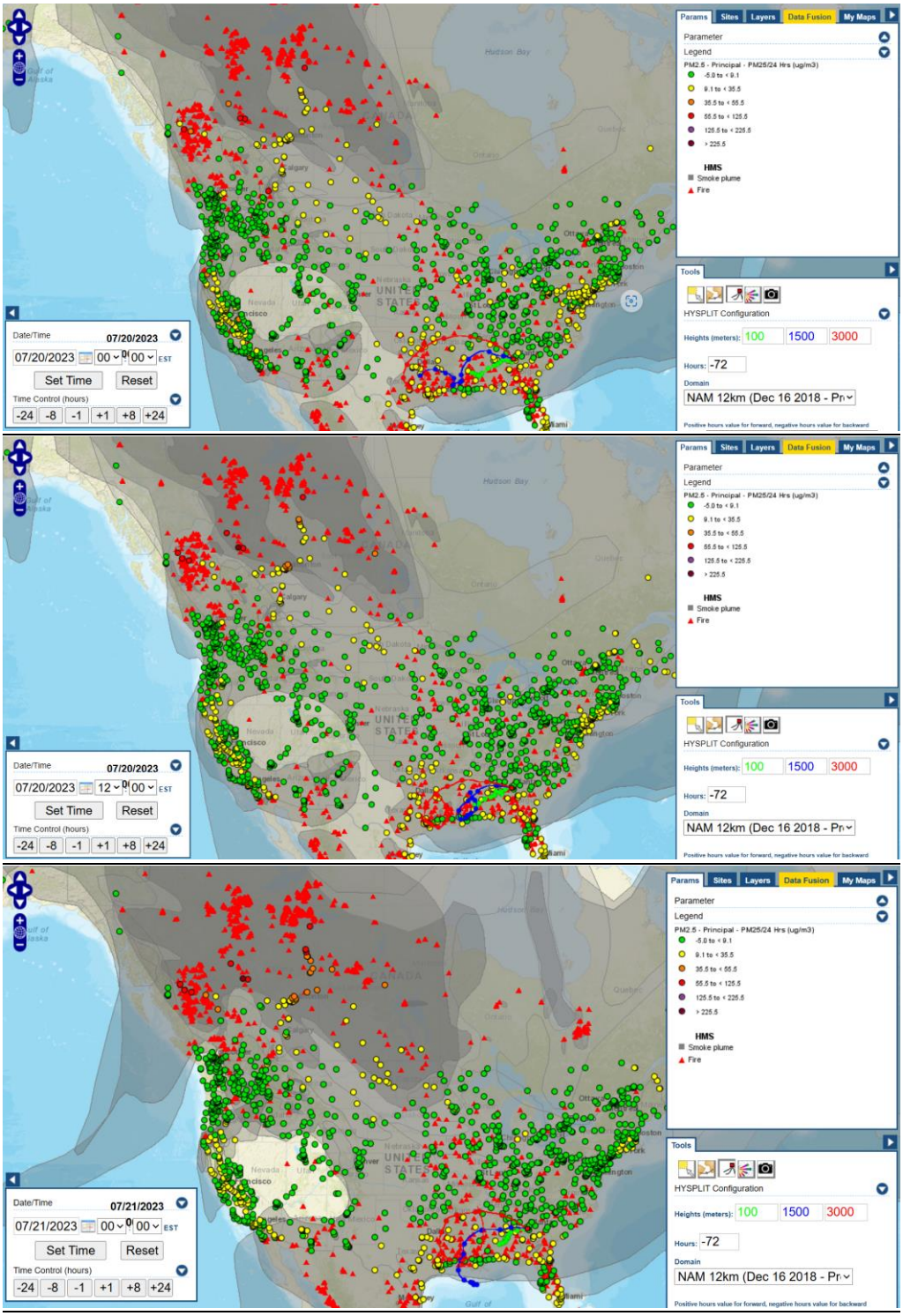


Figure C3. Map of HMS smoke plumes (grey polygons) and fires (red triangles), daily $PM_{2.5}$ concentrations (circles), and HYSPLIT back-trajectories of release heights at 100 m (green lines), 1500 m (blue lines), and 3000 m (red lines) for 0 AM EST on July 20, 2023 (top), 12 PM EST on July 20, 2023 (middle), and 0 AM EST on July 21, 2023 (bottom).

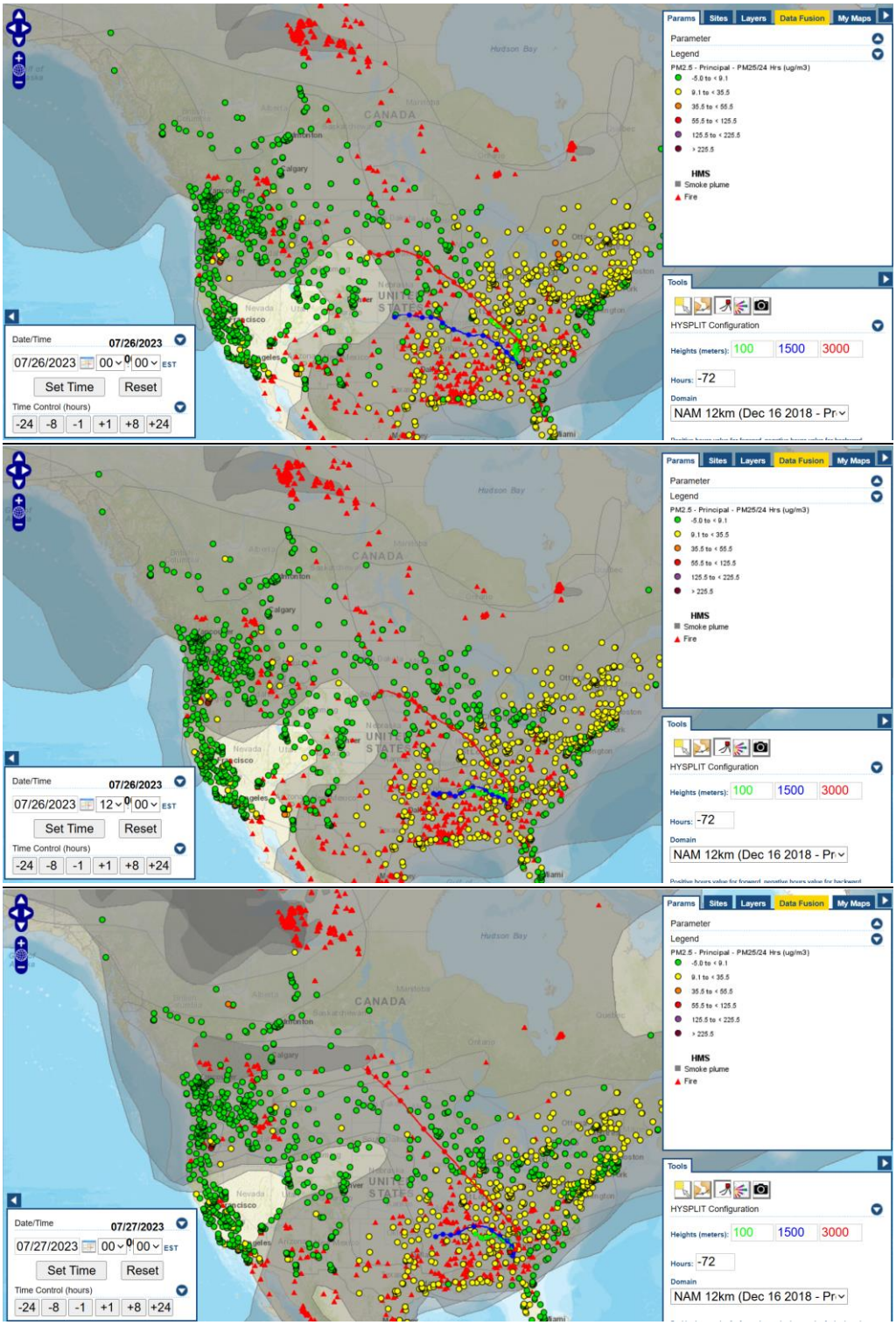


Figure C4. Map of HMS smoke plumes (grey polygons) and fires (red triangles), daily $PM_{2.5}$ concentrations (circles), and HYSPLIT back-trajectories of release heights at 100 m (green lines), 1500 m (blue lines), and 3000 m (red lines) for 0 AM EST on July 26, 2023 (top), 12 PM EST on July 26, 2023 (middle), and 0 AM EST on July 27, 2023 (bottom).

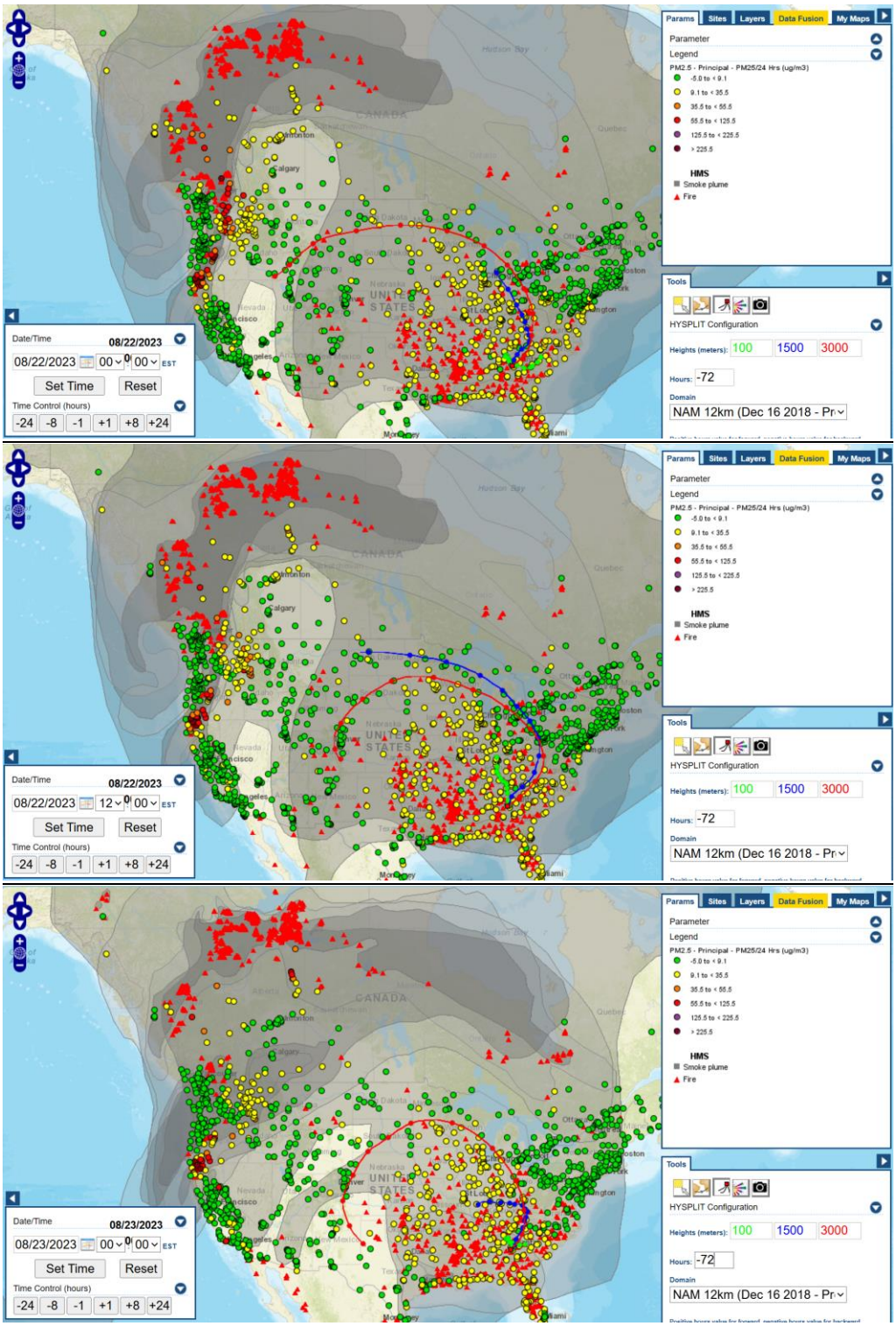


Figure C5. Map of HMS smoke plumes (grey polygons) and fires (red triangles), daily $PM_{2.5}$ concentrations (circles), and HYSPLIT back-trajectories of release heights at 100 m (green lines), 1500 m (blue lines), and 3000 m (red lines) for 0 AM EST on August 22, 2023 (top), 12 PM EST on August 22, 2023 (middle), and 0 AM EST on August 23, 2023 (bottom).

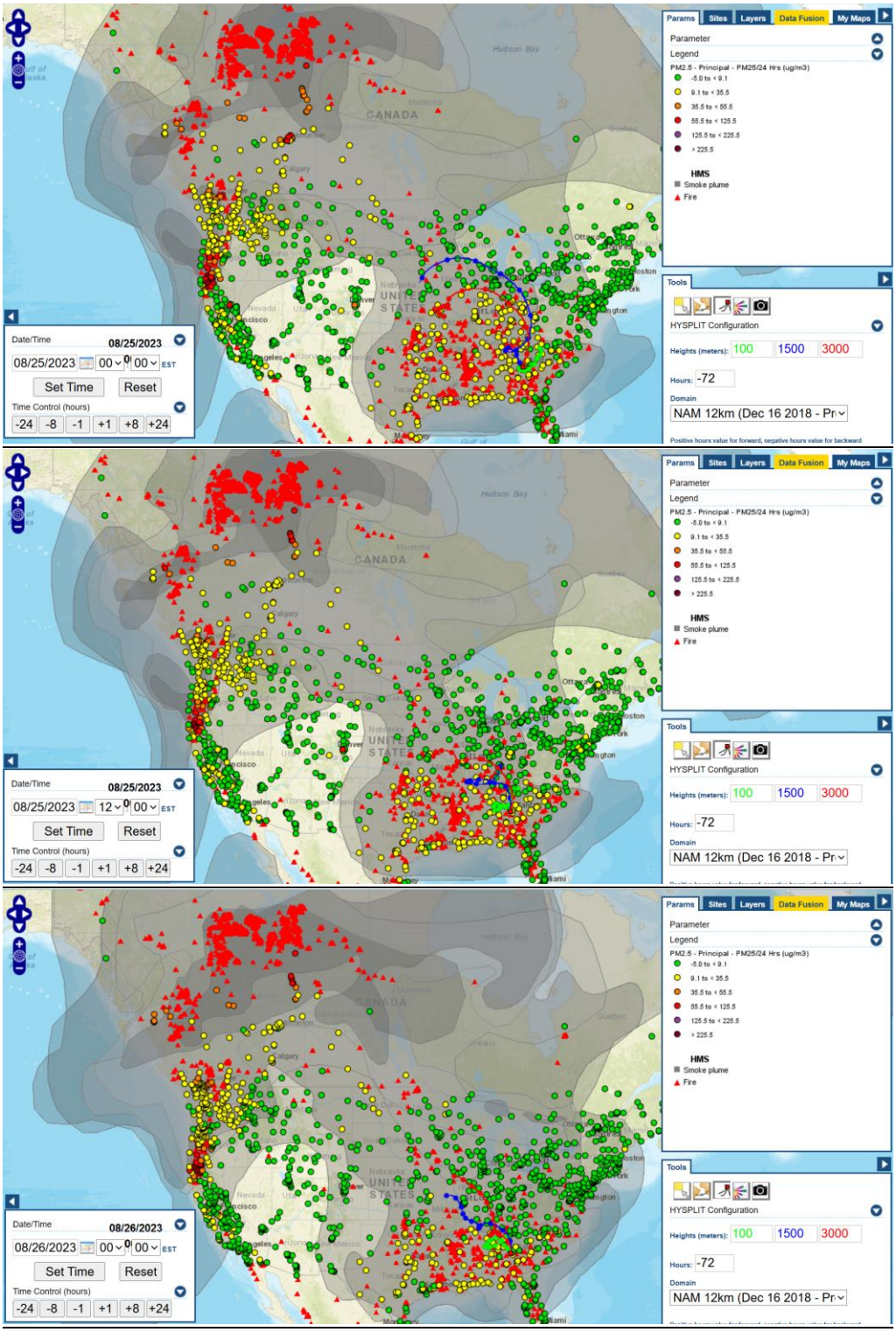


Figure C6. Map of HMS smoke plumes (grey polygons) and fires (red triangles), daily $PM_{2.5}$ concentrations (circles), and HYSPLIT back-trajectories of release heights at 100 m (green lines), 1500 m (blue lines), and 3000 m (red lines) for 0 AM EST on August 25, 2023 (top), 12 PM EST on August 25, 2023 (middle), and 0 AM EST on August 26, 2023 (bottom).

Appendix D: $PM_{2.5}$ Surface Concentrations in the Southeast

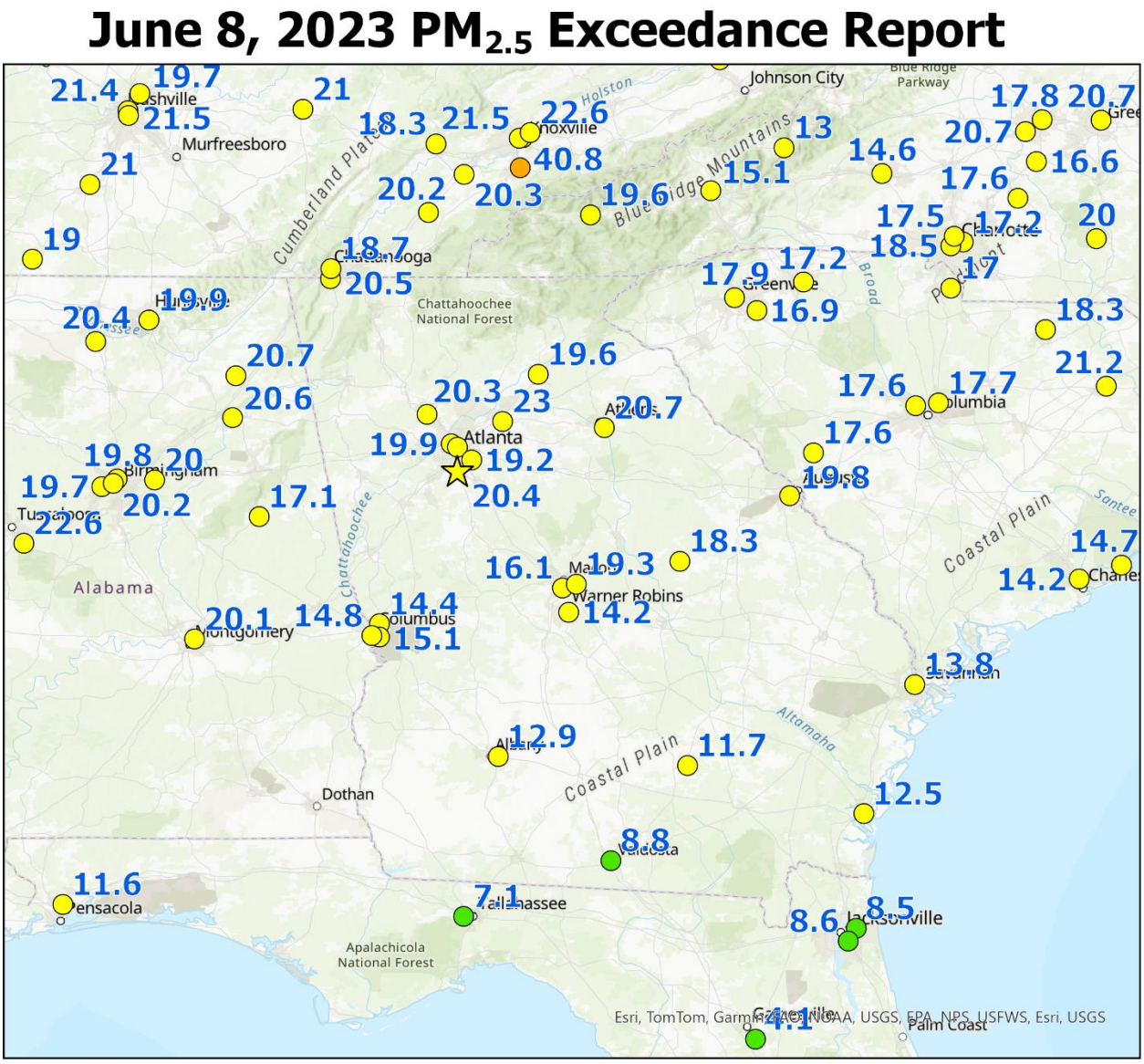
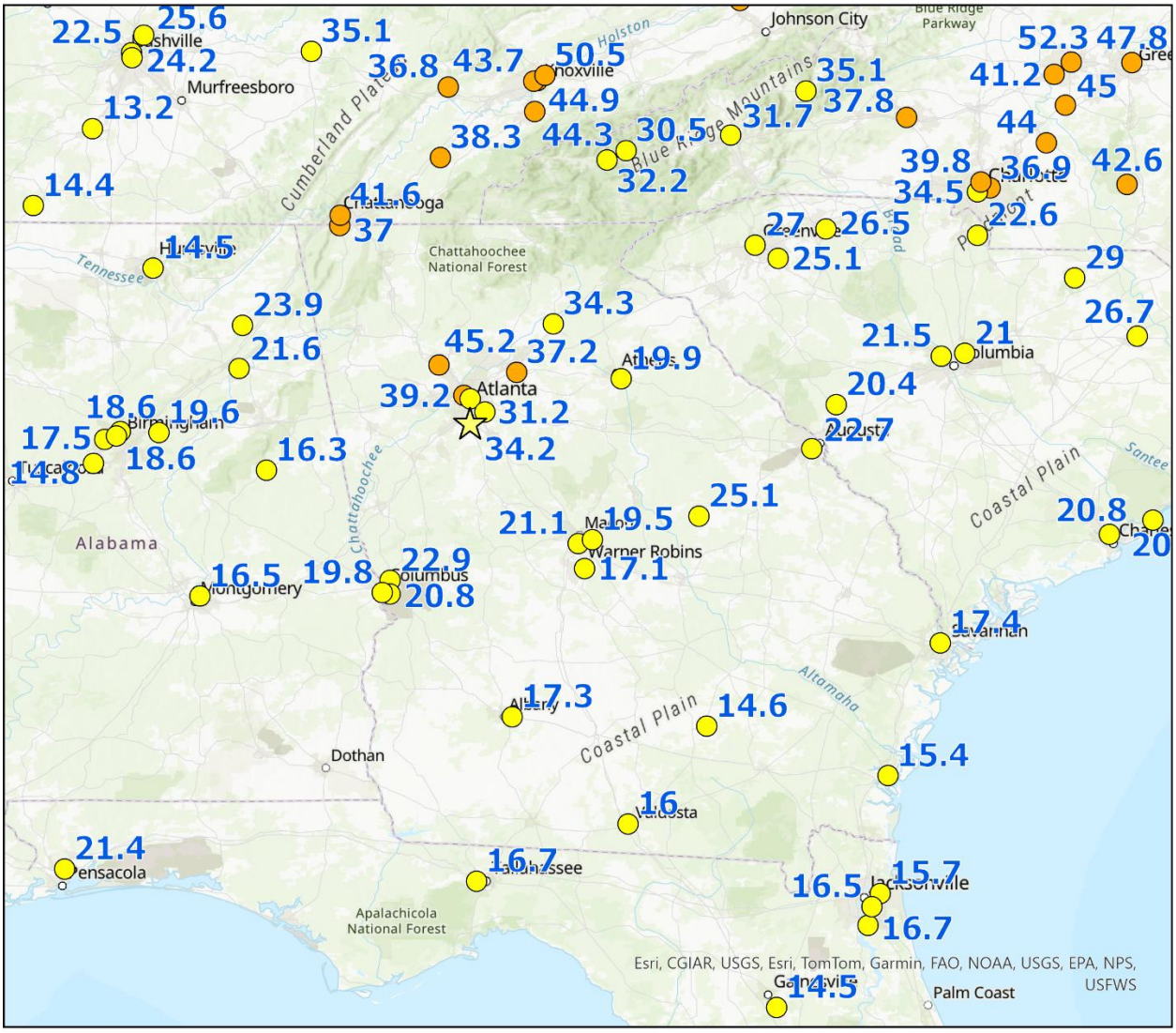


Figure D1. Surface level, daily $PM_{2.5}$ concentrations on June 8, 2023, across the southeast. The Forest Park site is represented by a star. Numerous sites measured concentrations that exceeded the level of annual $PM_{2.5}$ NAAQS.

June 29, 2023 $PM_{2.5}$ Exceedance Report



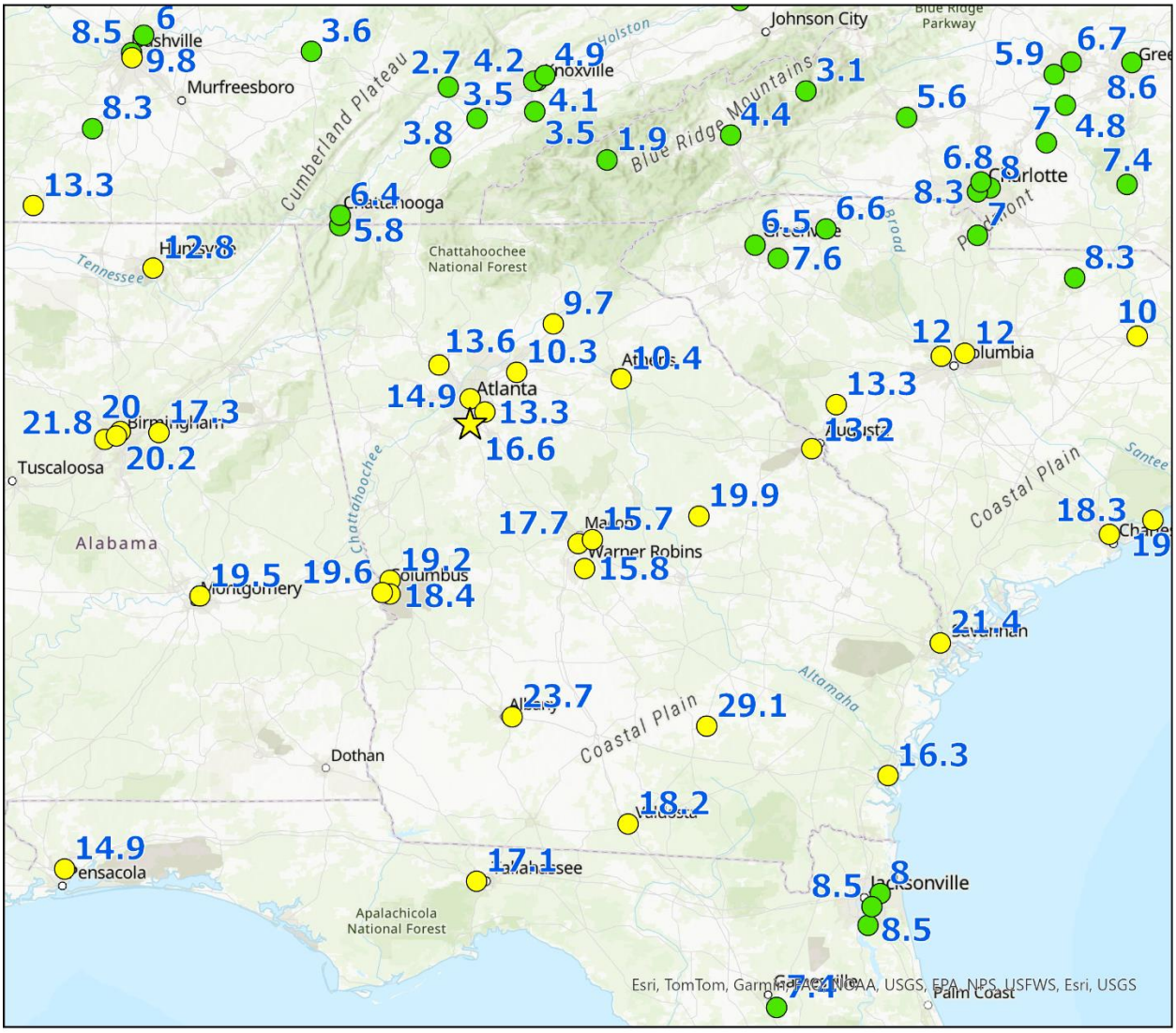
AQI category - 24-hr average $PM_{2.5}$

FINAL

- Good (0-9 ug/m^3)
- Moderate (9.1-35.4 ug/m^3)
- Unhealthy for sensitive (35.5-55.4 ug/m^3)
- Unhealthy (55.5-150.4 ug/m^3)
- Very unhealthy (150.4-250.4 ug/m^3)
- Hazardous (>250.4 ug/m^3)

Figure D2. Surface level, daily $PM_{2.5}$ concentrations on June 29, 2023, across the southeast. The Forest Park site is represented by a star. Numerous sites measured concentrations that exceeded the level of annual $PM_{2.5}$ NAAQS.

July 20, 2023 $PM_{2.5}$ Exceedance Report



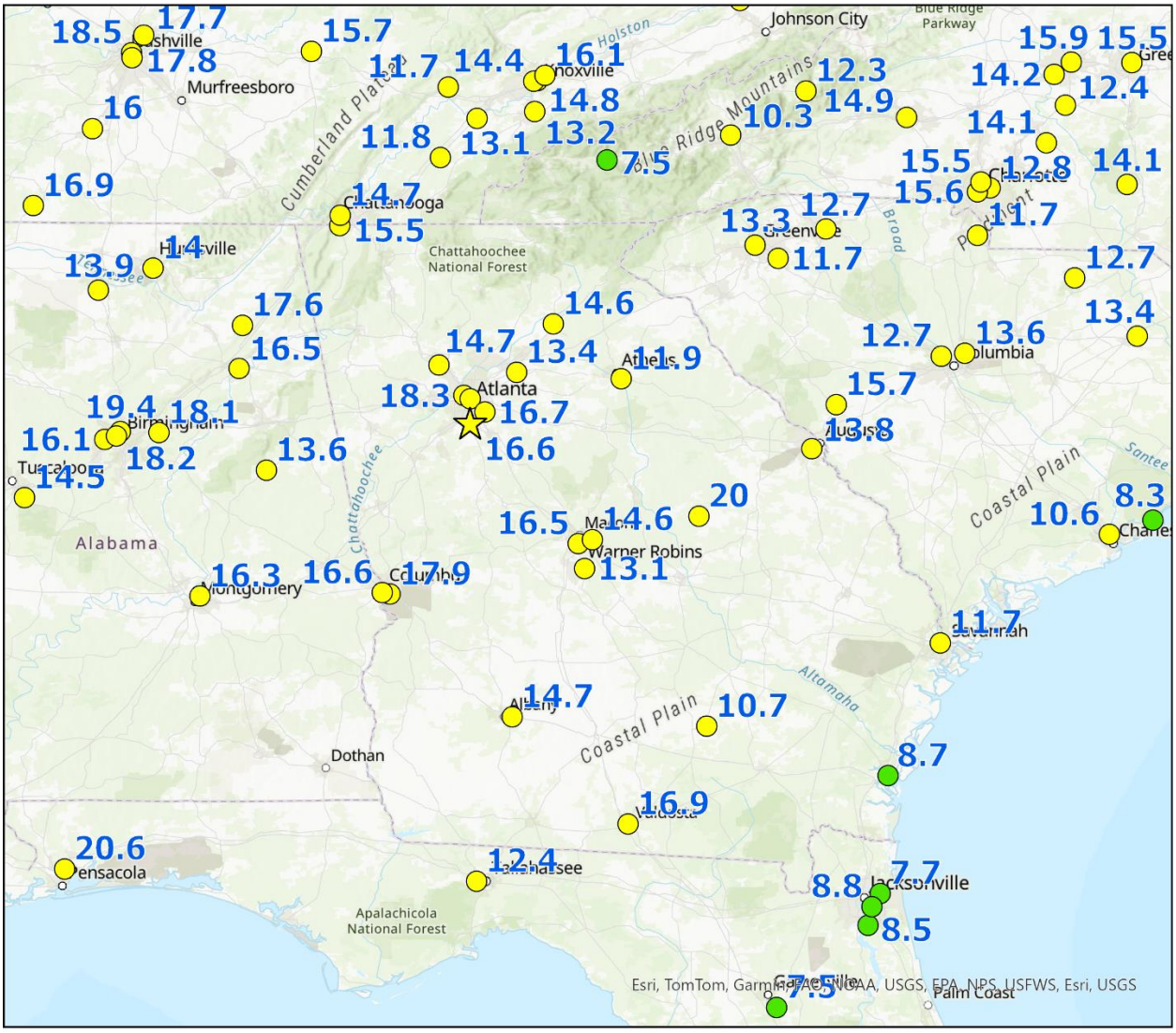
AQI category - 24-hr average $PM_{2.5}$

FINAL

- Good (0-9 ug/m^3)
- Moderate (9.1-35.4 ug/m^3)
- Unhealthy for sensitive (35.5-55.4 ug/m^3)
- Unhealthy (55.5-150.4 ug/m^3)
- Very unhealthy (150.4-250.4 ug/m^3)
- Hazardous (>250.4 ug/m^3)

Figure D3. Surface level, daily $PM_{2.5}$ concentrations on July 20, 2023, across the southeast. The Forest Park site is represented by a star. Numerous sites measured concentrations that exceeded the level of annual $PM_{2.5}$ NAAQS.

July 26, 2023 $PM_{2.5}$ Exceedance Report



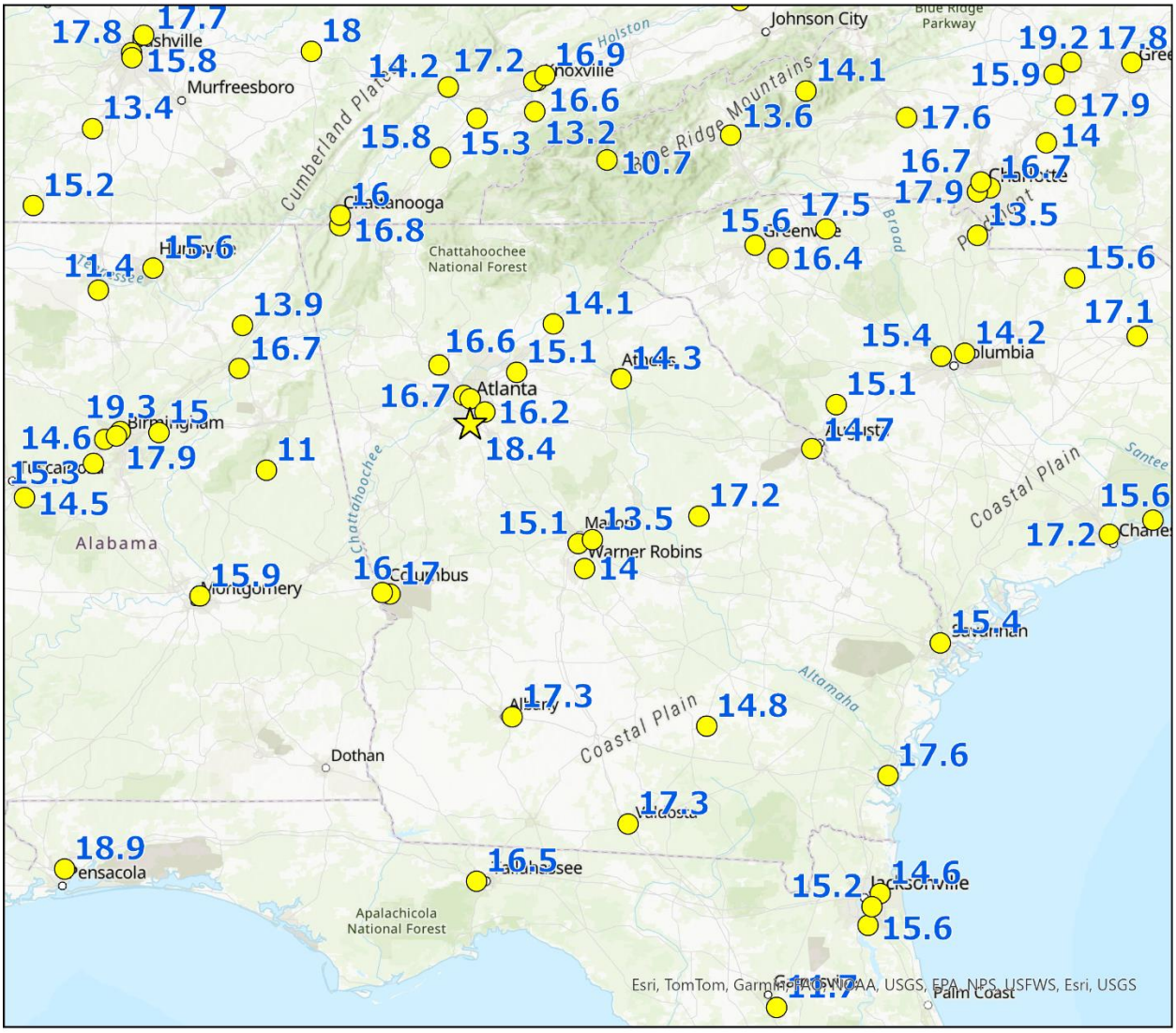
AQI category - 24-hr average $PM_{2.5}$

FINAL

- Good (0-9 ug/m^3)
- Moderate (9.1-35.4 ug/m^3)
- Unhealthy for sensitive (35.5-55.4 ug/m^3)
- Unhealthy (55.5-150.4 ug/m^3)
- Very unhealthy (150.4-250.4 ug/m^3)
- Hazardous (>250.4 ug/m^3)

Figure D4. Surface level, daily $PM_{2.5}$ concentrations on July 26, 2023, across the southeast. The Forest Park site is represented by a star. Numerous sites measured concentrations that exceeded the level of annual $PM_{2.5}$ NAAQS.

August 22, 2023 $PM_{2.5}$ Exceedance Report



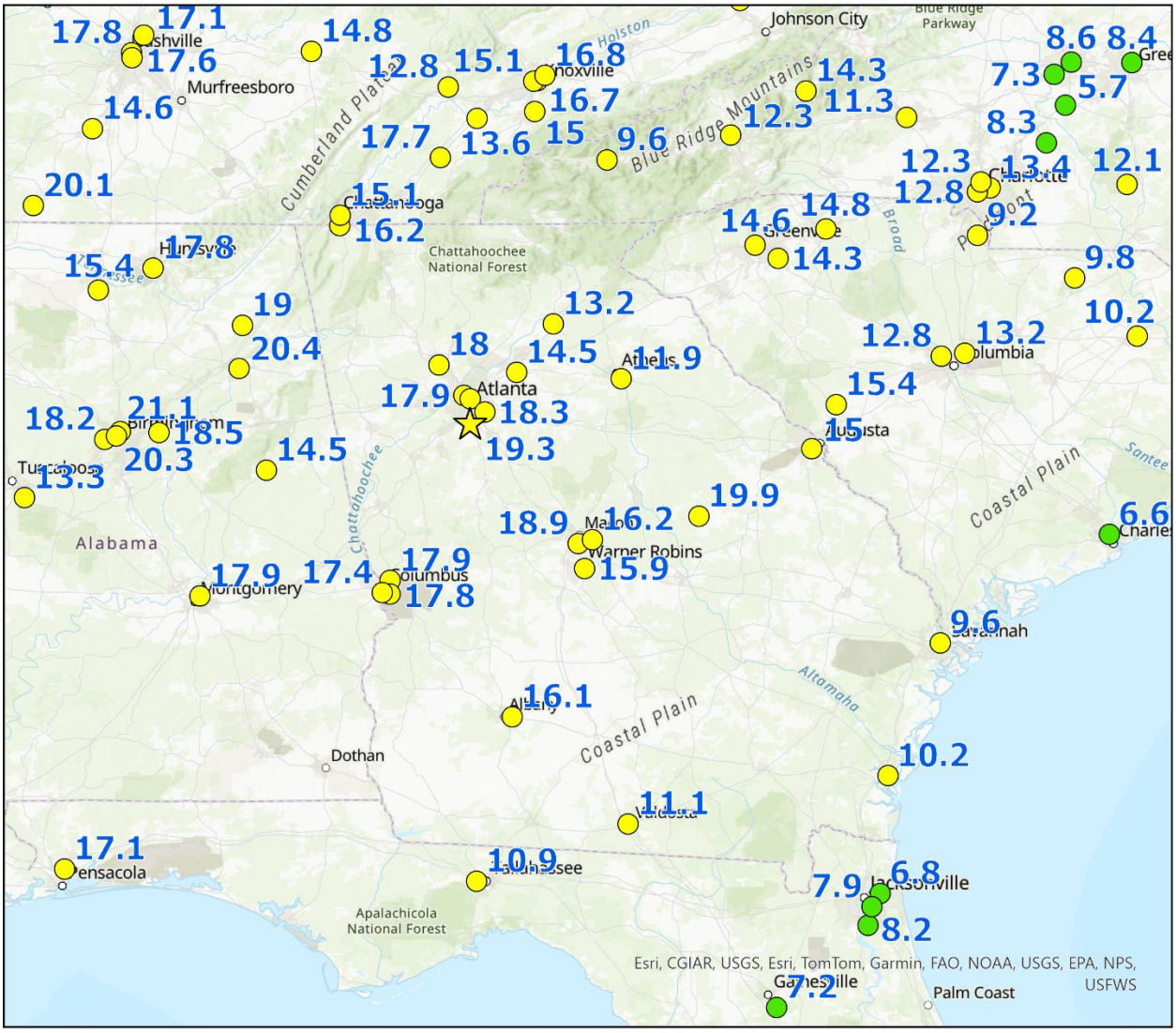
AQI category - 24-hr average $PM_{2.5}$

FINAL

- Good (0-9 ug/m^3)
- Moderate (9.1-35.4 ug/m^3)
- Unhealthy for sensitive (35.5-55.4 ug/m^3)
- Unhealthy (55.5-150.4 ug/m^3)
- Very unhealthy (150.4-250.4 ug/m^3)
- Hazardous (>250.4 ug/m^3)

Figure D5. Surface level, daily $PM_{2.5}$ concentrations on August 22, 2023, across the southeast. The Forest Park site is represented by a star. Numerous sites measured concentrations that exceeded the level of annual $PM_{2.5}$ NAAQS.

August 25, 2023 $PM_{2.5}$ Exceedance Report



AQI category - 24-hr average $PM_{2.5}$

FINAL

- Good (0-9 ug/m^3)
- Moderate (9.1-35.4 ug/m^3)
- Unhealthy for sensitive (35.5-55.4 ug/m^3)
- Unhealthy (55.5-150.4 ug/m^3)
- Very unhealthy (150.4-250.4 ug/m^3)
- Hazardous (>250.4 ug/m^3)

Figure D6. Surface level, daily $PM_{2.5}$ concentrations on August 25, 2023, across the southeast. The Forest Park site is represented by a star. Numerous sites measured concentrations that exceeded the level of annual $PM_{2.5}$ NAAQS.

Appendix E: Hourly $PM_{2.5}$ Time Series

No hourly $PM_{2.5}$ times series available for the Forest Park site.

Appendix F: Upper Air Maps

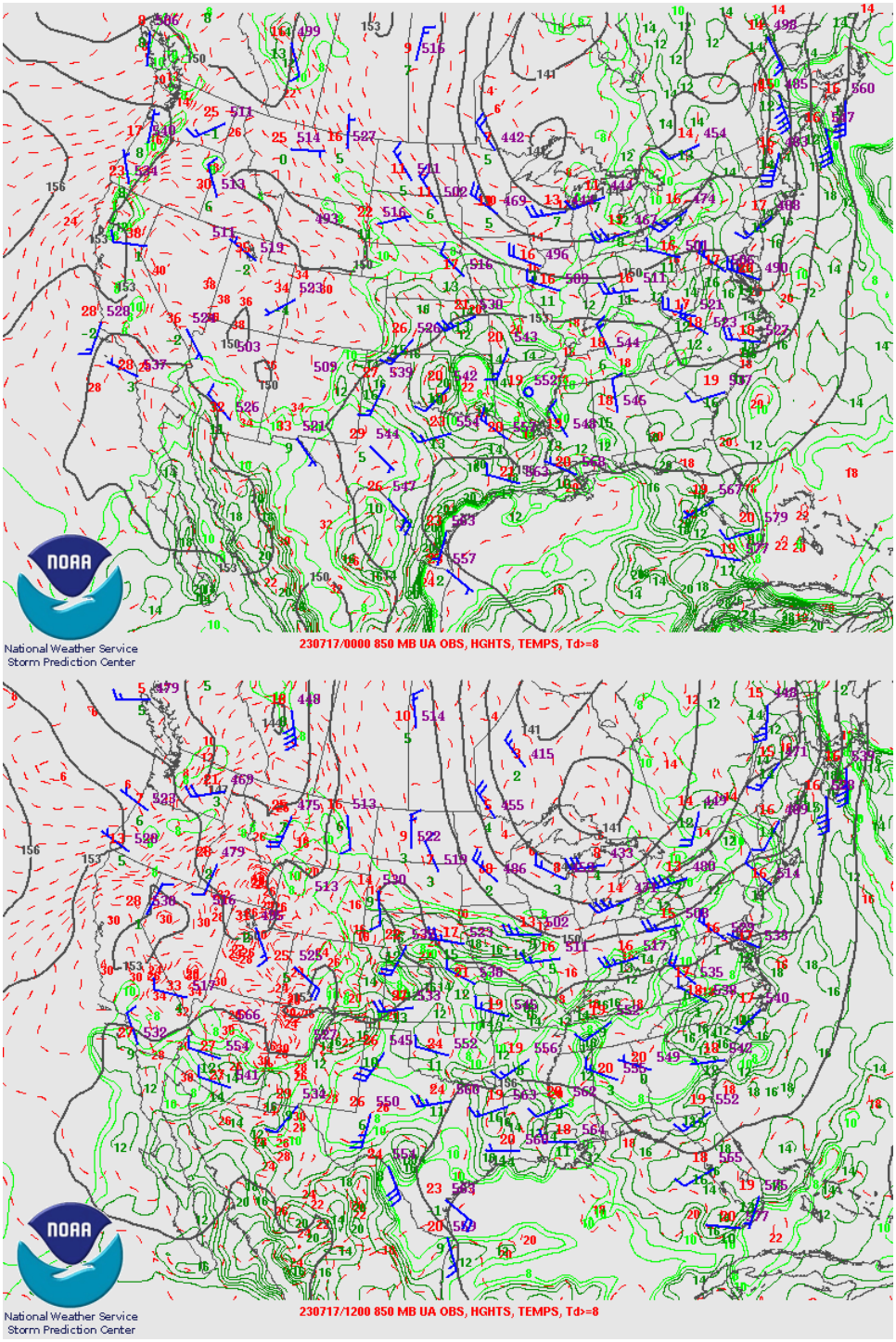


Figure F1. Storm Prediction Center upper air maps for July 17, 2023 at 00 UTC (top) and at 12 UTC (bottom). Maps are generated at a pressure of 850 mb (altitude of 1170-1590 m MSL). Wind barbs (degrees from north, knots) are plotted in blue, isotherms (degrees Celsius (°C)) in red, isodrosotherms (°C) in green contours, and isoheights (m MSL) in dark grey.

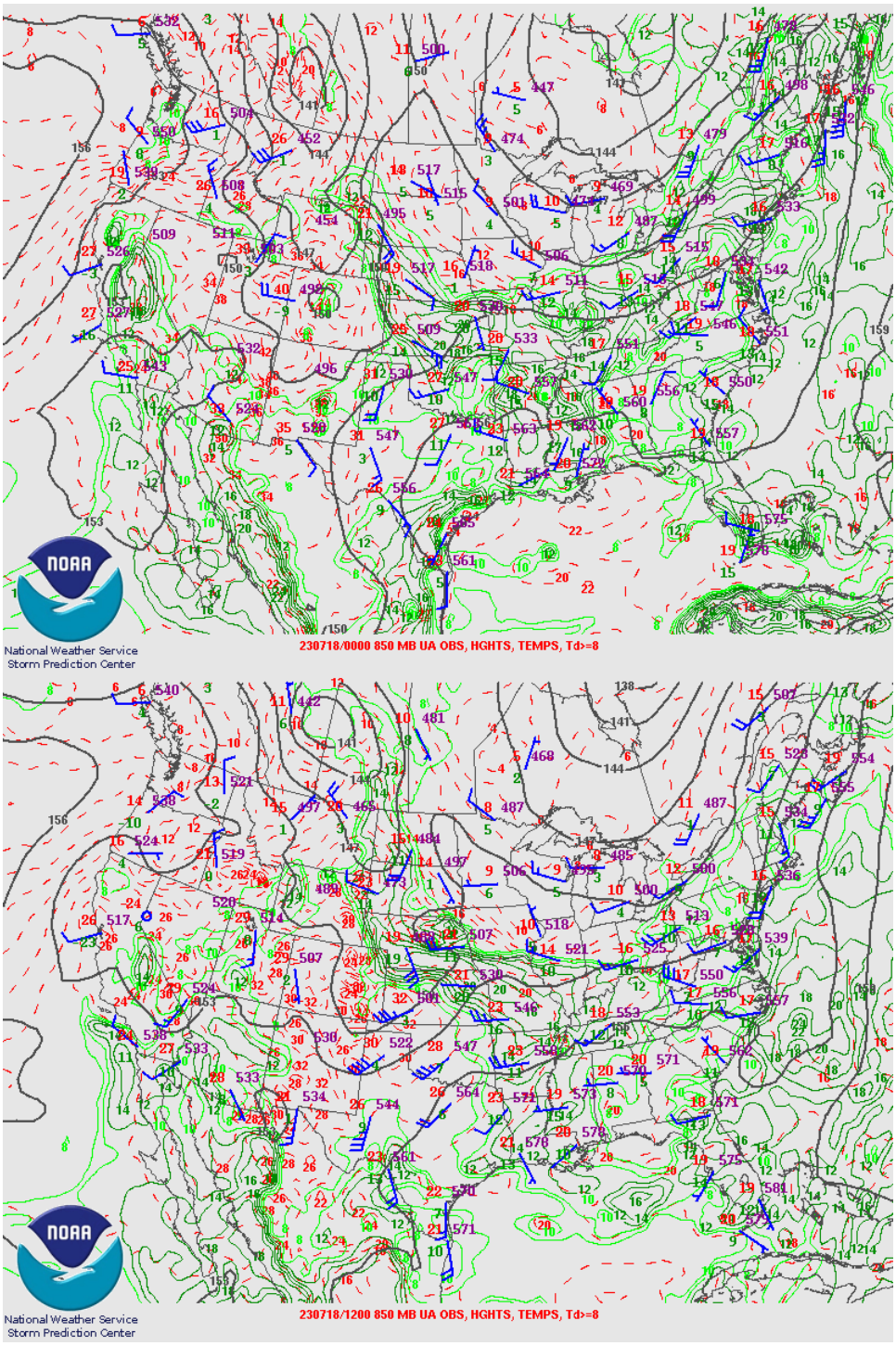


Figure F2. Storm Prediction Center upper air maps for July 18, 2023, at 00 UTC (top) and at 12 UTC (bottom). Maps are generated at a pressure of 850 mb (altitude of 1170-1590 m MSL). Wind barbs (degrees from north, knots) are plotted in blue, isotherms (°C) in red, isodrosotherms (°C) in green contours, and isoheights (m MSL) in dark grey.

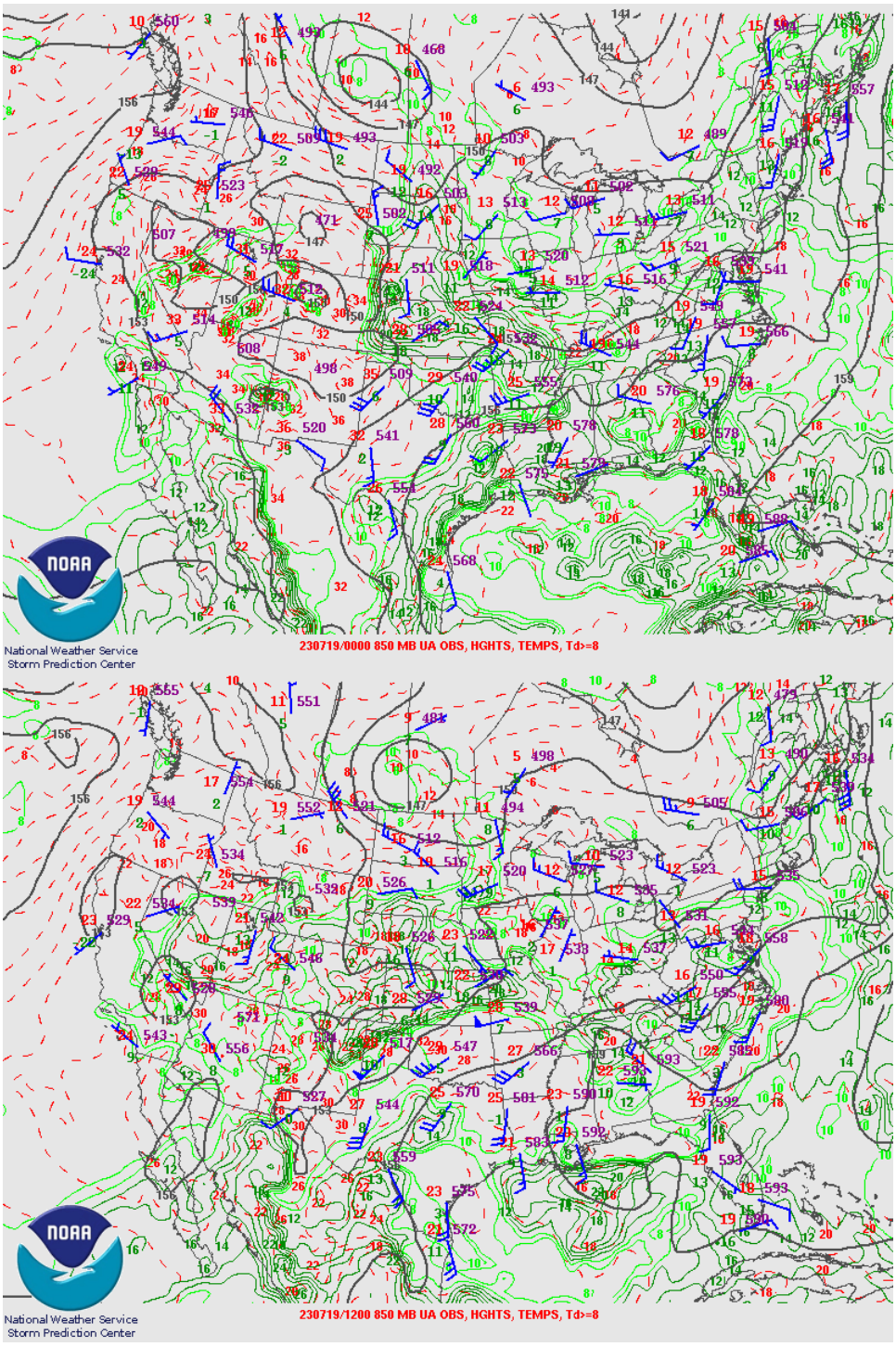


Figure F3. Storm Prediction Center upper air maps for July 19, 2023, at 00 UTC (top) and at 12 UTC (bottom). Maps are generated at a pressure of 850 mb (altitude of 1170-1590 m MSL). Wind barbs (degrees from north, knots) are plotted in blue, isotherms (°C) in red, isodrosotherms (°C) in green contours, and isoheights (m MSL) in dark grey.

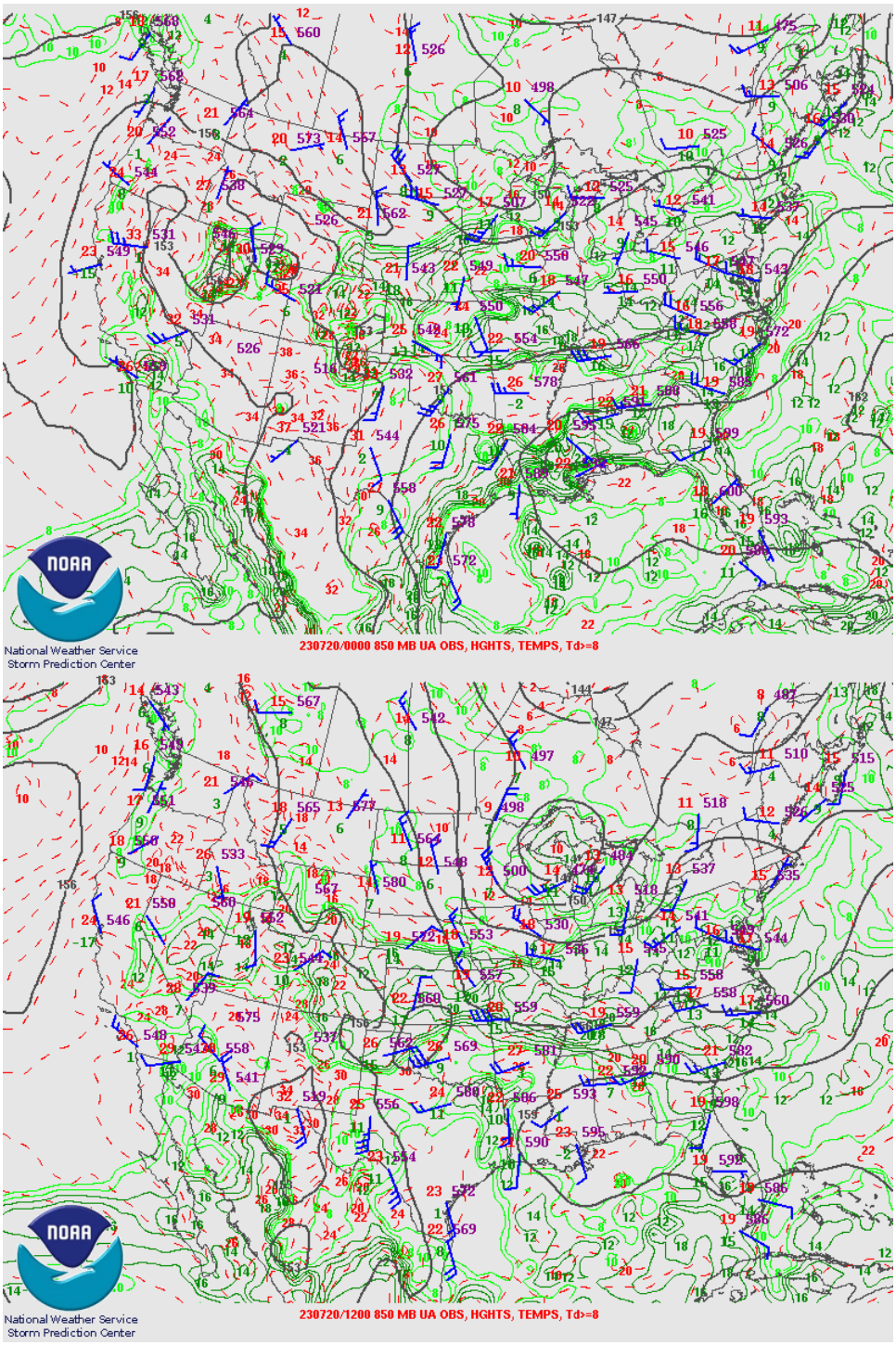


Figure F4. Storm Prediction Center upper air maps for July 20, 2023, at 00 UTC (top) and at 12 UTC (bottom). Maps are generated at a pressure of 850 mb (altitude of 1170-1590 m MSL). Wind barbs (degrees from north, knots) are plotted in blue, isotherms (°C) in red, isodrosotherms (°C) in green contours, and isoheights (m MSL) in dark grey.

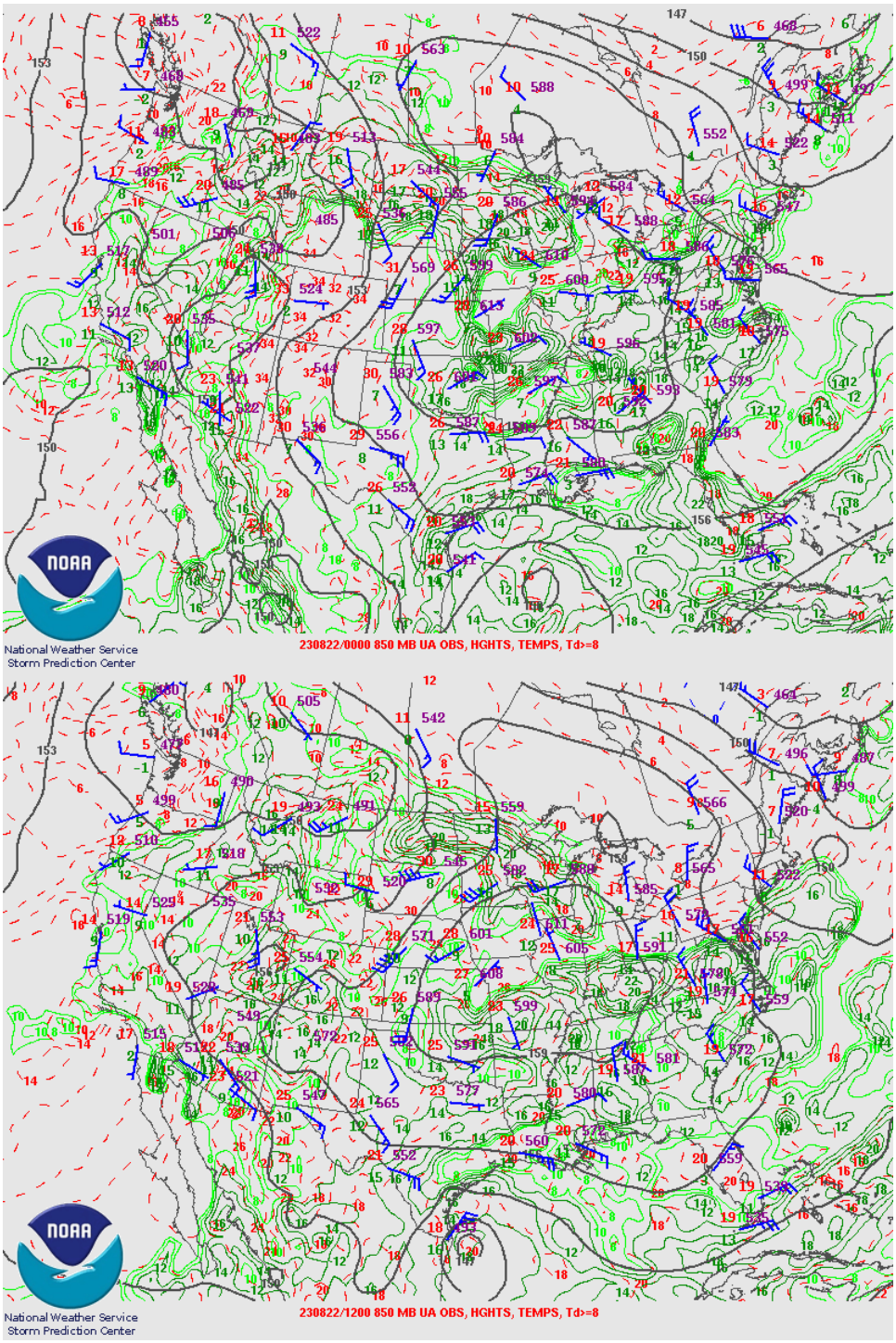


Figure F5. Storm Prediction Center upper air maps for August 22, 2023, at 00 UTC (top) and at 12 UTC (bottom). Maps are generated at a pressure of 850 mb (altitude of 1170-1590 m MSL). Wind barbs (degrees from north, knots) are plotted in blue, isotherms (°C) in red, isodrosotherms (°C) in green contours, and isoheights (m MSL) in dark grey.

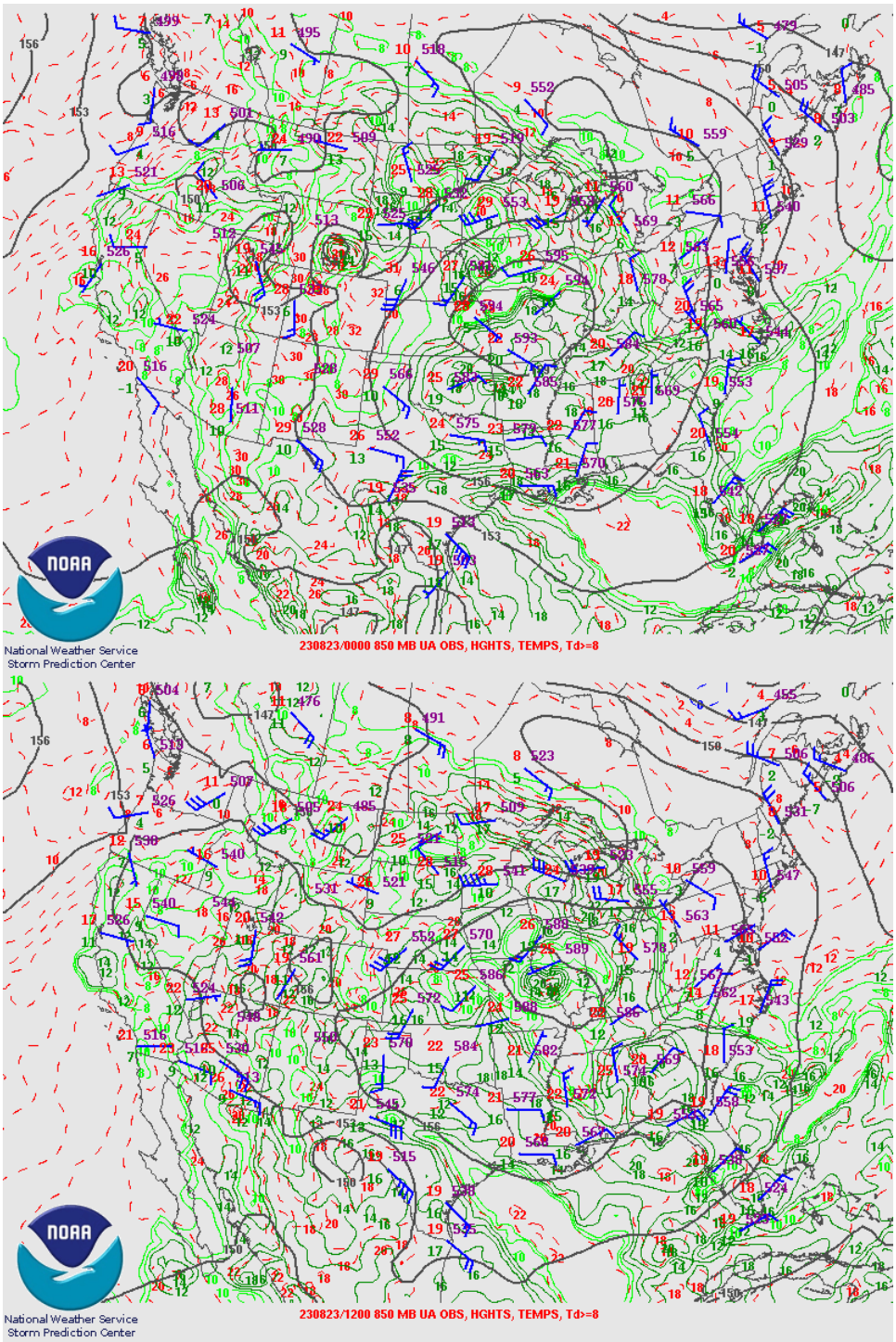


Figure F6. Storm Prediction Center upper air maps for August 23, 2023, at 00 UTC (top) and at 12 UTC (bottom). Maps are generated at a pressure of 850 mb (altitude of 1170-1590 m MSL). Wind barbs (degrees from north, knots) are plotted in blue, isotherms (°C) in red, isodrosotherms (°C) in green contours, and isoheights (m MSL) in dark grey.

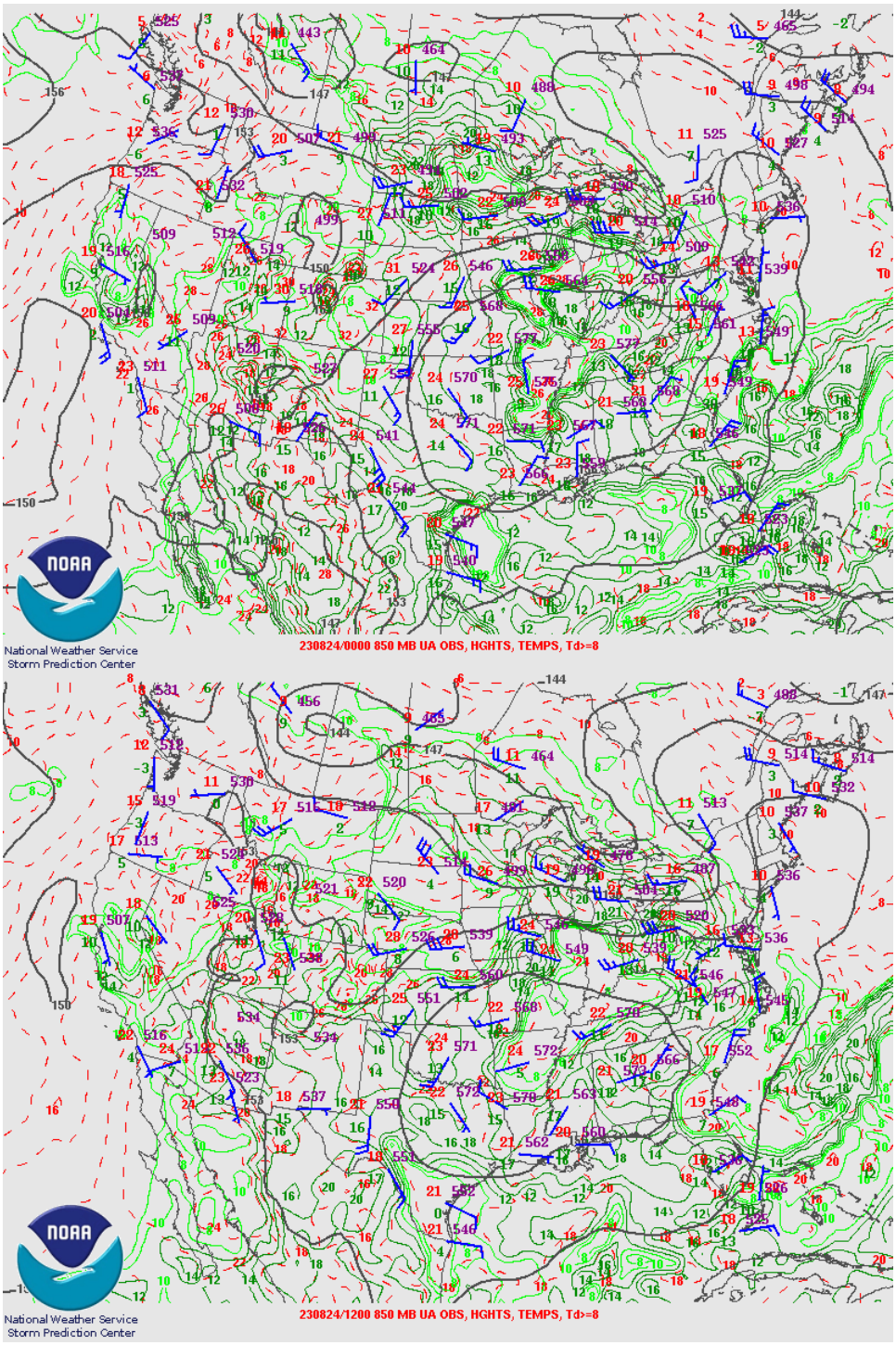


Figure F7. Storm Prediction Center upper air maps for August 24, 2023, at 00 UTC (top) and at 12 UTC (bottom). Maps are generated at a pressure of 850 mb (altitude of 1170-1590 m MSL). Wind barbs (degrees from north, knots) are plotted in blue, isotherms (°C) in red, isodrosotherms (°C) in green contours, and isoheights (m MSL) in dark grey.

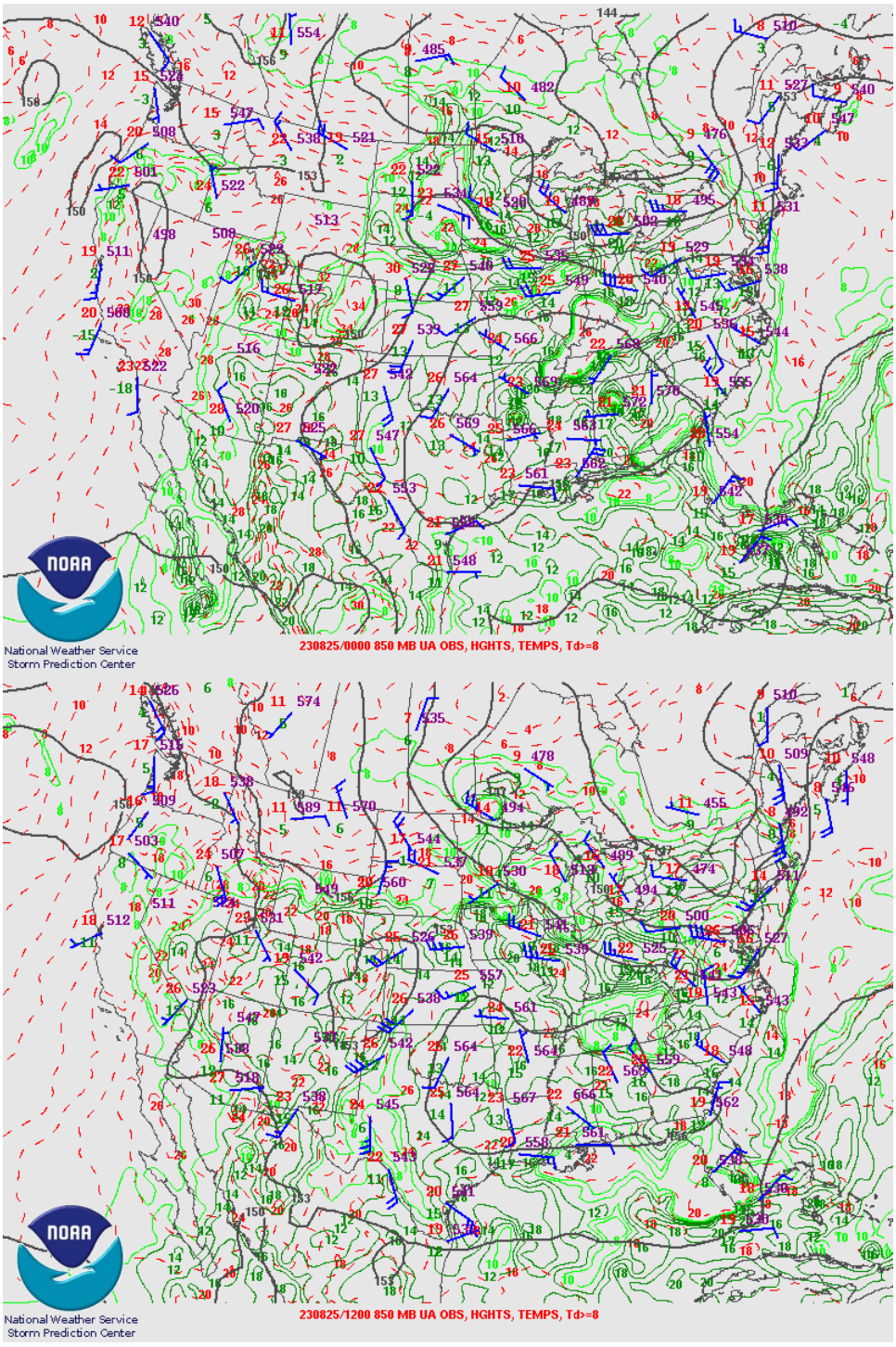


Figure F8. Storm Prediction Center upper air maps for August 25, 2023, at 00 UTC (top) and at 12 UTC (bottom). Maps are generated at a pressure of 850 mb (altitude of 1170-1590 m MSL). Wind barbs (degrees from north, knots) are plotted in blue, isotherms (°C) in red, isodrosotherms (°C) in green contours, and isoheights (m MSL) in dark grey.

Appendix G: Public Comments

Appendix H: Responses to Public Comments