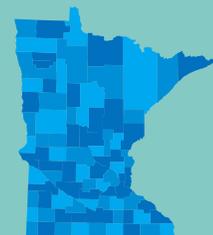


October 2023

Adjustment to 2021 and 2022 fine particulate matter background used in air dispersion modeling to account for wildfire smoke



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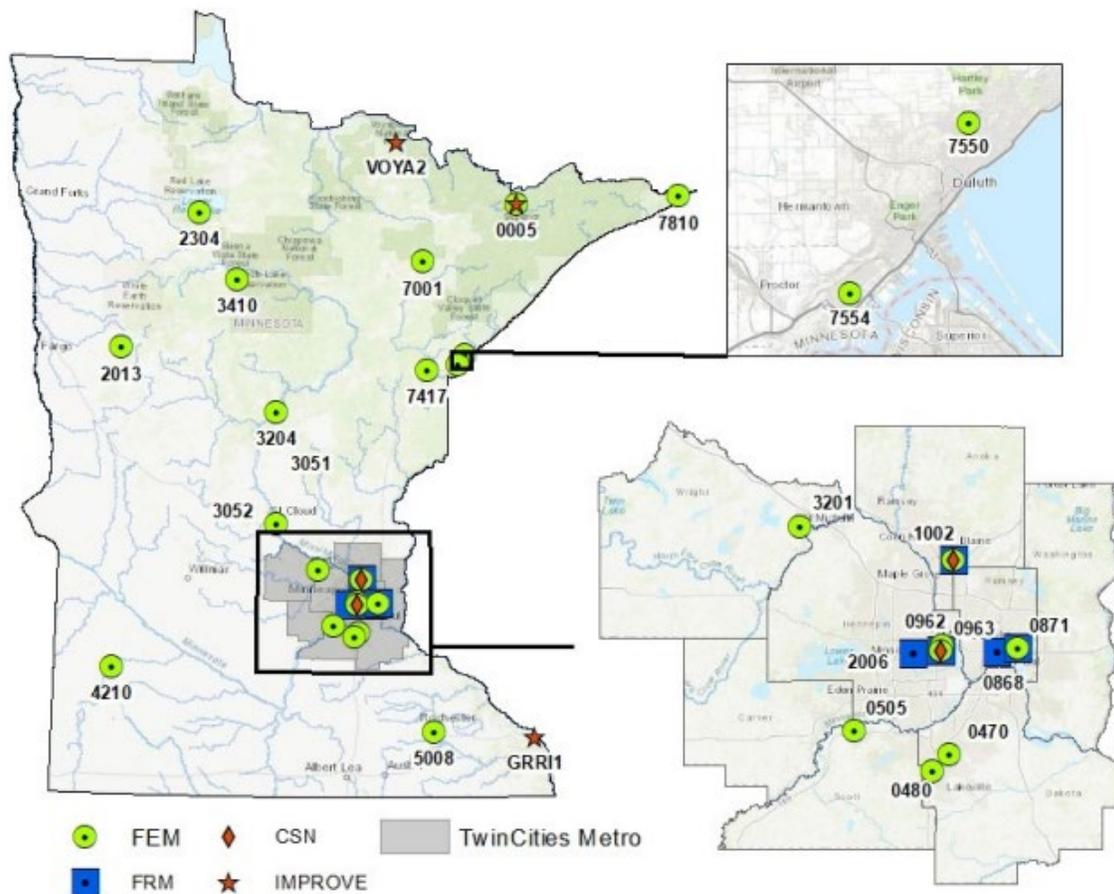
This report is available in alternative formats upon request, and online at www.pca.state.mn.us.

Document number: aq2-215

Overview

Air dispersion modeling background concentrations are typically set to the current monitor design values. This document provides evidence that monitors were impacted by smoke in 2021 and 2022, and that the 2020-2022 design values are inflated by smoke. During 2021 Minnesota was affected by smoke from wildfires in Canada and within Minnesota during July and August 2021, and during 2022 Minnesota was affected by fires in the southwest US and western Canada. While the smoke did not change the attainment status at any locations, the smoke significantly increased the background concentrations of 24-hour coarse particulate (PM₁₀) and 24-hour and annual fine particulate (PM_{2.5}) used for air dispersion modeling. In 2021, smoke from fires located in Canada impacted Minnesota monitors from July 1 to August 8, and smoke from fires in northeast Minnesota and adjacent areas of western Ontario impacted monitors from August 22-27. In 2022, smoke from wildfires in the southwest United States (US) impacted Minnesota monitors on June 14, and a combination of smoke from wildfires in western Canada and prescribed fires in southern Saskatchewan, Manitoba, and North Dakota impacted Minnesota monitors from October 20 to October 22.

Figure 1: PM_{2.5} monitoring sites in Minnesota



For 24-hour PM_{2.5}, monitors in northern Minnesota had the greatest smoke impacts. The highest impact was at Leech Lake, where smoke pushed the 2021 98th percentile from 17.6 µg/m³ to 48.5 µg/m³. Even monitors in southern Minnesota, farther away from the fires, had an increase of at least 3-5 µg/m³ due to the smoke. Table 1 lists the 98th percentile 24-hour PM_{2.5} values for 2021. Smoke was still observed on a few days in 2022, with smaller impacts to the 98th percentile PM_{2.5} concentrations in 2022 (see Table 2). Table 3 lists the 2020-2022 24-hour PM_{2.5} design values with and without smoke. Even though smoke impacted only a few monitor days, there was a measurable increase in annual PM_{2.5} values. Many monitors had an increase of 2-3 µg/m³ in annual PM_{2.5} concentrations due to wildfire smoke in 2021 (Table 4), and slight increases in annual PM_{2.5} due to wildfire smoke in 2022 (Table 5). Table 6 lists the 2020-2022 annual PM_{2.5} design values with and without smoke.

Table 1: Summary of 2021 24-hour PM_{2.5} 98th percentile values and effects of removing days influenced by wildfire smoke

Monitor name	AQS	PM _{2.5} 98 th percentile including wildfire smoke (µg/m ³)	PM _{2.5} 98 th percentile excluding wildfire smoke (µg/m ³)
Apple Valley	270370470	26.5	21.5
Blaine	270031002	27.6	19.0
Brainerd	270353204	28.3	13.5
Detroit Lakes	270052013	43.7	20.5
Duluth-WDSE	271377550	18.9	14.7
Ely	270750005	26.4	11.0
Fargo NW	380171004	59.8	22.2
Fond du Lac	270177417	24.4	10.8
Grand Portage	270317810	22.4	11.9
Lacrosse DOT	550630012	26.6	20.4
Lakeville – Near Road	270370480	26.5	21.4
Leech Lake Nation	270213410	48.5	17.5
Marshall	270834210	30.0	15.4
Minneapolis-Near Road	270530962	27.5	21.9
Minneapolis-Phillips	270530963	27.3	21.7
No index entries found.	270072304	46.3	14.5
Rochester	271095008	20.9	15.7
Shakopee	271390505	23.1	20.2
St. Cloud	271453052	29.9	23.5
St. Michael	271713201	28.5	21.7
St. Paul-Harding	271230871	29.5	21.6
Virginia	271377001	34.2	13.2
West Duluth	271377554	22.6	14.9

Table 2: Summary of 2022 24-hour PM_{2.5} 98th percentile values and effects of removing days influenced by wildfire smoke

Monitor name	AQS	PM _{2.5} 98 th percentile including wildfire smoke (µg/m ³)	PM _{2.5} 98 th percentile excluding wildfire smoke (µg/m ³)
Apple Valley	270370470	15.1	14.9
Blaine	270031002	15.7	14.5
Brainerd	270353204	15.8	14.5
Detroit Lakes	270052013	13.1	12.8
Duluth-WDSE	271377550	12.8	12.4
Ely	270750005	12.8	12.8
Fargo NW	380171004	22.1	19.5
Fond du Lac	270177417	7.7	7.7
Grand Portage	270317810	8.3	7.4
Lacrosse DOT	550630012	18.9	17.1
Lakeville – Near Road	270370480	16.4	16
Leech Lake Nation	270213410	13.2	12.5
Marshall*	270834210	20	14
Minneapolis-Near Road	270530962	19.2	18.3
Minneapolis-Phillips	270530963	19	17.5
No index entries found.	270072304	11.3	11.3
Rochester	271095008	19.5	17.1
Shakopee	271390505	16.5	15.4
St. Cloud	271453052	17	15.2
St. Michael	271713201	15.9	15.7
St. Paul-Harding	271230871	17.4	16.6
Virginia	271377001	11.8	11.7
West Duluth	271377554	13.3	13.3

*Excludes erroneously high values at Marshall 2/22/22 to 2/25/22

Table 3: Summary of 2020-2022 24-hour PM_{2.5} design values and effects of removing days influenced by wildfire smoke

Monitor name	AQS	PM _{2.5} 24-hour design values including wildfire smoke (µg/m ³)	PM _{2.5} 24-hour design values excluding wildfire smoke (µg/m ³)
Apple Valley	270370470	19	18
Blaine	270031002	20	18
Brainerd	270353204	19	13
Detroit Lakes	270052013	24	16
Duluth-WDSE	271377550	16	14
Ely	270750005	16	12
Fargo NW	380171004	31	21
Fond du Lac	270177417	13	9
Grand Portage	270317810	14	9
Lacrosse DOT	550630012	21	19
Lakeville – Near Road	270370480	20	18

Monitor name	AQS	PM _{2.5} 24-hour design values including wildfire smoke (µg/m ³)	PM _{2.5} 24-hour design values excluding wildfire smoke (µg/m ³)
Leech Lake Nation	270213410	25	14
Marshall	270834210	22	16
Minneapolis-Near Road	270530962	22	20
Minneapolis-Phillips	270530963	22	20
Red Lake Nation	270072304	24	13
Rochester	271095008	19	17
Shakopee	271390505	18	17
St. Cloud	271453052	21	18
St. Michael	271713201	20	18
St. Paul-Harding	271230871	21	21
Virginia	271377001	19	12
West Duluth	271377554	17	14

Table 4: Summary of 2021 Annual PM_{2.5} concentrations and effects of removing days influenced by wildfire smoke

Monitor name	AQS	PM _{2.5} 2021 annual concentrations including wildfire smoke (µg/m ³)	PM _{2.5} 2021 annual concentrations excluding wildfire smoke (µg/m ³)
Apple Valley	270370470	6.6	5.7
Blaine	270031002	7.6	6.6
Brainerd	270353204	6.9	4.5
Detroit Lakes	270052013	12.1	9.7
Duluth-WDSE	271377550	4.3	2.5
Ely	270750005	5.3	3.3
Fargo NW	380171004	11.1	7.7
Fond du Lac	270177417	4.5	2.7
Grand Portage	270317810	3.8	2.2
Lacrosse DOT	550630012	8.5	7.9
Lakeville – Near Road	270370480	8.8	7.9
Leech Lake Nation	270213410	13.3	10.5
Marshall	270834210	7.5	6.1
Minneapolis-Near Road	270530962	8.5	7.7
Minneapolis-Phillips	270530963	7.7	6.6
Red Lake Nation	270072304	8.3	5.5
Rochester	271095008	6.1	5.3
Shakopee	271390505	6.7	6.3
St. Cloud	271453052	8.9	7.1
St. Michael	271713201	8.9	7.6
St. Paul-Harding	271230871	8.1	7.3
Virginia	271377001	6.5	4.7
West Duluth	271377554	5.7	4.9

Table 5: Summary of 2022 Annual PM_{2.5} concentrations and effects of removing days influenced by wildfire smoke

Monitor name	AQS	PM _{2.5} 2022 annual concentrations including wildfire smoke (µg/m ³)	PM _{2.5} 2022 annual concentrations excluding wildfire smoke (µg/m ³)*
Apple Valley	270370470	6.1	6.2
Blaine	270031002	5.9	5.8
Brainerd	270353204	5.7	5.6
Detroit Lakes	270052013	5.1	5.2
Duluth-WDSE	271377550	3.1	3.6
Ely	270750005	4.3	4.3
Fargo NW	380171004	7.6	7.5
Fond du Lac	270177417	1.4	2.4
Grand Portage	270317810	1.2	2.1
Lacrosse DOT	550630012	7.4	7.3
Lakeville – Near Road	270370480	6.3	6.3
Leech Lake Nation	270213410	5.9	5.9
Marshall	270834210	5.9	5.8
Minneapolis-Near Road	270530962	7.6	7.5
Minneapolis-Phillips	270530963	7.8	7.6
Red Lake Nation	270072304	4.7	4.7
Rochester	271095008	6.5	6.4
Shakopee	271390505	6.9	6.7
St. Cloud	271453052	6.6	6.5
St. Michael	271713201	6.2	6.0
St. Paul-Harding	271230871	6.6	6.6
Virginia	271377001	4.6	4.6
West Duluth	271377554	3.9	4.5

*Also omits any daily values <0 µg/m³

Table 6: Summary of 2020-2022 annual PM_{2.5} design values and effects of removing days influenced by wildfire smoke

Monitor name	AQS	PM _{2.5} annual design values including wildfire smoke (µg/m ³)	PM _{2.5} annual design values excluding wildfire smoke (µg/m ³)
Apple Valley	270370470	6.7	6.5
Blaine	270031002	6.6	6.2
Brainerd	270353204	4.7	4.4
Detroit Lakes	270052013	5.5	4.8
Duluth-WDSE	271377550	7.8	6.8
Ely	270750005	2.2	2.1
Fargo NW	380171004	7.2	6.2
Fond du Lac	270177417	4.5	4.7
Grand Portage	270317810	4.9	4.8
Lacrosse DOT	550630012	8.3	7.6
Lakeville – Near Road	270370480	2.3	2.3

Monitor name	AQS	PM _{2.5} annual design values including wildfire smoke (µg/m ³)	PM _{2.5} annual design values excluding wildfire smoke (µg/m ³)
Leech Lake Nation	270213410	7.9	7.6
Marshall	270834210	7.4	7.1
Minneapolis-Near Road	270530962	6.4	5.7
Minneapolis-Phillips	270530963	7.8	7.5
Red Lake Nation	270072304	8	7.7
Rochester	271095008	6.2	5.3
Shakopee	271390505	6	5.8
St. Cloud	271453052	6.4	6.3
St. Michael	271713201	7.1	6.5
St. Paul-Harding	271230871	7	6.6
Virginia	271377001	7.2	7.2
West Duluth	271377554	5.1	4.5

Meteorological and climatological conditions

Much of the Upper Midwest and South Central Canada were under severe to exceptional drought during the summer of 2021 (Figure 2). By June 30, most of the Upper Midwest and South Central Canada was experiencing drought, with extreme and exceptional drought in much of southern Manitoba and the Dakotas. Precipitation avoided the area for most of the summer, and the area covered by extreme and exceptional drought spread eastward into Minnesota and western Ontario throughout the rest of the summer. The drought set the stage for an active fire season in south central Canada and northern Minnesota.

Figure 2a: North American drought monitor for June 30, 2021.

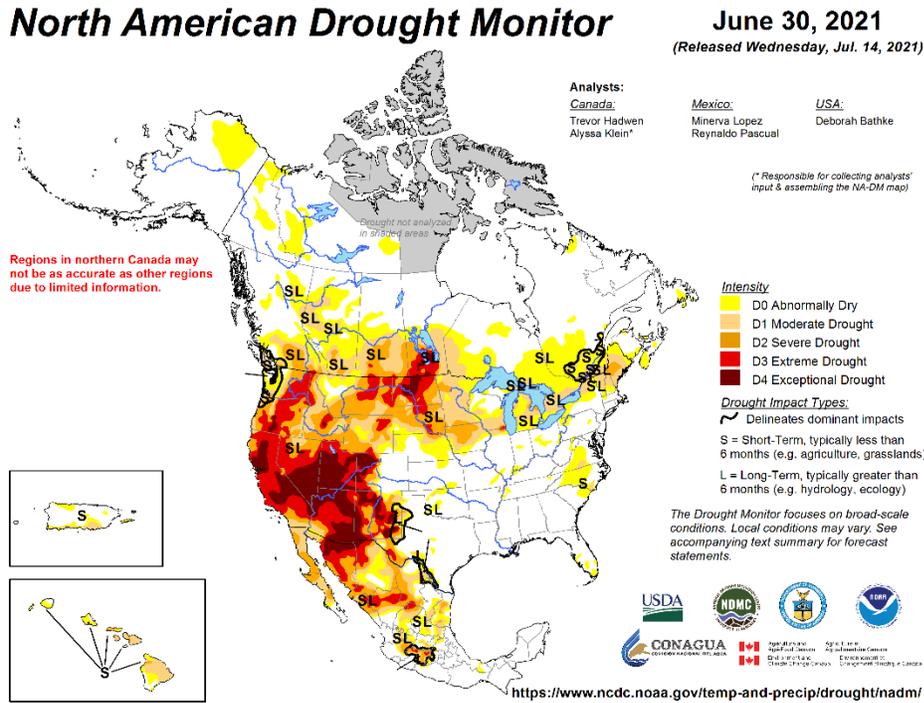


Figure 2b: North American drought monitor for July 31, 2021.

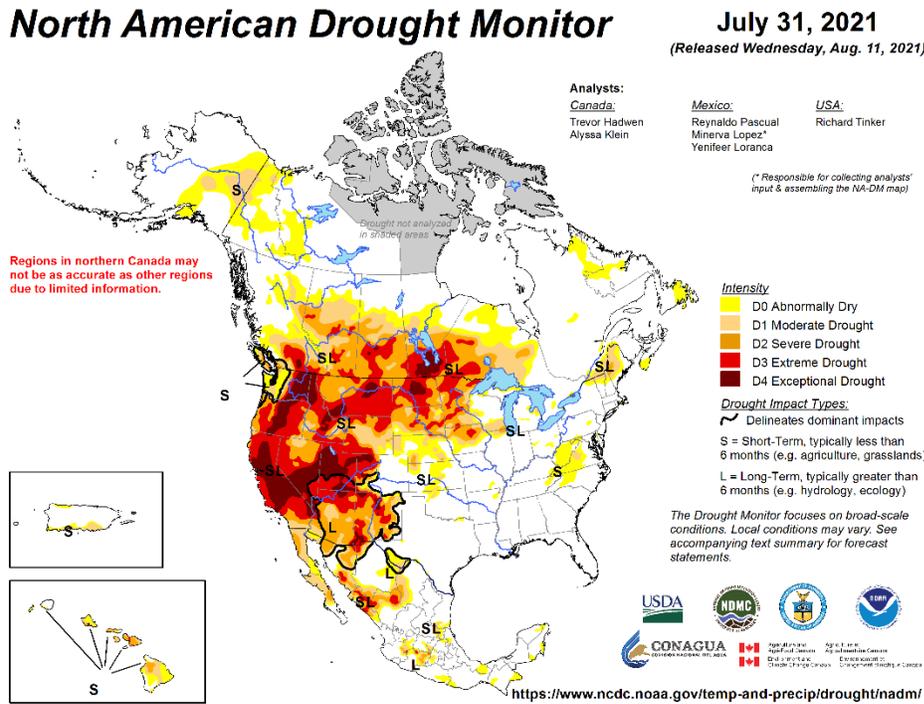
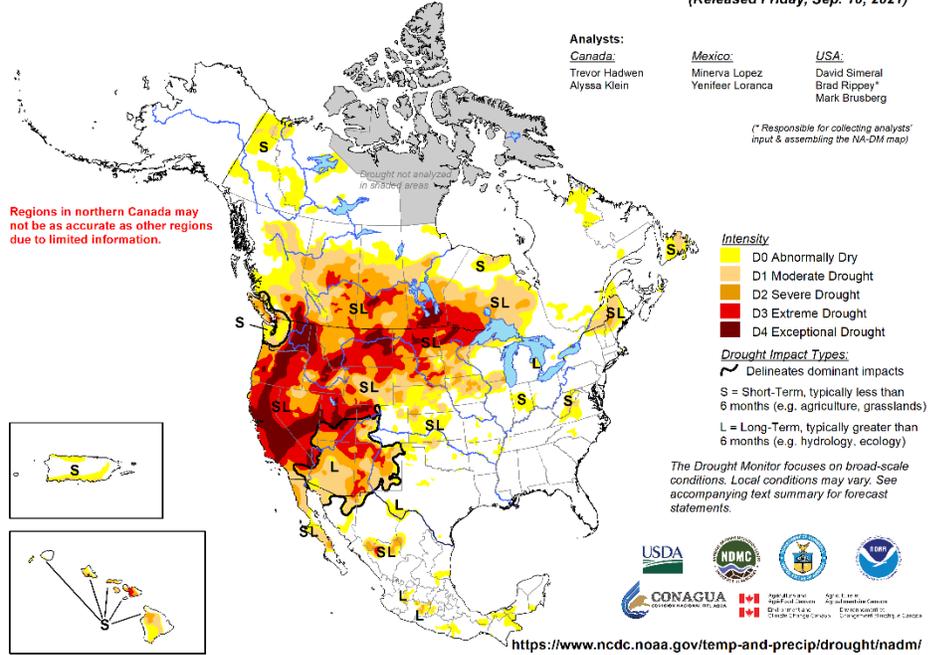


Figure 2c: North American drought monitor for August 31, 2021.

North American Drought Monitor

August 31, 2021
(Released Friday, Sep. 10, 2021)



During June of 2022, severe to extreme drought was ongoing over the southwest US (Figure 3a). Western Canada began the summer with drought-free conditions, but by early fall much of British Columbia and Alberta was experiencing severe to extreme drought (Figure 3b).

Figure 3a: North American Drought Monitor for June 30, 2022.

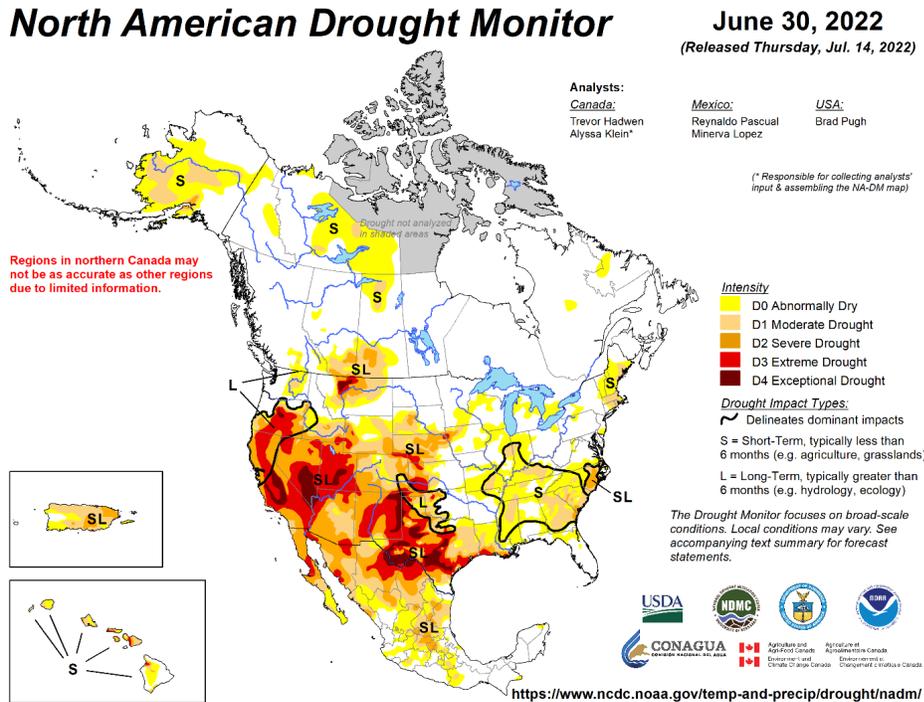
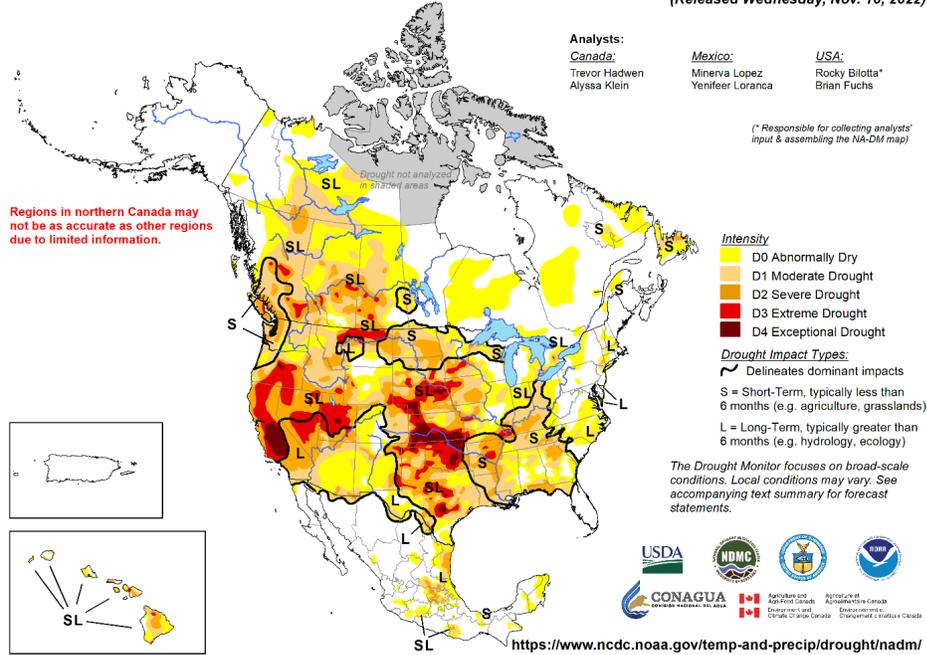


Figure 3b: North American Drought Monitor for October 31, 2022.

North American Drought Monitor

October 31, 2022
(Released Wednesday, Nov. 16, 2022)

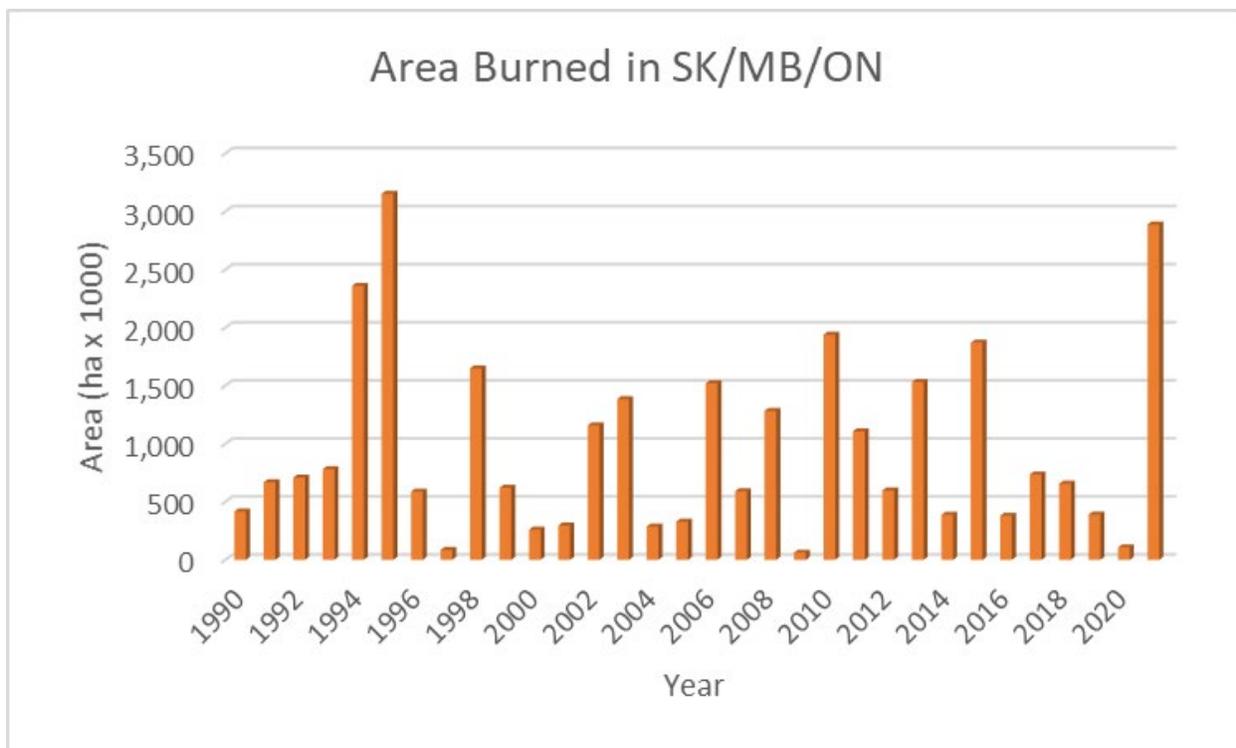


Description of wildfires

Canadian wildfires – 2021

The summer of 2021 was a very active fire season for the provinces of Saskatchewan, Manitoba, and Ontario. Nearly 3 million hectares burned in these provinces, which was the most hectares burned since 1995.

Figure 3: Area burned in Saskatchewan, Manitoba, and Ontario provinces from 1990 to 2021.



Canada typically does not name fires as is traditionally done in the United States (US). These fires burned large areas of Saskatchewan, Manitoba, and Ontario. The maps below show fire locations and fire perimeters from July 1 to August 7. Satellite images are included in the daily fire impacts section.

Figure 3a: Active fires and fire perimeters on July 1, 2021.

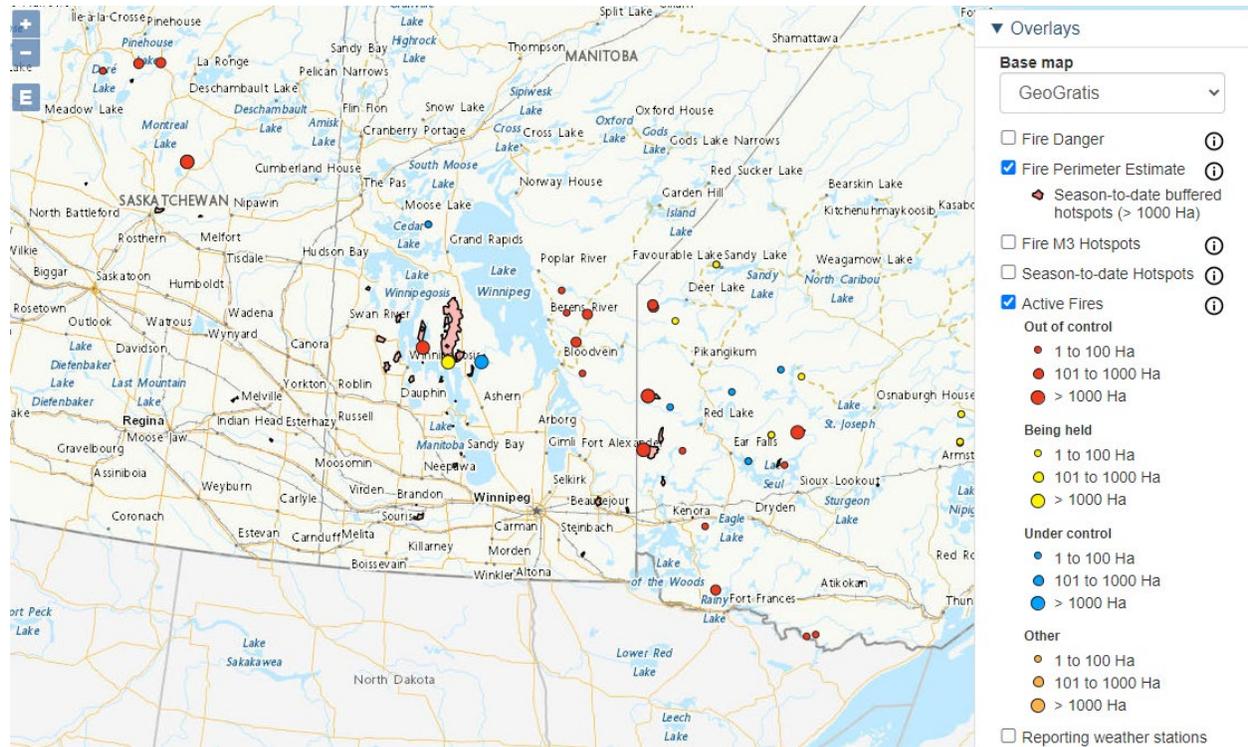


Figure 3b: Active fires and fire perimeters on July 7, 2021.

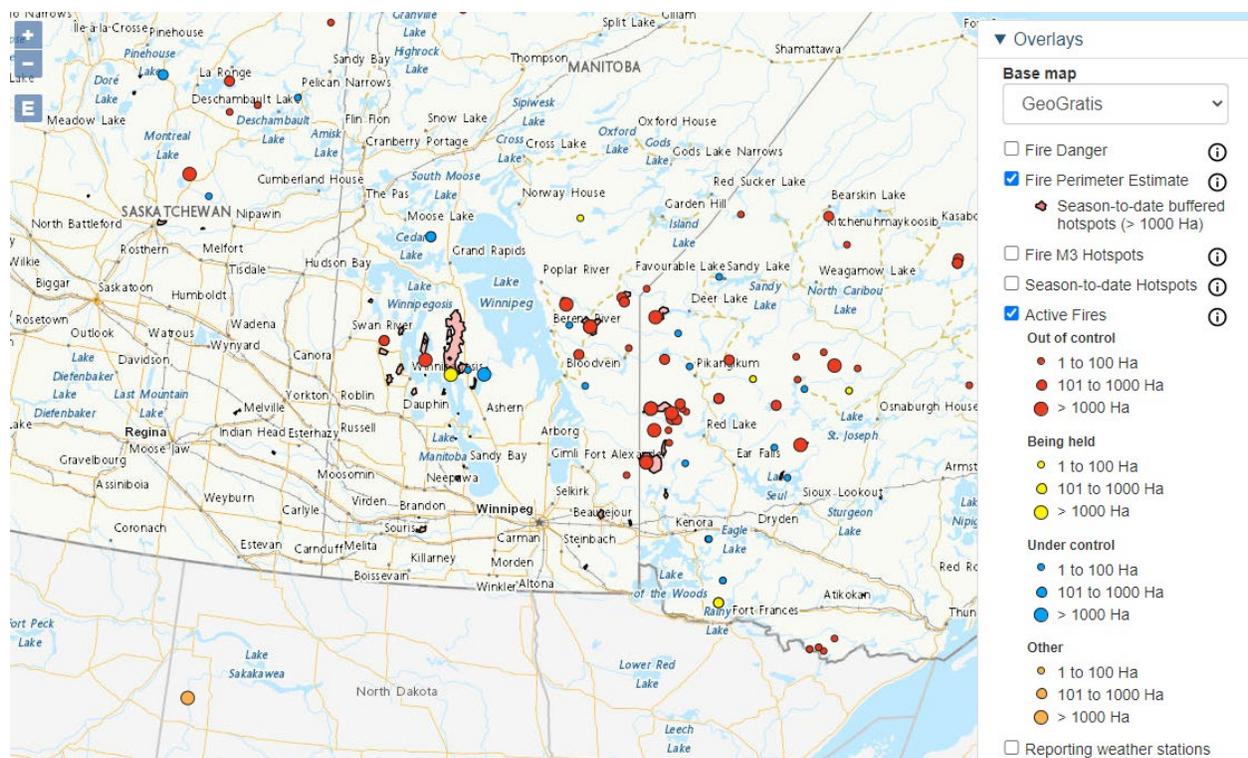


Figure 3c: Active fires and fire perimeters on July 15, 2021.

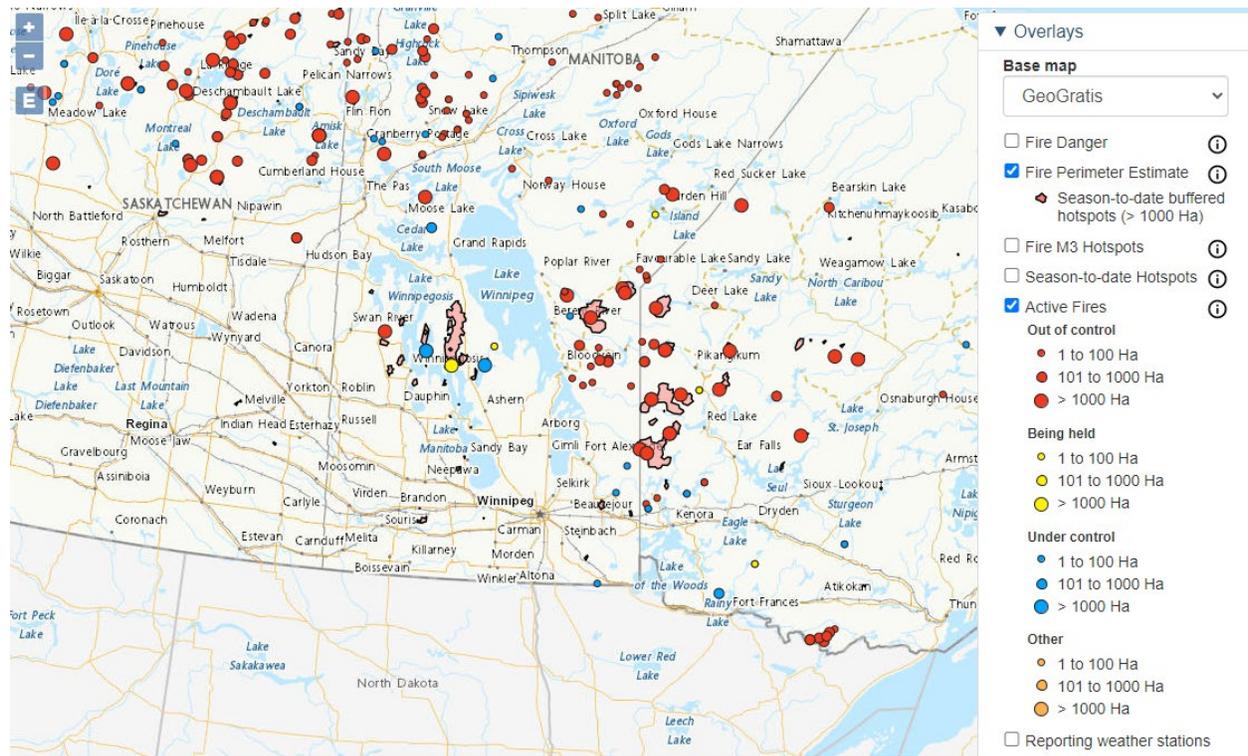


Figure 3d: Active fires and fire perimeters on July 22, 2021.

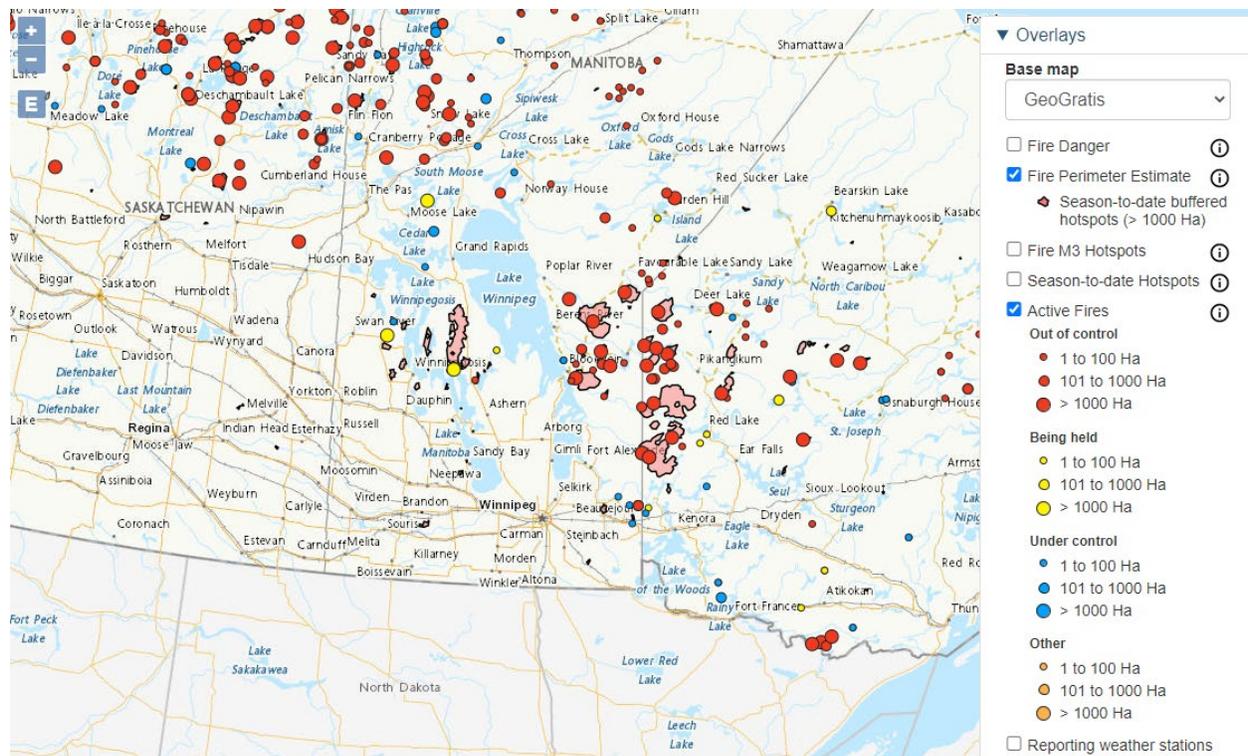


Figure 3e: Active fires and fire perimeters on August 1, 2021.

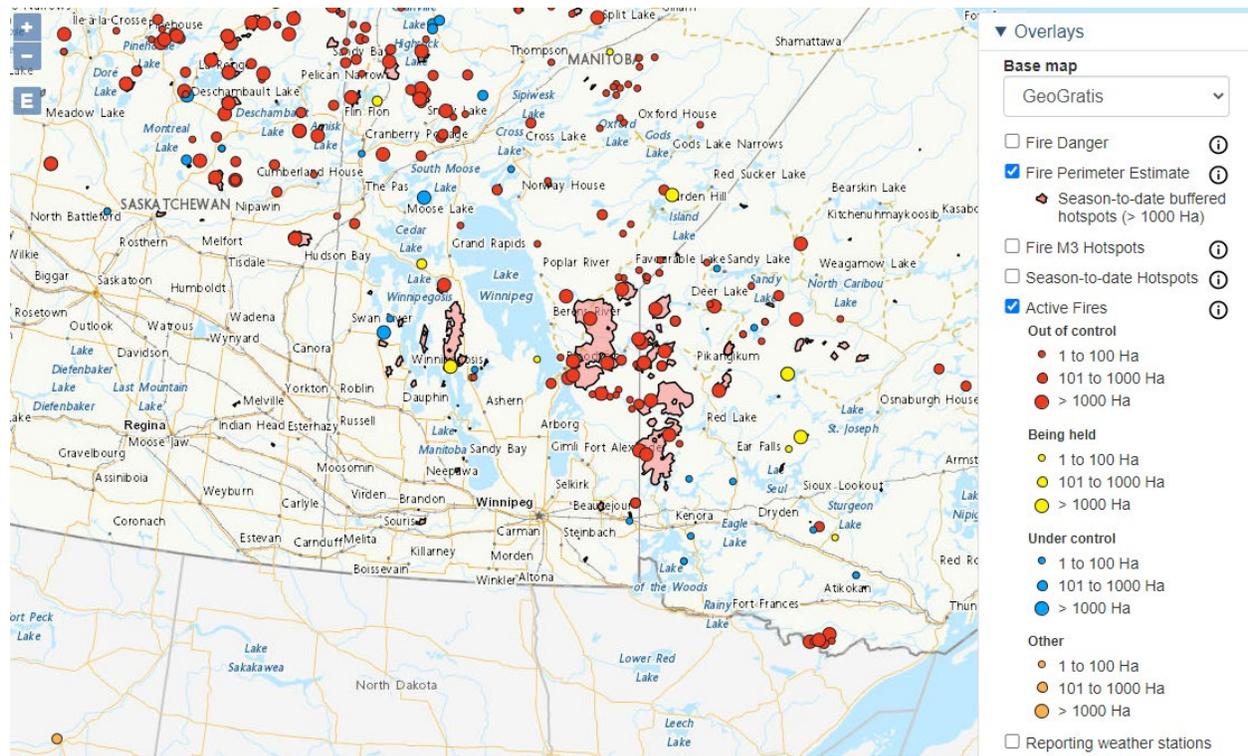
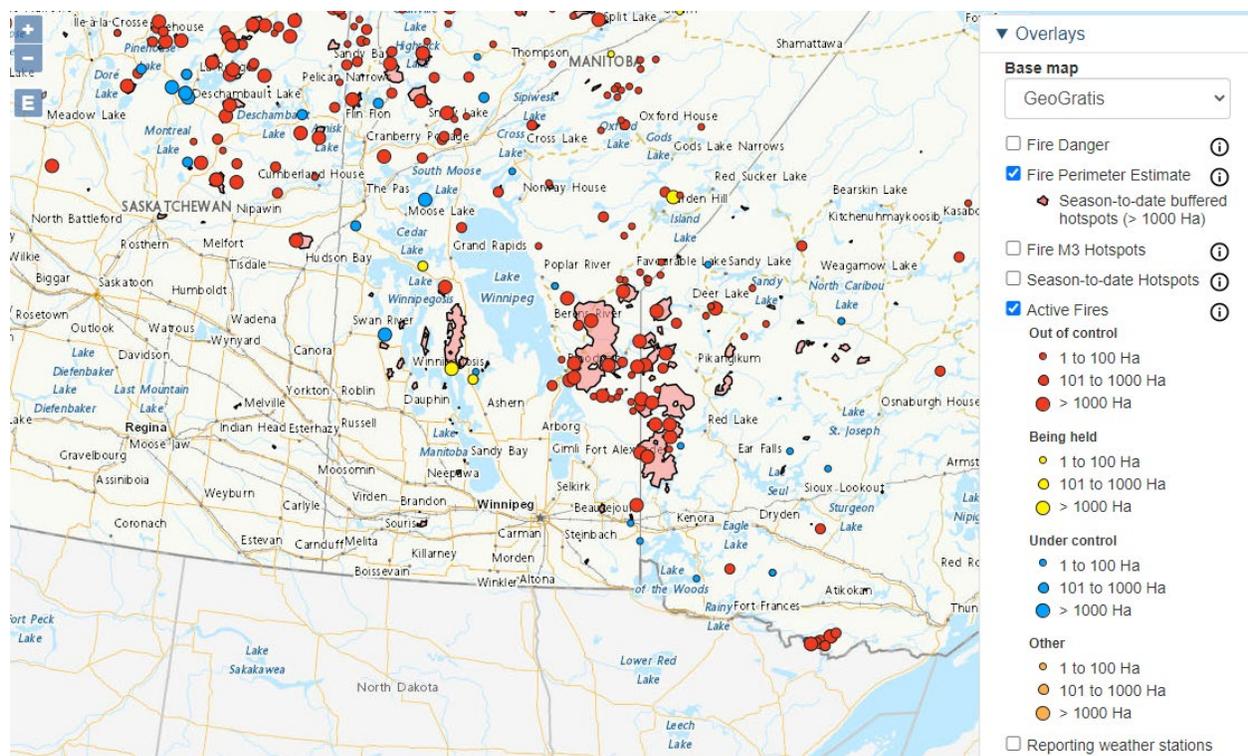


Figure 3f: Active fires and fire perimeters on August 7, 2021.



Northeast Minnesota wildfires – 2021

Several fires erupted in northeast Minnesota during August 2021. The largest was the Greenwood fire, which burned over 26,000 acres between August 15 and September 15. The John Ek fire burned over 1,300 acres between August 14 and September 15. Several wildfires burned over 120,000 acres in/near Quetico Provincial Park, located just north of the Minnesota border between July 6 and September 15.

Figure 4: Large incident map for August 14, 2021, from the National Interagency Fire Center. Number 90 is the Greenwood fire, and number 91 is the John Ek fire. The Quetico fires can be seen in the Canada wildfire maps along the Minnesota border.

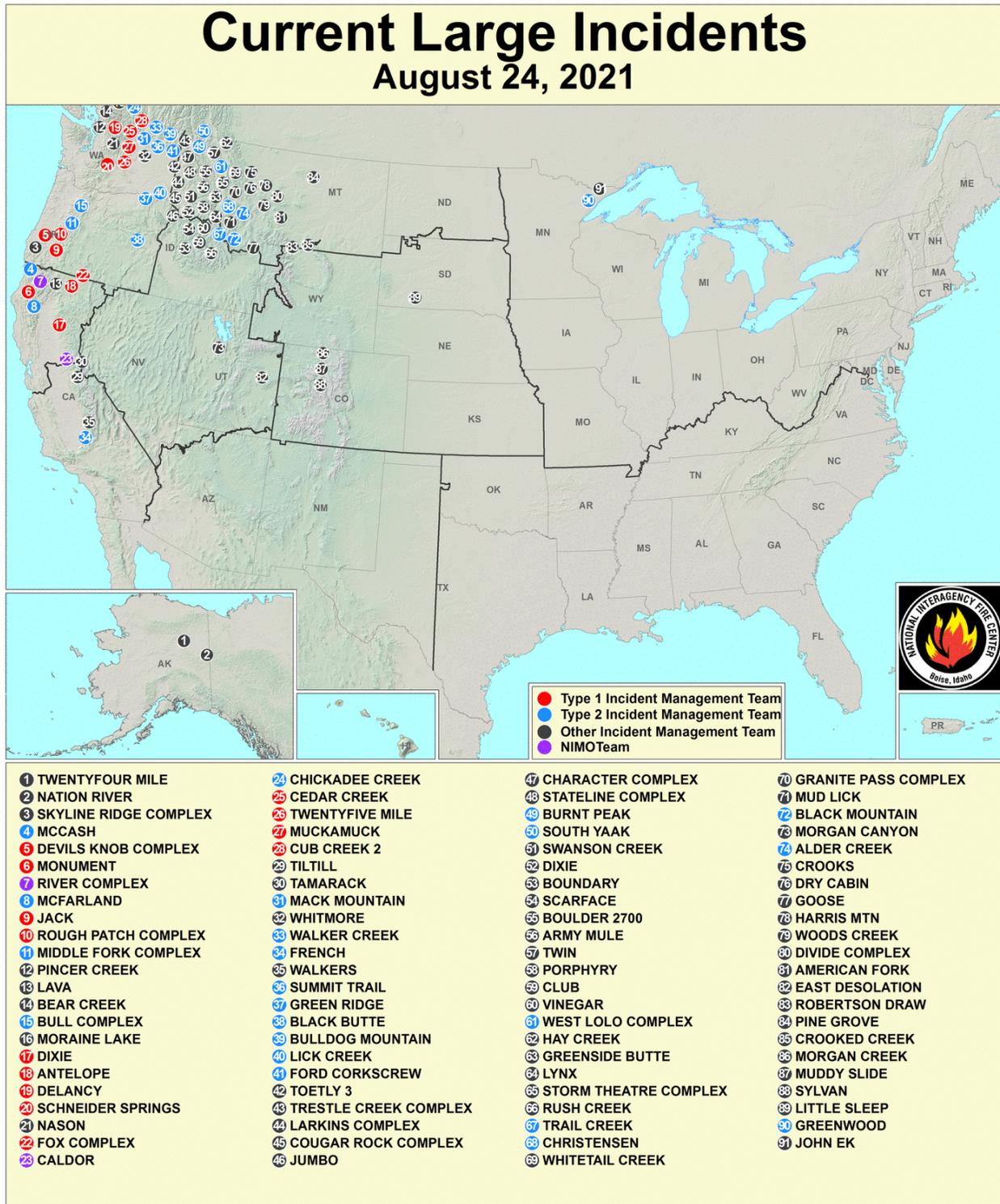


Figure 5: Major fires of Northern Minnesota. Fires from 2021 are depicted in red.

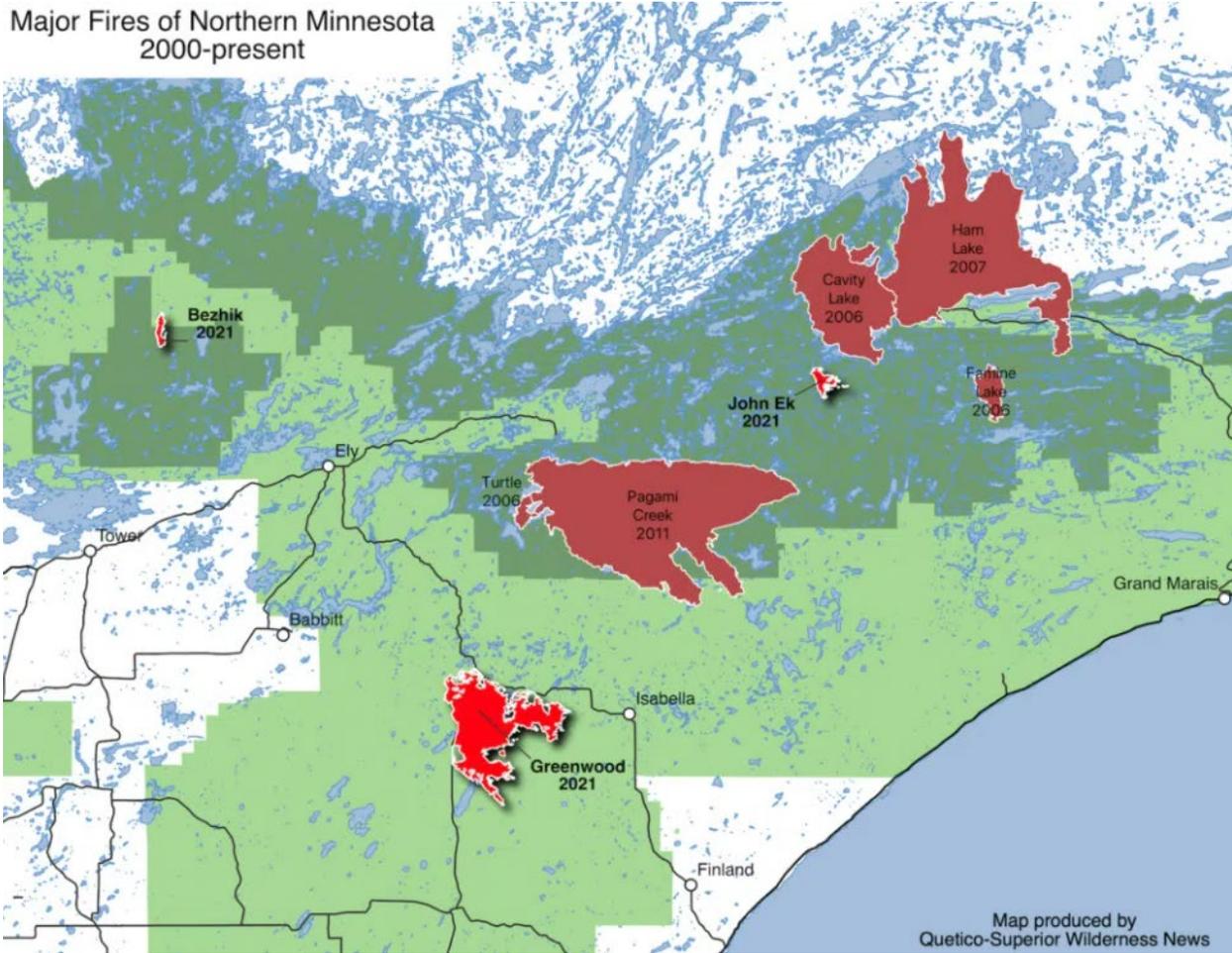
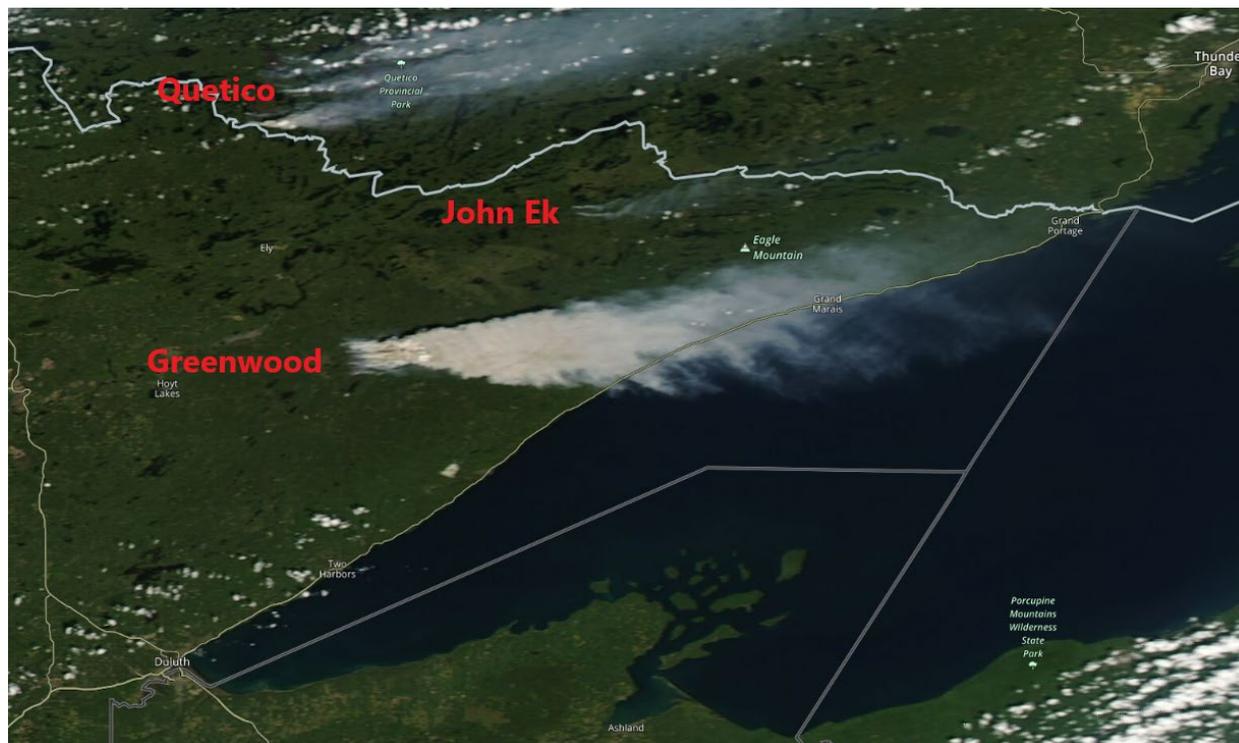


Figure 6: MODIS AQUA visible satellite image from August 24, 2021.



Southwest US wildfires – June 2022

Several fires were present over New Mexico and Arizona during the second week of June 2022 (Figure 7). The Pipeline fire west of Flagstaff, Arizona was particularly active on June 13, 2022, when the burn area rapidly expanded to over 20,000 acres. Heavy smoke can be seen coming from the fire on June 13, with smoke and haze already over Colorado (Figure 8). Forward trajectories from the fire show air parcels originating over the fire on June 13 over Minnesota on June 14 (Figure 9).

Figure 7: Large incident map for June 13, 2022, from the National Interagency Fire Center.

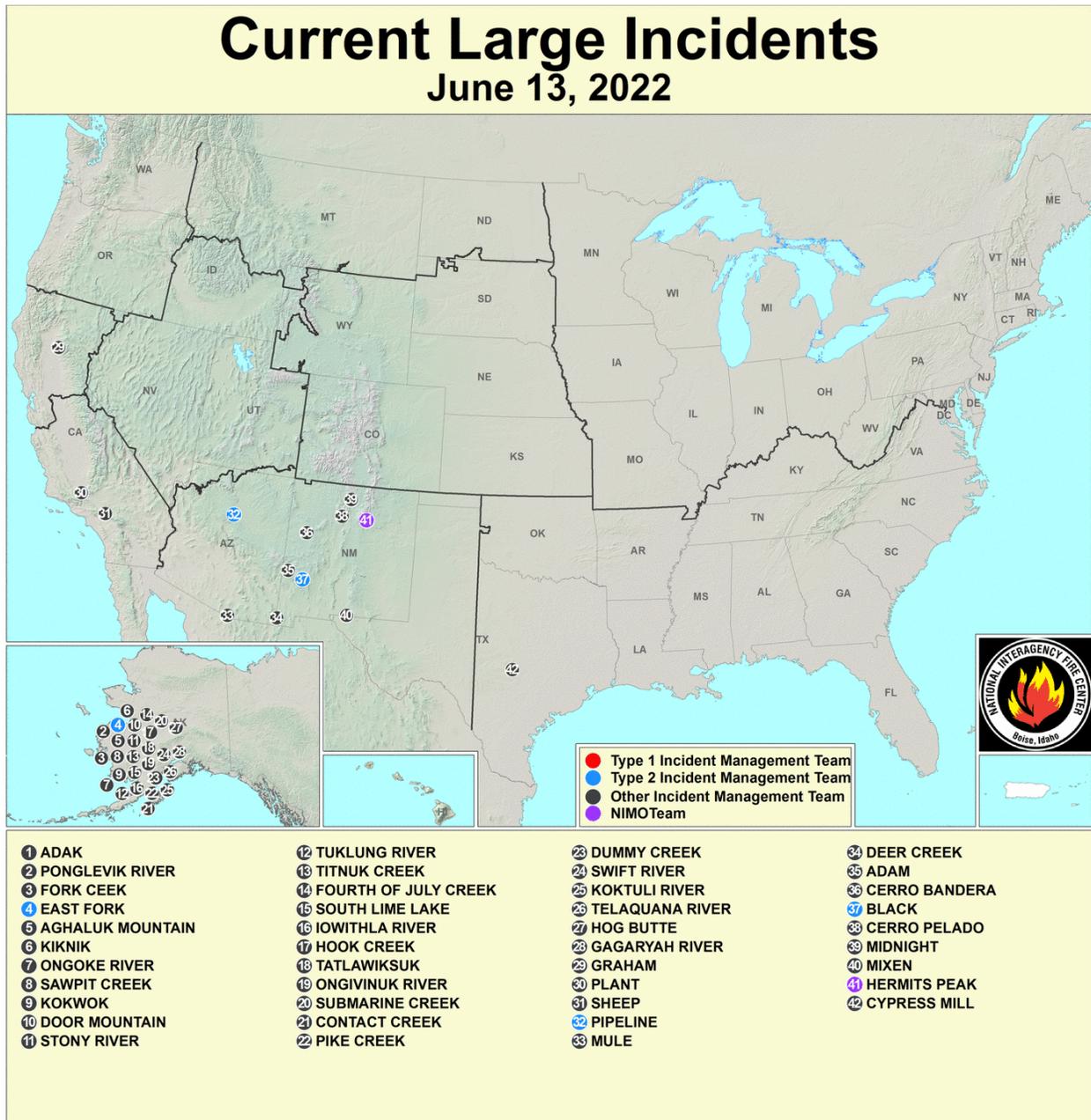


Figure 8: MODIS visible satellite for June 13, 2022, centered over the southwest US.

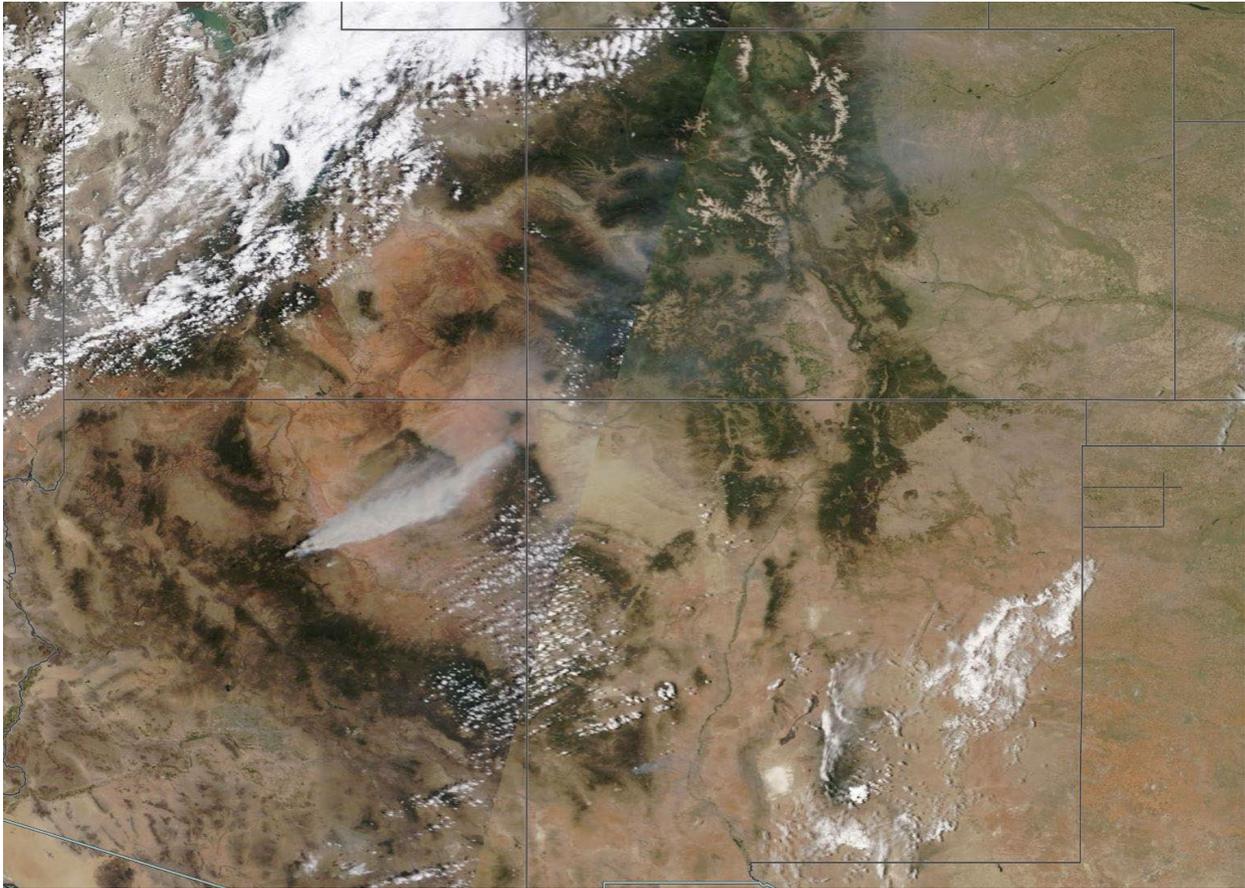
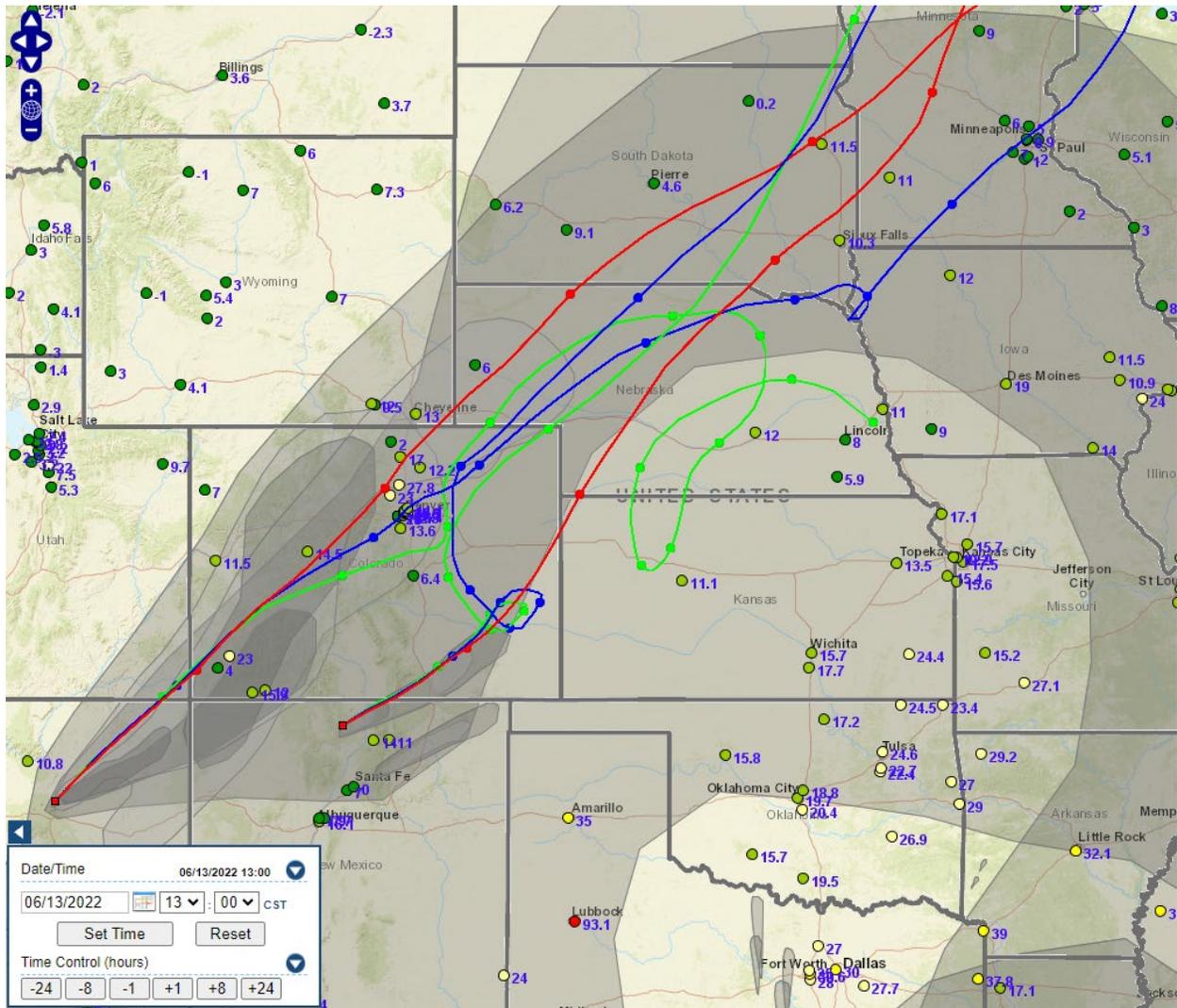


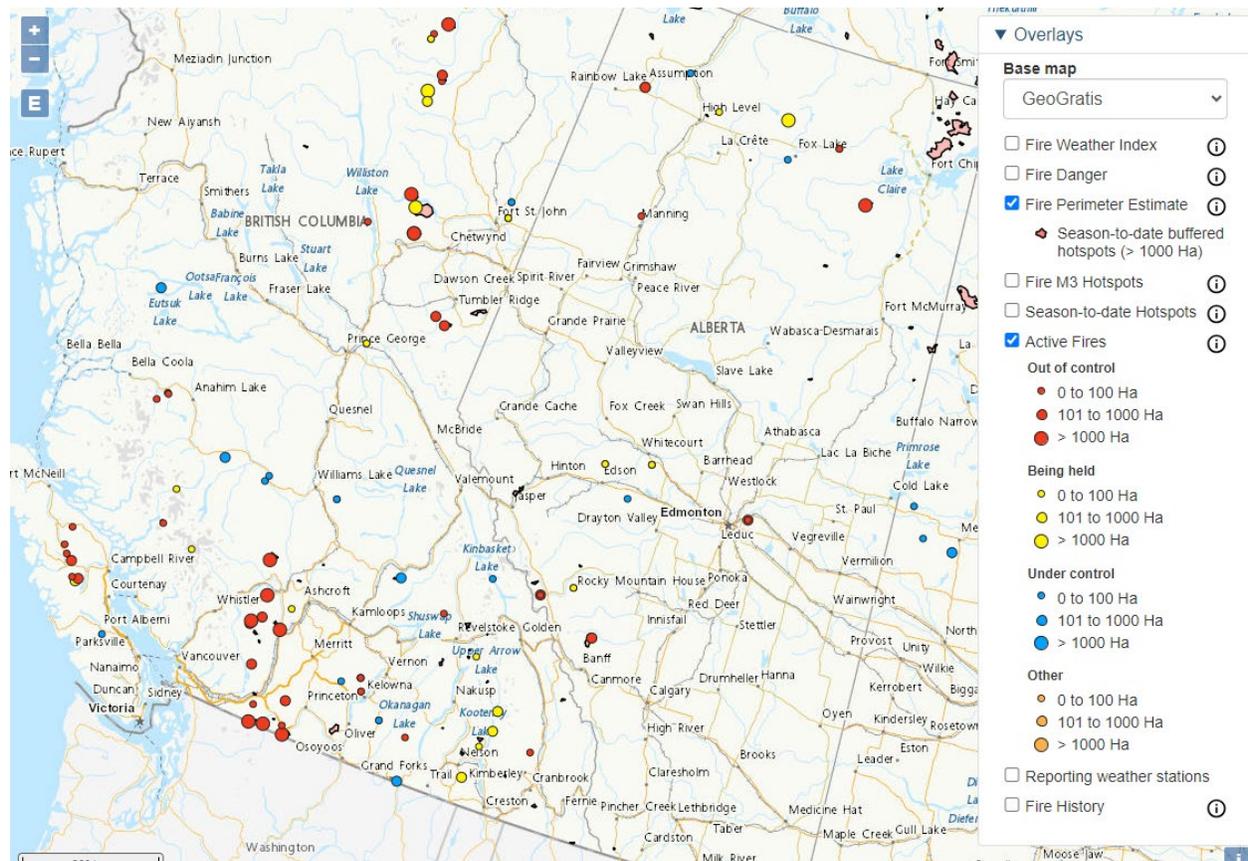
Figure 9: Forward trajectories originating from the southwest US on June 13, 2022.



Western Canada wildfires – October 2022

Several late season wildfires occurred in western Canada during October 2022. The map below shows fire locations on October 19, 2022. Satellite images and backward trajectories showing impacts to Minnesota monitors are included in the daily fire impacts section.

Figure 10: Active fires and fire perimeters on October 19, 2022.



Daily fire impacts

Throughout Minnesota in 2021, a total of 39 days were impacted by smoke that was high enough to affect PM_{2.5} design values. Table 7 provides a list of days and the monitors impacted by smoke during 2021. Table 8 provides a list of 4 days when the monitors were impacted by smoke during 2022. The rest of this section shows daily satellite imagery, fire locations, and monitor data for each day identified in Tables 7 and 8.

Table 7: List of days for 2021 when 24-hour PM_{2.5} concentrations were influenced by wildfire smoke.

Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Detroit Lakes	270052013	7/1/2021	19.7	34	Canada wildfire smoke
Fargo NW	380171004	7/1/2021	21.9	48.3	Canada wildfire smoke
Leech Lake Nation	270213410	7/1/2021	20.3	37	Canada wildfire smoke
Red Lake Nation	270072304	7/1/2021	15.1	27	Canada wildfire smoke
Detroit Lakes	270052013	7/2/2021	16.1	24	Canada wildfire smoke

Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
Fargo NW	380171004	7/2/2021	20.3	49.1	Canada wildfire smoke
Leech Lake Nation	270213410	7/2/2021	18.7	33	Canada wildfire smoke
Red Lake Nation	270072304	7/2/2021	15.2	25	Canada wildfire smoke
Fargo NW	380171004	7/3/2021	17.7	26.8	Canada wildfire smoke
Grand Portage	270317810	7/3/2021	17.7	30	Canada wildfire smoke
Leech Lake Nation	270213410	7/3/2021	17.5	30	Canada wildfire smoke
Ely	270750005	7/5/2021	15.7	80	Canada wildfire smoke
Grand Portage	270317810	7/5/2021	16.7	59	Canada wildfire smoke
Brainerd	270353204	7/6/2021	11.3	27	Canada wildfire smoke
Detroit Lakes	270052013	7/6/2021	24.0	71	Canada wildfire smoke
Ely	270750005	7/6/2021	10.5	46	Canada wildfire smoke
Fargo NW	380171004	7/6/2021	60.2	168.8	Canada wildfire smoke
Leech Lake Nation	270213410	7/6/2021	27.7	62	Canada wildfire smoke
Red Lake Nation	270072304	7/6/2021	14.7	65	Canada wildfire smoke
Virginia	271377001	7/6/2021	16	39	Canada wildfire smoke
Ely	270750005	7/10/2021	14.2	55	Canada wildfire smoke
Leech Lake Nation	270213410	7/10/2021	16.5	29	Canada wildfire smoke
Virginia	271377001	7/10/2021	12.5	28	Canada wildfire smoke
Apple Valley	270370470	7/11/2021	20.5	42	Canada wildfire smoke
Blaine	270031002	7/11/2021	23.7	43	Canada wildfire smoke
Brainerd	270353204	7/11/2021	19.5	35	Canada wildfire smoke
Fargo NW	380171004	7/11/2021	16.7	35.6	Canada wildfire smoke
Fond du Lac	270177417	7/11/2021	17.7	32	Canada wildfire smoke
Ely	270750005	7/11/2021	15.9	34	Canada wildfire smoke
Lakeville - Near Road	270370480	7/11/2021	23.7	49	Canada wildfire smoke
Leech Lake Nation	270213410	7/11/2021	20	28	Canada wildfire smoke
Marshall	270834210	7/11/2021	20.2	51	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/11/2021	24.5	44	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/11/2021	24	47	Canada wildfire smoke
Shakopee	271390505	7/11/2021	24.7	42	Canada wildfire smoke
St. Cloud	271453052	7/11/2021	23.2	42	Canada wildfire smoke
St. Michael	271713201	7/11/2021	24.4	40	Canada wildfire smoke
Virginia	271377001	7/11/2021	20.5	35	Canada wildfire smoke
Detroit Lakes	270052013	7/12/2021	23.8	40	Canada wildfire smoke
Ely	270750005	7/12/2021	17.8	31	Canada wildfire smoke
Fargo NW	380171004	7/12/2021	41.8	60.4	Canada wildfire smoke

Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
Leech Lake Nation	270213410	7/12/2021	26.5	43	Canada wildfire smoke
Marshall	270834210	7/12/2021	20.5	53	Canada wildfire smoke
St. Michael	271713201	7/12/2021	16.9	39	Canada wildfire smoke
Virginia	271377001	7/12/2021	17.5	27	Canada wildfire smoke
Brainerd	270353204	7/13/2021	15	31	Canada wildfire smoke
Detroit Lakes	270052013	7/13/2021	28.2	39	Canada wildfire smoke
Duluth-WDSE	271377550	7/13/2021	13.5	38	Canada wildfire smoke
Ely	270750005	7/13/2021	24.2	77	Canada wildfire smoke
Fargo NW	380171004	7/13/2021	54.5	78.3	Canada wildfire smoke
Fond du Lac	270177417	7/13/2021	14.1	26	Canada wildfire smoke
Leech Lake Nation	270213410	7/13/2021	29.4	42	Canada wildfire smoke
St. Cloud	271453052	7/13/2021	12.2	26	Canada wildfire smoke
Virginia	271377001	7/13/2021	25.3	56	Canada wildfire smoke
West Duluth	271377554	7/13/2021	15.6	30	Canada wildfire smoke
Brainerd	270353204	7/14/2021	33.7	73	Canada wildfire smoke
Detroit Lakes	270052013	7/14/2021	40.7	72	Canada wildfire smoke
Duluth-WDSE	271377550	7/14/2021	19.5	35	Canada wildfire smoke
Ely	270750005	7/14/2021	23	63	Canada wildfire smoke
Fargo NW	380171004	7/14/2021	78.2	133.3	Canada wildfire smoke
Fond du Lac	270177417	7/14/2021	23.2	29	Canada wildfire smoke
Leech Lake Nation	270213410	7/14/2021	53	107	Canada wildfire smoke
Marshall	270834210	7/14/2021	15.1	29	Canada wildfire smoke
Red Lake Nation	270072304	7/14/2021	50.7	97	Canada wildfire smoke
St. Cloud	271453052	7/14/2021	23.5	30	Canada wildfire smoke
Virginia	271377001	7/14/2021	37.2	76	Canada wildfire smoke
West Duluth	271377554	7/14/2021	23.2	39	Canada wildfire smoke
Brainerd	270353204	7/15/2021	25.1	32	Canada wildfire smoke
Detroit Lakes	270052013	7/15/2021	45.1	74	Canada wildfire smoke
Ely	270750005	7/15/2021	25.5	87	Canada wildfire smoke
Fargo NW	380171004	7/15/2021	87	129.3	Canada wildfire smoke
Fond du Lac	270177417	7/15/2021	21.7	37	Canada wildfire smoke
Lakeville - Near Road	270370480	7/15/2021	17.3	26	Canada wildfire smoke
Leech Lake Nation	270213410	7/15/2021	43.8	61	Canada wildfire smoke
Marshall	270834210	7/15/2021	34.7	52	Canada wildfire smoke
Red Lake Nation	270072304	7/15/2021	46.3	62	Canada wildfire smoke
Rochester	271095008	7/15/2021	17.3	31	Canada wildfire smoke

Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
St. Cloud	271453052	7/15/2021	36.8	88	Canada wildfire smoke
Virginia	271377001	7/15/2021	25.1	27	Canada wildfire smoke
Blaine	270031002	7/16/2021	19.2	28	Canada wildfire smoke
Brainerd	270353204	7/16/2021	24.3	41	Canada wildfire smoke
Detroit Lakes	270052013	7/16/2021	30.3	42	Canada wildfire smoke
Duluth-WDSE	271377550	7/16/2021	17.6	43	Canada wildfire smoke
Ely	270750005	7/16/2021	26.4	46	Canada wildfire smoke
Fargo NW	380171004	7/16/2021	54.1	72	Canada wildfire smoke
Fond du Lac	270177417	7/16/2021	28.1	37	Canada wildfire smoke
Lacrosse DOT	550630012	7/16/2021	16.7	22.5	Canada wildfire smoke
Lakeville - Near Road	270370480	7/16/2021	16.4	21	Canada wildfire smoke
Leech Lake Nation	270213410	7/16/2021	33.2	41	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/16/2021	20.3	43	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/16/2021	16.9	26	Canada wildfire smoke
Red Lake Nation	270072304	7/16/2021	29.2	37	Canada wildfire smoke
Shakopee	271390505	7/16/2021	16	26	Canada wildfire smoke
St. Cloud	271453052	7/16/2021	18.2	26	Canada wildfire smoke
St. Michael	271713201	7/16/2021	18.3	25	Canada wildfire smoke
St. Paul-Harding	271230871	7/16/2021	16.7	21	Canada wildfire smoke
Virginia	271377001	7/16/2021	39.6	62	Canada wildfire smoke
West Duluth	271377554	7/16/2021	19.6	38	Canada wildfire smoke
Brainerd	270353204	7/17/2021	25.2	33	Canada wildfire smoke
Detroit Lakes	270052013	7/17/2021	21.4	31	Canada wildfire smoke
Ely	270750005	7/17/2021	39.2	109	Canada wildfire smoke
Fargo NW	380171004	7/17/2021	22.9	31	Canada wildfire smoke
Fond du Lac	270177417	7/17/2021	24	36	Canada wildfire smoke
Leech Lake Nation	270213410	7/17/2021	31.7	46	Canada wildfire smoke
Red Lake Nation	270072304	7/17/2021	19.5	29	Canada wildfire smoke
St. Cloud	271453052	7/17/2021	19	28	Canada wildfire smoke
Virginia	271377001	7/17/2021	36.7	48	Canada wildfire smoke
Detroit Lakes	270052013	7/18/2021	19	28	Canada wildfire smoke
Ely	270750005	7/18/2021	28.5	42	Canada wildfire smoke
Fargo NW	380171004	7/18/2021	21.7	24	Canada wildfire smoke
Grand Portage	270317810	7/18/2021	21.3	38	Canada wildfire smoke
Leech Lake Nation	270213410	7/18/2021	21.4	45	Canada wildfire smoke
Red Lake Nation	270072304	7/18/2021	14	27	Canada wildfire smoke
Virginia	271377001	7/18/2021	21.7	37	Canada wildfire smoke
Detroit Lakes	270052013	7/19/2021	20.7	28	Canada wildfire smoke

Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
Ely	270750005	7/19/2021	17.1	159	Canada wildfire smoke
Fargo NW	380171004	7/19/2021	32.6	64.7	Canada wildfire smoke
Grand Portage	270317810	7/19/2021	26.9	64	Canada wildfire smoke
Leech Lake Nation	270213410	7/19/2021	22.7	31	Canada wildfire smoke
Red Lake Nation	270072304	7/19/2021	18.5	52	Canada wildfire smoke
Virginia	271377001	7/19/2021	16.4	121	Canada wildfire smoke
Apple Valley	270370470	7/20/2021	27.6	77	Canada wildfire smoke
Blaine	270031002	7/20/2021	36.1	92	Canada wildfire smoke
Brainerd	270353204	7/20/2021	125.3	280	Canada wildfire smoke
Detroit Lakes	270052013	7/20/2021	64.8	233	Canada wildfire smoke
Duluth-WDSE	271377550	7/20/2021	27.9	153	Canada wildfire smoke
Ely	270750005	7/20/2021	25.4	127	Canada wildfire smoke
Fargo NW	380171004	7/20/2021	57.5	236.3	Canada wildfire smoke
Fond du Lac	270177417	7/20/2021	30	102	Canada wildfire smoke
Lacrosse DOT	550630012	7/20/2021	16.3	50.1	Canada wildfire smoke
Lakeville - Near Road	270370480	7/20/2021	27.6	78	Canada wildfire smoke
Leech Lake Nation	270213410	7/20/2021	200.6	343	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/20/2021	32	81	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/20/2021	33.1	79	Canada wildfire smoke
Red Lake Nation	270072304	7/20/2021	208.7	397	Canada wildfire smoke
Shakopee	271390505	7/20/2021	28.6	78	Canada wildfire smoke
St. Cloud	271453052	7/20/2021	45.2	123	Canada wildfire smoke
St. Michael	271713201	7/20/2021	35.5	117	Canada wildfire smoke
St. Paul-Harding	271230871	7/20/2021	30.2	69	Canada wildfire smoke
Virginia	271377001	7/20/2021	66.6	230	Canada wildfire smoke
West Duluth	271377554	7/20/2021	31.5	138	Canada wildfire smoke
Apple Valley	270370470	7/21/2021	32.1	55	Canada wildfire smoke
Blaine	270031002	7/21/2021	31.9	53	Canada wildfire smoke
Brainerd	270353204	7/21/2021	23.5	42	Canada wildfire smoke
Detroit Lakes	270052013	7/21/2021	62.3	190	Canada wildfire smoke
Fargo NW	380171004	7/21/2021	71.8	219	Canada wildfire smoke
Lacrosse DOT	550630012	7/21/2021	31.3	52.4	Canada wildfire smoke
Lakeville - Near Road	270370480	7/21/2021	33.7	72	Canada wildfire smoke
Leech Lake Nation	270213410	7/21/2021	25.3	71	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/21/2021	32.6	53	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/21/2021	33	50	Canada wildfire smoke

Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
Red Lake Nation	270072304	7/21/2021	35.3	99	Canada wildfire smoke
Shakopee	271390505	7/21/2021	34.4	70	Canada wildfire smoke
St. Cloud	271453052	7/21/2021	25.7	44	Canada wildfire smoke
St. Michael	271713201	7/21/2021	30.9	51	Canada wildfire smoke
St. Paul-Harding	271230871	7/21/2021	31.7	50	Canada wildfire smoke
Apple Valley	270370470	7/22/2021	18.9	27	Canada wildfire smoke
Blaine	270031002	7/22/2021	19	27	Canada wildfire smoke
Brainerd	270353204	7/22/2021	22.7	36	Canada wildfire smoke
Detroit Lakes	270052013	7/22/2021	22.7	27	Canada wildfire smoke
Fargo NW	380171004	7/22/2021	20.2	22.4	Canada wildfire smoke
Lacrosse DOT	550630012	7/22/2021	23.4	29.6	Canada wildfire smoke
Lakeville - Near Road	270370480	7/22/2021	19.6	24	Canada wildfire smoke
Leech Lake Nation	270213410	7/22/2021	27.7	35	Canada wildfire smoke
Marshall	270834210	7/22/2021	20.5	27	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/22/2021	17.2	22	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/22/2021	18.6	24	Canada wildfire smoke
Red Lake Nation	270072304	7/22/2021	17.9	24	Canada wildfire smoke
Shakopee	271390505	7/22/2021	19.7	26	Canada wildfire smoke
St. Cloud	271453052	7/22/2021	19.9	33	Canada wildfire smoke
St. Michael	271713201	7/22/2021	20.9	25	Canada wildfire smoke
St. Paul-Harding	271230871	7/22/2021	19.3	26	Canada wildfire smoke
Virginia	271377001	7/22/2021	15.3	23	Canada wildfire smoke
Apple Valley	270370470	7/23/2021	16.9	25	Canada wildfire smoke
Blaine	270031002	7/23/2021	17.1	24	Canada wildfire smoke
Brainerd	270353204	7/23/2021	19.6	26	Canada wildfire smoke
Detroit Lakes	270052013	7/23/2021	23.5	33	Canada wildfire smoke
Fargo NW	380171004	7/23/2021	21.1	29.6	Canada wildfire smoke
Lacrosse DOT	550630012	7/23/2021	24.5	26.4	Canada wildfire smoke
Lakeville - Near Road	270370480	7/23/2021	17.8	25	Canada wildfire smoke
Leech Lake Nation	270213410	7/23/2021	25.5	31	Canada wildfire smoke
Marshall	270834210	7/23/2021	19.3	27	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/23/2021	17	39	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/23/2021	16.5	28	Canada wildfire smoke
Red Lake Nation	270072304	7/23/2021	16.3	23	Canada wildfire smoke
Rochester	271095008	7/23/2021	17.4	26	Canada wildfire smoke
Shakopee	271390505	7/23/2021	19.7	30	Canada wildfire smoke
St. Cloud	271453052	7/23/2021	20.7	25	Canada wildfire smoke
St. Michael	271713201	7/23/2021	19.7	26	Canada wildfire smoke

Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
St. Paul-Harding	271230871	7/23/2021	19	27	Canada wildfire smoke
Virginia	271377001	7/23/2021	16.1	24	Canada wildfire smoke
Detroit Lakes	270052013	7/24/2021	16	28	Canada wildfire smoke
Fargo NW	380171004	7/24/2021	19.4	32.3	Canada wildfire smoke
Leech Lake Nation	270213410	7/24/2021	18.4	27	Canada wildfire smoke
Detroit Lakes	270052013	7/25/2021	16.5	28	Canada wildfire smoke
Fargo NW	380171004	7/25/2021	23.1	28.9	Canada wildfire smoke
Lacrosse DOT	550630012	7/25/2021	16.2	24.9	Canada wildfire smoke
Lakeville - Near Road	270370480	7/25/2021	16.7	24	Canada wildfire smoke
Leech Lake Nation	270213410	7/25/2021	18.9	83	Canada wildfire smoke
Marshall	270834210	7/25/2021	18.8	29	Canada wildfire smoke
St. Cloud	271453052	7/25/2021	16.5	27	Canada wildfire smoke
Detroit Lakes	270052013	7/26/2021	17.6	23	Canada wildfire smoke
Fargo NW	380171004	7/26/2021	17.5	27.7	Canada wildfire smoke
Lacrosse DOT	550630012	7/26/2021	20.5	26.7	Canada wildfire smoke
Leech Lake Nation	270213410	7/26/2021	20.8	39	Canada wildfire smoke
Detroit Lakes	270052013	7/27/2021	18.3	25	Canada wildfire smoke
Ely	270750005	7/27/2021	16.5	21	Canada wildfire smoke
Fargo NW	380171004	7/27/2021	18.3	22.4	Canada wildfire smoke
Grand Portage	270317810	7/27/2021	23.6	35	Canada wildfire smoke
Leech Lake Nation	270213410	7/27/2021	19.7	29	Canada wildfire smoke
Red Lake Nation	270072304	7/27/2021	15	20	Canada wildfire smoke
St. Cloud	271453052	7/27/2021	16.4	27	Canada wildfire smoke
St. Michael	271713201	7/27/2021	16.2	21	Canada wildfire smoke
Virginia	271377001	7/27/2021	16.9	21	Canada wildfire smoke
Brainerd	270353204	7/28/2021	14.7	25	Canada wildfire smoke
Detroit Lakes	270052013	7/28/2021	18.3	25	Canada wildfire smoke
Fargo NW	380171004	7/28/2021	17.3	25.1	Canada wildfire smoke
Leech Lake Nation	270213410	7/28/2021	21.3	64	Canada wildfire smoke
Red Lake Nation	270072304	7/28/2021	16.7	49	Canada wildfire smoke
West Duluth	271377554	7/28/2021	18.4	24	Canada wildfire smoke
Apple Valley	270370470	7/29/2021	60.4	142	Canada wildfire smoke
Blaine	270031002	7/29/2021	70.6	155	Canada wildfire smoke
Brainerd	270353204	7/29/2021	171.2	401	Canada wildfire smoke
Detroit Lakes	270052013	7/29/2021	111.4	221	Canada wildfire smoke
Duluth-WDSE	271377550	7/29/2021	26.2	60	Canada wildfire smoke

Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
Ely	270750005	7/29/2021	14.3	49	Canada wildfire smoke
Fargo NW	380171004	7/29/2021	80.5	338.8	Canada wildfire smoke
Fond du Lac	270177417	7/29/2021	52.4	130	Canada wildfire smoke
Lacrosse DOT	550630012	7/29/2021	27.7	88.8	Canada wildfire smoke
Lakeville - Near Road	270370480	7/29/2021	63.5	138	Canada wildfire smoke
Leech Lake Nation	270213410	7/29/2021	117.9	202	Canada wildfire smoke
Marshall	270834210	7/29/2021	99.4	210	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/29/2021	63.5	143	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/29/2021	64.1	152	Canada wildfire smoke
Red Lake Nation	270072304	7/29/2021	127.6	301	Canada wildfire smoke
Rochester	271095008	7/29/2021	31	68	Canada wildfire smoke
St. Cloud	271453052	7/29/2021	177.3	422	Canada wildfire smoke
St. Michael	271713201	7/29/2021	115.6	258	Canada wildfire smoke
St. Paul-Harding	271230871	7/29/2021	54.7	129	Canada wildfire smoke
Virginia	271377001	7/29/2021	34.4	142	Canada wildfire smoke
West Duluth	271377554	7/29/2021	31.9	62	Canada wildfire smoke
Apple Valley	270370470	7/30/2021	50.9	79	Canada wildfire smoke
Blaine	270031002	7/30/2021	62.5	85	Canada wildfire smoke
Brainerd	270353204	7/30/2021	98.7	133	Canada wildfire smoke
Detroit Lakes	270052013	7/30/2021	132.3	163	Canada wildfire smoke
Duluth-WDSE	271377550	7/30/2021	22.7	103	Canada wildfire smoke
Ely	270750005	7/30/2021	20.7	77	Canada wildfire smoke
Fargo NW	380171004	7/30/2021	135.7	211.9	Canada wildfire smoke
Fond du Lac	270177417	7/30/2021	30.1	104	Canada wildfire smoke
Lacrosse DOT	550630012	7/30/2021	23.9	47.2	Canada wildfire smoke
Lakeville - Near Road	270370480	7/30/2021	53	76	Canada wildfire smoke
Leech Lake Nation	270213410	7/30/2021	109.7	147	Canada wildfire smoke
Marshall	270834210	7/30/2021	106.7	213	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/30/2021	59.9	79	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/30/2021	58.2	80	Canada wildfire smoke
Red Lake Nation	270072304	7/30/2021	99.5	126	Canada wildfire smoke
Rochester	271095008	7/30/2021	42.3	73	Canada wildfire smoke
St. Cloud	271453052	7/30/2021	99.7	143	Canada wildfire smoke
St. Michael	271713201	7/30/2021	80.1	132	Canada wildfire smoke
St. Paul-Harding	271230871	7/30/2021	51	80	Canada wildfire smoke
Virginia	271377001	7/30/2021	29.1	105	Canada wildfire smoke
West Duluth	271377554	7/30/2021	21.2	107	Canada wildfire smoke
Apple Valley	270370470	7/31/2021	54.3	92	Canada wildfire smoke

Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
Blaine	270031002	7/31/2021	54.7	98	Canada wildfire smoke
Brainerd	270353204	7/31/2021	55.4	101	Canada wildfire smoke
Detroit Lakes	270052013	7/31/2021	65.8	138	Canada wildfire smoke
Duluth-WDSE	271377550	7/31/2021	50.7	101	Canada wildfire smoke
Ely	270750005	7/31/2021	18.1	27	Canada wildfire smoke
Fargo NW	380171004	7/31/2021	77.3	149.5	Canada wildfire smoke
Fond du Lac	270177417	7/31/2021	50.1	99	Canada wildfire smoke
Grand Portage	270317810	7/31/2021	23.6	45	Canada wildfire smoke
Lacrosse DOT	550630012	7/31/2021	39.3	59.9	Canada wildfire smoke
Lakeville - Near Road	270370480	7/31/2021	57.7	95	Canada wildfire smoke
Leech Lake Nation	270213410	7/31/2021	64.7	115	Canada wildfire smoke
Marshall	270834210	7/31/2021	49.3	104	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/31/2021	54.2	98	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/31/2021	55.5	96	Canada wildfire smoke
Red Lake Nation	270072304	7/31/2021	42.1	128	Canada wildfire smoke
Rochester	271095008	7/31/2021	45.1	69	Canada wildfire smoke
St. Cloud	271453052	7/31/2021	56.5	108	Canada wildfire smoke
St. Michael	271713201	7/31/2021	51.3	96	Canada wildfire smoke
St. Paul-Harding	271230871	7/31/2021	53.7	93	Canada wildfire smoke
Virginia	271377001	7/31/2021	25.9	80	Canada wildfire smoke
West Duluth	271377554	7/31/2021	54.3	108	Canada wildfire smoke
Apple Valley	270370470	8/1/2021	20	76	Canada wildfire smoke
Blaine	270031002	8/1/2021	18.1	68	Canada wildfire smoke
Brainerd	270353204	8/1/2021	23.6	61	Canada wildfire smoke
Detroit Lakes	270052013	8/1/2021	19	45	Canada wildfire smoke
Fargo NW	380171004	8/1/2021	50.9	78.4	Canada wildfire smoke
Lacrosse DOT	550630012	8/1/2021	25	55.3	Canada wildfire smoke
Lakeville - Near Road	270370480	8/1/2021	24.1	81	Canada wildfire smoke
Leech Lake Nation	270213410	8/1/2021	32.9	63	Canada wildfire smoke
Marshall	270834210	8/1/2021	50.1	96	Canada wildfire smoke
Minneapolis - Near Road	270530962	8/1/2021	18.8	56	Canada wildfire smoke
Minneapolis - Phillips	270530963	8/1/2021	17.3	60	Canada wildfire smoke
Red Lake Nation	270072304	8/1/2021	18.3	40	Canada wildfire smoke
Rochester	271095008	8/1/2021	27.4	77	Canada wildfire smoke
St. Cloud	271453052	8/1/2021	21.3	52	Canada wildfire smoke
St. Michael	271713201	8/1/2021	17.5	51	Canada wildfire smoke

Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
St. Paul-Harding	271230871	8/1/2021	20	70	Canada wildfire smoke
Apple Valley	270370470	8/2/2021	17.1	34	Canada wildfire smoke
Blaine	270031002	8/2/2021	19.1	35	Canada wildfire smoke
Brainerd	270353204	8/2/2021	21.2	46	Canada wildfire smoke
Detroit Lakes	270052013	8/2/2021	43.7	81	Canada wildfire smoke
Duluth-WDSE	271377550	8/2/2021	22.1	40	Canada wildfire smoke
Ely	270750005	8/2/2021	39.6	52	Canada wildfire smoke
Fargo NW	380171004	8/2/2021	69.3	112.8	Canada wildfire smoke
Fond du Lac	270177417	8/2/2021	19.7	29	Canada wildfire smoke
Grand Portage	270317810	8/2/2021	36.3	131	Canada wildfire smoke
Lakeville - Near Road	270370480	8/2/2021	20.5	38	Canada wildfire smoke
Leech Lake Nation	270213410	8/2/2021	48.5	77	Canada wildfire smoke
Marshall	270834210	8/2/2021	51	65	Canada wildfire smoke
Minneapolis - Near Road	270530962	8/2/2021	19.7	33	Canada wildfire smoke
Minneapolis - Phillips	270530963	8/2/2021	19	34	Canada wildfire smoke
Red Lake Nation	270072304	8/2/2021	46.4	88	Canada wildfire smoke
St. Cloud	271453052	8/2/2021	22.5	38	Canada wildfire smoke
St. Michael	271713201	8/2/2021	21.4	40	Canada wildfire smoke
St. Paul-Harding	271230871	8/2/2021	18.3	34	Canada wildfire smoke
Virginia	271377001	8/2/2021	33.4	47	Canada wildfire smoke
West Duluth	271377554	8/2/2021	22.5	34	Canada wildfire smoke
Apple Valley	270370470	8/3/2021	27	35	Canada wildfire smoke
Blaine	270031002	8/3/2021	29.5	36	Canada wildfire smoke
Brainerd	270353204	8/3/2021	41.3	63	Canada wildfire smoke
Detroit Lakes	270052013	8/3/2021	43.6	73	Canada wildfire smoke
Duluth-WDSE	271377550	8/3/2021	39.2	48	Canada wildfire smoke
Ely	270750005	8/3/2021	49.5	67	Canada wildfire smoke
Fargo NW	380171004	8/3/2021	45.3	63.6	Canada wildfire smoke
Fond du Lac	270177417	8/3/2021	38.3	48	Canada wildfire smoke
Grand Portage	270317810	8/3/2021	51	68	Canada wildfire smoke
Lacrosse DOT	550630012	8/3/2021	19.8	32.8	Canada wildfire smoke
Lakeville - Near Road	270370480	8/3/2021	29.6	40	Canada wildfire smoke
Leech Lake Nation	270213410	8/3/2021	57.8	77	Canada wildfire smoke
Marshall	270834210	8/3/2021	30.7	45	Canada wildfire smoke
Minneapolis - Near Road	270530962	8/3/2021	27.7	39	Canada wildfire smoke
Minneapolis - Phillips	270530963	8/3/2021	27.3	40	Canada wildfire smoke
Red Lake Nation	270072304	8/3/2021	47.5	60	Canada wildfire smoke
Rochester	271095008	8/3/2021	18.5	32	Canada wildfire smoke

Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
St. Cloud	271453052	8/3/2021	42.7	55	Canada wildfire smoke
St. Michael	271713201	8/3/2021	32.1	40	Canada wildfire smoke
St. Paul-Harding	271230871	8/3/2021	29.6	42	Canada wildfire smoke
Virginia	271377001	8/3/2021	49.2	56	Canada wildfire smoke
West Duluth	271377554	8/3/2021	43.1	53	Canada wildfire smoke
Blaine	270031002	8/4/2021	16.2	33	Canada wildfire smoke
Brainerd	270353204	8/4/2021	19.1	38	Canada wildfire smoke
Detroit Lakes	270052013	8/4/2021	25	38	Canada wildfire smoke
Duluth-WDSE	271377550	8/4/2021	22.7	38	Canada wildfire smoke
Ely	270750005	8/4/2021	34.2	56	Canada wildfire smoke
Fargo NW	380171004	8/4/2021	24.5	37.6	Canada wildfire smoke
Fond du Lac	270177417	8/4/2021	23.3	34	Canada wildfire smoke
Grand Portage	270317810	8/4/2021	36	51	Canada wildfire smoke
Lacrosse DOT	550630012	8/4/2021	30	36.4	Canada wildfire smoke
Leech Lake Nation	270213410	8/4/2021	28.3	46	Canada wildfire smoke
Red Lake Nation	270072304	8/4/2021	21.8	33	Canada wildfire smoke
St. Cloud	271453052	8/4/2021	16.7	34	Canada wildfire smoke
St. Michael	271713201	8/4/2021	16.5	37	Canada wildfire smoke
Virginia	271377001	8/4/2021	31.4	52	Canada wildfire smoke
West Duluth	271377554	8/4/2021	26.2	45	Canada wildfire smoke
Brainerd	270353204	8/5/2021	17.5	45	Canada wildfire smoke
Detroit Lakes	270052013	8/5/2021	40	79	Canada wildfire smoke
Fargo NW	380171004	8/5/2021	46.3	71	Canada wildfire smoke
Leech Lake Nation	270213410	8/5/2021	30.6	76	Canada wildfire smoke
Marshall	270834210	8/5/2021	15	20	Canada wildfire smoke
Red Lake Nation	270072304	8/5/2021	26.7	73	Canada wildfire smoke
St. Cloud	271453052	8/5/2021	19	48	Canada wildfire smoke
St. Michael	271713201	8/5/2021	16.3	46	Canada wildfire smoke
Virginia	271377001	8/5/2021	17.5	48	Canada wildfire smoke
Apple Valley	270370470	8/6/2021	19.2	27	Canada wildfire smoke
Blaine	270031002	8/6/2021	18.7	26	Canada wildfire smoke
Brainerd	270353204	8/6/2021	28.9	41	Canada wildfire smoke
Detroit Lakes	270052013	8/6/2021	44.7	70	Canada wildfire smoke
Ely	270750005	8/6/2021	15.2	32	Canada wildfire smoke
Fargo NW	380171004	8/6/2021	50.2	76.8	Canada wildfire smoke
Fond du Lac	270177417	8/6/2021	24.5	37	Canada wildfire smoke

Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
Lakeville - Near Road	270370480	8/6/2021	22	29	Canada wildfire smoke
Leech Lake Nation	270213410	8/6/2021	51.9	62	Canada wildfire smoke
Marshall	270834210	8/6/2021	30	40	Canada wildfire smoke
Minneapolis - Near Road	270530962	8/6/2021	20.4	26	Canada wildfire smoke
Minneapolis - Phillips	270530963	8/6/2021	21	28	Canada wildfire smoke
Red Lake Nation	270072304	8/6/2021	56.9	76	Canada wildfire smoke
Rochester	271095008	8/6/2021	17	27	Canada wildfire smoke
St. Cloud	271453052	8/6/2021	25.9	37	Canada wildfire smoke
St. Michael	271713201	8/6/2021	25.5	38	Canada wildfire smoke
St. Paul-Harding	271230871	8/6/2021	19	33	Canada wildfire smoke
Virginia	271377001	8/6/2021	25.1	38	Canada wildfire smoke
West Duluth	271377554	8/6/2021	19.8	34	Canada wildfire smoke
Detroit Lakes	270052013	8/7/2021	24.4	45	Canada wildfire smoke
Fargo NW	380171004	8/7/2021	23.1	48	Canada wildfire smoke
Ely	270750005	8/7/2021	15.7	21	Canada wildfire smoke
Leech Lake Nation	270213410	8/7/2021	22.3	63	Canada wildfire smoke
Red Lake Nation	270072304	8/7/2021	20.1	54	Canada wildfire smoke
St. Cloud	271453052	8/7/2021	14.7	25	Canada wildfire smoke
Virginia	271377001	8/7/2021	14.8	22	Canada wildfire smoke
Ely	270750005	8/22/2021	28.5	199	Northeast MN fires
Duluth-WDSE	271377550	8/24/2021	35.5	101	Northeast MN fires
Ely	270750005	8/24/2021	17.4	76	Northeast MN fires
Fond du Lac	270177417	8/24/2021	39.1	137	Northeast MN fires
Virginia	271377001	8/24/2021	31	115	Northeast MN fires
Grand Portage	270317810	8/25/2021	58.9	267	Northeast MN fires
Apple Valley	270370470	8/26/2021	15.8	47	Northeast MN fires
Blaine	270031002	8/26/2021	15.8	79	Northeast MN fires
Brainerd	270353204	8/26/2021	28.4	127	Northeast MN fires
Detroit Lakes	270052013	8/26/2021	30.2	107	Northeast MN fires
Duluth-WDSE	271377550	8/26/2021	24.9	179	Northeast MN fires
Ely	270750005	8/26/2021	68.3	280	Northeast MN fires
Fargo NW	380171004	8/26/2021	24.3	132.3	Northeast MN fires
Fond du Lac	270177417	8/26/2021	22.5	169	Northeast MN fires
Grand Portage	270317810	8/26/2021		43	Northeast MN fires
Lakeville - Near Road	270370480	8/26/2021	19.2	47	Northeast MN fires
Leech Lake Nation	270213410	8/26/2021	43.3	130	Northeast MN fires

Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
Minneapolis - Near Road	270530962	8/26/2021	17.1	60	Northeast MN fires
Minneapolis - Phillips	270530963	8/26/2021	17.5	59	Northeast MN fires
Red Lake Nation	270072304	8/26/2021	30.9	184	Northeast MN fires
Shakopee	271390505	8/26/2021	18.8	53	Northeast MN fires
St. Cloud	271453052	8/26/2021	46.4	170	Northeast MN fires
St. Michael	271713201	8/26/2021	27.7	135	Northeast MN fires
St. Paul-Harding	271230871	8/26/2021	19.9	73	Northeast MN fires
Virginia	271377001	8/26/2021	56.5	225	Northeast MN fires
West Duluth	271377554	8/26/2021		74	Northeast MN fires
Fargo NW	380171004	8/27/2021	24.2	132.6	Northeast MN fires
Red Lake Nation	270072304	8/27/2021	19.9	122	Northeast MN fires

Table 8: List of days for 2022 when 24-hour PM_{2.5} Concentrations Were Influenced by Wildfire Smoke

Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
Apple Valley	270370470	6/14/2022	14.96	27	Smoke from southwest US wildfires
Blaine	270031002	6/14/2022	16.71	30	Smoke from southwest US wildfires
Brainerd	270353204	6/14/2022	15.63	34	Smoke from southwest US wildfires
Detroit Lakes	270052013	6/14/2022	11.71	28	Smoke from southwest US wildfires
Ely	270750005	6/14/2022	10.91	18	Smoke from southwest US wildfires
LACROSSE DOT	550630012	6/14/2022	18.91	24.3	Smoke from southwest US wildfires
Lakeville – Near Road	270370480	6/14/2022	14.75	29	Smoke from southwest US wildfires
Leech Lake Nation	270213410	6/14/2022	11.83	33	Smoke from southwest US wildfires
Marshall	270834210	6/14/2022	12.42	31	Smoke from southwest US wildfires
Minneapolis - Near Road	270530962	6/14/2022	13.75	27	Smoke from southwest US wildfires
Minneapolis-Phillips	270530963	6/14/2022	17.25	33	Smoke from southwest US wildfires
Rochester	271095008	6/14/2022	20.04	38	Smoke from southwest US wildfires

Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Shakopee	271390505	6/14/2022	21.77	43	Smoke from southwest US wildfires
St. Michael	271713201	6/14/2022	14.63	29	Smoke from southwest US wildfires
St. Paul-Harding	271230871	6/14/2022	16.87	32	Smoke from southwest US wildfires
Apple Valley	270370470	10/20/2022	14.98	23	Canada Wildfire Smoke
Blaine	270031002	10/20/2022	11.87	20	Canada Wildfire Smoke
Brainerd	270353204	10/20/2022	11.82	18.3	Canada Wildfire Smoke
Detroit Lakes	270052013	10/20/2022	12.82	20	Canada Wildfire Smoke
Fargo NW	380171004	10/20/2022	31.78	45.1	Canada Wildfire Smoke
LACROSSE DOT	550630012	10/20/2022	13.47	18.5	Canada Wildfire Smoke
Lakeville - Near Road	270370480	10/20/2022	15.74	26.6	Canada Wildfire Smoke
Leech Lake Nation	270213410	10/20/2022	13.21	19	Canada Wildfire Smoke
Marshall	270834210	10/20/2022	17.54	27	Canada Wildfire Smoke
Minneapolis - Near Road	270530962	10/20/2022	19.22	72.4	Canada Wildfire Smoke
Minneapolis-Phillips	270530963	10/20/2022	16.37	25.9	Canada Wildfire Smoke
Red Lake Nation	270072304	10/20/2022	9.38	17	Canada Wildfire Smoke
Rochester	271095008	10/20/2022	17.93	32.3	Canada Wildfire Smoke
Shakopee	271390505	10/20/2022	17.3	26.9	Canada Wildfire Smoke
St. Cloud	271453052	10/20/2022	14.64	26.8	Canada Wildfire Smoke
St. Michael	271713201	10/20/2022	14.77	24.4	Canada Wildfire Smoke
St. Paul-Hardin	271230871	10/20/2022	12.46	21	Canada Wildfire Smoke
Apple Valley	270370470	10/21/2022	22.78	34.3	Canada Wildfire Smoke
Blaine	270031002	10/21/2022	22.08	45	Canada Wildfire Smoke
Brainerd	270353204	10/21/2022	16.82	25.3	Canada Wildfire Smoke
Detroit Lakes	270052013	10/21/2022	12.42	25	Canada Wildfire Smoke
Duluth-WDSE	271377550	10/21/2022	12.04	41	Canada Wildfire Smoke
Ely	270750005	10/21/2022	9	19	Canada Wildfire Smoke
Fargo NW	380171004	10/21/2022	20.85	31	Canada Wildfire Smoke
Fond du Lac	270177417	10/21/2022	9.79	18	Canada Wildfire Smoke
Grand Portage	270317810	10/21/2022	3.92	16	Canada Wildfire Smoke
LACROSSE DOT	550630012	10/21/2022	27.2	48.8	Canada Wildfire Smoke
Lakeville – Near Road	270370480	10/21/2022	24.58	31.6	Canada Wildfire Smoke
Leech Lake Nation	270213410	10/21/2022	13.5	27	Canada Wildfire Smoke
Marshall	270834210	10/21/2022	18.79	26	Canada Wildfire Smoke
Minneapolis - Near Road	270530962	10/21/2022	28.81	52.6	Canada Wildfire Smoke
Minneapolis-Phillips	270530963	10/21/2022	29.78	53.4	Canada Wildfire Smoke

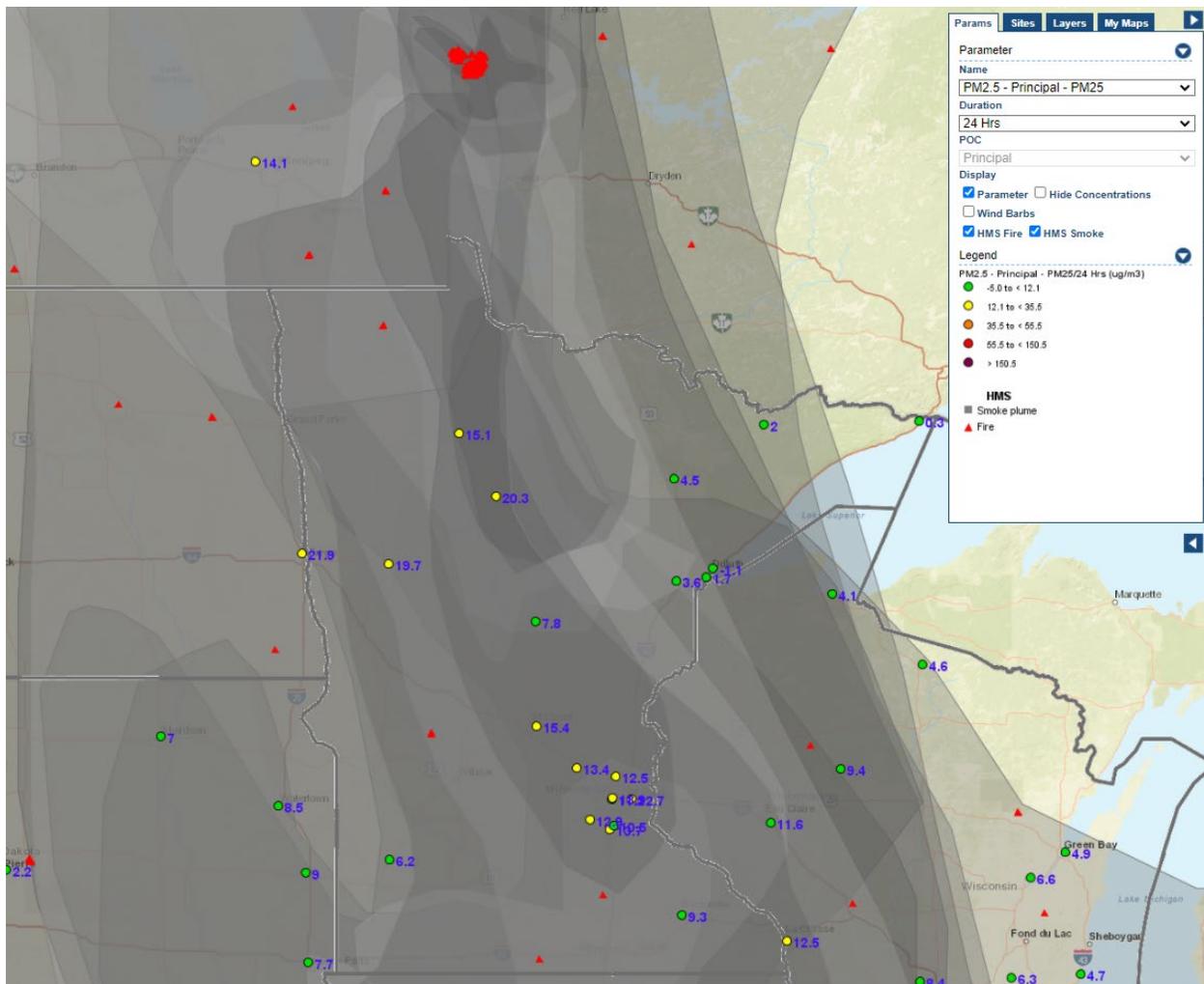
Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
Red Lake Nation	270072304	10/21/2022	10.92	29	Canada Wildfire Smoke
Rochester	271095008	10/21/2022	30.45	44.3	Canada Wildfire Smoke
Shakopee	271390505	10/21/2022	29.62	57.5	Canada Wildfire Smoke
St. Cloud	271453052	10/21/2022	23.68	27.7	Canada Wildfire Smoke
St. Michael	271713201	10/21/2022	29.92	51.1	Canada Wildfire Smoke
St. Paul-Hardin	271230871	10/21/2022	22.88	54	Canada Wildfire Smoke
Virginia	271377001	10/21/2022	11.46	21	Canada Wildfire Smoke
West Duluth	271377554	10/21/2022	9.83	21	Canada Wildfire Smoke
Apple Valley	270370470	10/22/2022	24.41	32.3	Canada Wildfire Smoke
Blaine	270031002	10/22/2022	19.46	35	Canada Wildfire Smoke
Brainerd	270353204	10/22/2022	17.25	21.8	Canada Wildfire Smoke
Detroit Lakes	270052013	10/22/2022	13.5	19	Canada Wildfire Smoke
Fargo NW	380171004	10/22/2022	24.2	31.8	Canada Wildfire Smoke
LACROSSE DOT	550630012	10/22/2022	19.17	33.7	Canada Wildfire Smoke
Lakeville – Near Road	270370480	10/22/2022	24.4	36.9	Canada Wildfire Smoke
Leech Lake Nation	270213410	10/22/2022	11.96	18	Canada Wildfire Smoke
Marshall	270834210	10/22/2022	20.04	32	Canada Wildfire Smoke
Minneapolis - Near Road	270530962	10/22/2022	25.79	44.8	Canada Wildfire Smoke
Minneapolis-Phillips	270530963	10/22/2022	26.61	43.1	Canada Wildfire Smoke
Rochester	271095008	10/22/2022	22.75	39	Canada Wildfire Smoke
Shakopee	271390505	10/22/2022	24.34	37.5	Canada Wildfire Smoke
St. Cloud	271453052	10/22/2022	23.56	40.1	Canada Wildfire Smoke
St. Michael	271713201	10/22/2022	27.29	46.3	Canada Wildfire Smoke
St. Paul-Harding	271230871	10/22/2022	16.5	35	Canada Wildfire Smoke

7/1/2021 Impacts

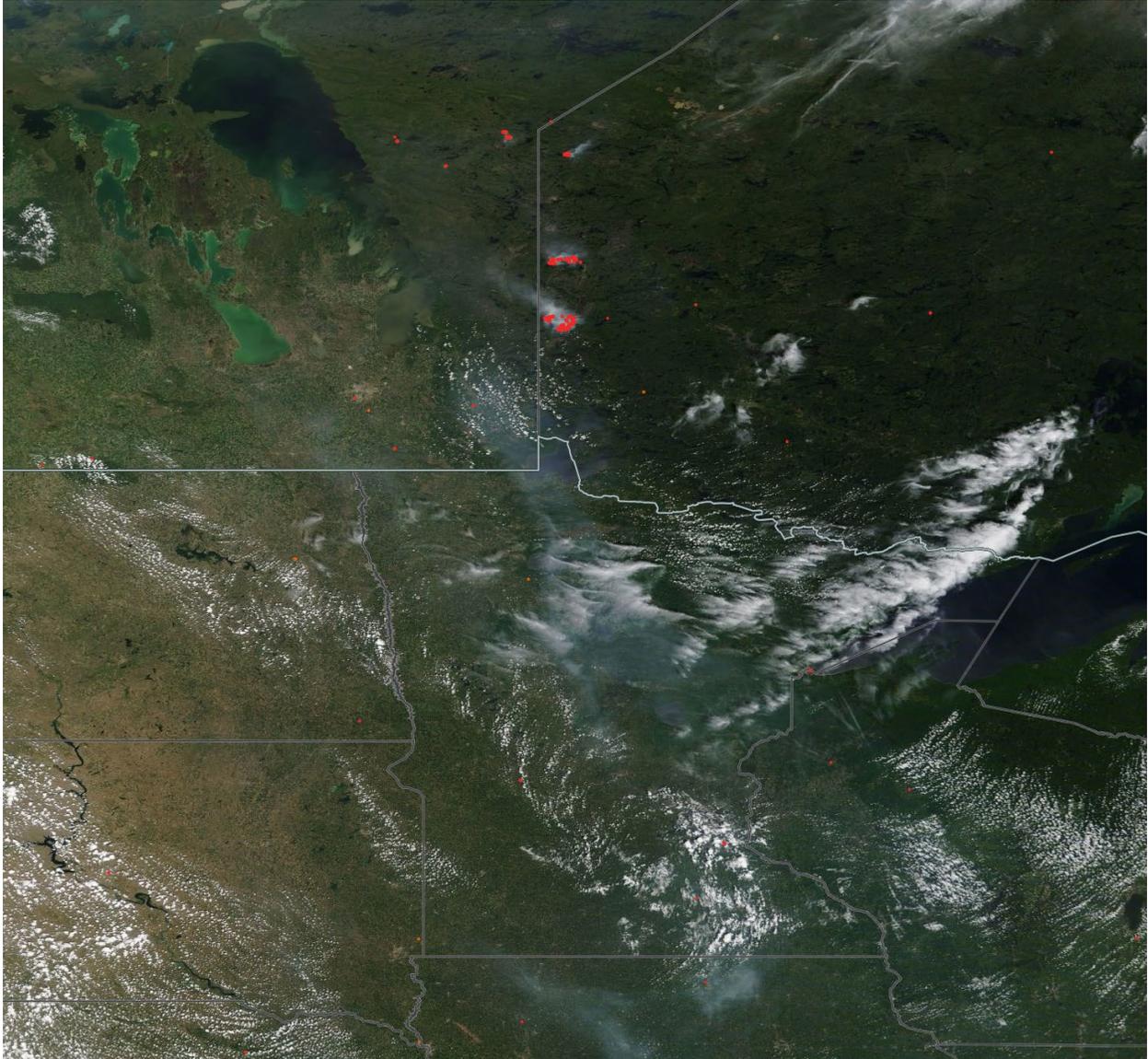
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 1, 2021.

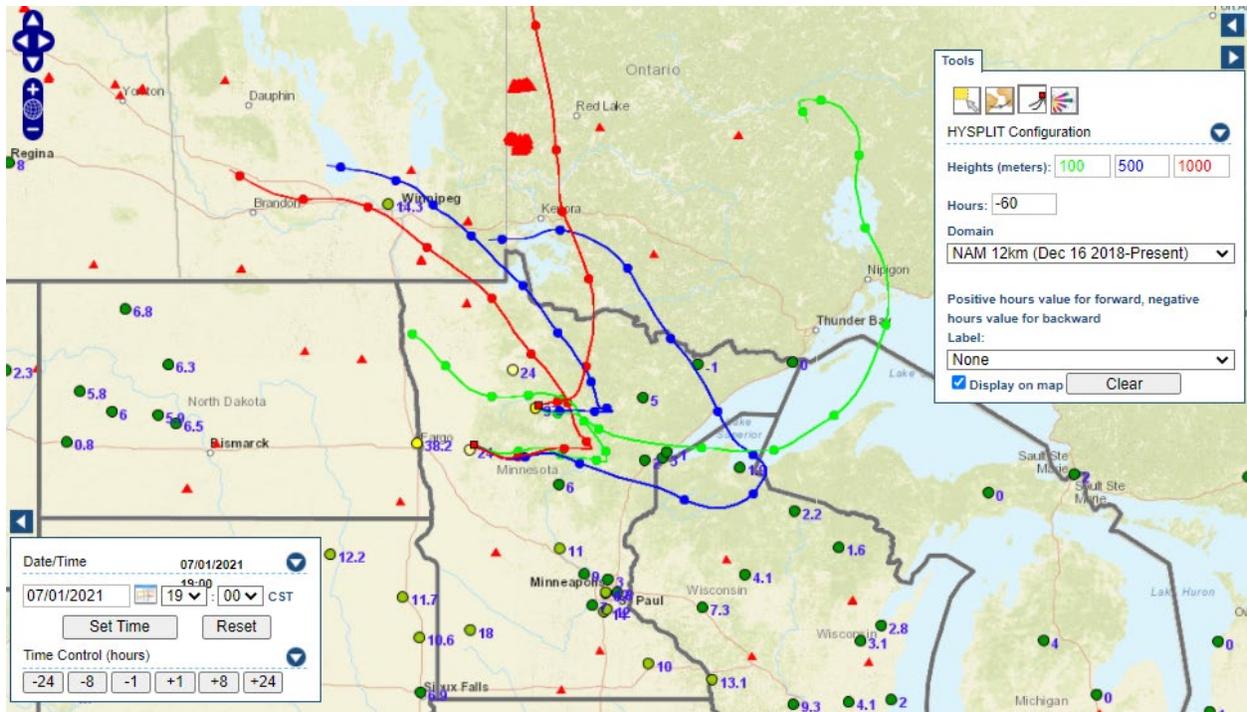
Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
Detroit Lakes	270052013	7/1/2021	19.7	34	Canada wildfire smoke
Fargo NW	380171004	7/1/2021	21.9	48.3	Canada wildfire smoke
Leech Lake Nation	270213410	7/1/2021	20.3	37	Canada wildfire smoke
Red Lake Nation	270072304	7/1/2021	15.1	27	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 1, 2021.



MODIS visible satellite for July 1, 2021.



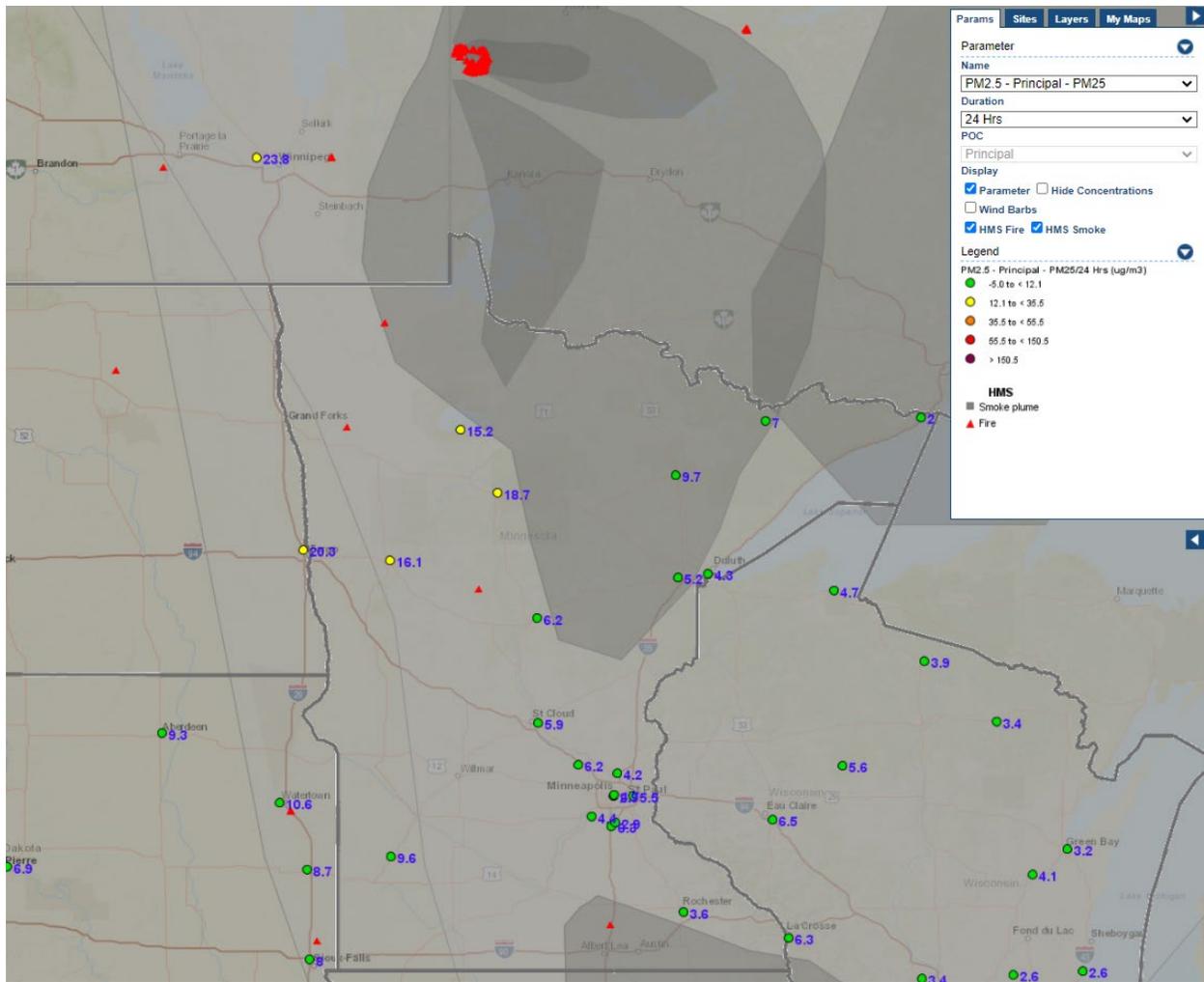
Backward trajectories for July 1, 2021.

7/2/2021 Impacts

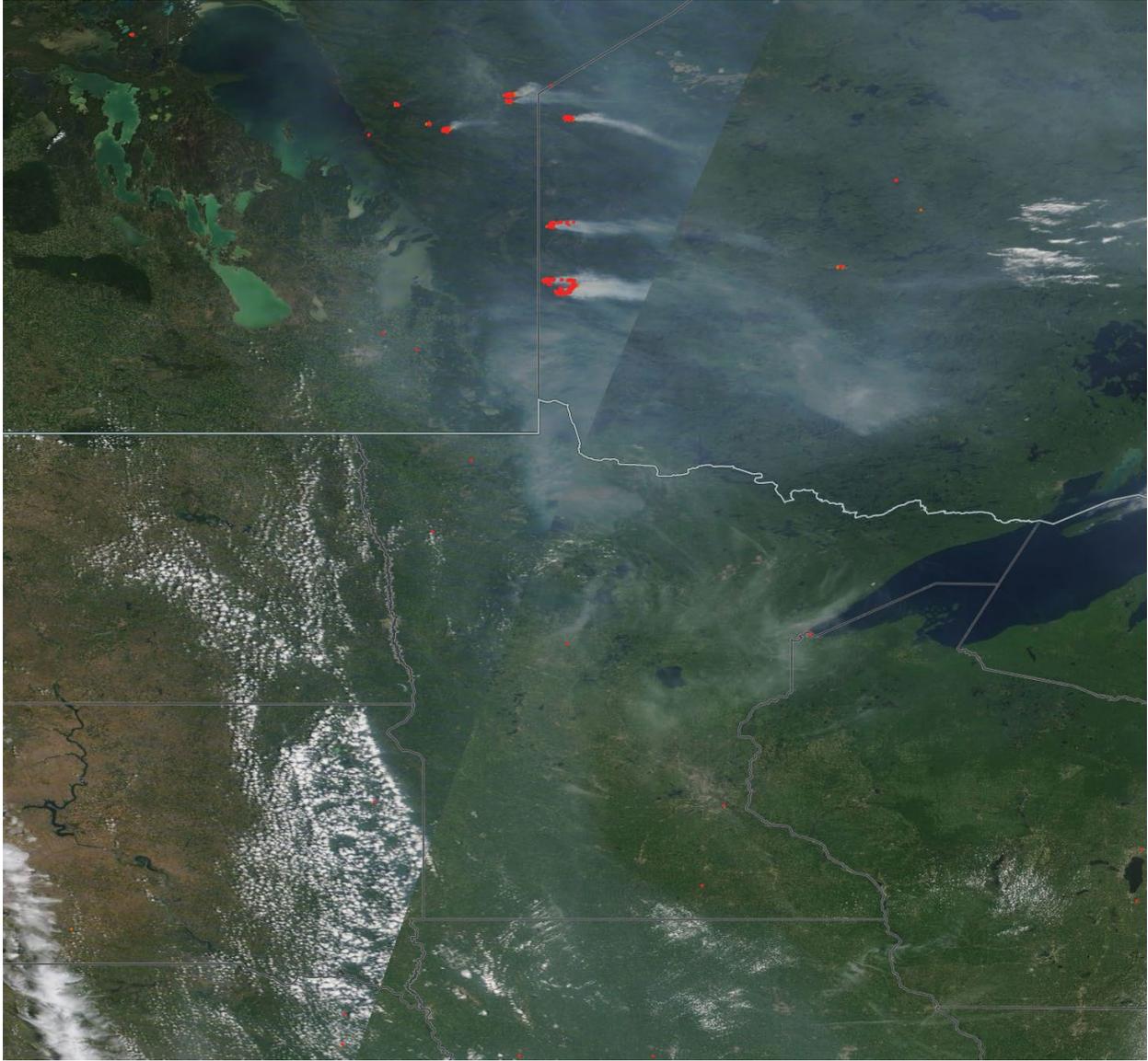
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 2, 2021.

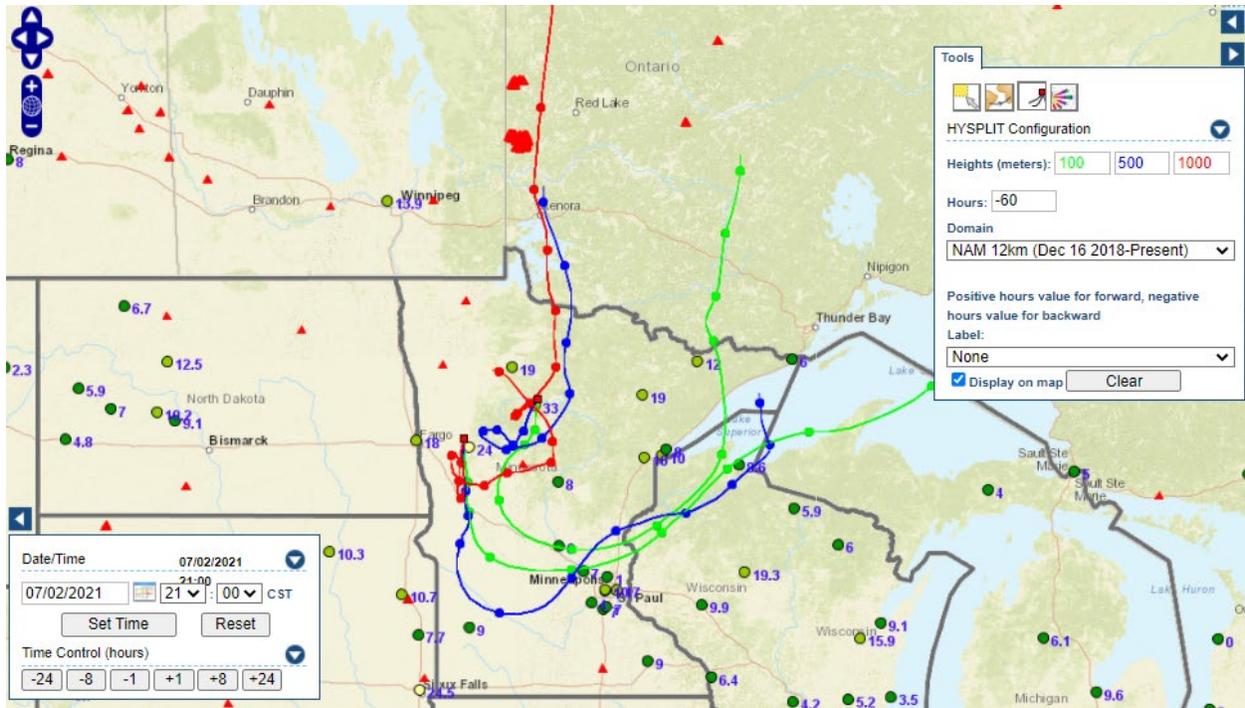
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Detroit Lakes	270052013	7/2/2021	16.1	24	Canada wildfire smoke
Fargo NW	380171004	7/2/2021	20.3	49.1	Canada wildfire smoke
Leech Lake Nation	270213410	7/2/2021	18.7	33	Canada wildfire smoke
Red Lake Nation	270072304	7/2/2021	15.2	25	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 2, 2021.



MODIS visible satellite for July 2, 2021.



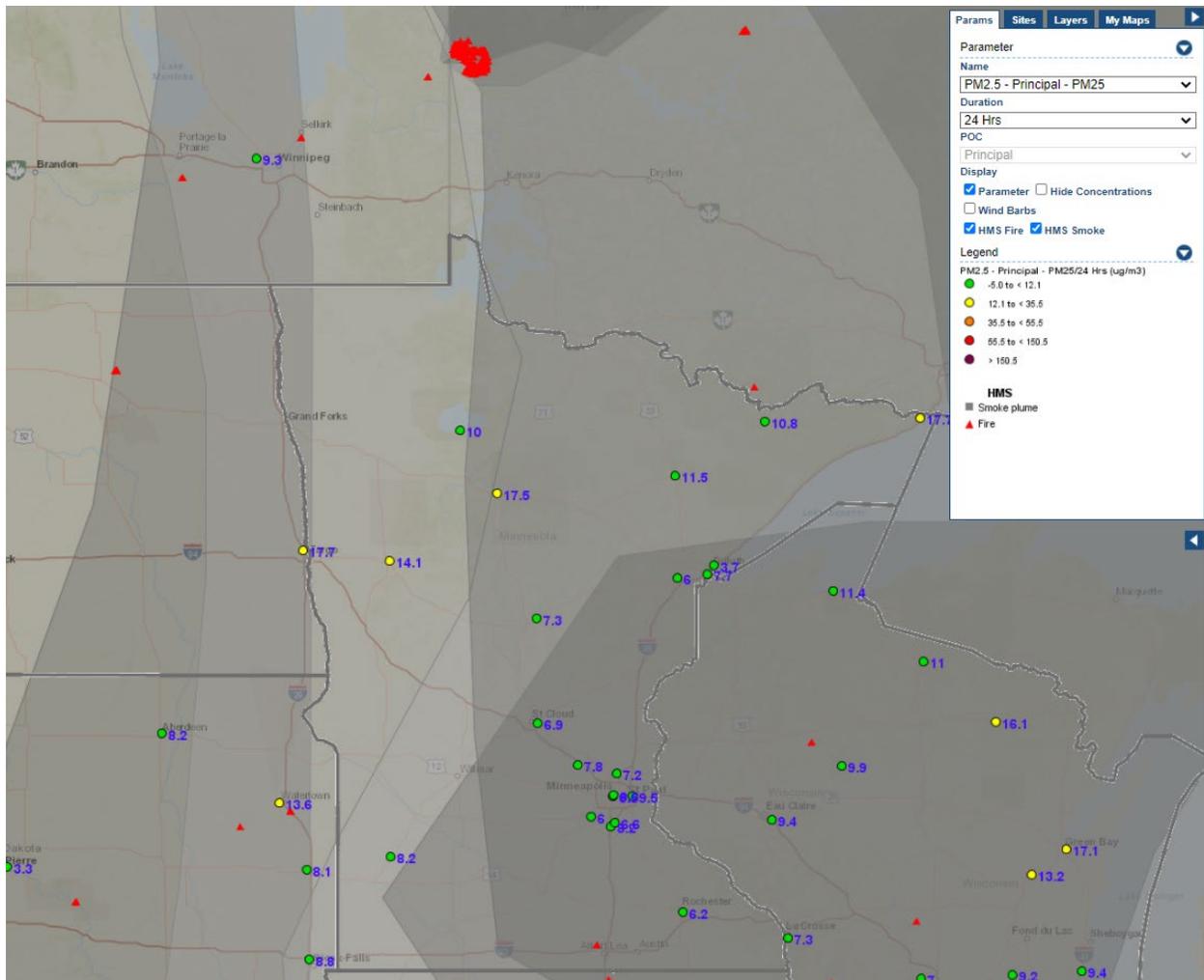
Backward trajectories for July 2, 2021.

7/3/2021 Impacts

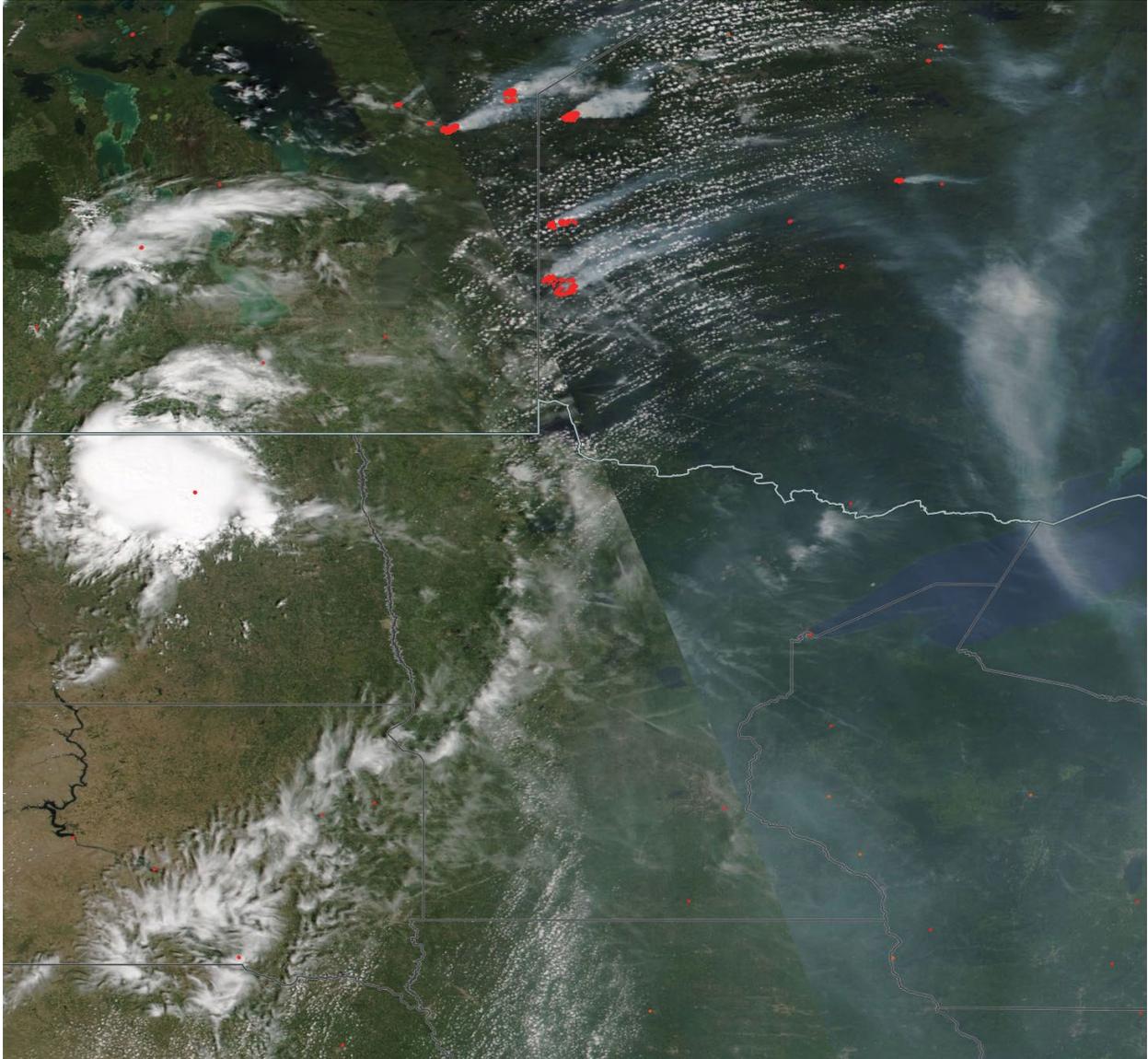
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 3, 2021.

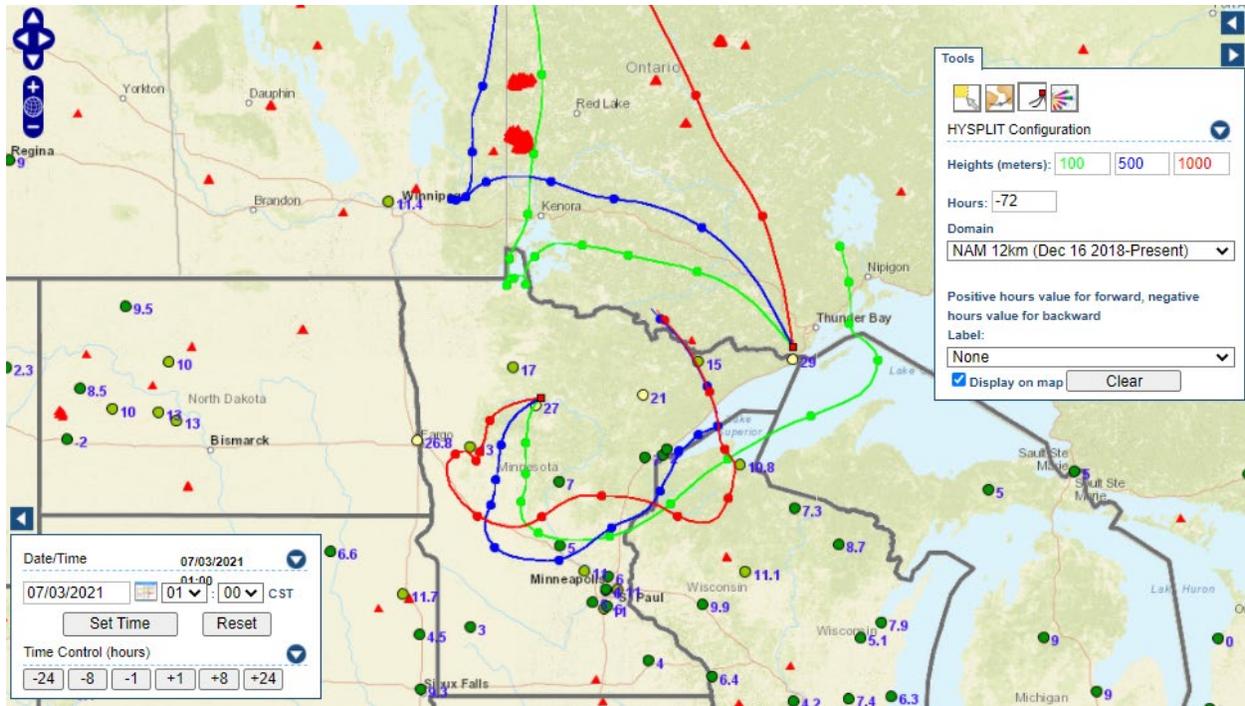
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Fargo NW	380171004	7/3/2021	17.7	26.8	Canada wildfire smoke
Grand Portage	270317810	7/3/2021	17.7	30	Canada wildfire smoke
Leech Lake Nation	270213410	7/3/2021	17.6	30	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 3, 2021.



MODIS visible satellite for July 3, 2021.



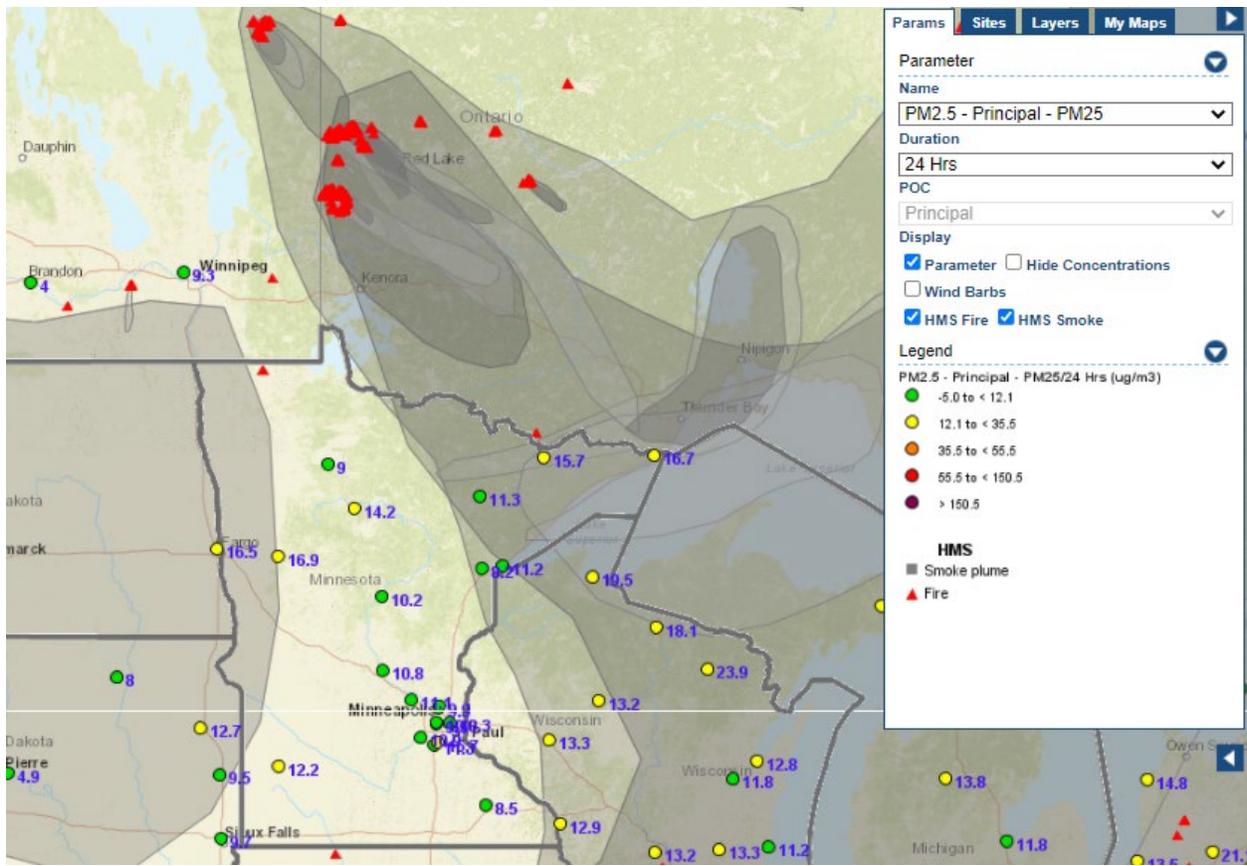
Backward trajectories for July 3, 2021.

7/5/2021 Impacts

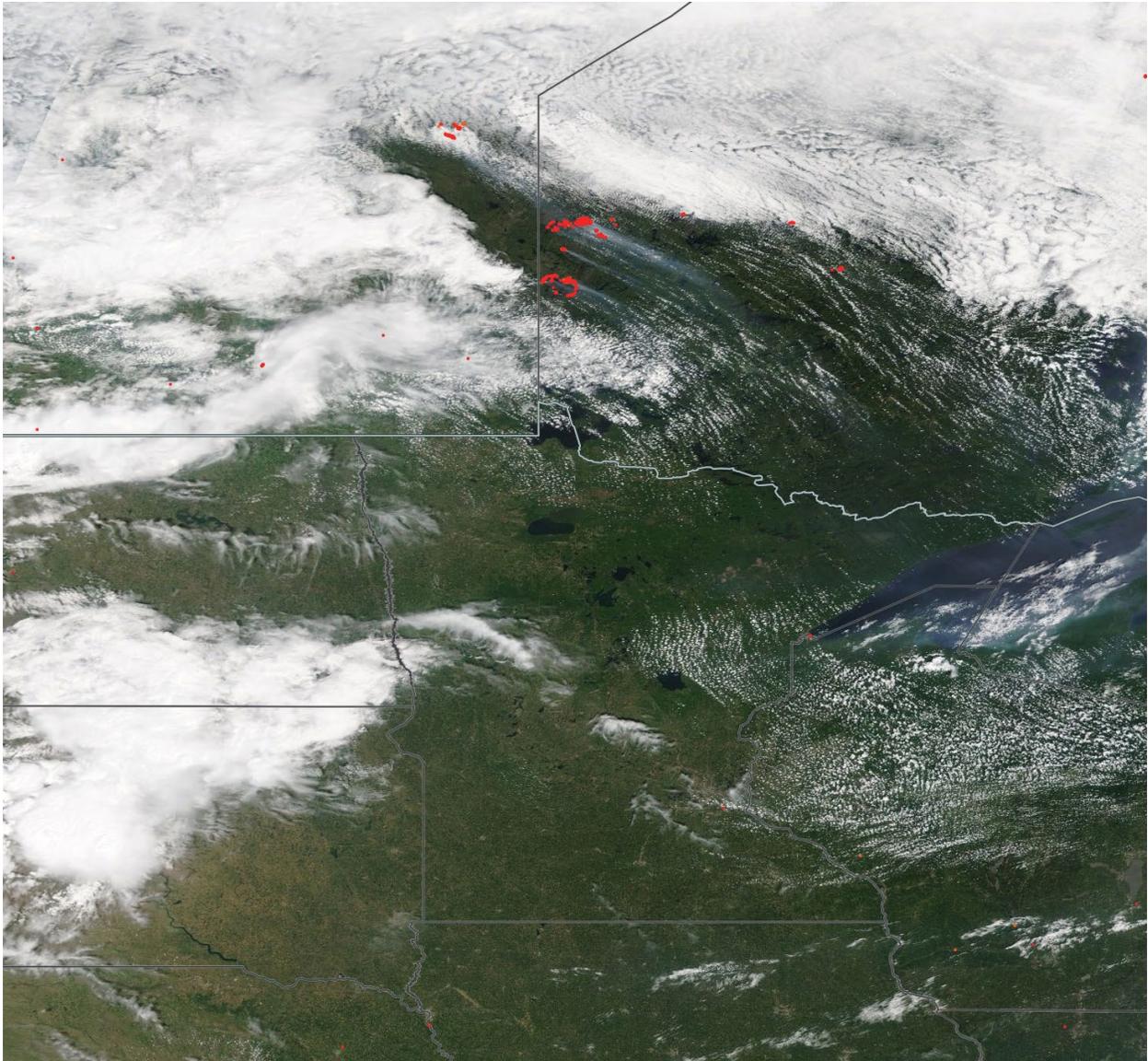
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 5, 2021.

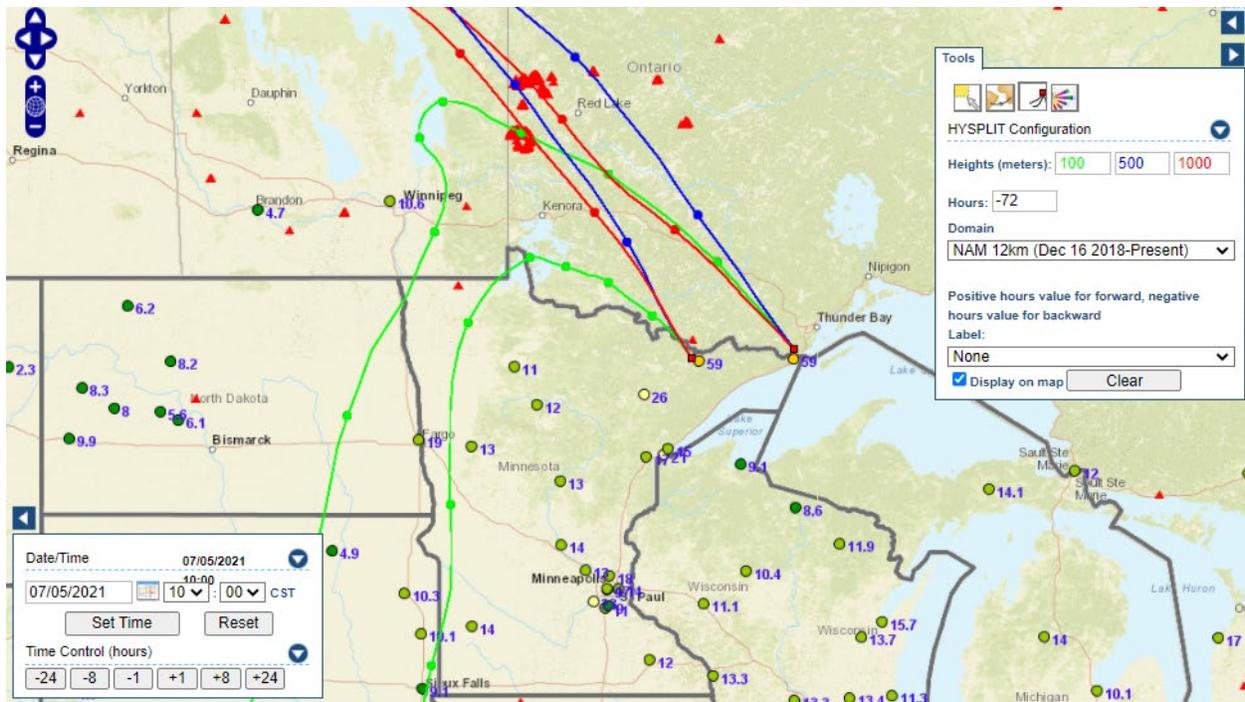
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Ely	270750005	7/5/2021	15.7	80	Canada wildfire smoke
Grand Portage	270317810	7/5/2021	16.7	59	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 5, 2021.



MODIS visible satellite for July 5, 2021.



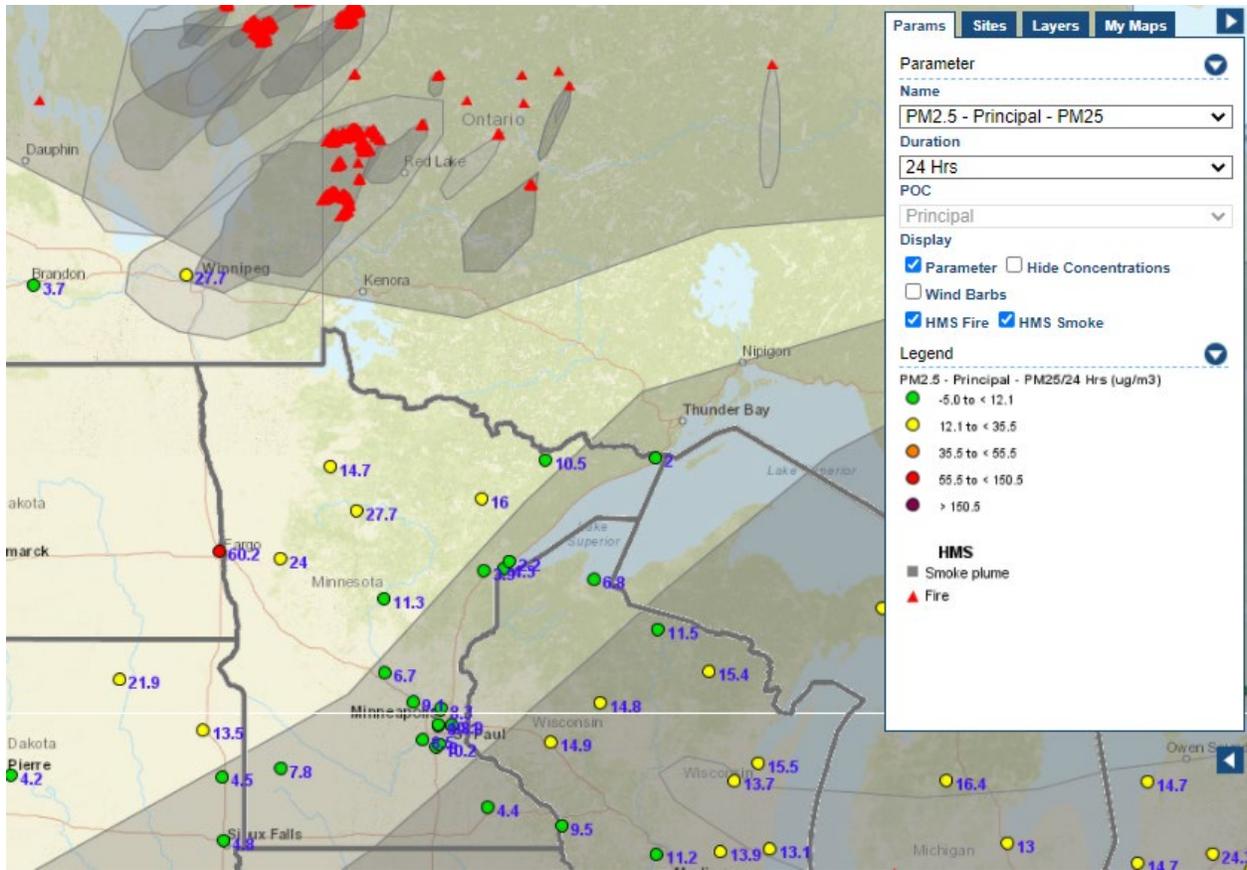
Backward trajectories for July 5, 2021.

7/6/2021 Impacts

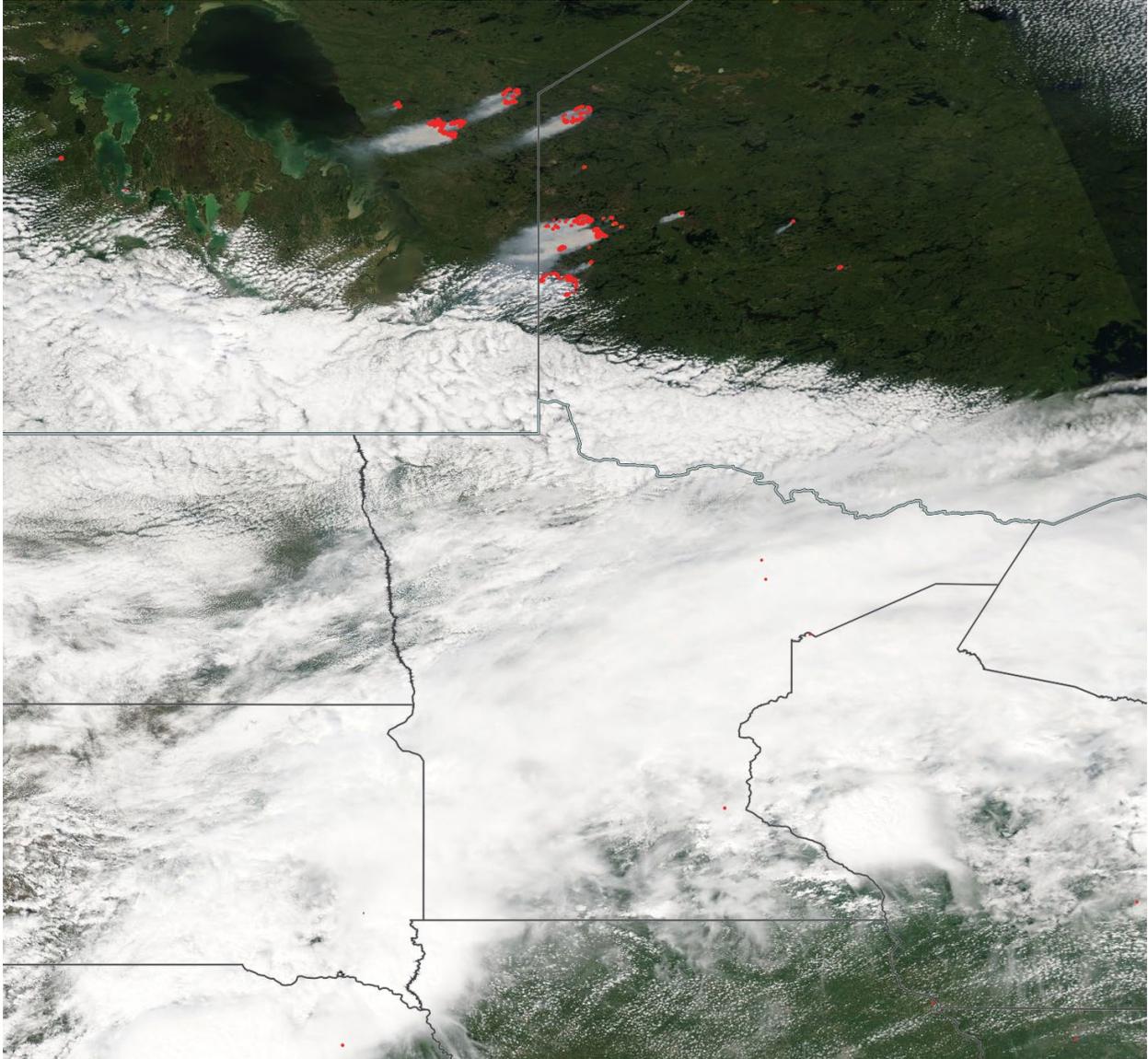
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 6, 2021.

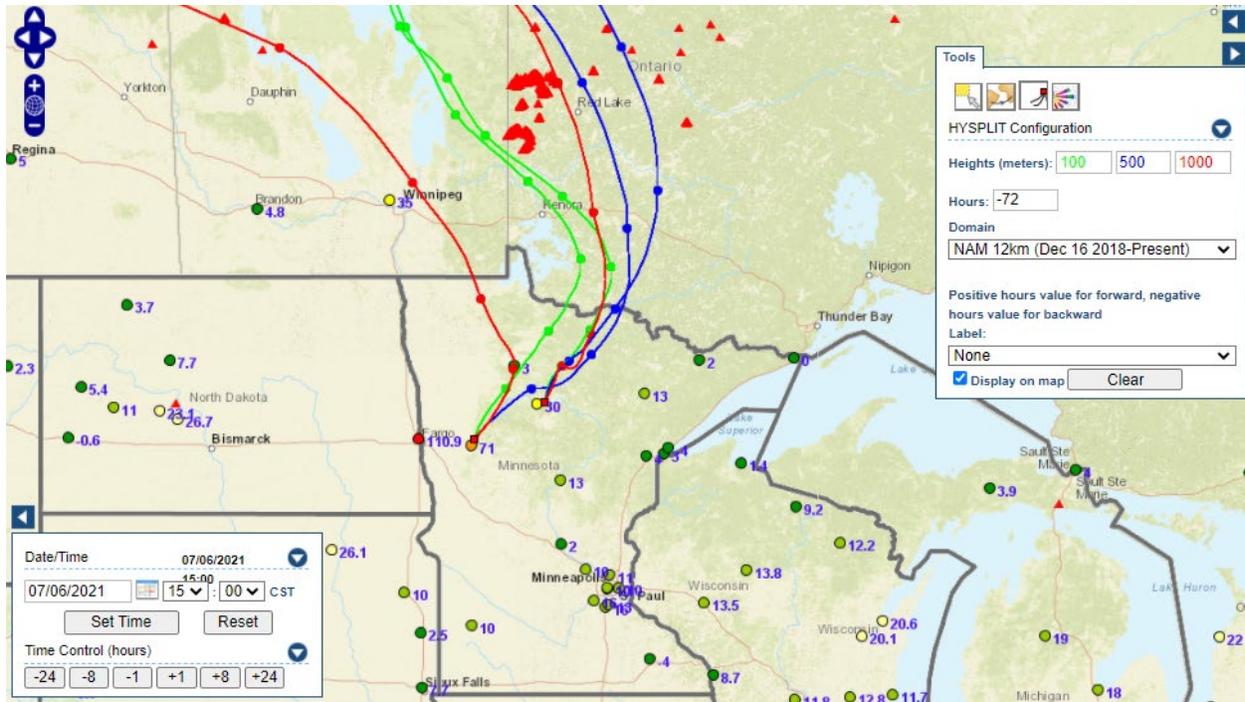
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Brainerd	270353204	7/6/2021	11.3	27	Canada wildfire smoke
Detroit Lakes	270052013	7/6/2021	24.0	71	Canada wildfire smoke
Ely	270750005	7/6/2021	10.5	46	Canada wildfire smoke
Fargo NW	380171004	7/6/2021	60.2	168.8	Canada wildfire smoke
Leech Lake Nation	270213410	7/6/2021	27.7	62	Canada wildfire smoke
Red Lake Nation	270072304	7/6/2021	14.7	65	Canada wildfire smoke
Virginia	271377001	7/6/2021	16	39	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 6, 2021.



MODIS visible satellite for July 6, 2021.



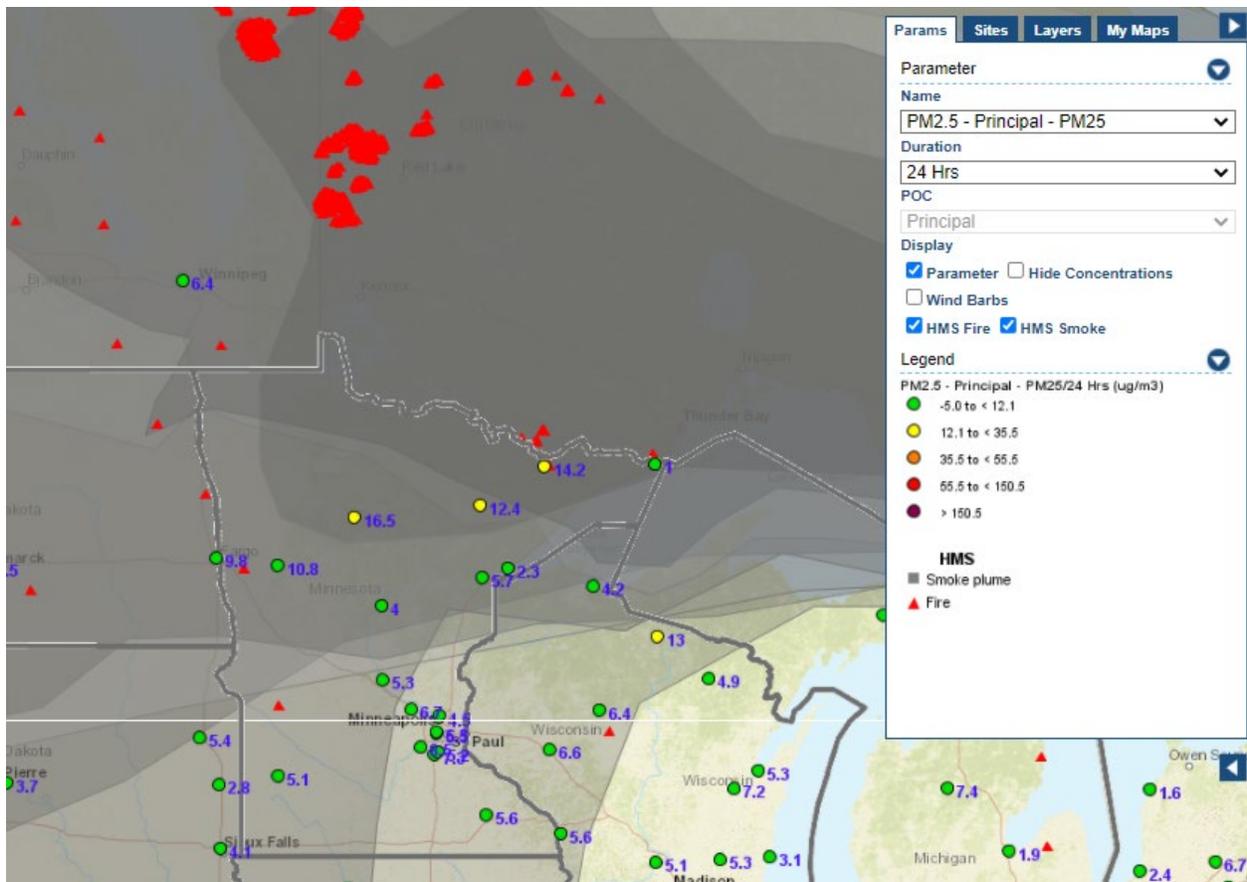
Backward trajectories for July 6, 2021.

7/10/2021 Impacts

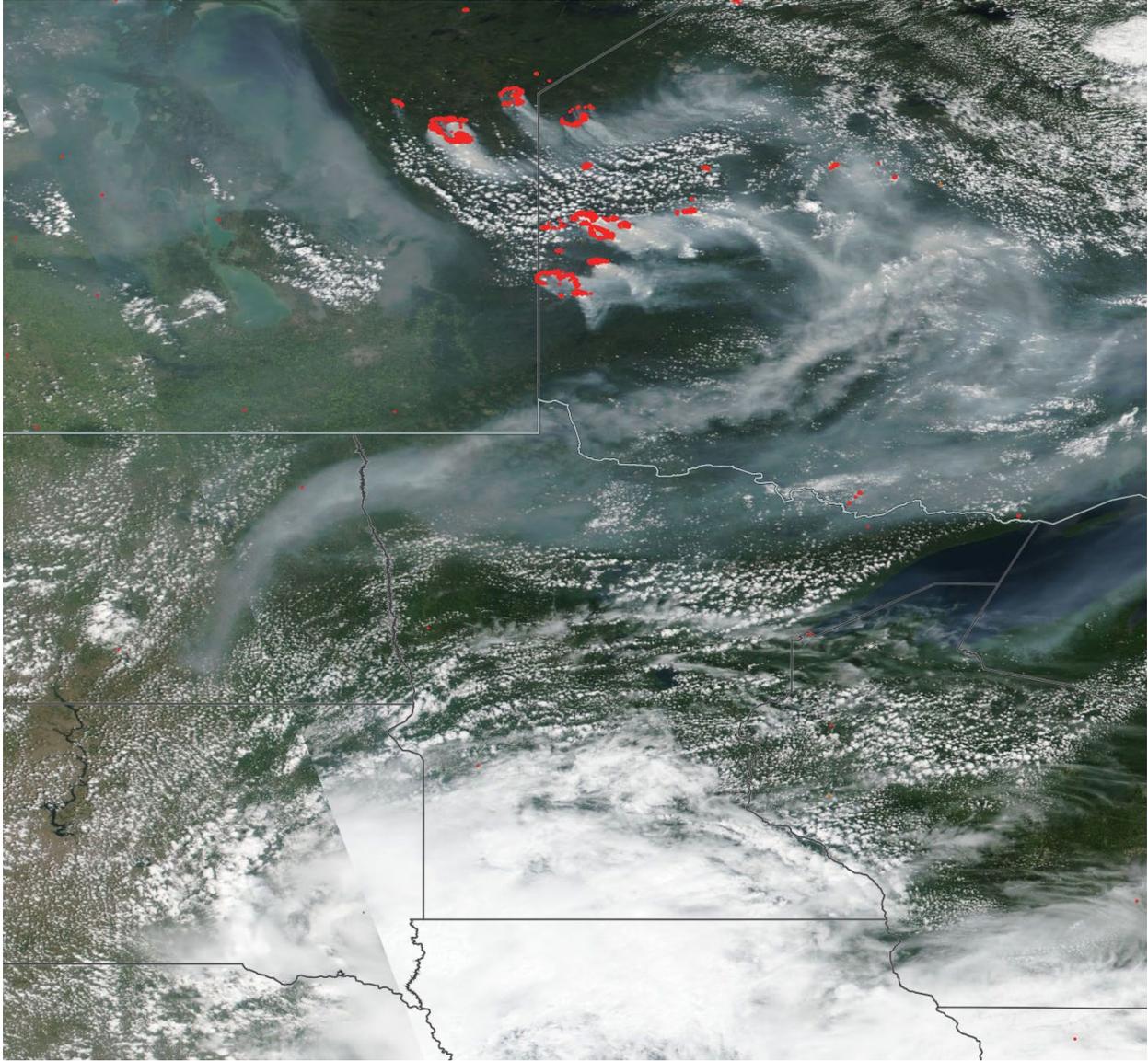
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 10, 2021.

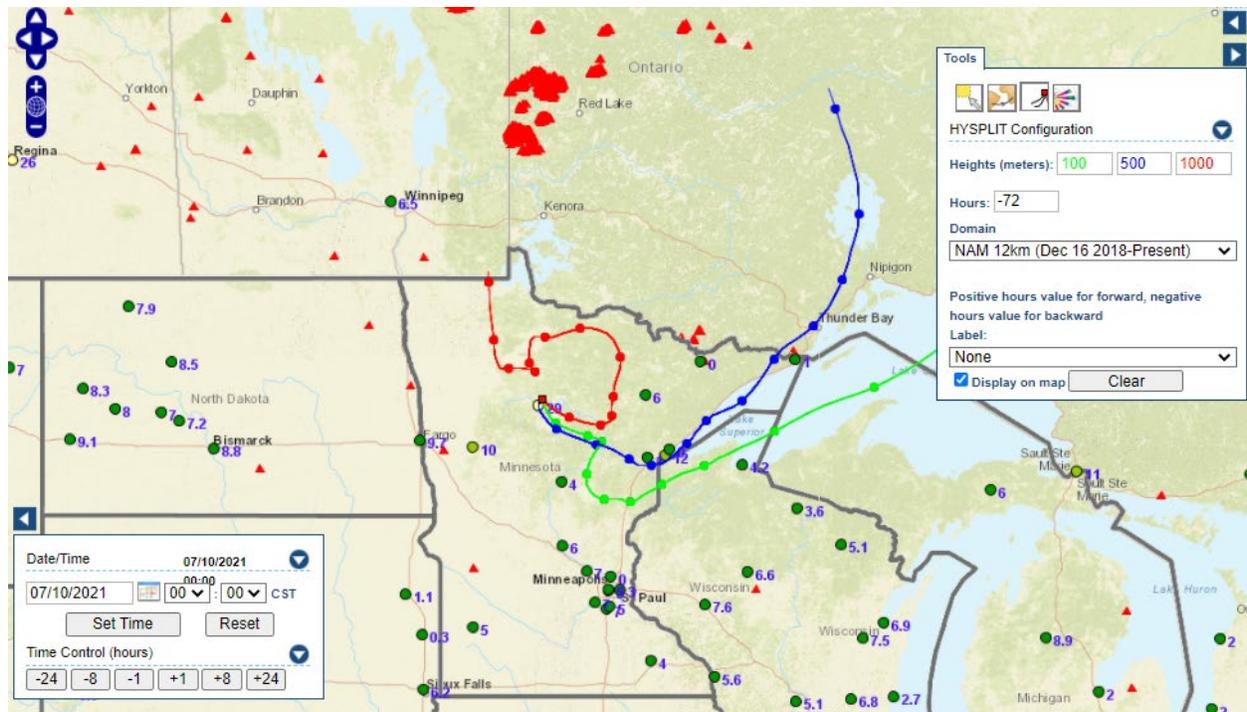
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Ely	270750005	7/10/2021	14.2	55	Canada wildfire smoke
Leech Lake Nation	270213410	7/10/2021	16.5	29	Canada wildfire smoke
Virginia	271377001	7/10/2021	12.5	28	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 10, 2021.



MODIS visible satellite for July 10, 2021.



Backward trajectories for July 10, 2021.

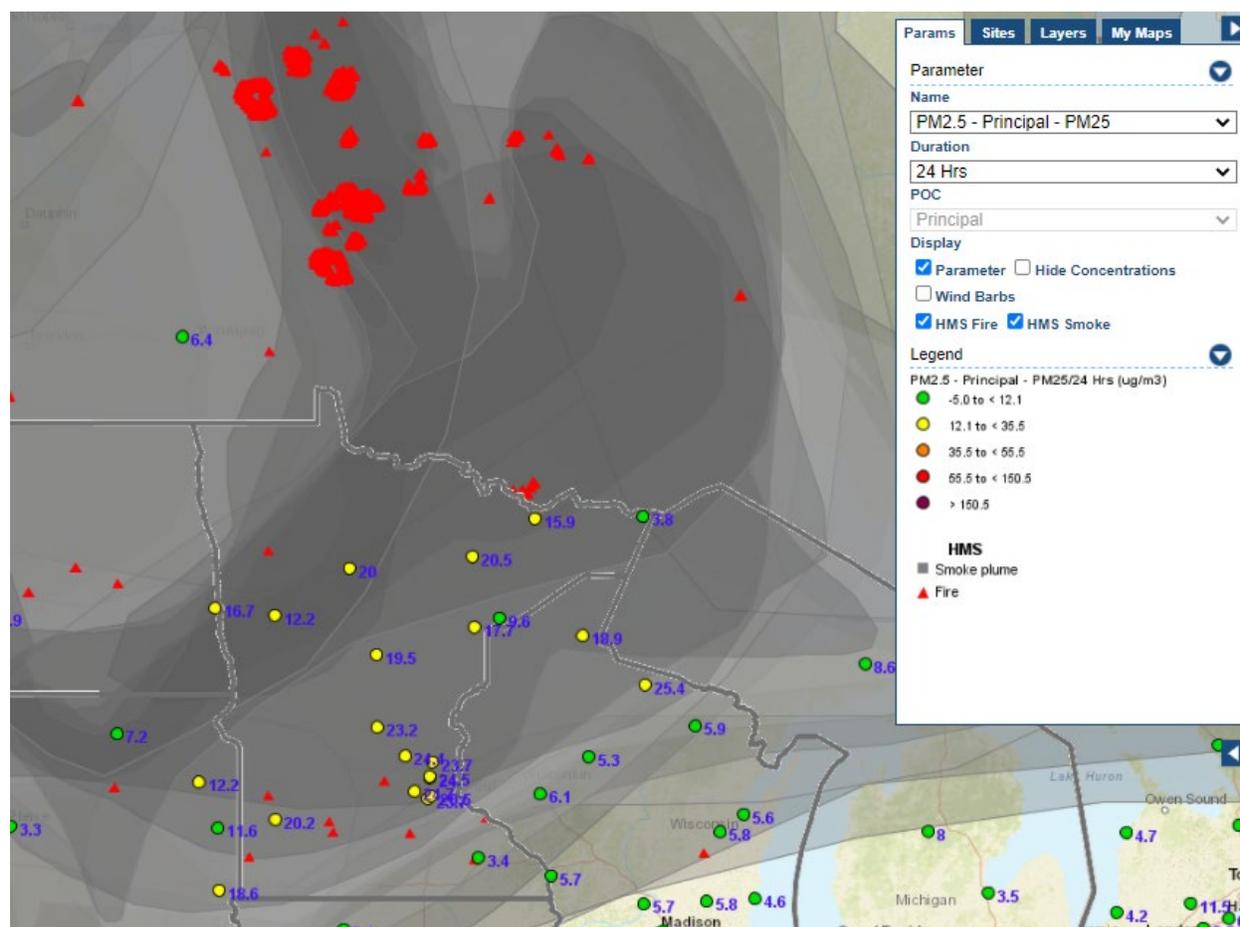
7/11/2021 Impacts

Smoke impacts from wildfires over Canada.

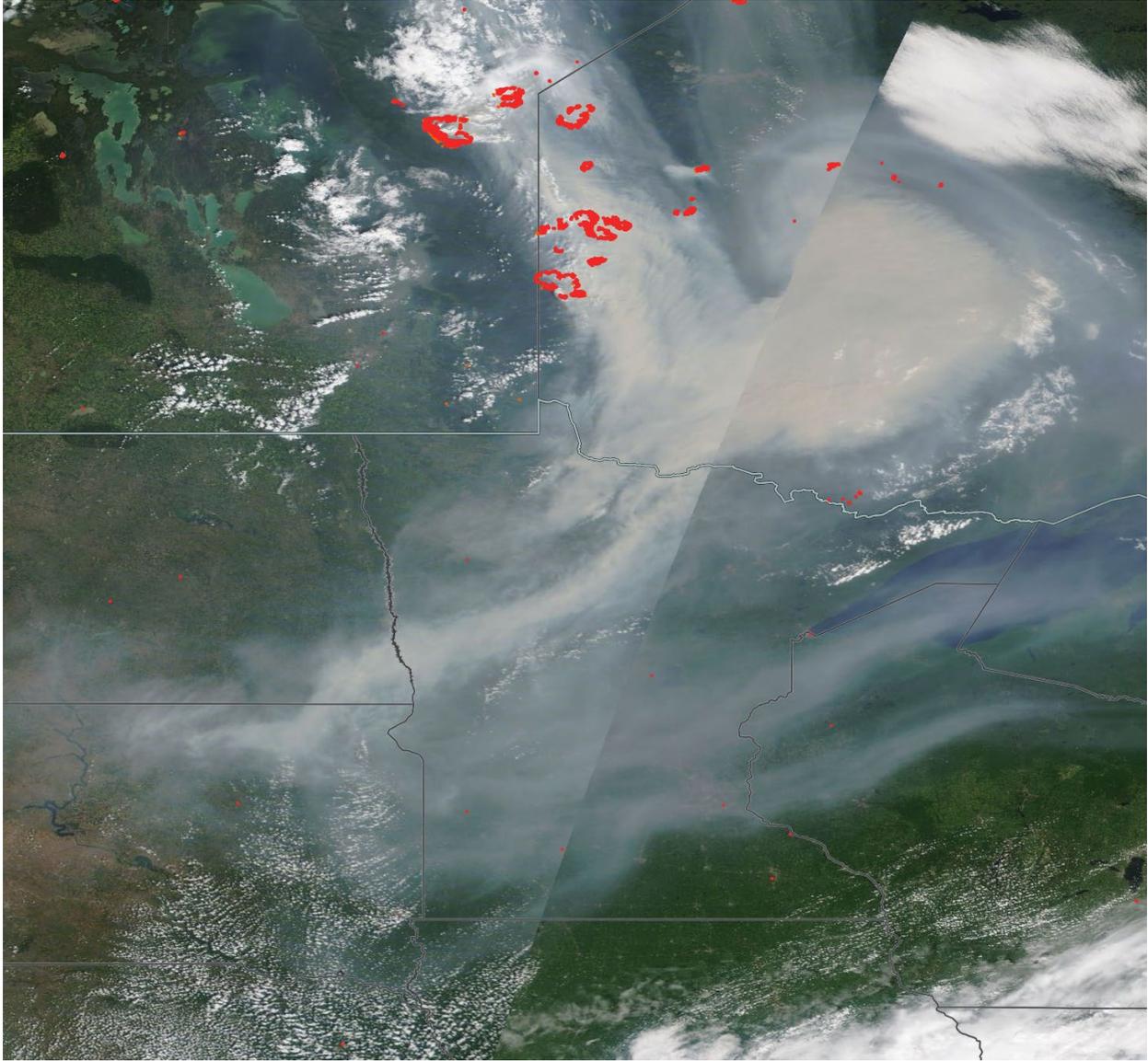
Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 11, 2021.

Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Apple Valley	270370470	7/11/2021	20.5	42	Canada wildfire smoke
Blaine	270031002	7/11/2021	23.7	43	Canada wildfire smoke
Brainerd	270353204	7/11/2021	19.5	35	Canada wildfire smoke
Fargo NW	380171004	7/11/2021	16.7	35.6	Canada wildfire smoke
Fond du Lac	270177417	7/11/2021	17.7	32	Canada wildfire smoke
Ely	270750005	7/11/2021	15.9	34	Canada wildfire smoke
Lakeville - Near Road	270370480	7/11/2021	23.7	49	Canada wildfire smoke
Leech Lake Nation	270213410	7/11/2021	20	28	Canada wildfire smoke
Marshall	270834210	7/11/2021	20.2	51	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/11/2021	24.5	44	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/11/2021	24	47	Canada wildfire smoke
Shakopee	271390505	7/11/2021	24.7	42	Canada wildfire smoke
St. Cloud	271453052	7/11/2021	23.2	42	Canada wildfire smoke

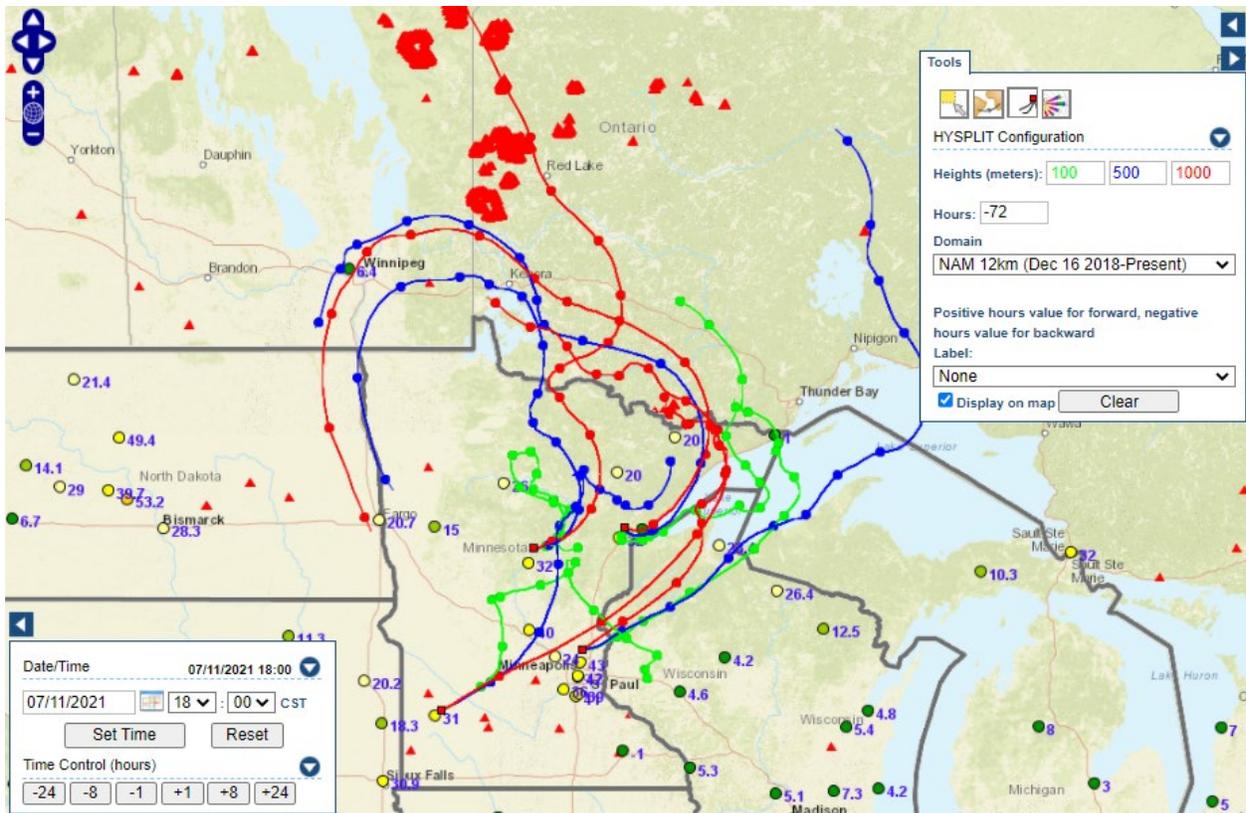
Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
St. Michael	271713201	7/11/2021	24.4	40	Canada wildfire smoke
Virginia	271377001	7/11/2021	20.5	35	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 11, 2021.



MODIS visible satellite for July 11, 2021.



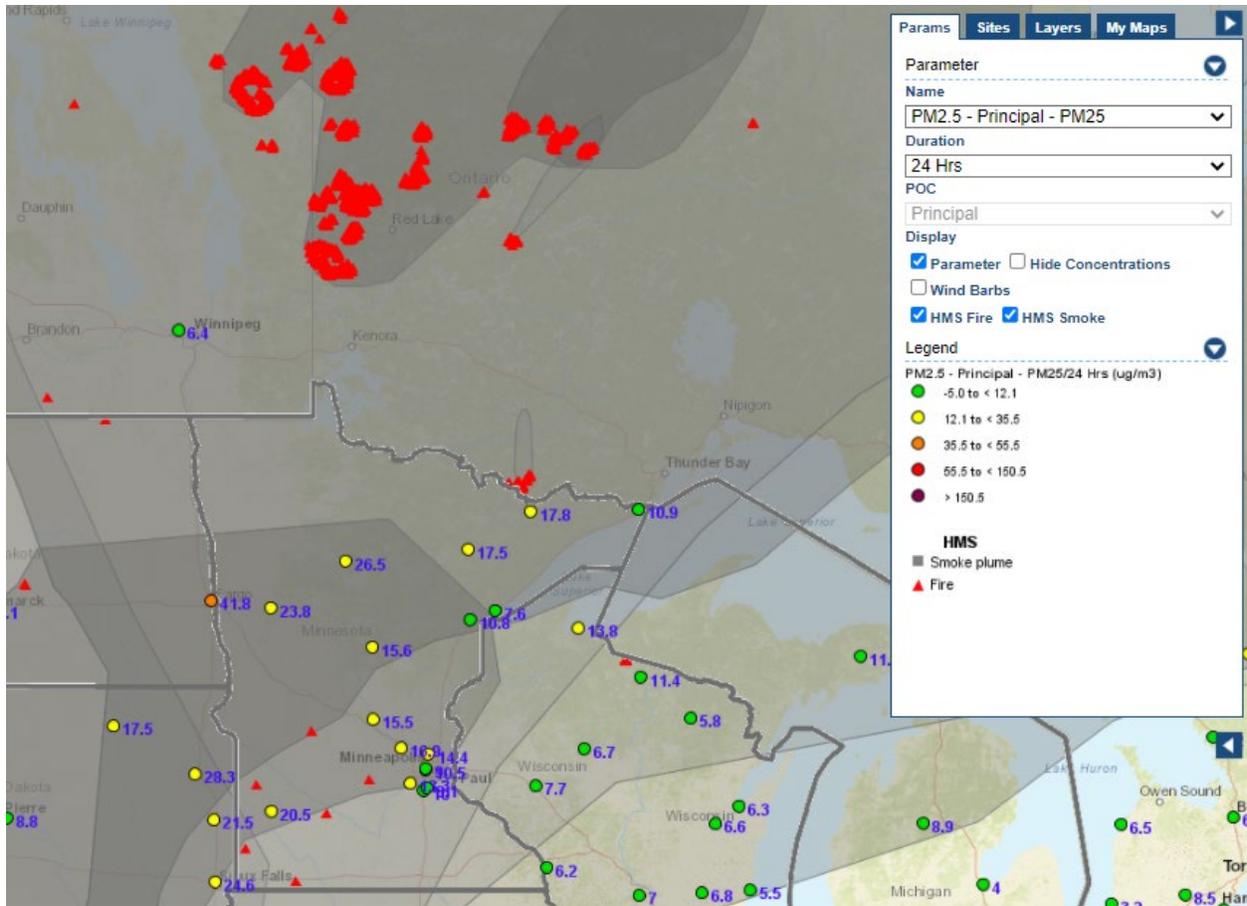
Backward trajectories for July 11, 2021.

7/12/2021 Impacts

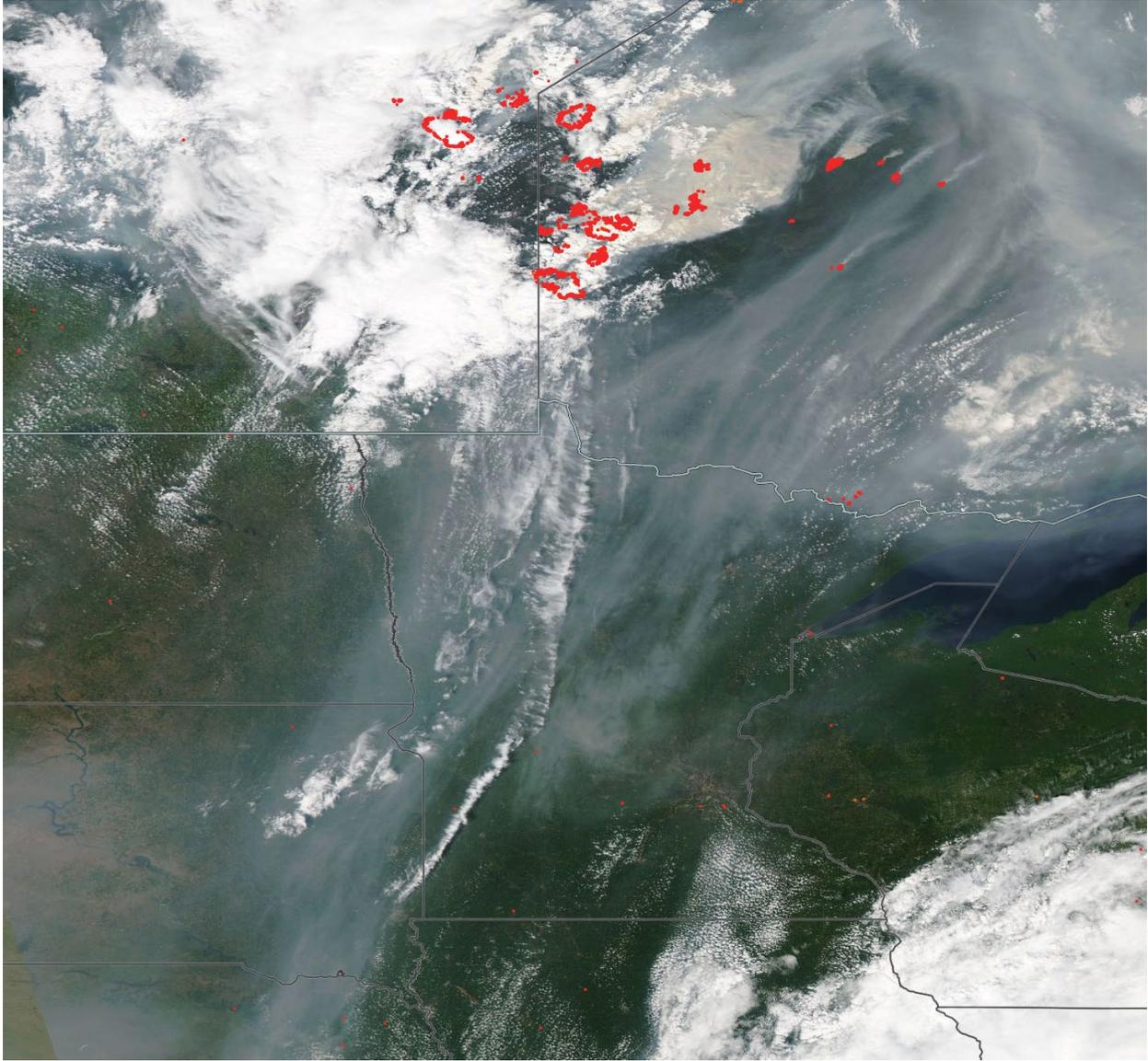
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 12, 2021.

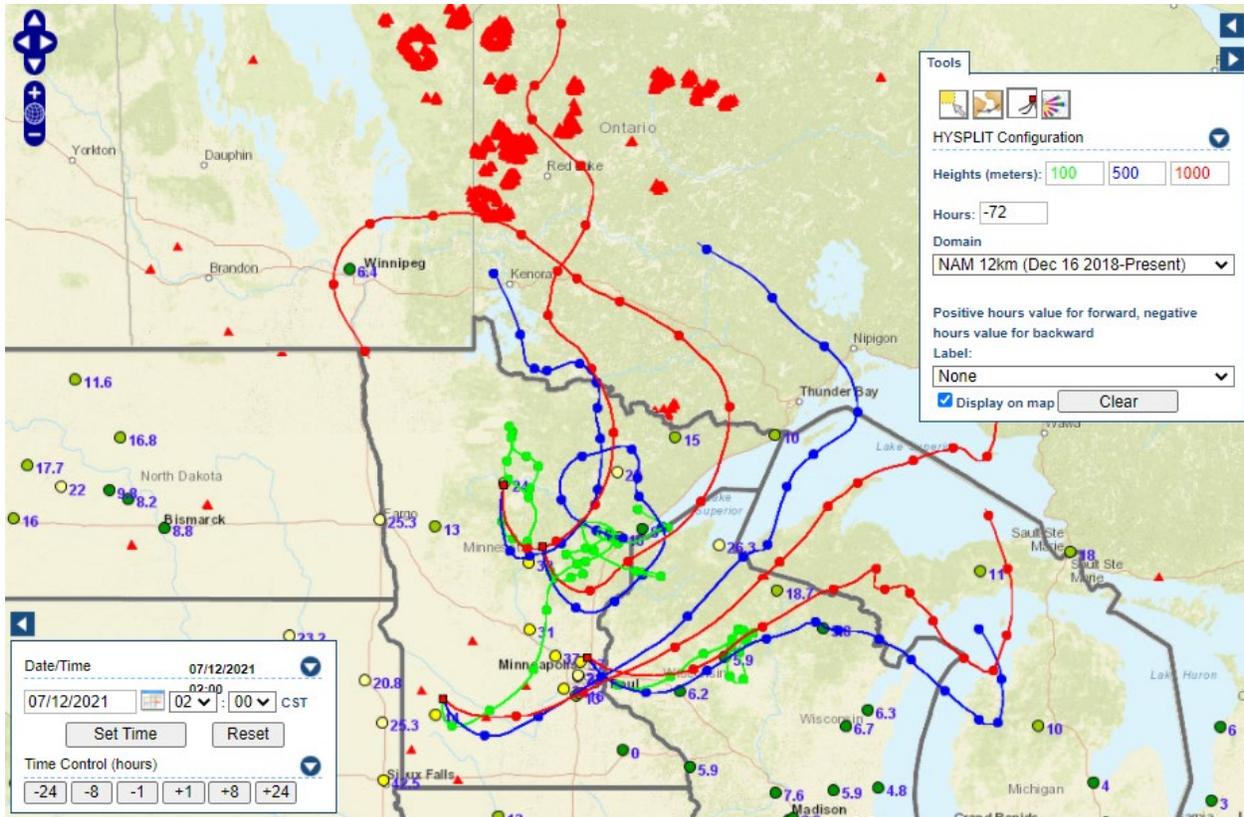
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Detroit Lakes	270052013	7/12/2021	23.8	40	Canada wildfire smoke
Ely	270750005	7/12/2021	17.8	31	Canada wildfire smoke
Fargo NW	380171004	7/12/2021	41.8	60.4	Canada wildfire smoke
Leech Lake Nation	270213410	7/12/2021	26.5	43	Canada wildfire smoke
Marshall	270834210	7/12/2021	20.5	53	Canada wildfire smoke
St. Michael	271713201	7/12/2021	16.9	39	Canada wildfire smoke
Virginia	271377001	7/12/2021	17.5	27	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 12, 2021.



MODIS visible satellite for July 12, 2021.



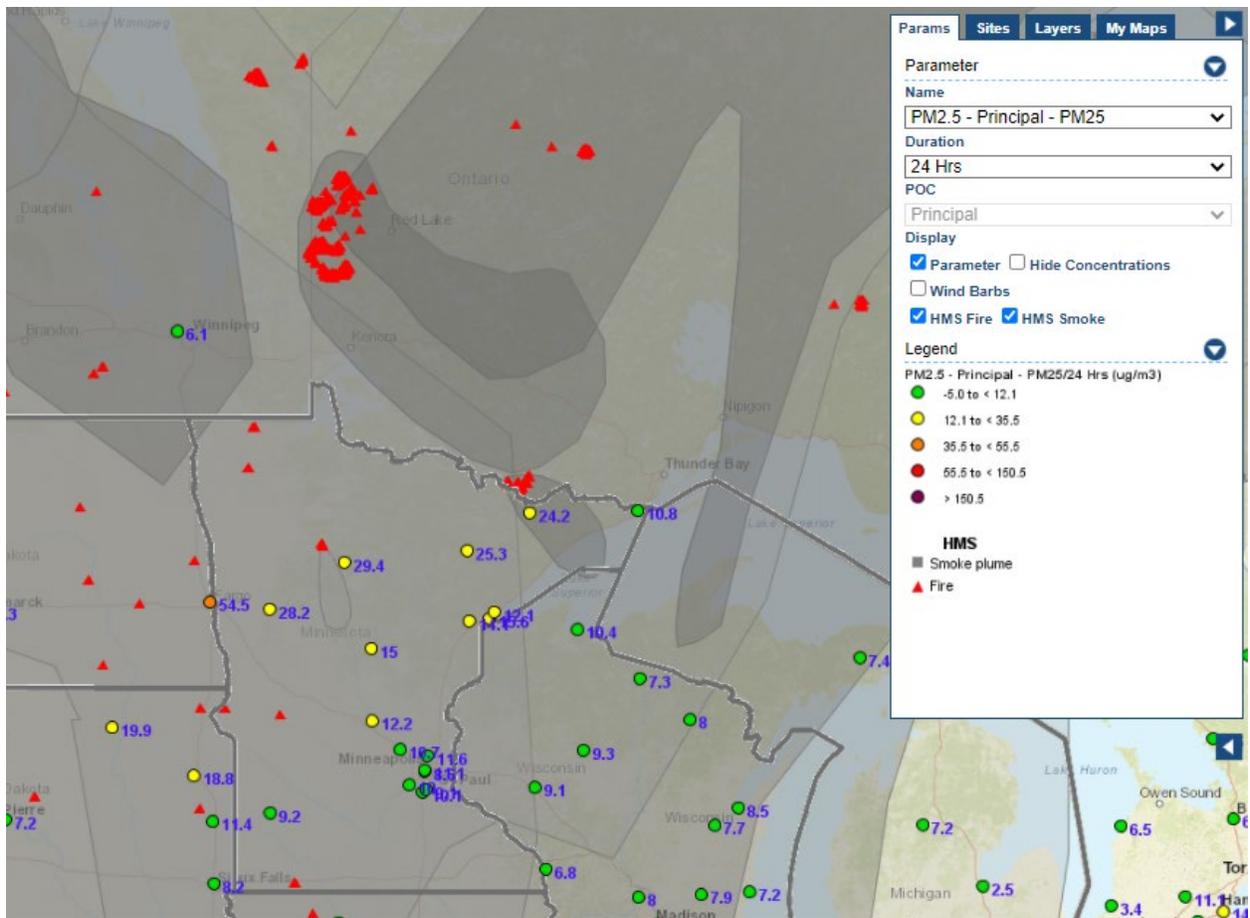
Backward trajectories for July 12, 2021.

7/13/2021 Impacts

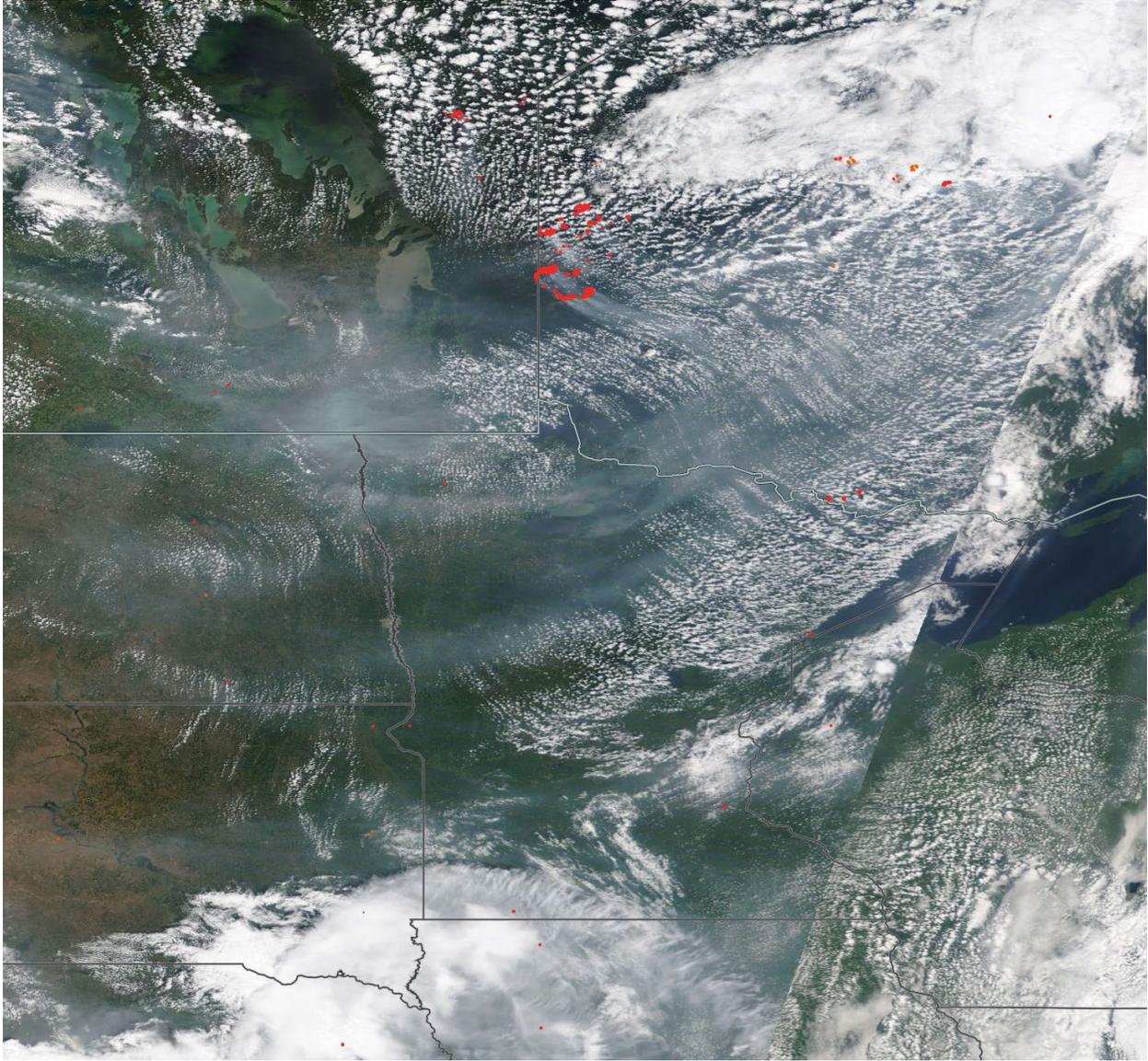
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 13, 2021.

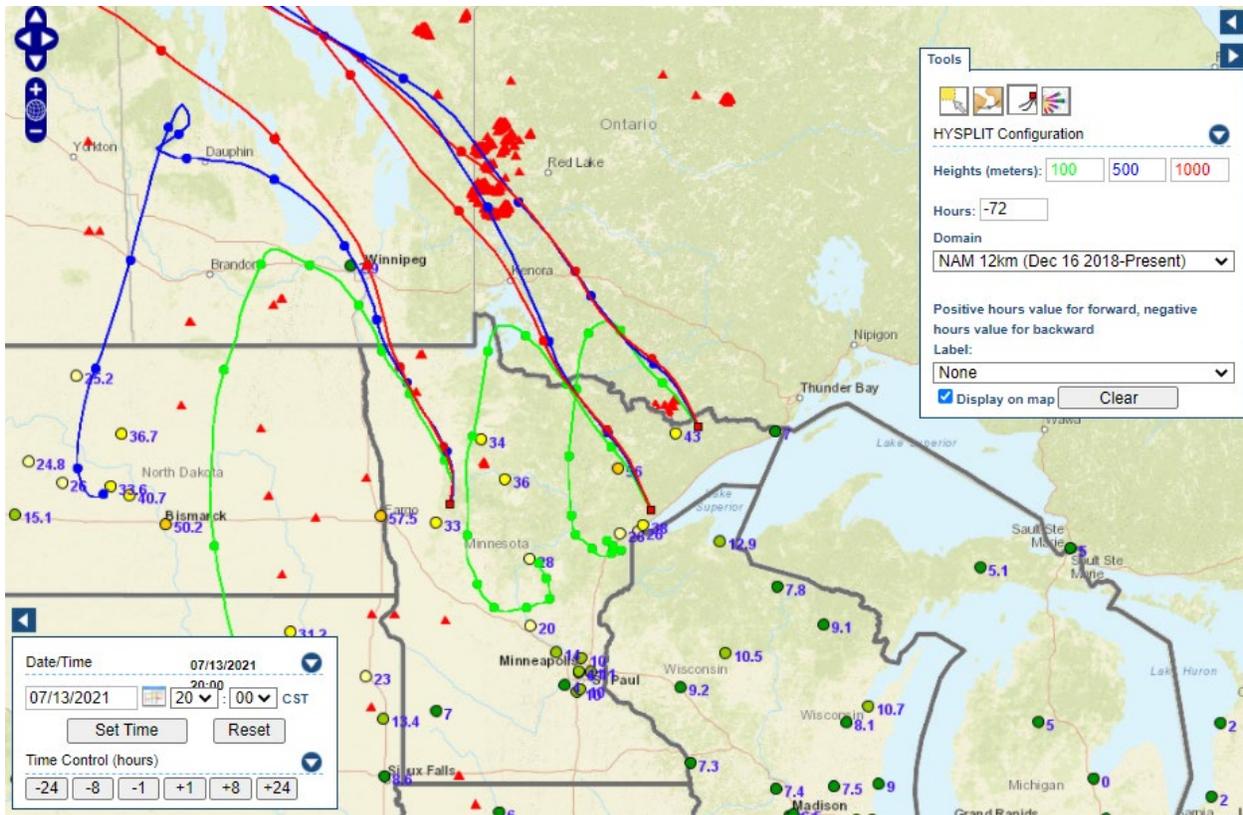
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Brainerd	270353204	7/13/2021	15	31	Canada wildfire smoke
Detroit Lakes	270052013	7/13/2021	28.2	39	Canada wildfire smoke
Duluth-WDSE	271377550	7/13/2021	13.5	38	Canada wildfire smoke
Ely	270750005	7/13/2021	24.2	77	Canada wildfire smoke
Fargo NW	380171004	7/13/2021	54.5	78.3	Canada wildfire smoke
Fond du Lac	270177417	7/13/2021	14.1	26	Canada wildfire smoke
Leech Lake Nation	270213410	7/13/2021	29.4	42	Canada wildfire smoke
St. Cloud	271453052	7/13/2021	12.2	26	Canada wildfire smoke
Virginia	271377001	7/13/2021	25.3	56	Canada wildfire smoke
West Duluth	271377554	7/13/2021	15.6	30	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 13, 2021.



MODIS visible satellite for July 13, 2021.



Backward trajectories for July 13, 2021.

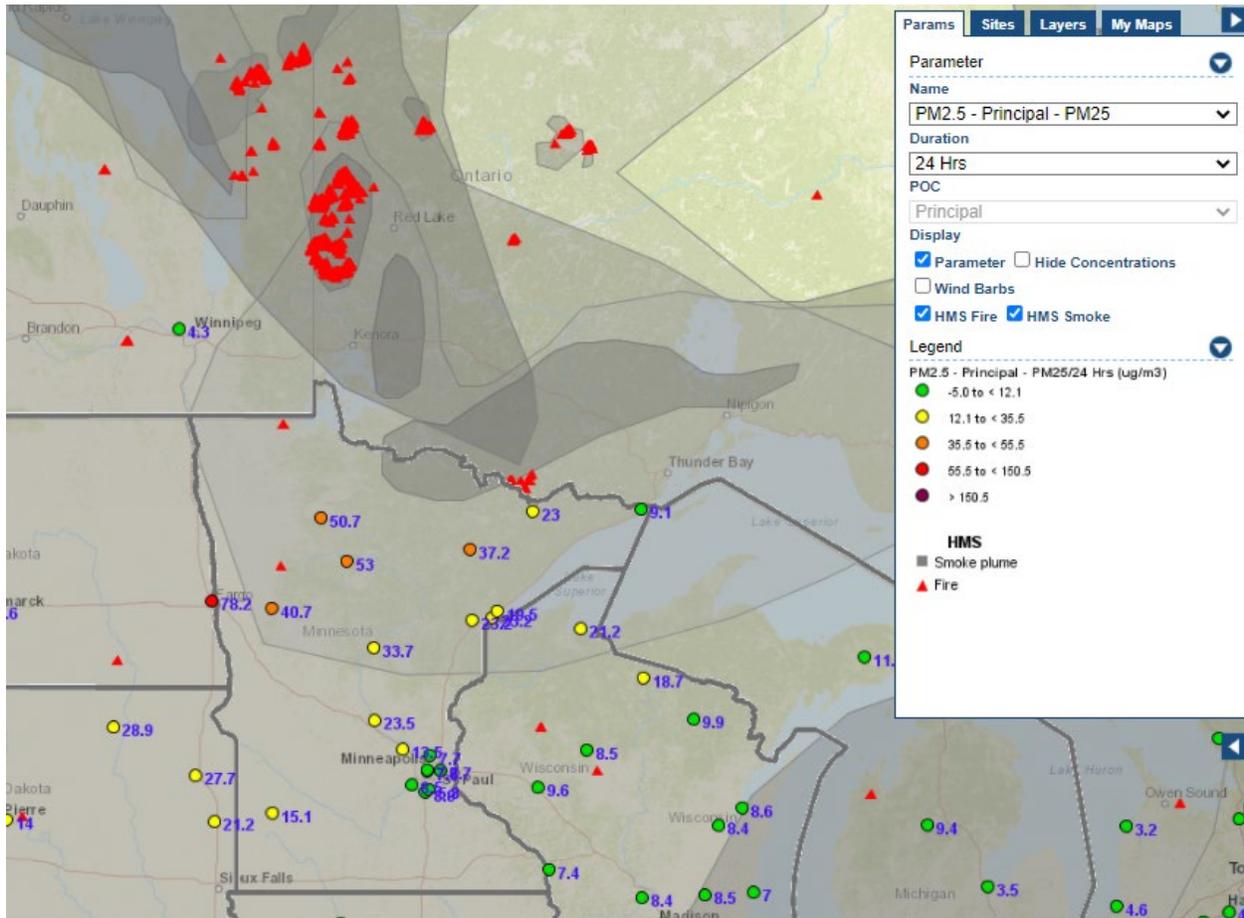
7/14/2021 Impacts

Smoke impacts from wildfires over Canada.

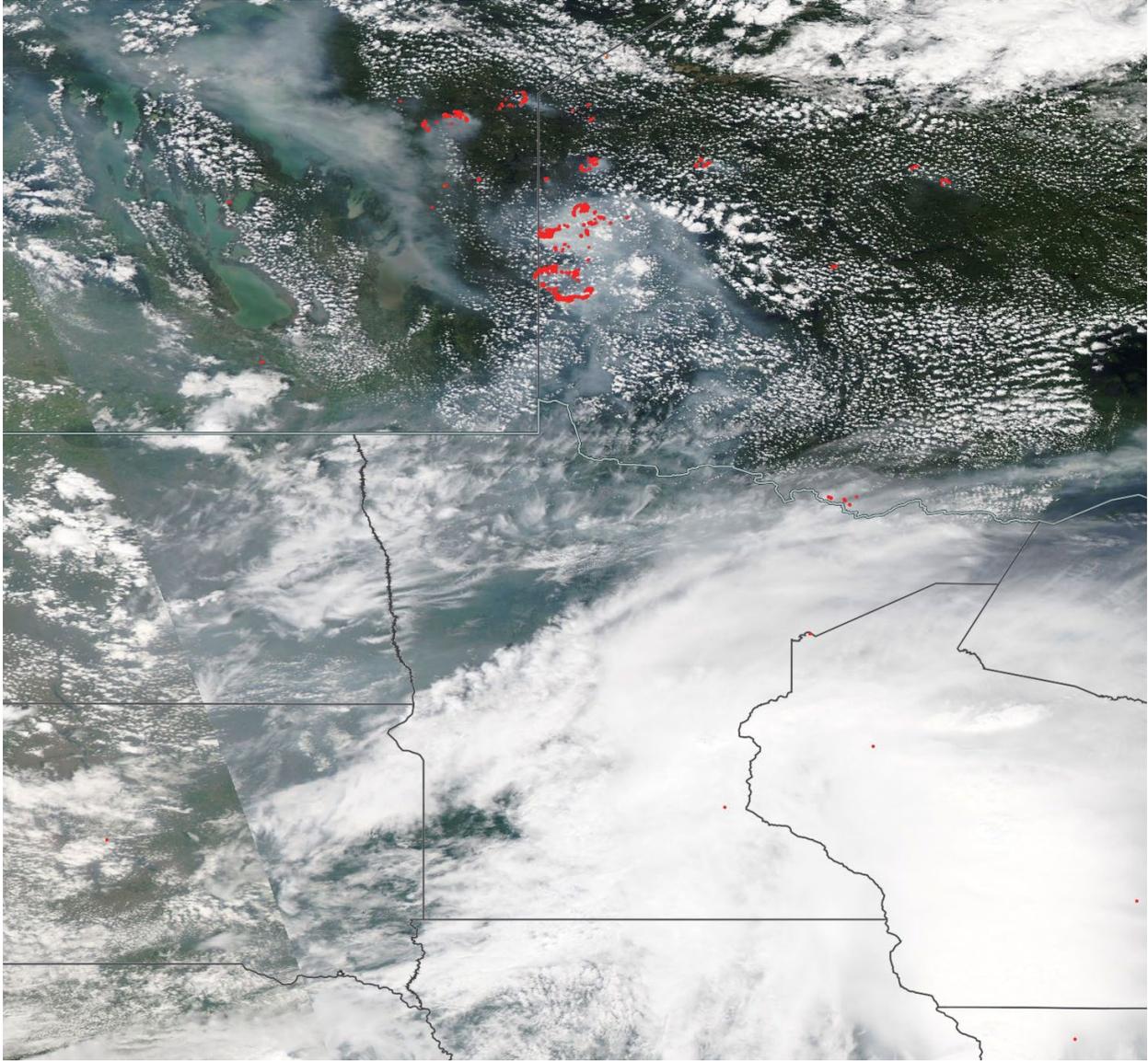
Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 14, 2021.

Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Brainerd	270353204	7/14/2021	33.7	73	Canada wildfire smoke
Detroit Lakes	270052013	7/14/2021	40.7	72	Canada wildfire smoke
Duluth-WDSE	271377550	7/14/2021	19.5	35	Canada wildfire smoke
Ely	270750005	7/14/2021	23	63	Canada wildfire smoke
Fargo NW	380171004	7/14/2021	78.2	133.3	Canada wildfire smoke
Fond du Lac	270177417	7/14/2021	23.2	29	Canada wildfire smoke
Leech Lake Nation	270213410	7/14/2021	53	107	Canada wildfire smoke
Marshall	270834210	7/14/2021	15.1	29	Canada wildfire smoke
Red Lake Nation	270072304	7/14/2021	50.7	97	Canada wildfire smoke
St. Cloud	271453052	7/14/2021	23.5	30	Canada wildfire smoke

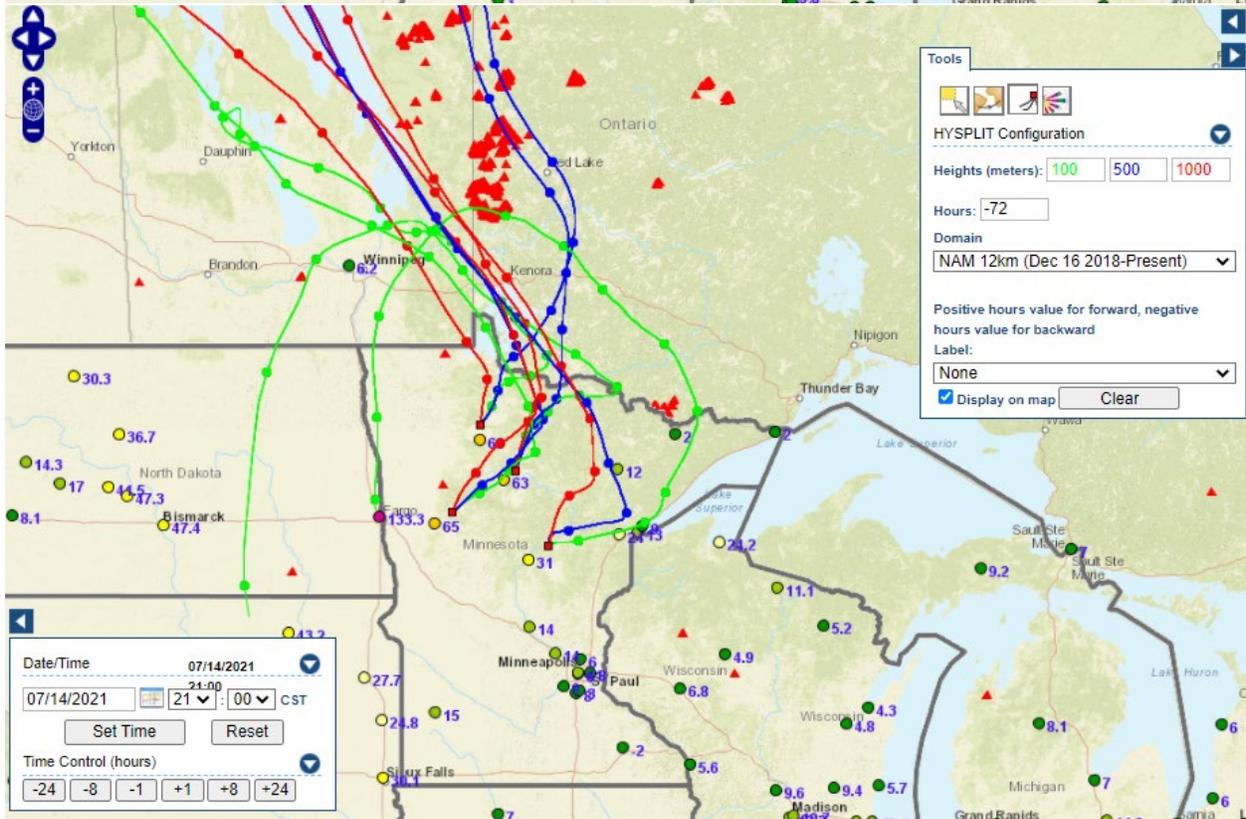
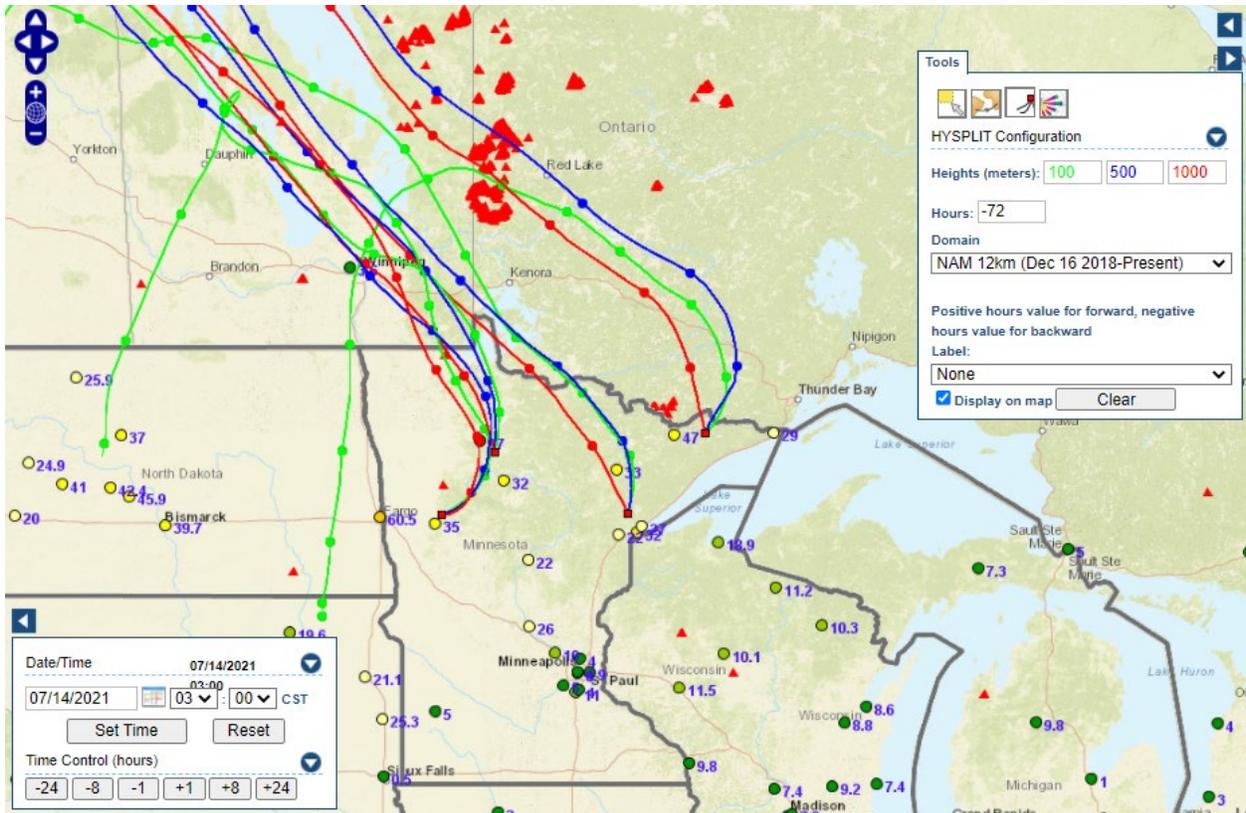
Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
Virginia	271377001	7/14/2021	37.2	76	Canada wildfire smoke
West Duluth	271377554	7/14/2021	23.2	39	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 14, 2021.



MODIS visible satellite for July 14, 2021.



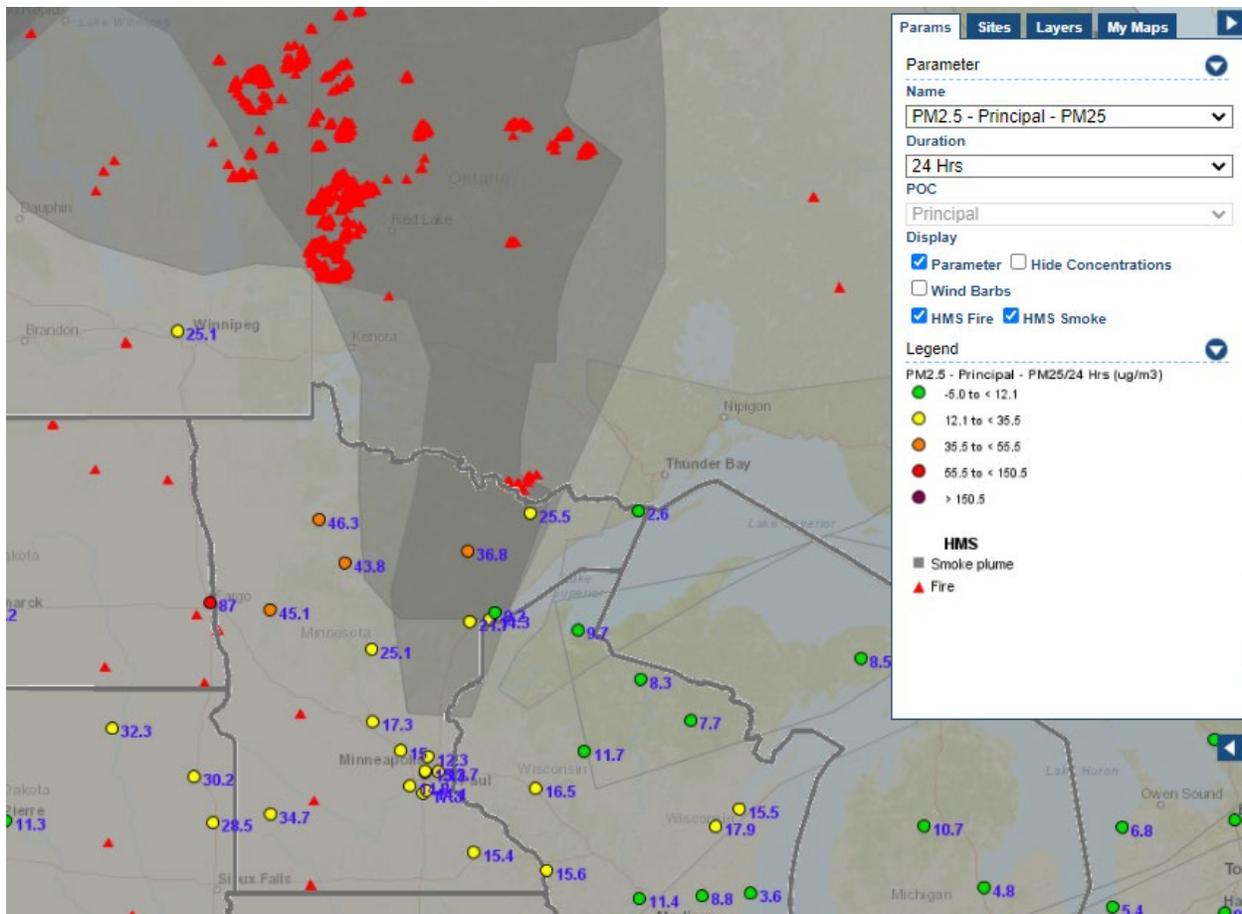
Backward trajectories for July 14, 2021.

7/15/2021 Impacts

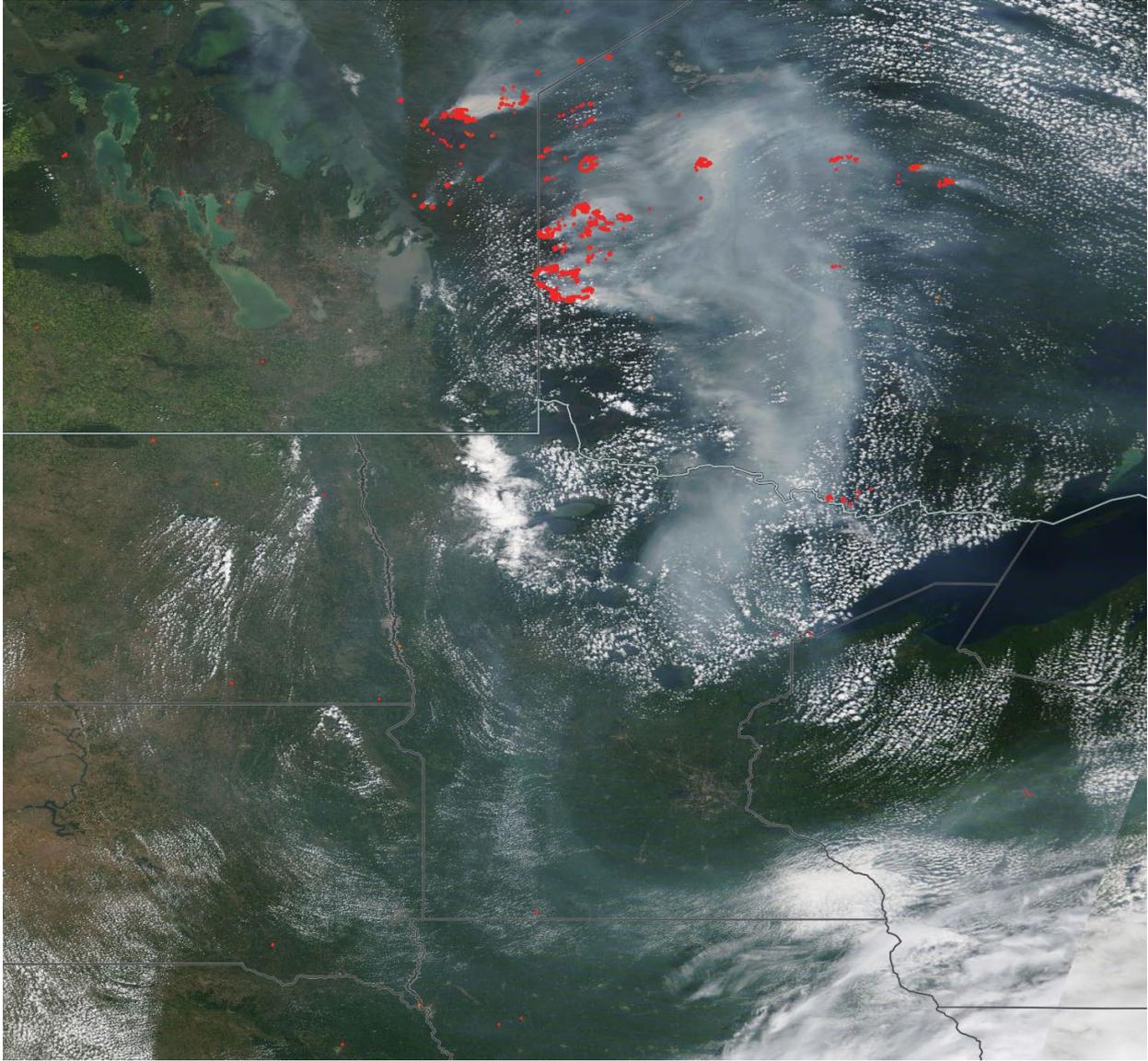
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 15, 2021.

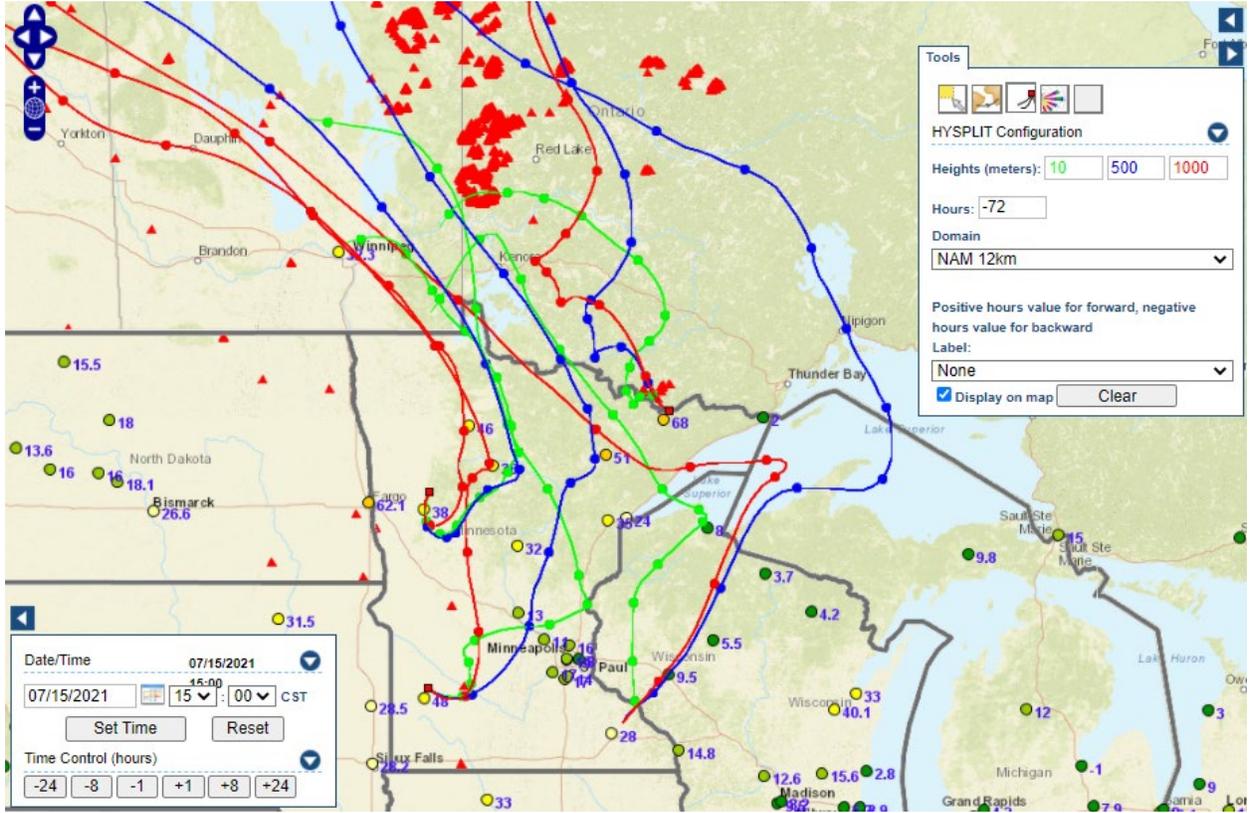
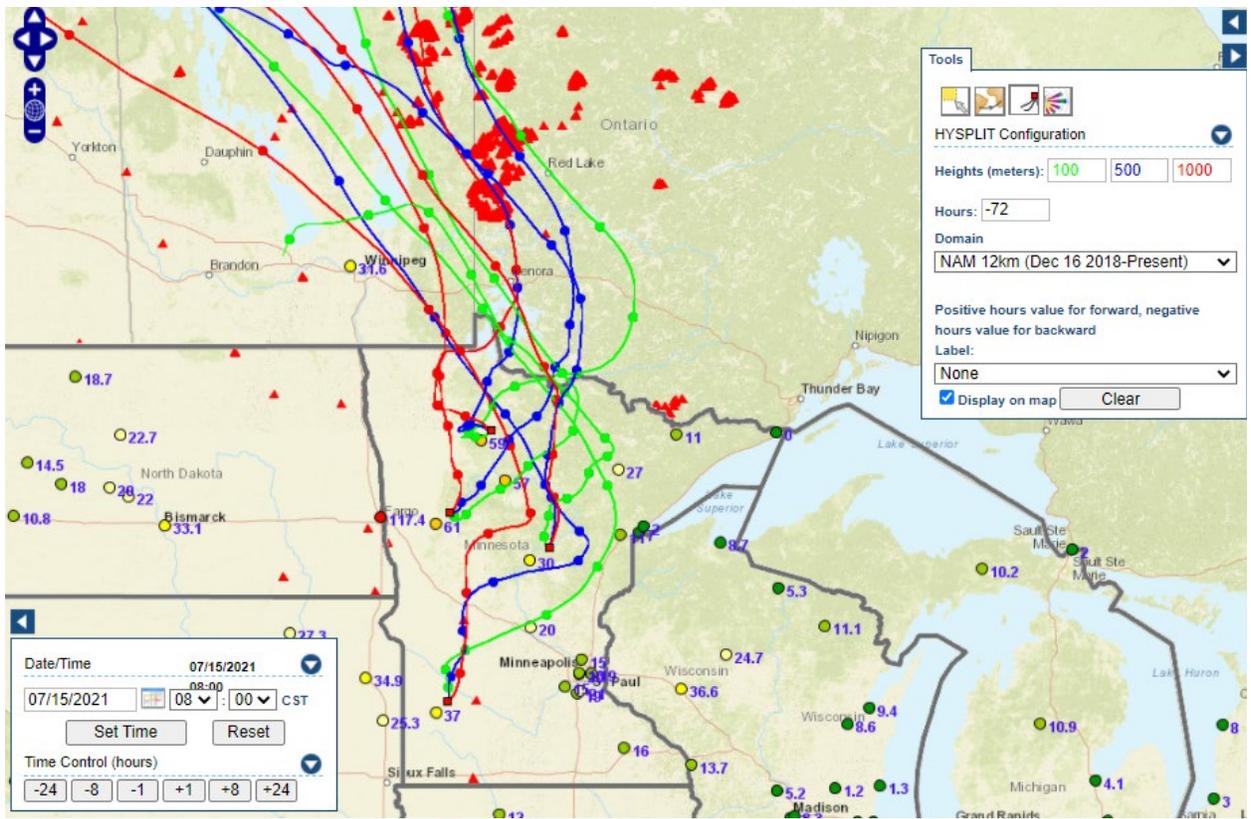
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Brainerd	270353204	7/15/2021	25.1	32	Canada wildfire smoke
Detroit Lakes	270052013	7/15/2021	45.1	74	Canada wildfire smoke
Ely	270750005	7/15/2021	25.5	87	Canada wildfire smoke
Fargo NW	380171004	7/15/2021	87	129.3	Canada wildfire smoke
Fond du Lac	270177417	7/15/2021	21.7	37	Canada wildfire smoke
Lakeville - Near Road	270370480	7/15/2021	17.3	26	Canada wildfire smoke
Leech Lake Nation	270213410	7/15/2021	43.8	61	Canada wildfire smoke
Marshall	270834210	7/15/2021	34.7	52	Canada wildfire smoke
Red Lake Nation	270072304	7/15/2021	46.3	62	Canada wildfire smoke
Rochester	271095008	7/15/2021	17.3	31	Canada wildfire smoke
St. Cloud	271453052	7/15/2021	36.8	88	Canada wildfire smoke
Virginia	271377001	7/15/2021	25.1	27	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 15, 2021.



MODIS visible satellite for July 15, 2021.



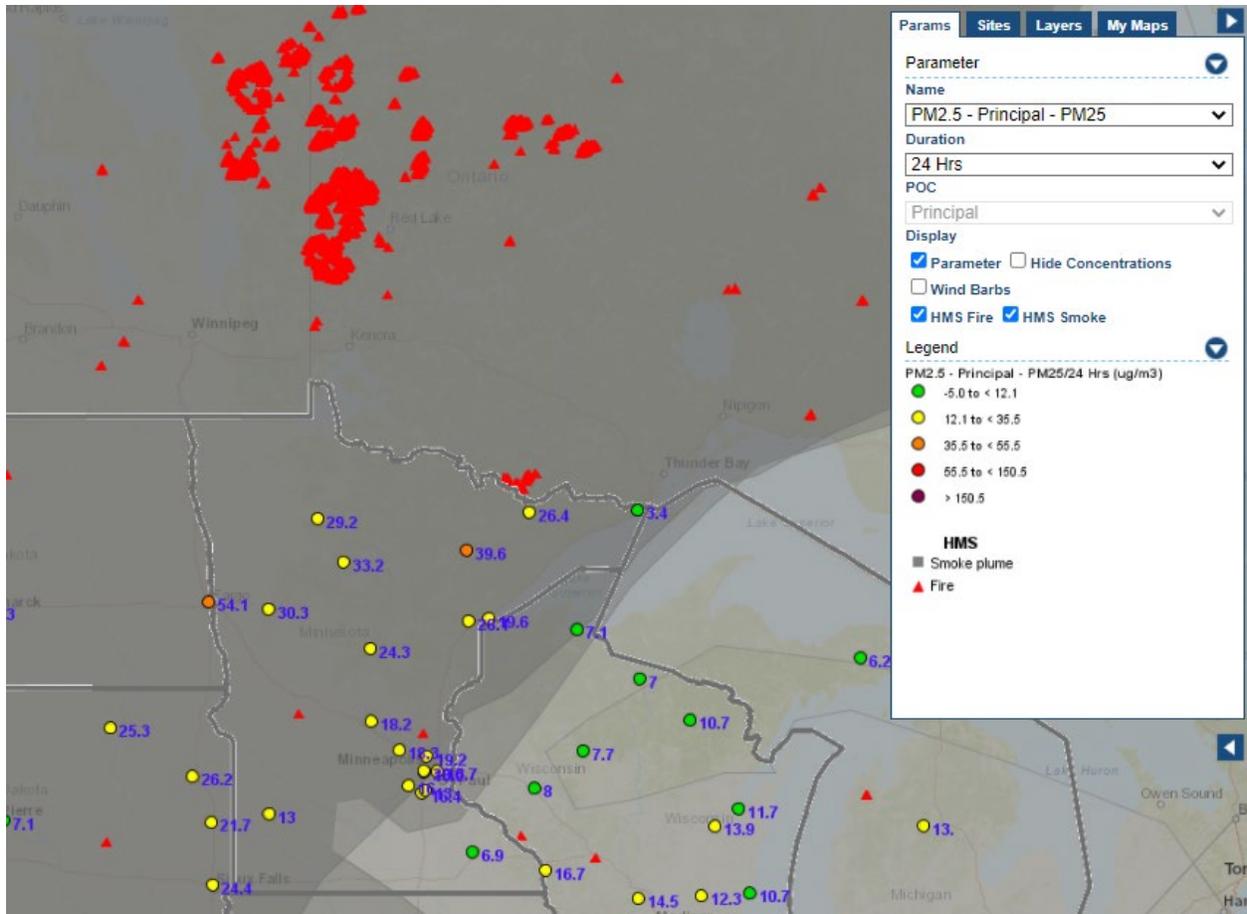
Backward trajectories for July 15, 2021.

7/16/2021 Impacts

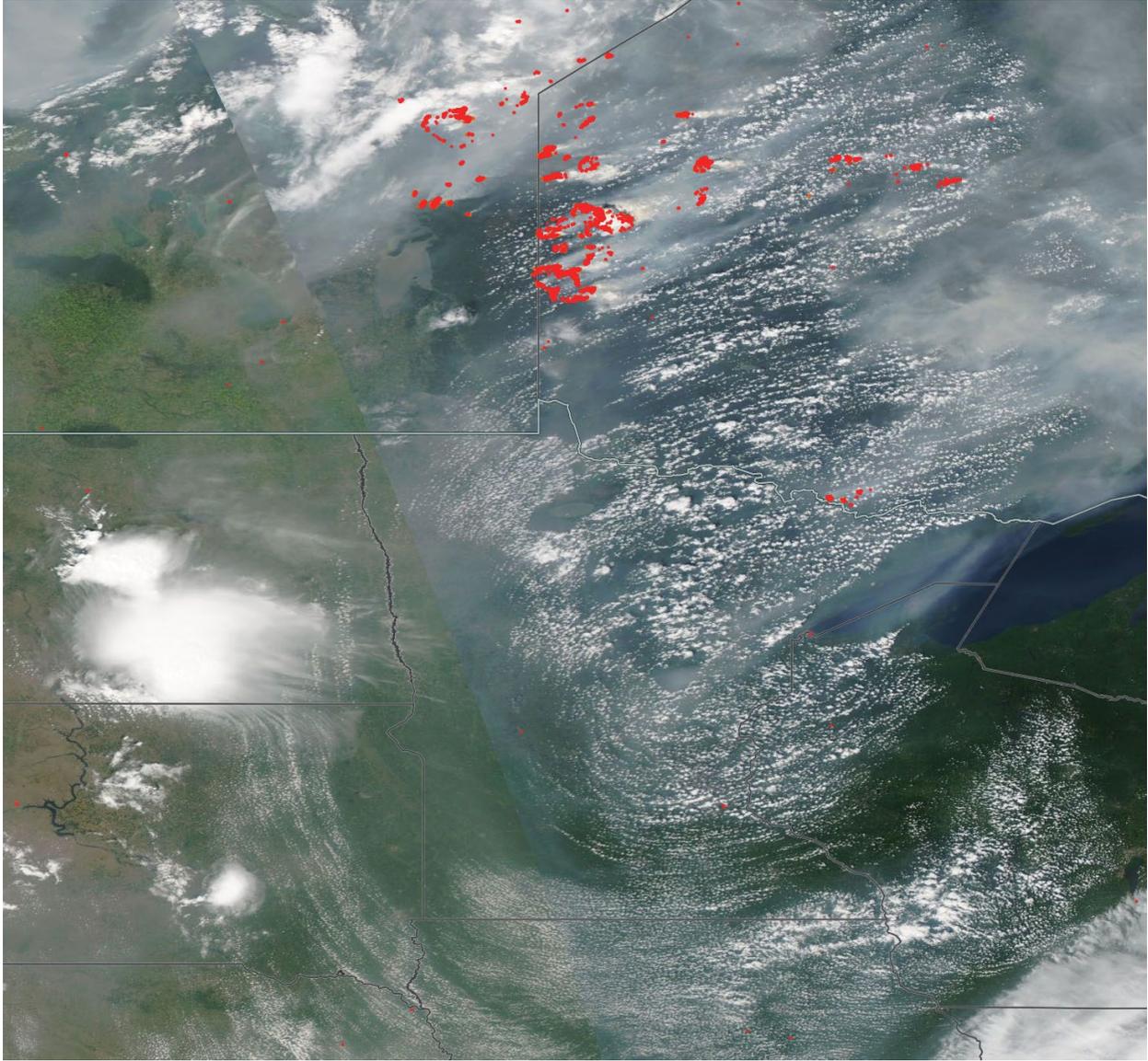
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 16, 2021.

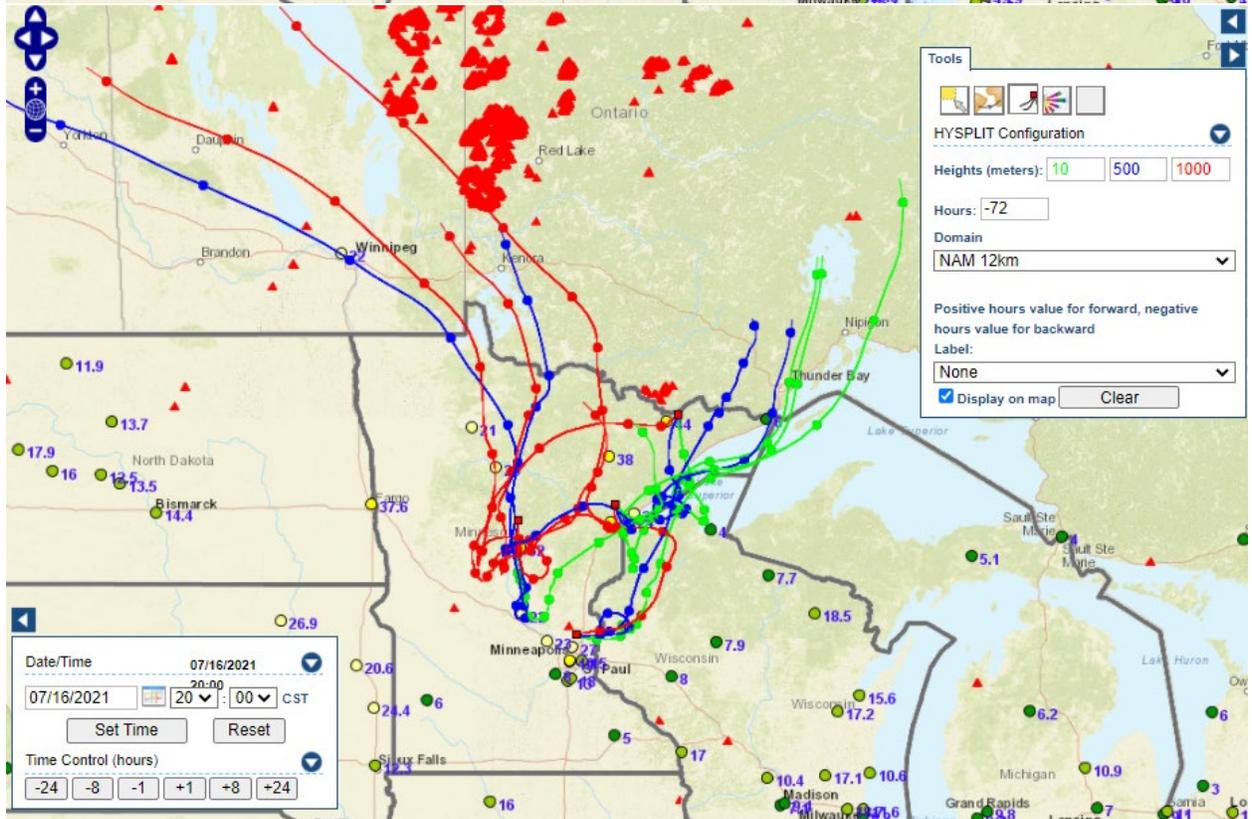
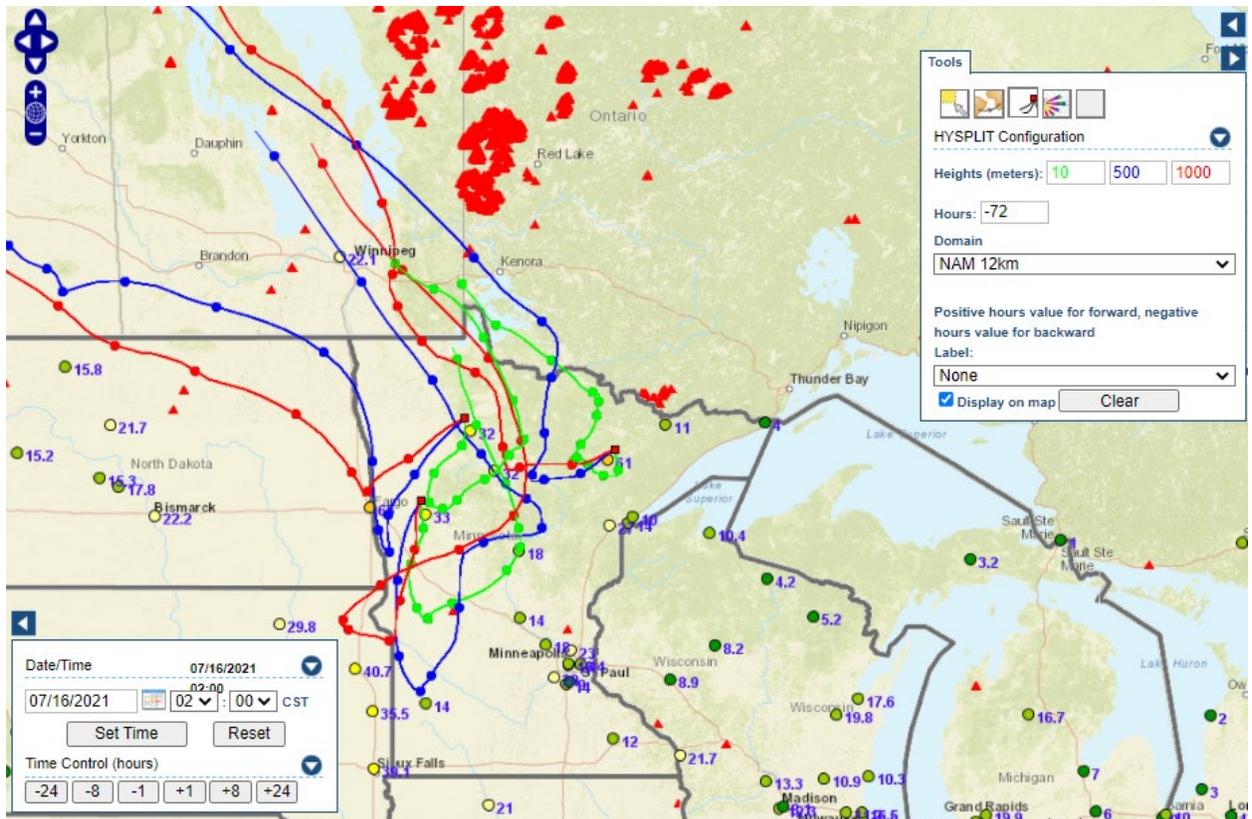
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Blaine	270031002	7/16/2021	19.2	28	Canada wildfire smoke
Brainerd	270353204	7/16/2021	24.3	41	Canada wildfire smoke
Detroit Lakes	270052013	7/16/2021	30.3	42	Canada wildfire smoke
Duluth-WDSE	271377550	7/16/2021	17.6	43	Canada wildfire smoke
Ely	270750005	7/16/2021	26.4	46	Canada wildfire smoke
Fargo NW	380171004	7/16/2021	54.1	72	Canada wildfire smoke
Fond du Lac	270177417	7/16/2021	28.1	37	Canada wildfire smoke
Lacrosse DOT	550630012	7/16/2021	16.7	22.5	Canada wildfire smoke
Lakeville - Near Road	270370480	7/16/2021	16.4	21	Canada wildfire smoke
Leech Lake Nation	270213410	7/16/2021	33.2	41	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/16/2021	20.3	43	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/16/2021	16.9	26	Canada wildfire smoke
Red Lake Nation	270072304	7/16/2021	29.2	37	Canada wildfire smoke
Shakopee	271390505	7/16/2021	16	26	Canada wildfire smoke
St. Cloud	271453052	7/16/2021	18.2	26	Canada wildfire smoke
St. Michael	271713201	7/16/2021	18.3	25	Canada wildfire smoke
St. Paul-Harding	271230871	7/16/2021	16.7	21	Canada wildfire smoke
Virginia	271377001	7/16/2021	39.6	62	Canada wildfire smoke
West Duluth	271377554	7/16/2021	19.6	38	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 16, 2021.



MODIS visible satellite for July 16, 2021.



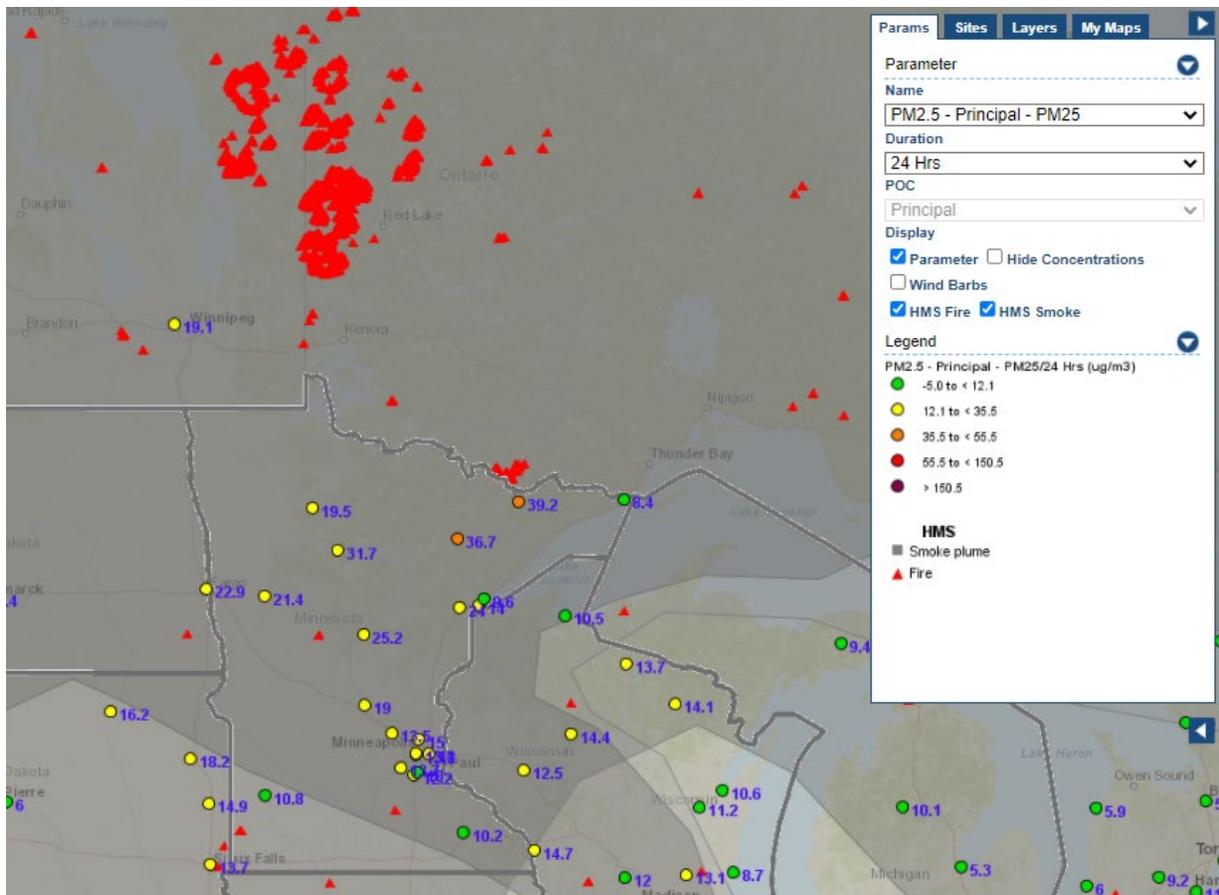
Backward trajectories for July 16, 2021.

7/17/2021 Impacts

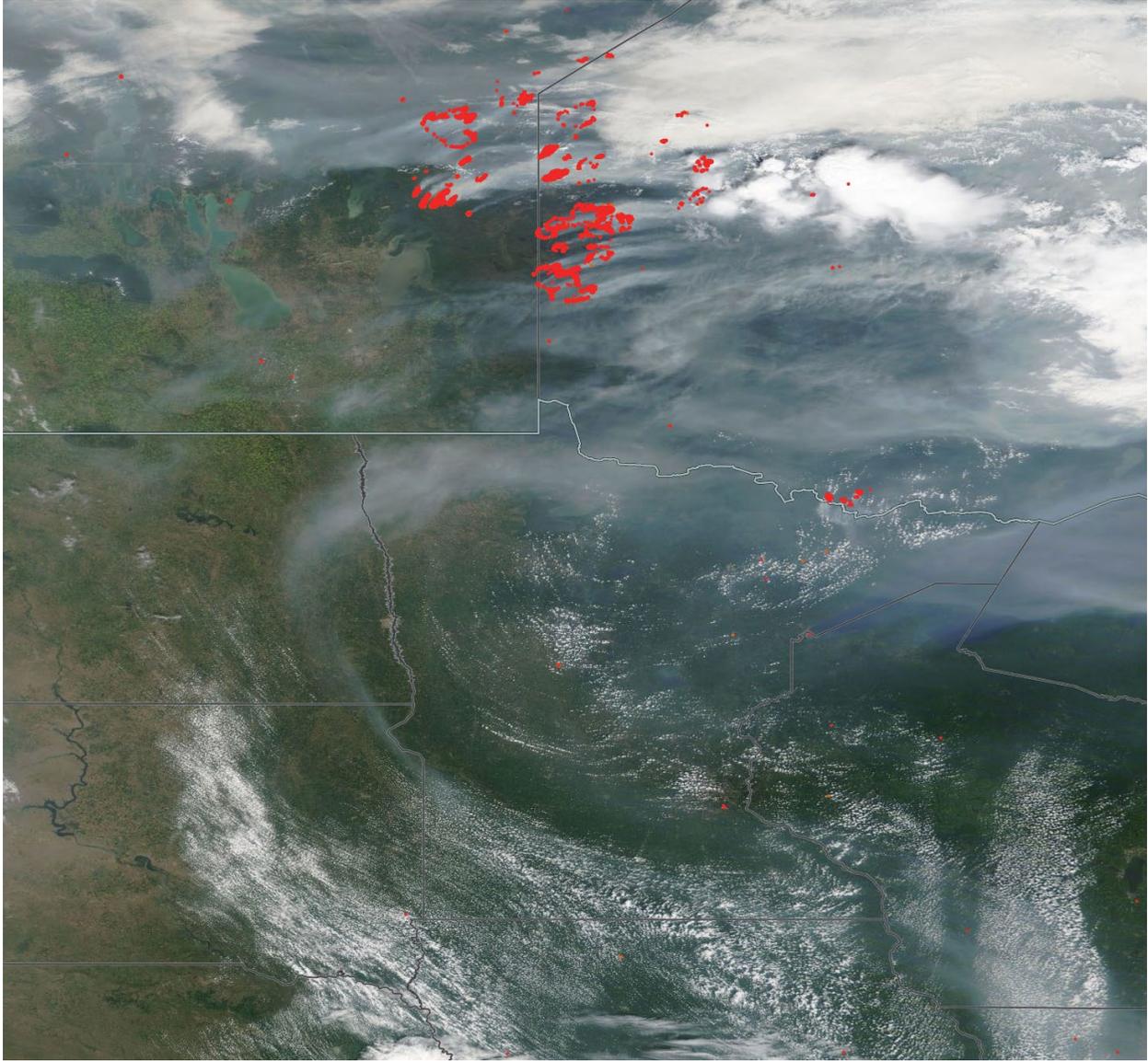
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 17, 2021.

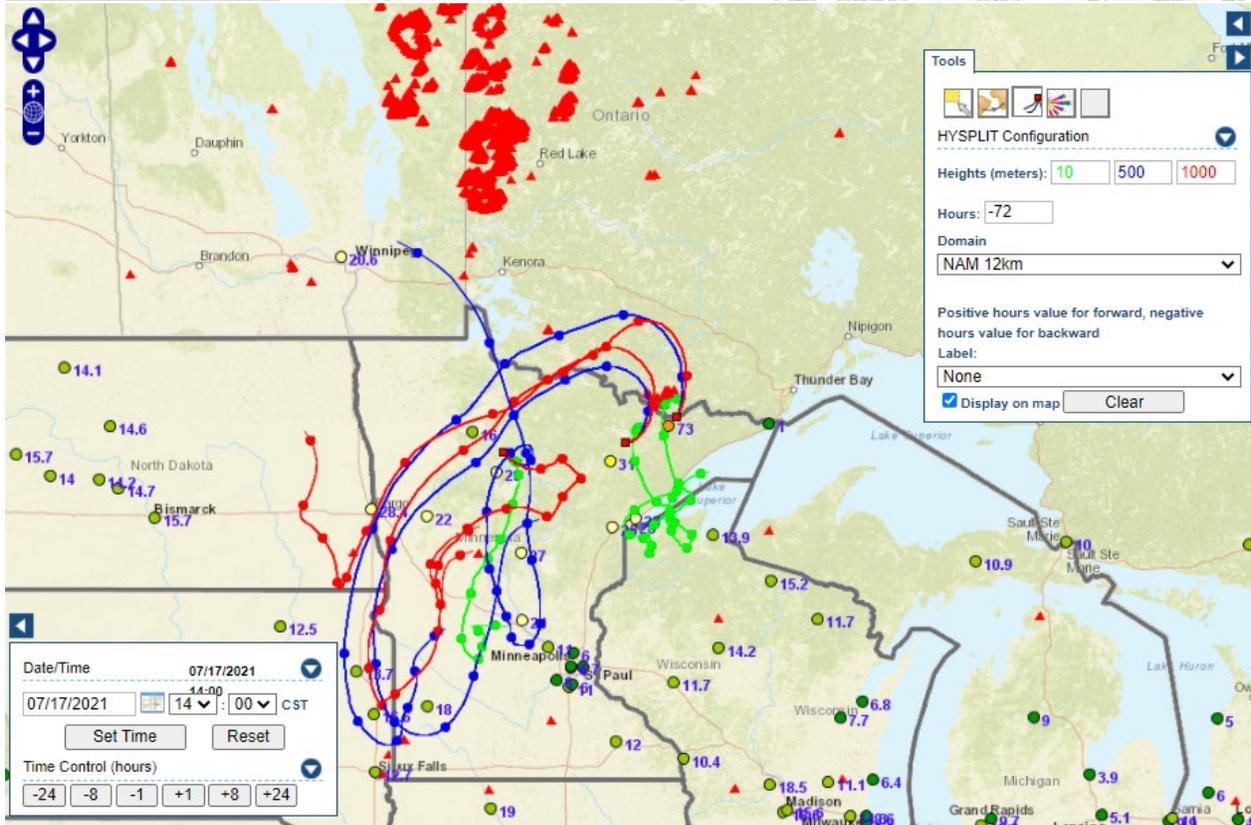
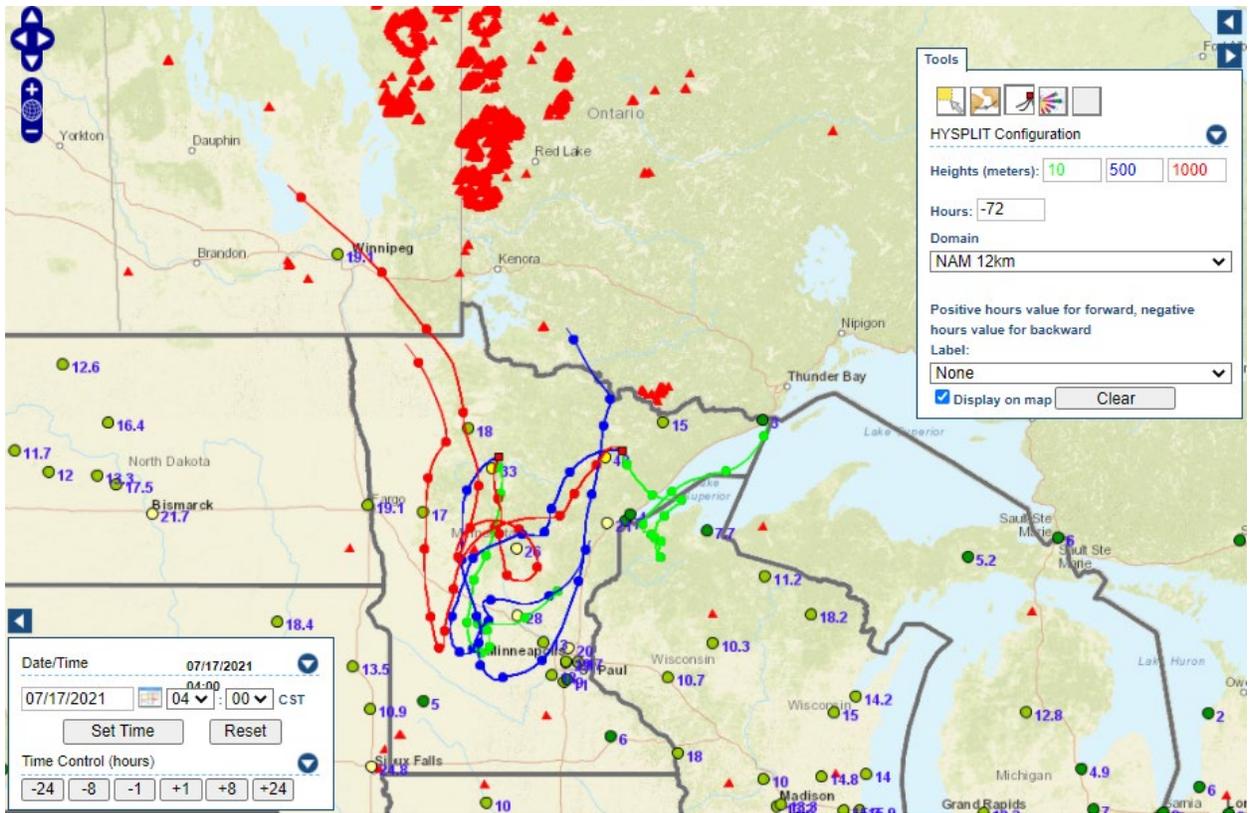
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Brainerd	270353204	7/17/2021	25.2	33	Canada wildfire smoke
Detroit Lakes	270052013	7/17/2021	21.4	31	Canada wildfire smoke
Ely	270750005	7/17/2021	39.2	109	Canada wildfire smoke
Fargo NW	380171004	7/17/2021	22.9	31	Canada wildfire smoke
Fond du Lac	270177417	7/17/2021	24	36	Canada wildfire smoke
Leech Lake Nation	270213410	7/17/2021	31.7	46	Canada wildfire smoke
Red Lake Nation	270072304	7/17/2021	19.5	29	Canada wildfire smoke
St. Cloud	271453052	7/17/2021	19	28	Canada wildfire smoke
Virginia	271377001	7/17/2021	36.7	48	Canada wildfire smoke

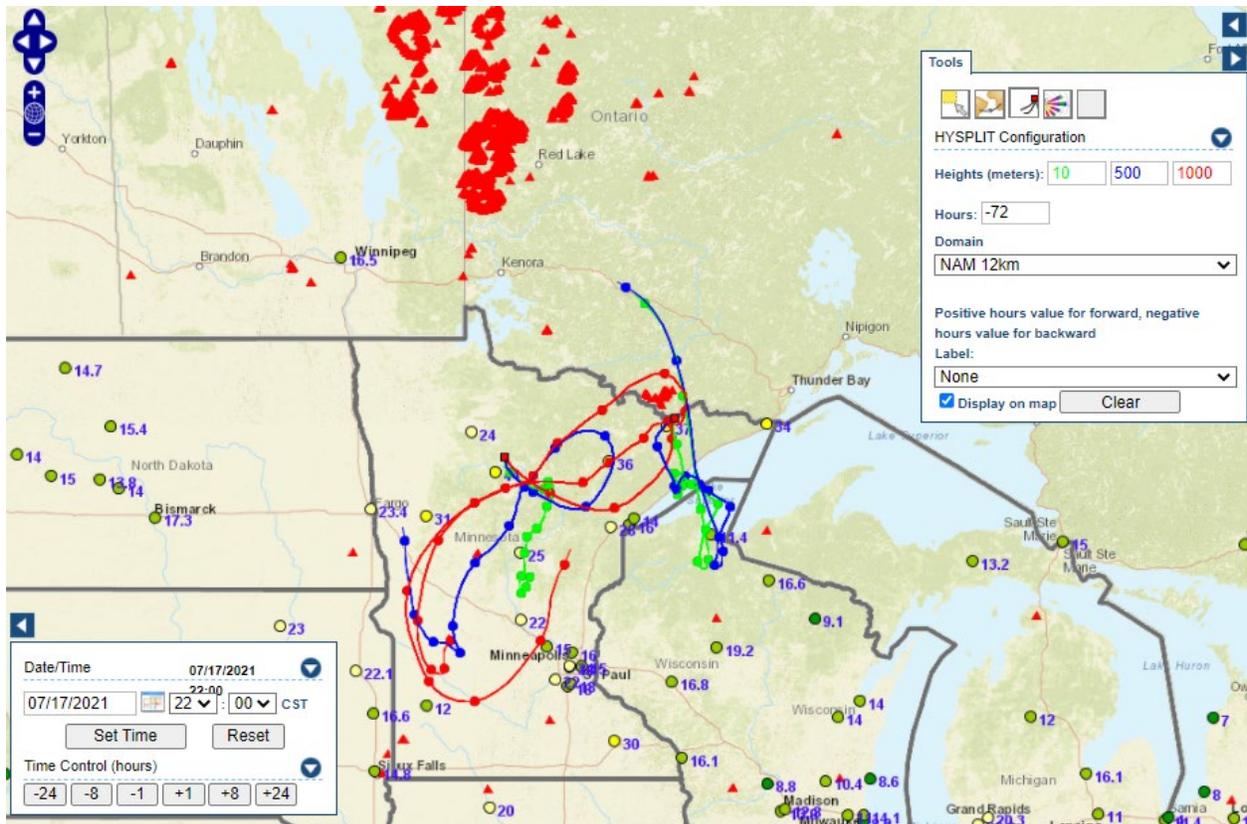


Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 17, 2021.



MODIS visible satellite for July 17, 2021.





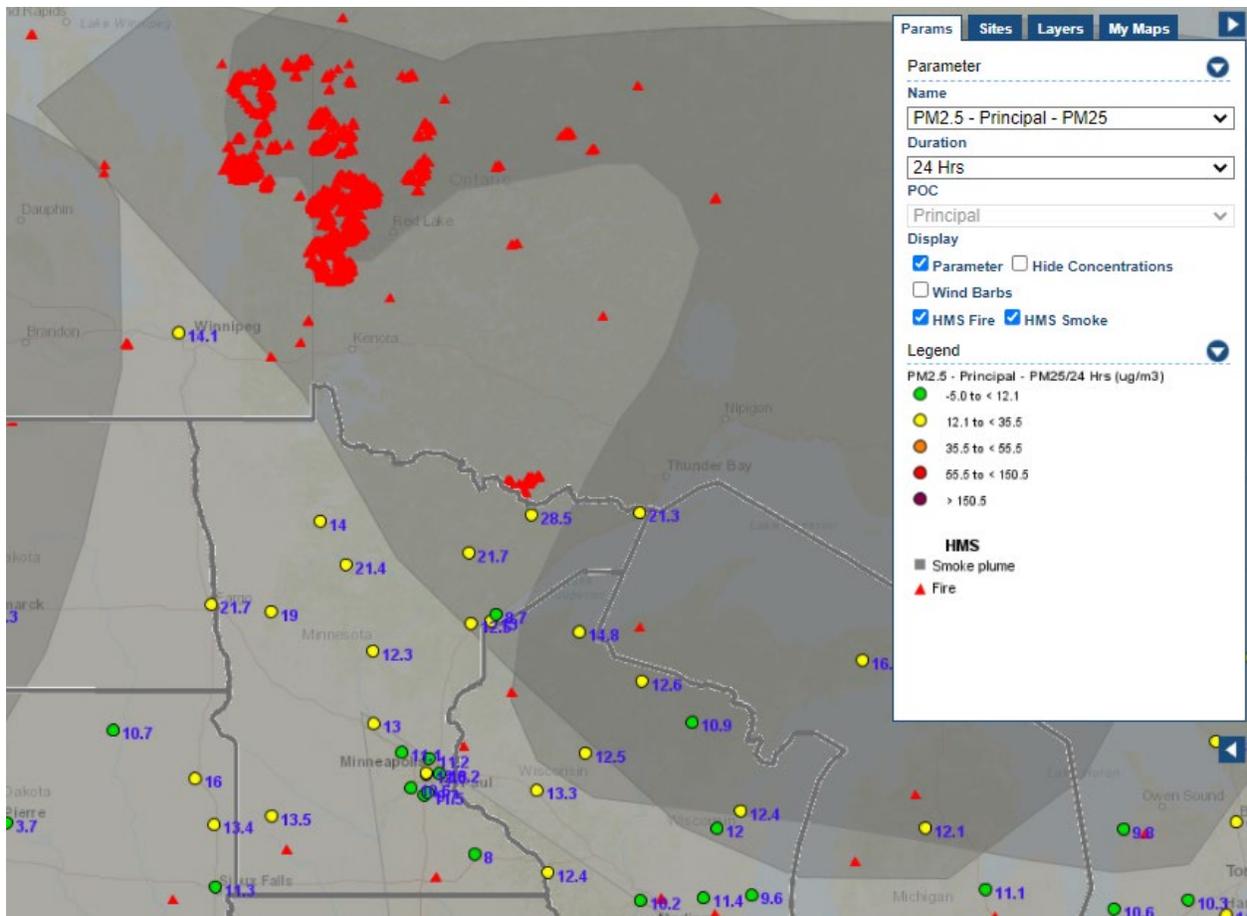
Backward trajectories for July 17, 2021.

7/18/2021 Impacts

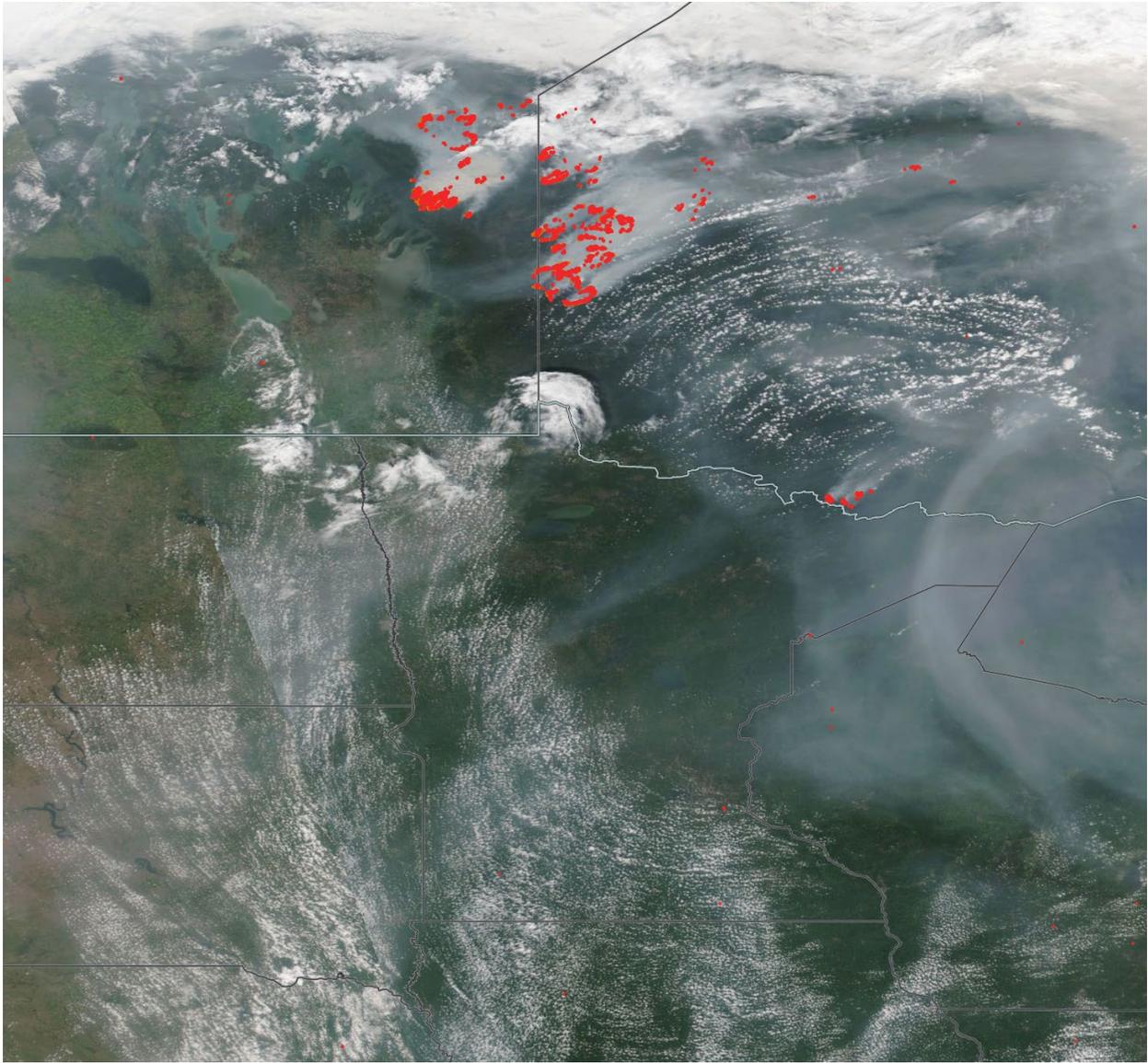
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 18, 2021.

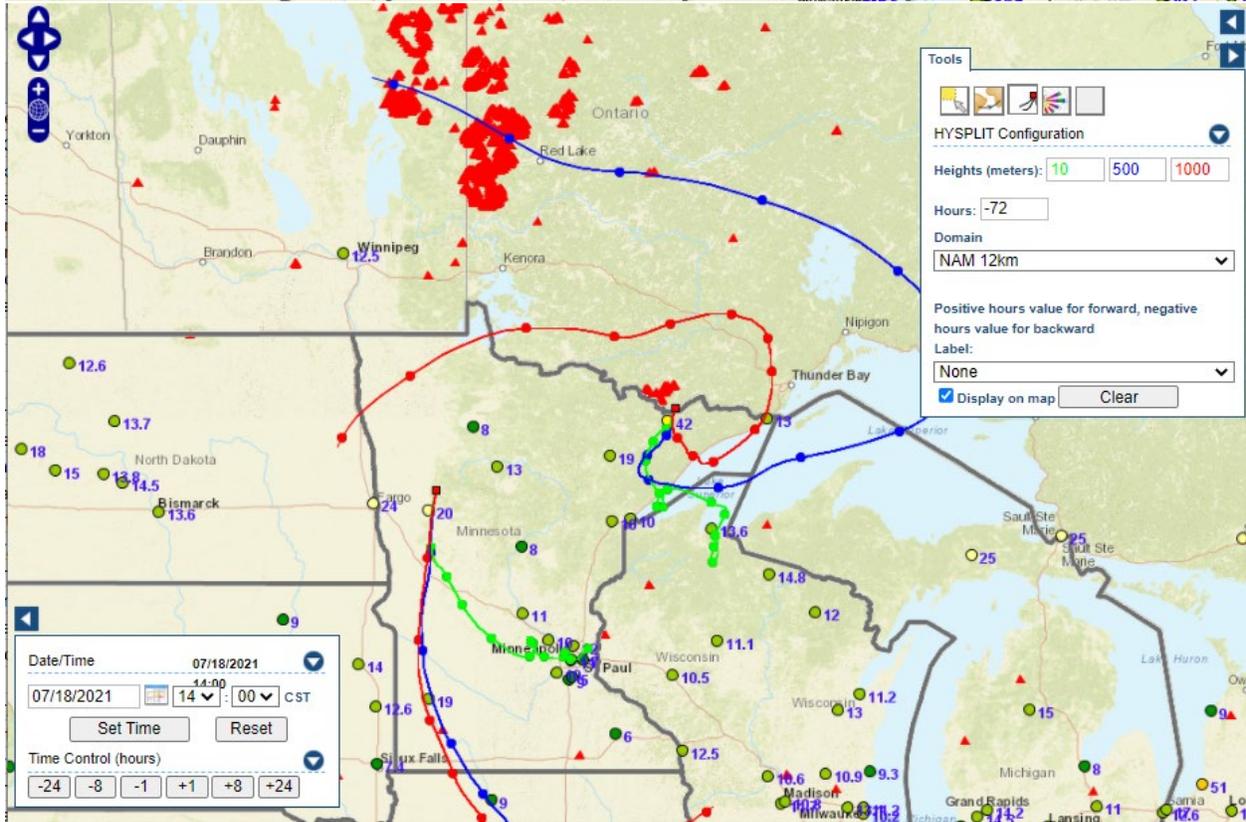
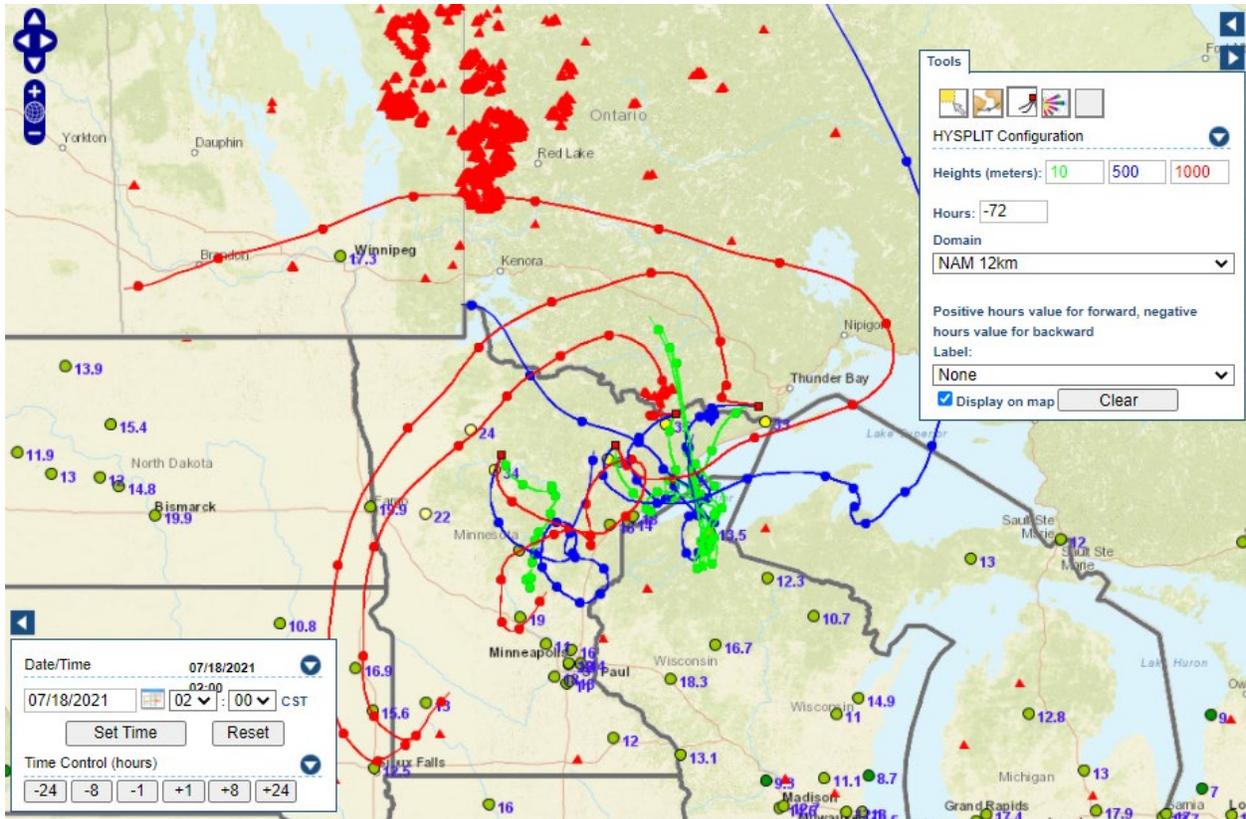
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Detroit Lakes	270052013	7/18/2021	19	28	Canada wildfire smoke
Ely	270750005	7/18/2021	28.5	42	Canada wildfire smoke
Fargo NW	380171004	7/18/2021	21.7	24	Canada wildfire smoke
Grand Portage	270317810	7/18/2021	21.3	38	Canada wildfire smoke
Leech Lake Nation	270213410	7/18/2021	21.4	45	Canada wildfire smoke
Red Lake Nation	270072304	7/18/2021	14	27	Canada wildfire smoke
Virginia	271377001	7/18/2021	21.7	37	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 18, 2021.



MODIS visible satellite for July 18, 2021.



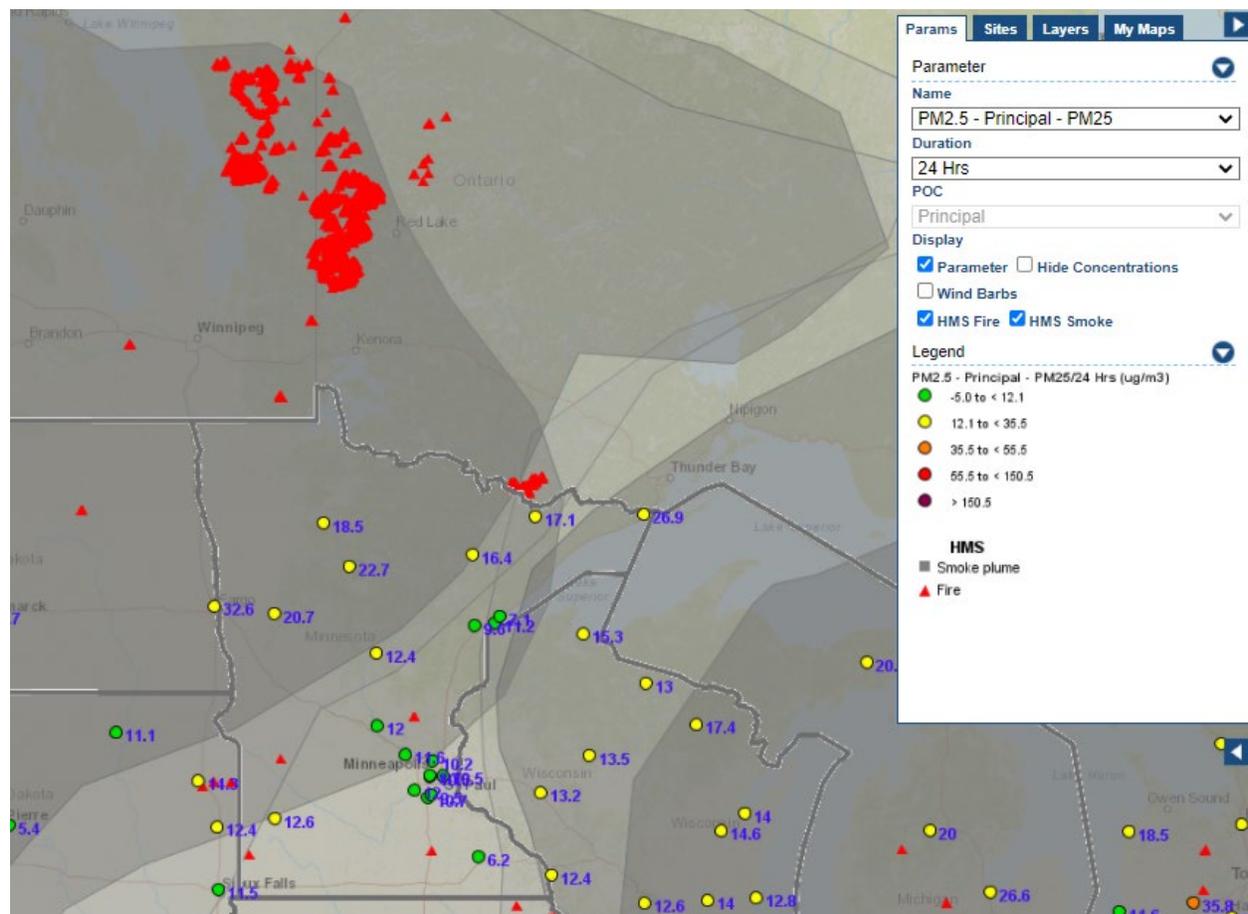
Backward trajectories for July 18, 2021.

7/19/2021 Impacts

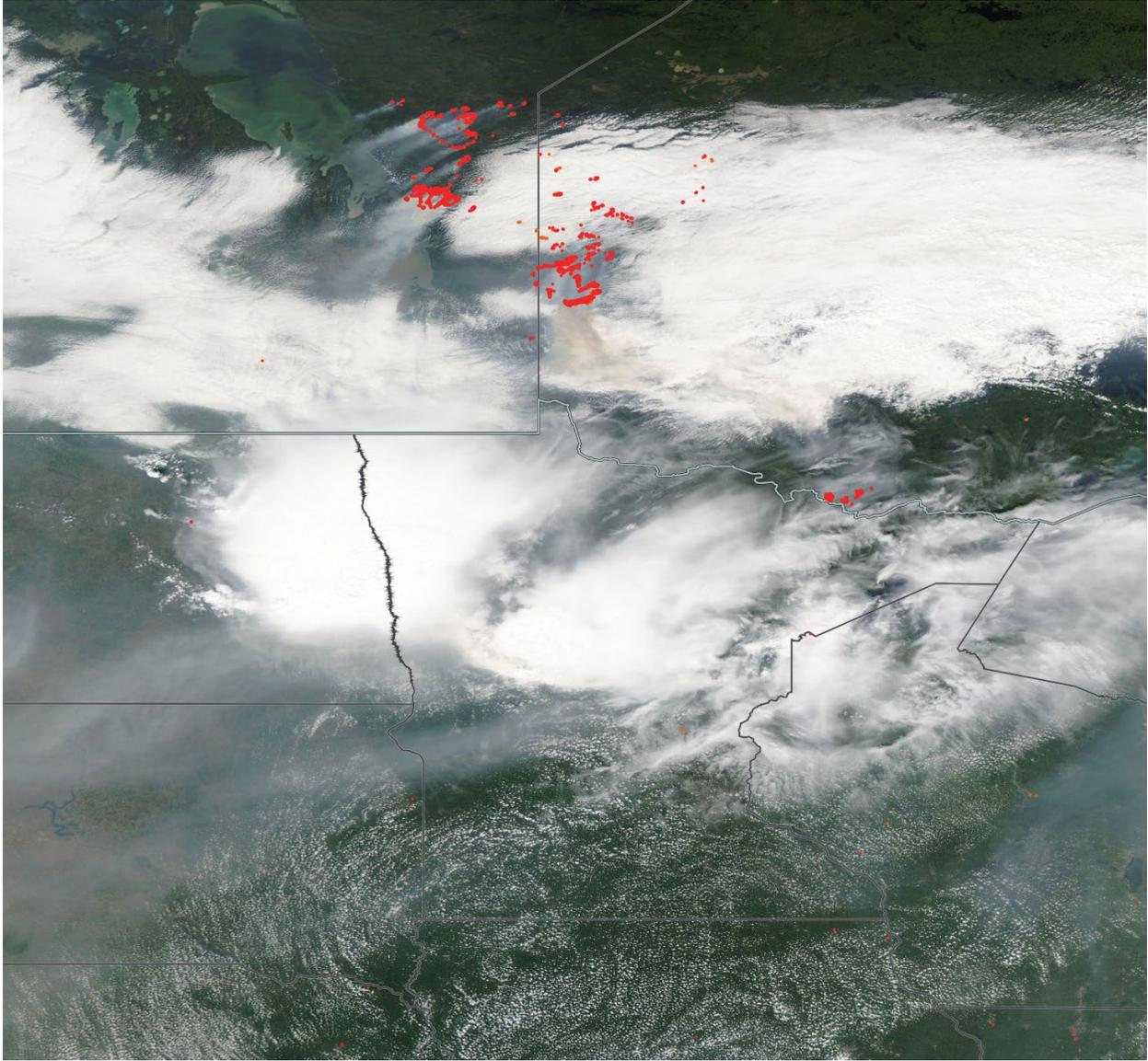
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 19, 2021.

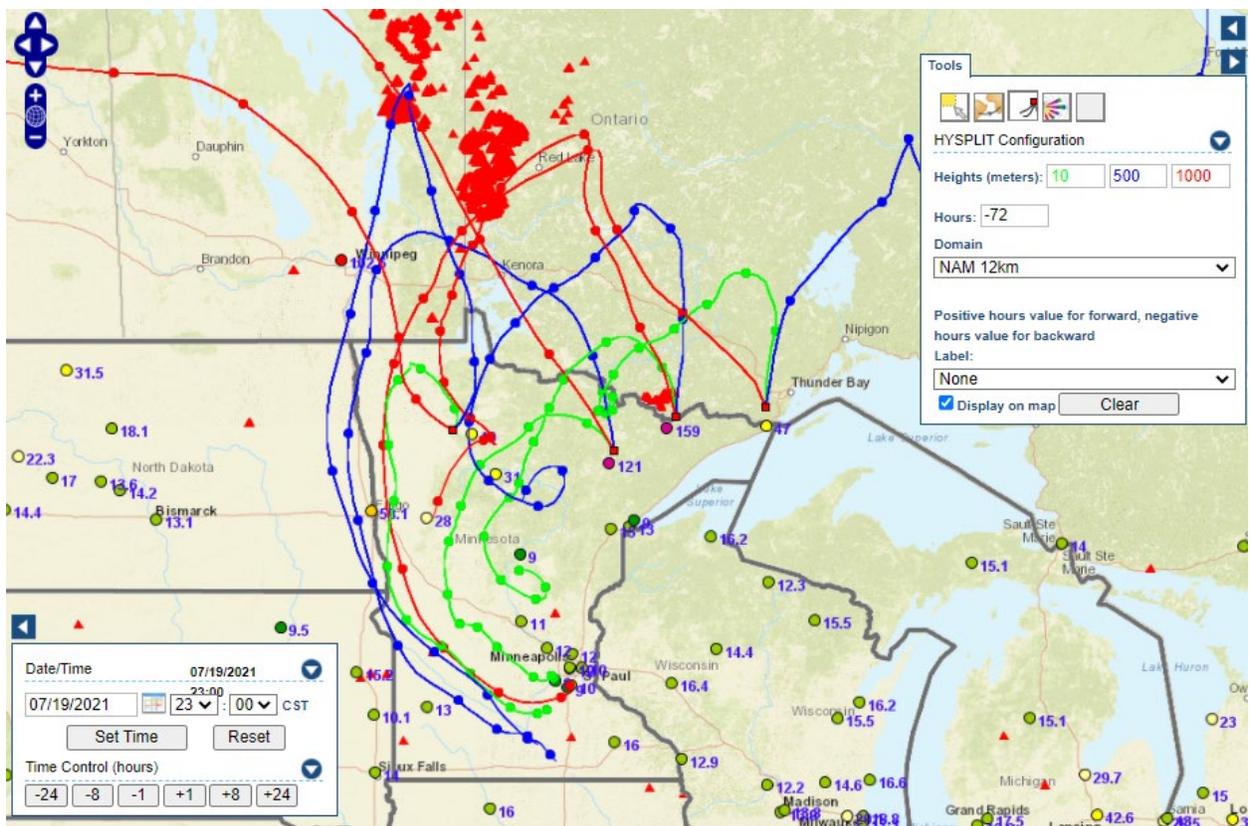
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Detroit Lakes	270052013	7/19/2021	20.7	28	Canada wildfire smoke
Ely	270750005	7/19/2021	17.1	159	Canada wildfire smoke
Fargo NW	380171004	7/19/2021	32.6	64.7	Canada wildfire smoke
Grand Portage	270317810	7/19/2021	26.9	64	Canada wildfire smoke
Leech Lake Nation	270213410	7/19/2021	22.7	31	Canada wildfire smoke
Red Lake Nation	270072304	7/19/2021	18.5	52	Canada wildfire smoke
Virginia	271377001	7/19/2021	16.4	121	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 19, 2021.



MODIS visible satellite for July 19, 2021.



Backward trajectories for July 19, 2021.

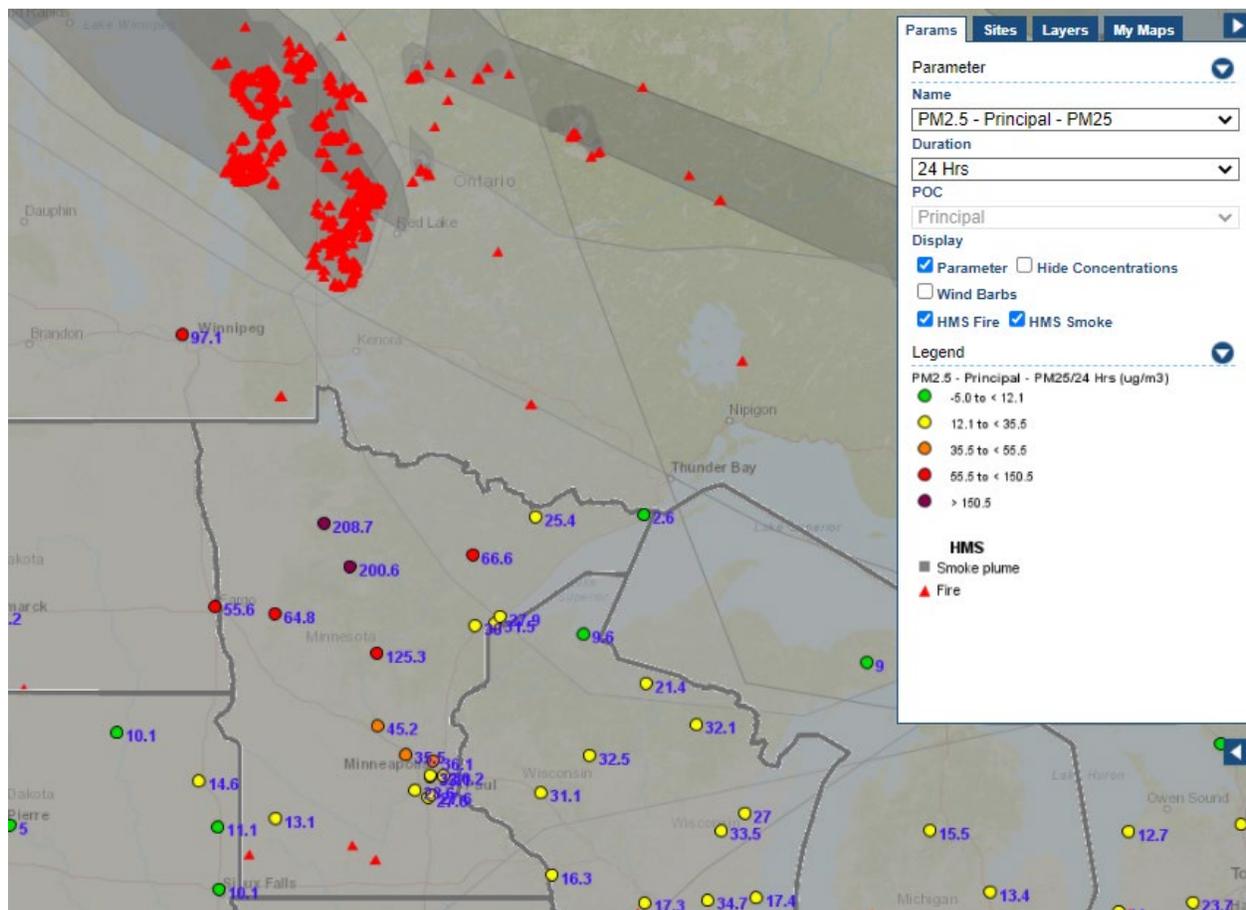
7/20/2021 Impacts

Smoke impacts from wildfires over Canada.

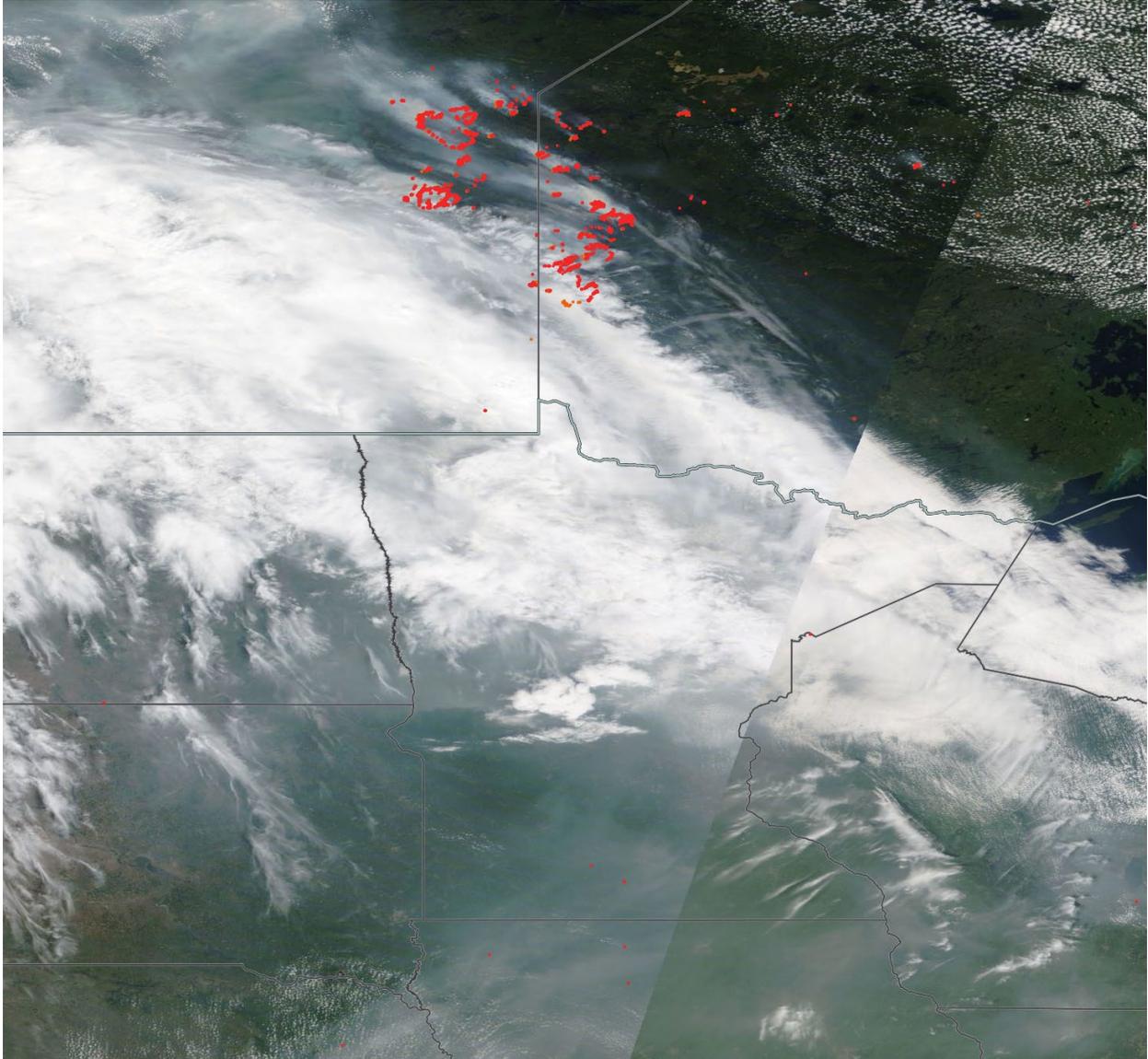
Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 20, 2021.

Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Apple Valley	270370470	7/20/2021	27.7	77	Canada wildfire smoke
Blaine	270031002	7/20/2021	36.1	92	Canada wildfire smoke
Brainerd	270353204	7/20/2021	125.4	280	Canada wildfire smoke
Detroit Lakes	270052013	7/20/2021	64.9	233	Canada wildfire smoke
Duluth-WDSE	271377550	7/20/2021	29.2	153	Canada wildfire smoke
Ely	270750005	7/20/2021	25.4	127	Canada wildfire smoke
Fargo NW	380171004	7/20/2021	55.7	236.3	Canada wildfire smoke
Fond du Lac	270177417	7/20/2021	30.0	102	Canada wildfire smoke
Lacrosse DOT	550630012	7/20/2021	16.3	50.1	Canada wildfire smoke
Lakeville - Near Road	270370480	7/20/2021	27.7	78	Canada wildfire smoke

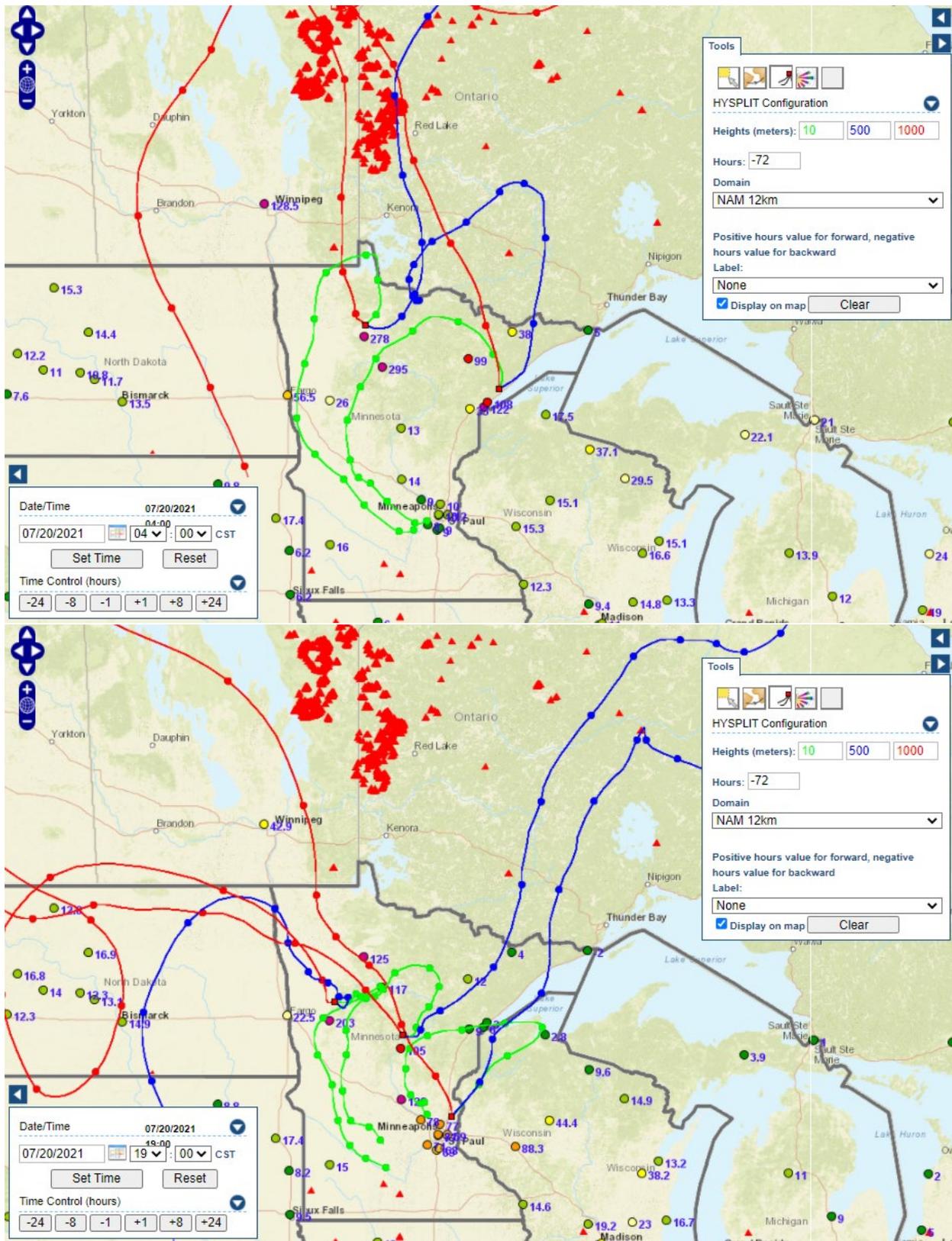
Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
Leech Lake Nation	270213410	7/20/2021	200.7	343	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/20/2021	32.1	81	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/20/2021	33.1	79	Canada wildfire smoke
Red Lake Nation	270072304	7/20/2021	208.8	397	Canada wildfire smoke
Shakopee	271390505	7/20/2021	28.6	78	Canada wildfire smoke
St. Cloud	271453052	7/20/2021	45.2	123	Canada wildfire smoke
St. Michael	271713201	7/20/2021	35.6	117	Canada wildfire smoke
St. Paul-Harding	271230871	7/20/2021	30.3	69	Canada wildfire smoke
Virginia	271377001	7/20/2021	66.6	230	Canada wildfire smoke
West Duluth	271377554	7/20/2021	33.0	138	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 20, 2021.



MODIS visible satellite for July 20, 2021.



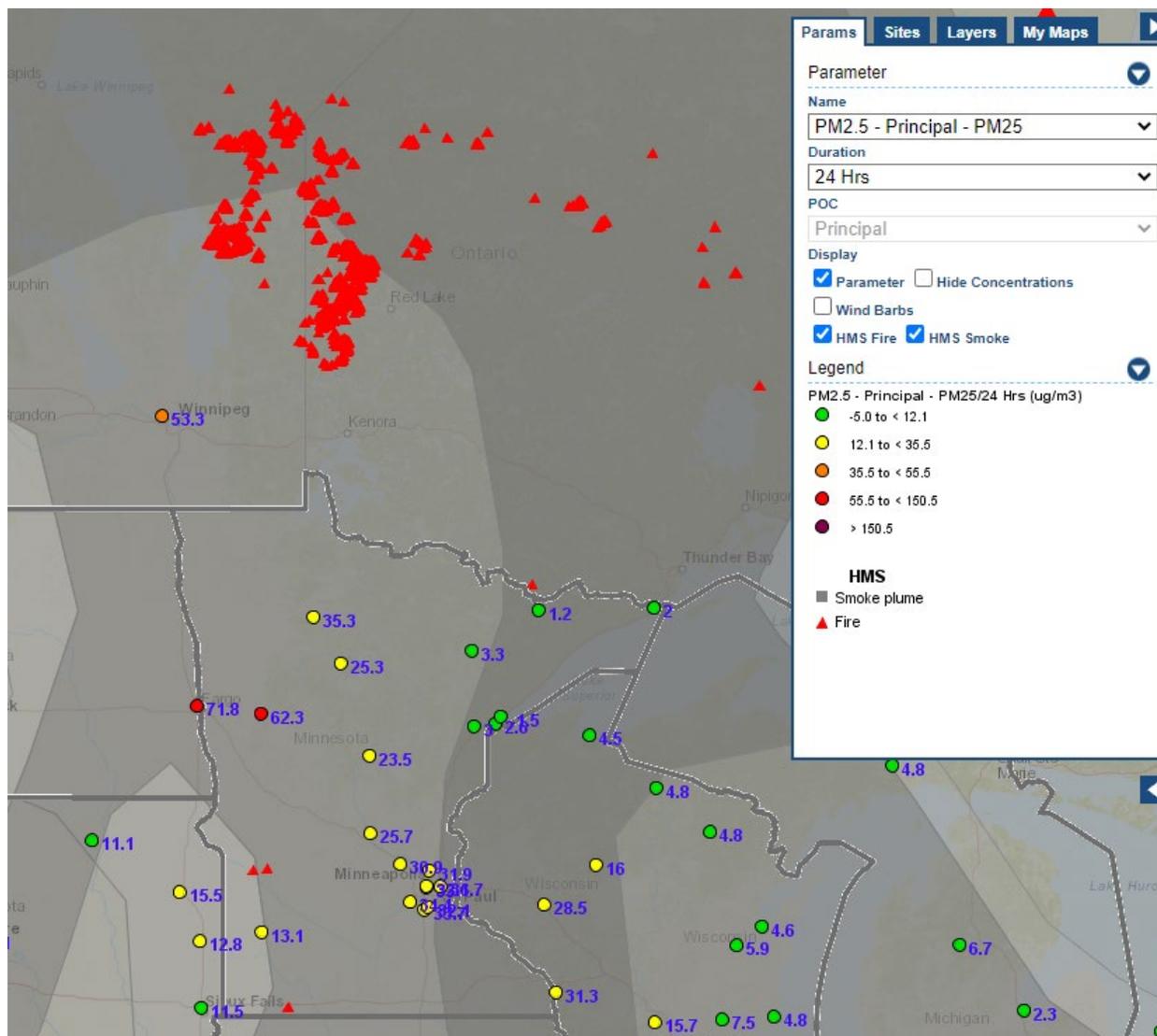
Backward trajectories for July 20, 2021.

7/21/2021 Impacts

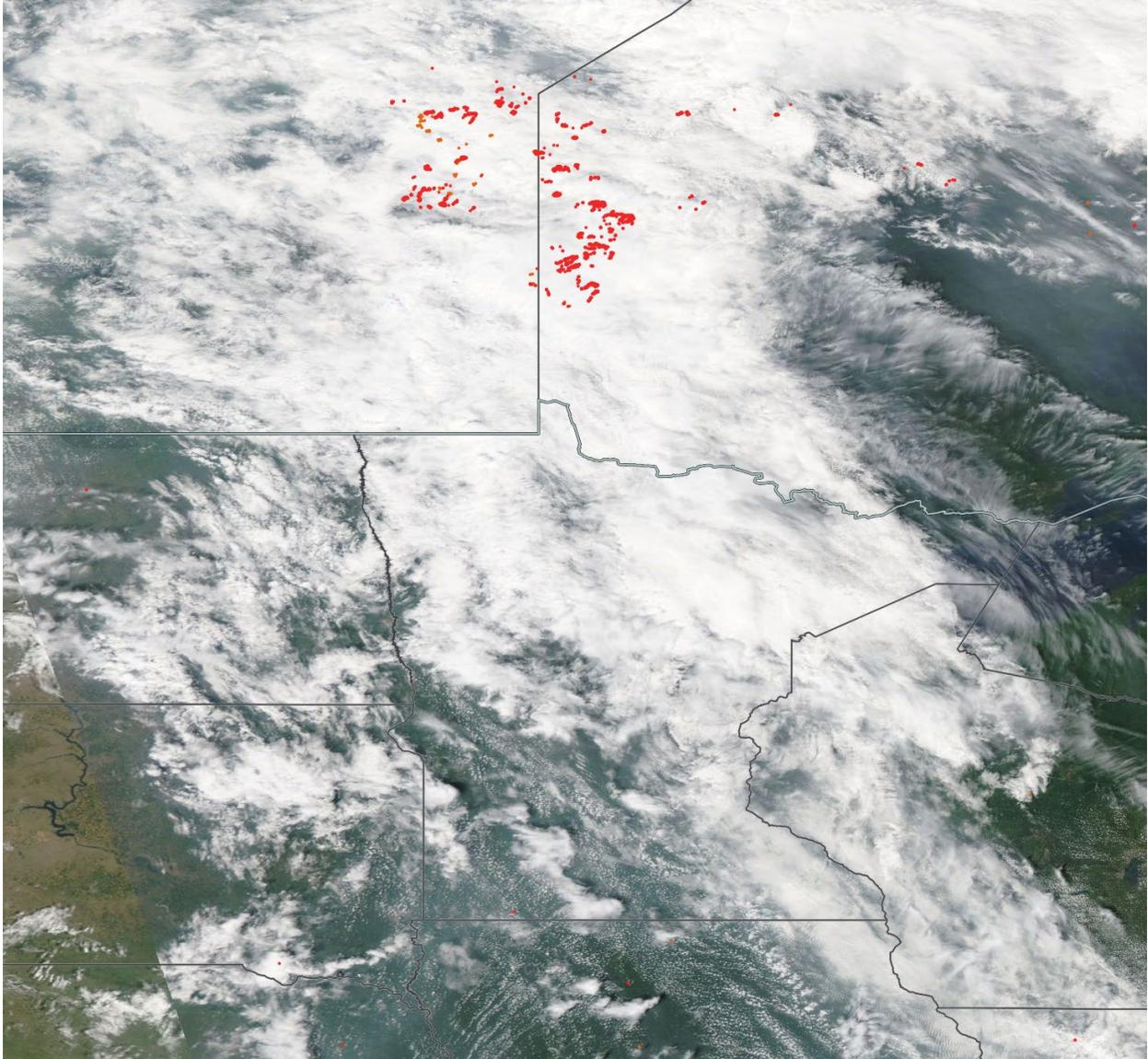
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 21, 2021.

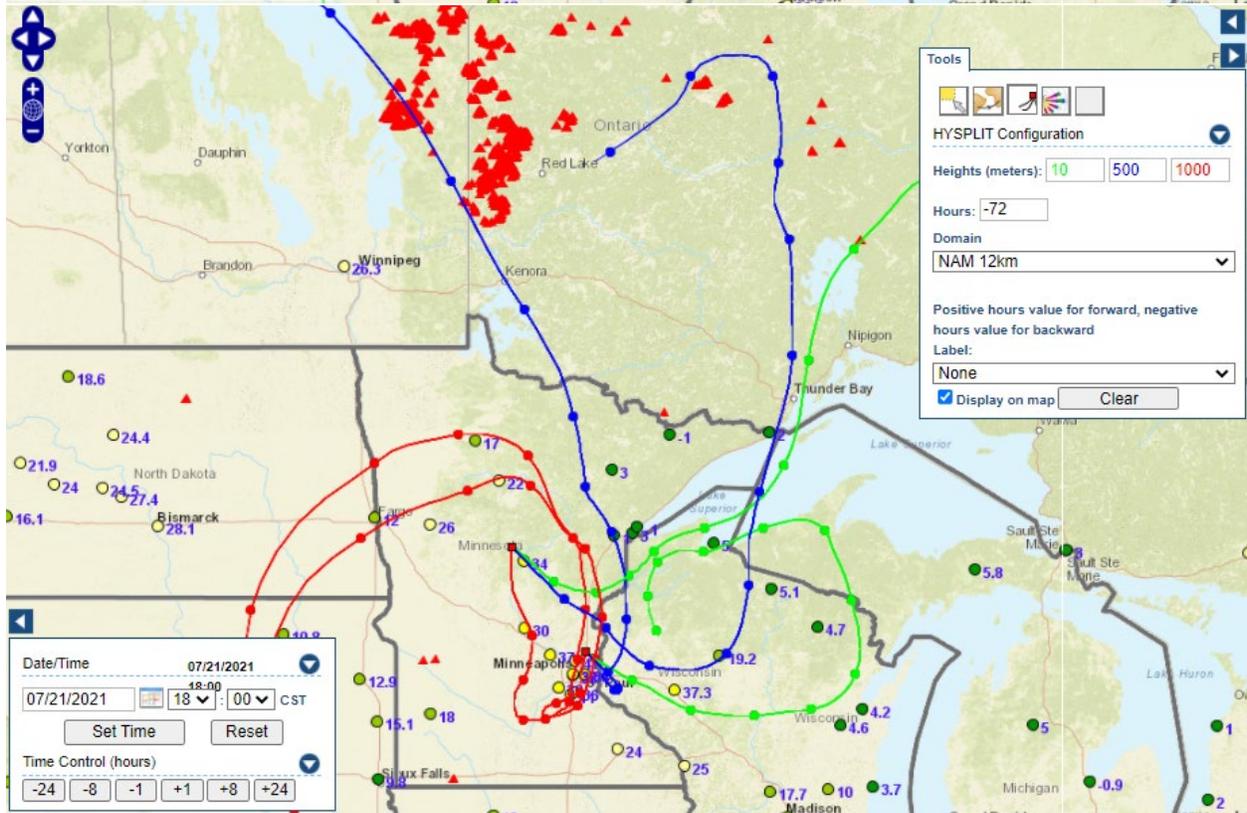
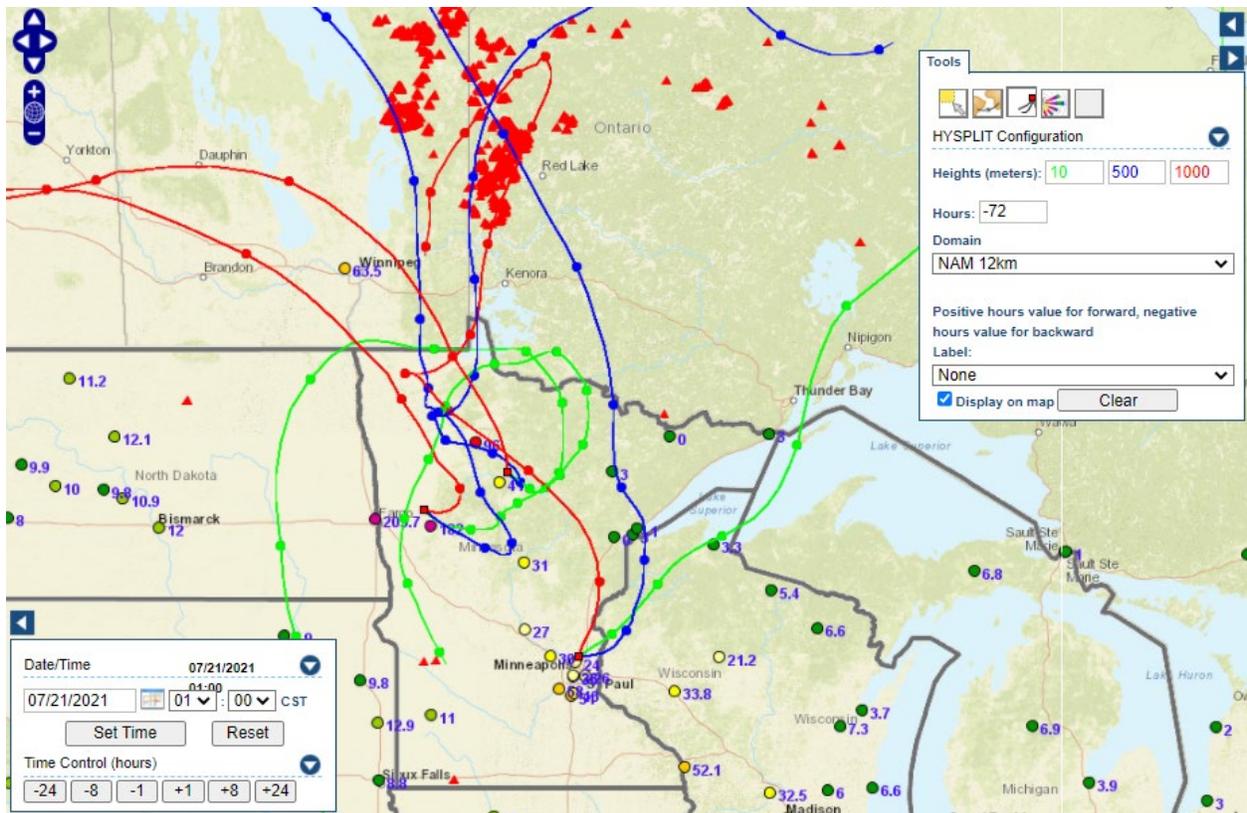
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Apple Valley	270370470	7/21/2021	32.2	55	Canada wildfire smoke
Blaine	270031002	7/21/2021	32.0	53	Canada wildfire smoke
Brainerd	270353204	7/21/2021	23.5	42	Canada wildfire smoke
Detroit Lakes	270052013	7/21/2021	62.3	190	Canada wildfire smoke
Fargo NW	380171004	7/21/2021	71.8	219	Canada wildfire smoke
Lacrosse DOT	550630012	7/21/2021	31.4	52.4	Canada wildfire smoke
Lakeville - Near Road	270370480	7/21/2021	33.8	72	Canada wildfire smoke
Leech Lake Nation	270213410	7/21/2021	25.4	71	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/21/2021	32.6	53	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/21/2021	33.0	50	Canada wildfire smoke
Red Lake Nation	270072304	7/21/2021	35.4	99	Canada wildfire smoke
Shakopee	271390505	7/21/2021	34.4	70	Canada wildfire smoke
St. Cloud	271453052	7/21/2021	25.8	44	Canada wildfire smoke
St. Michael	271713201	7/21/2021	31.0	51	Canada wildfire smoke
St. Paul-Harding	271230871	7/21/2021	31.8	50	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 21, 2021.



MODIS visible satellite for July 21, 2021.



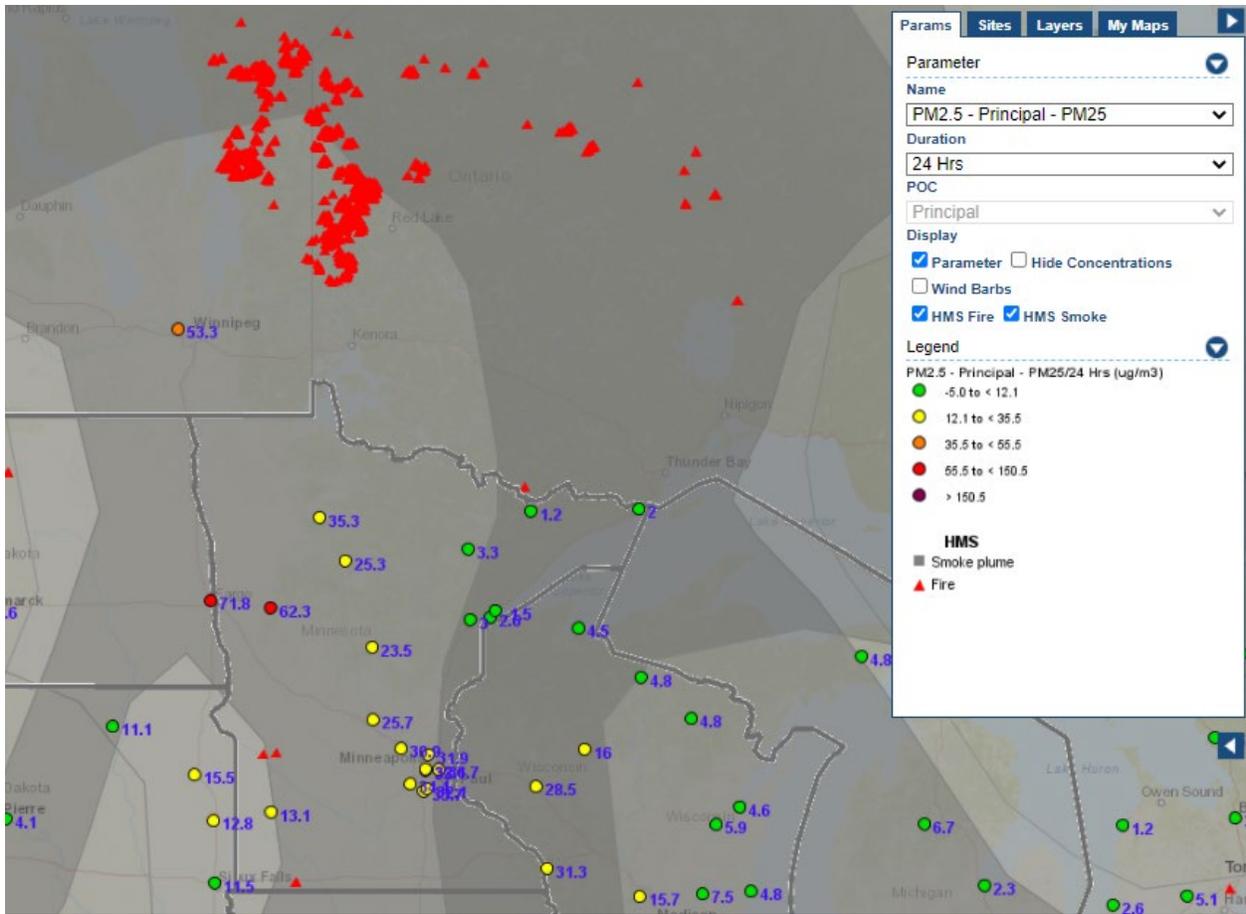
Backward trajectories for July 21, 2021.

7/22/2021 Impacts

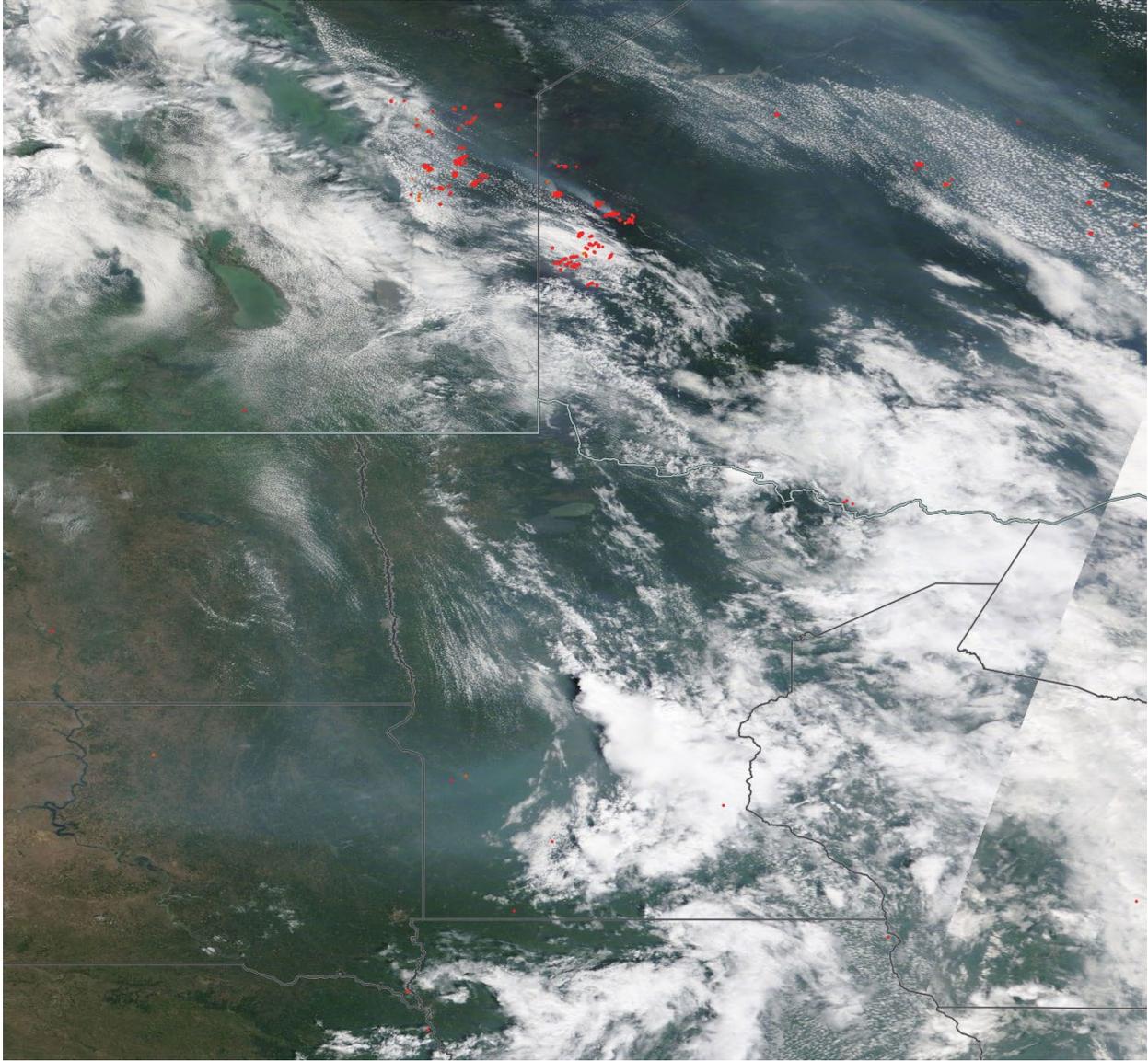
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 22, 2021.

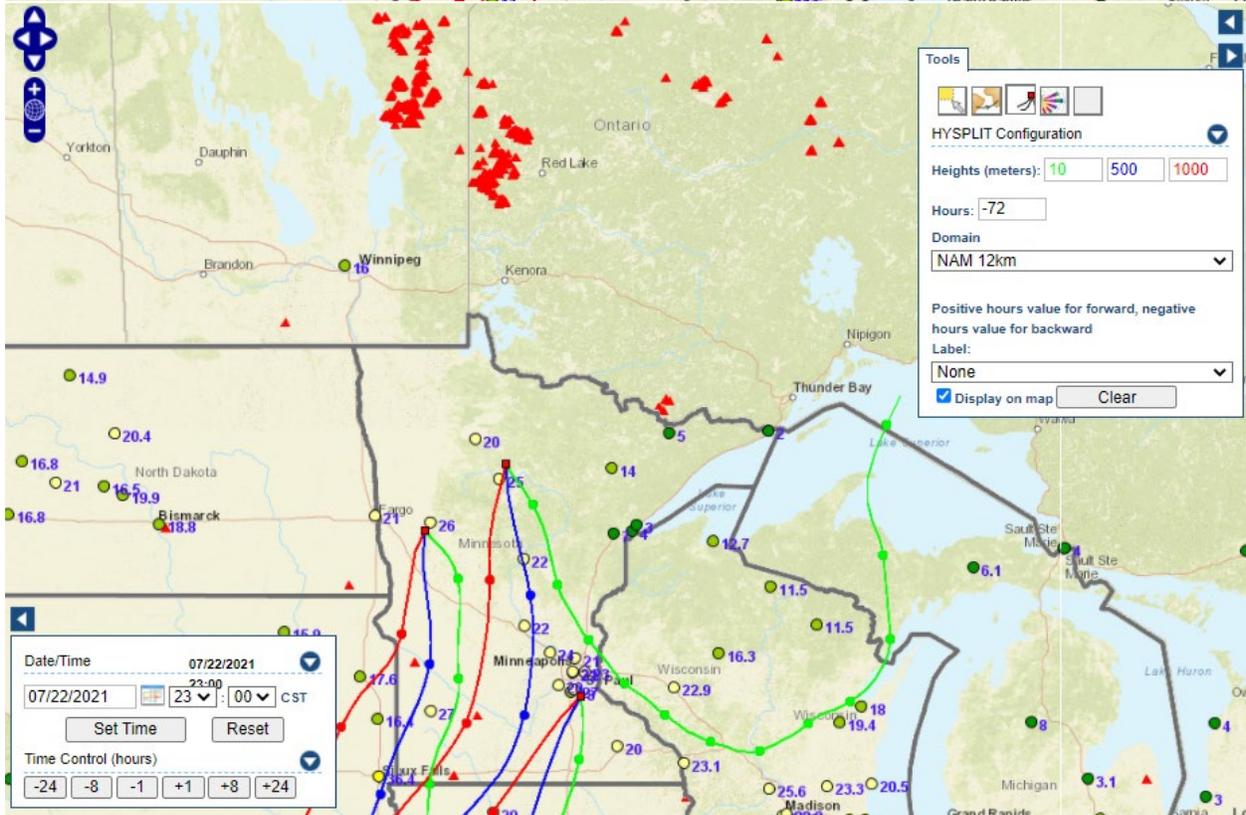
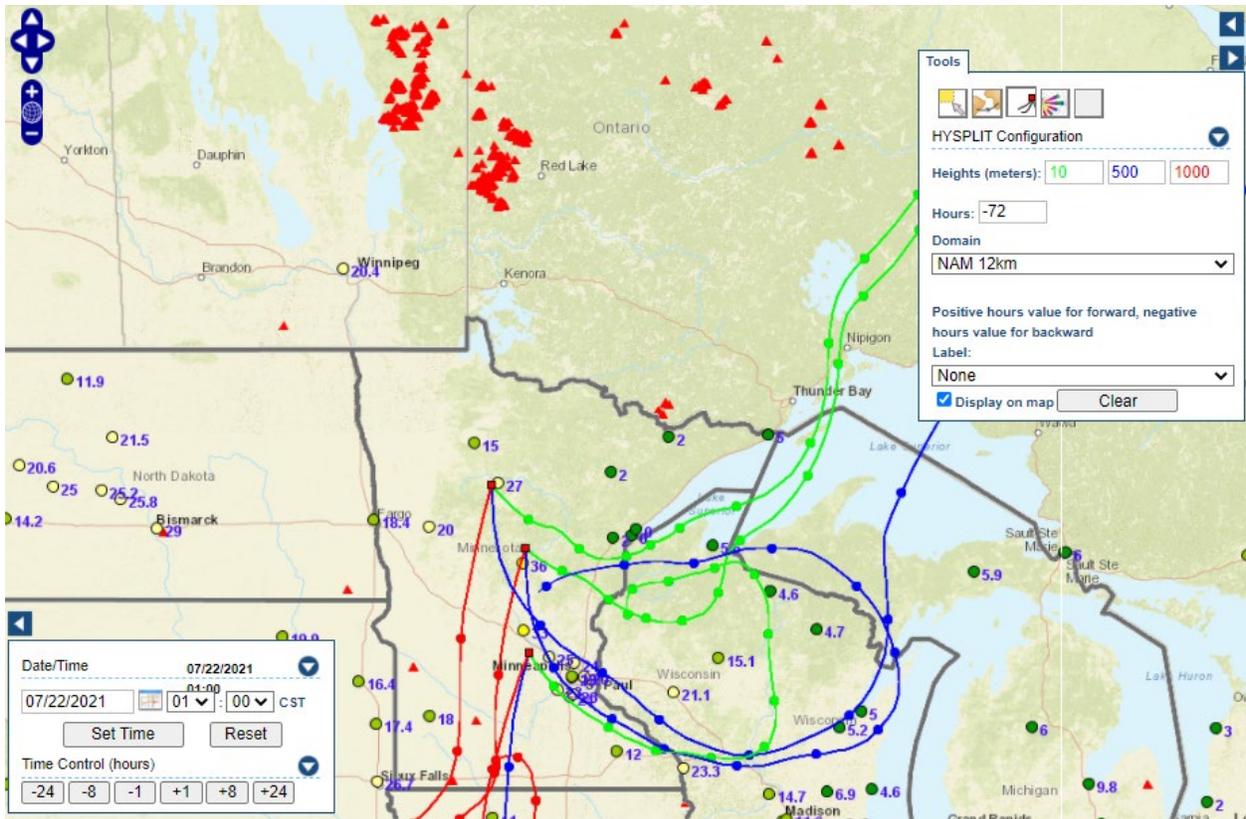
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Blaine	270031002	7/22/2021	19	27	Canada wildfire smoke
Brainerd	270353204	7/22/2021	22.7	36	Canada wildfire smoke
Detroit Lakes	270052013	7/22/2021	22.7	27	Canada wildfire smoke
Fargo NW	380171004	7/22/2021	20.2	22.4	Canada wildfire smoke
Lacrosse DOT	550630012	7/22/2021	23.4	29.6	Canada wildfire smoke
Lakeville - Near Road	270370480	7/22/2021	19.6	24	Canada wildfire smoke
Leech Lake Nation	270213410	7/22/2021	27.7	35	Canada wildfire smoke
Marshall	270834210	7/22/2021	20.5	27	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/22/2021	17.2	22	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/22/2021	18.6	24	Canada wildfire smoke
Red Lake Nation	270072304	7/22/2021	17.9	24	Canada wildfire smoke
Shakopee	271390505	7/22/2021	19.7	26	Canada wildfire smoke
St. Cloud	271453052	7/22/2021	19.9	33	Canada wildfire smoke
St. Michael	271713201	7/22/2021	20.9	25	Canada wildfire smoke
St. Paul-Harding	271230871	7/22/2021	19.3	26	Canada wildfire smoke
Virginia	271377001	7/22/2021	15.3	23	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 22, 2021.



MODIS visible satellite for July 22, 2021.



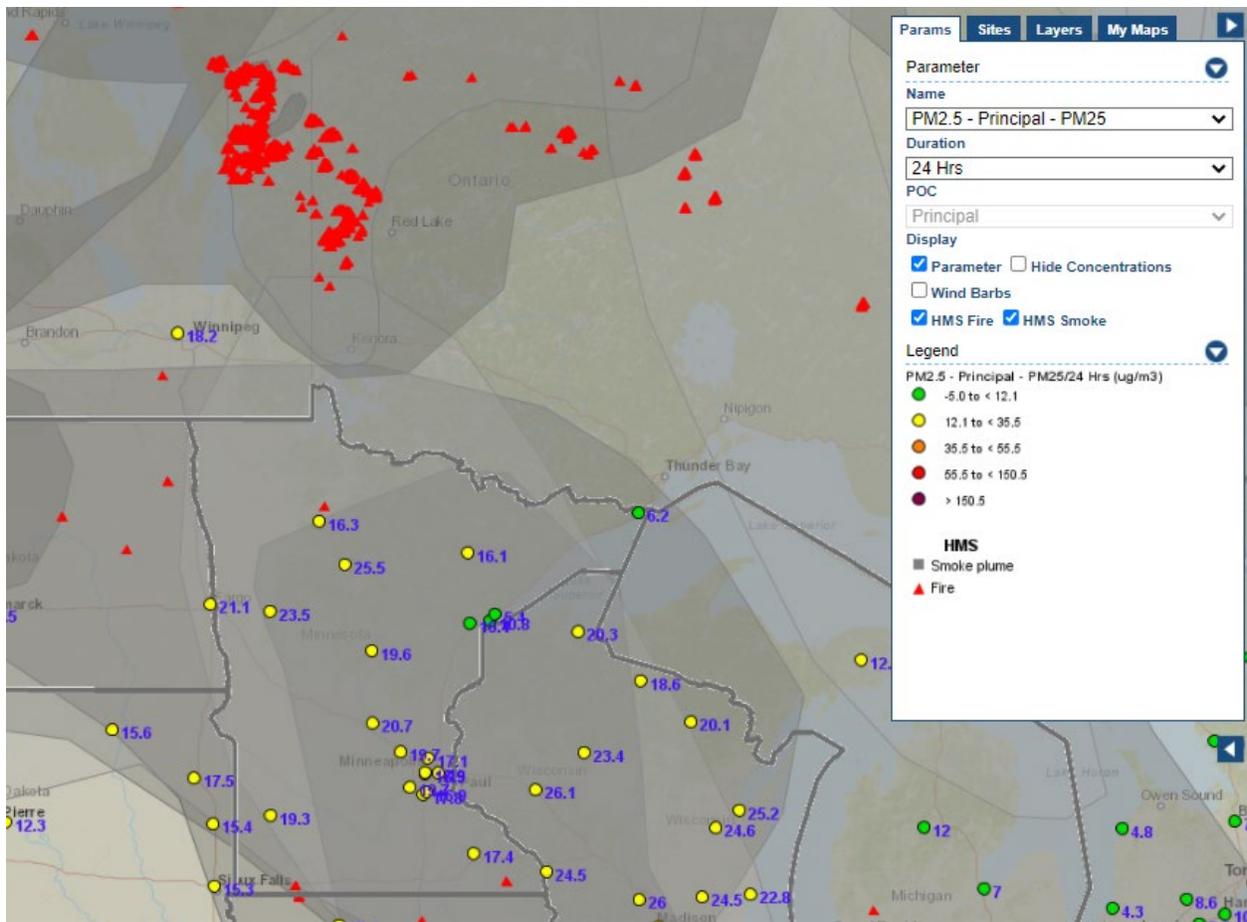
Backward trajectories for July 22, 2021.

7/23/2021 Impacts

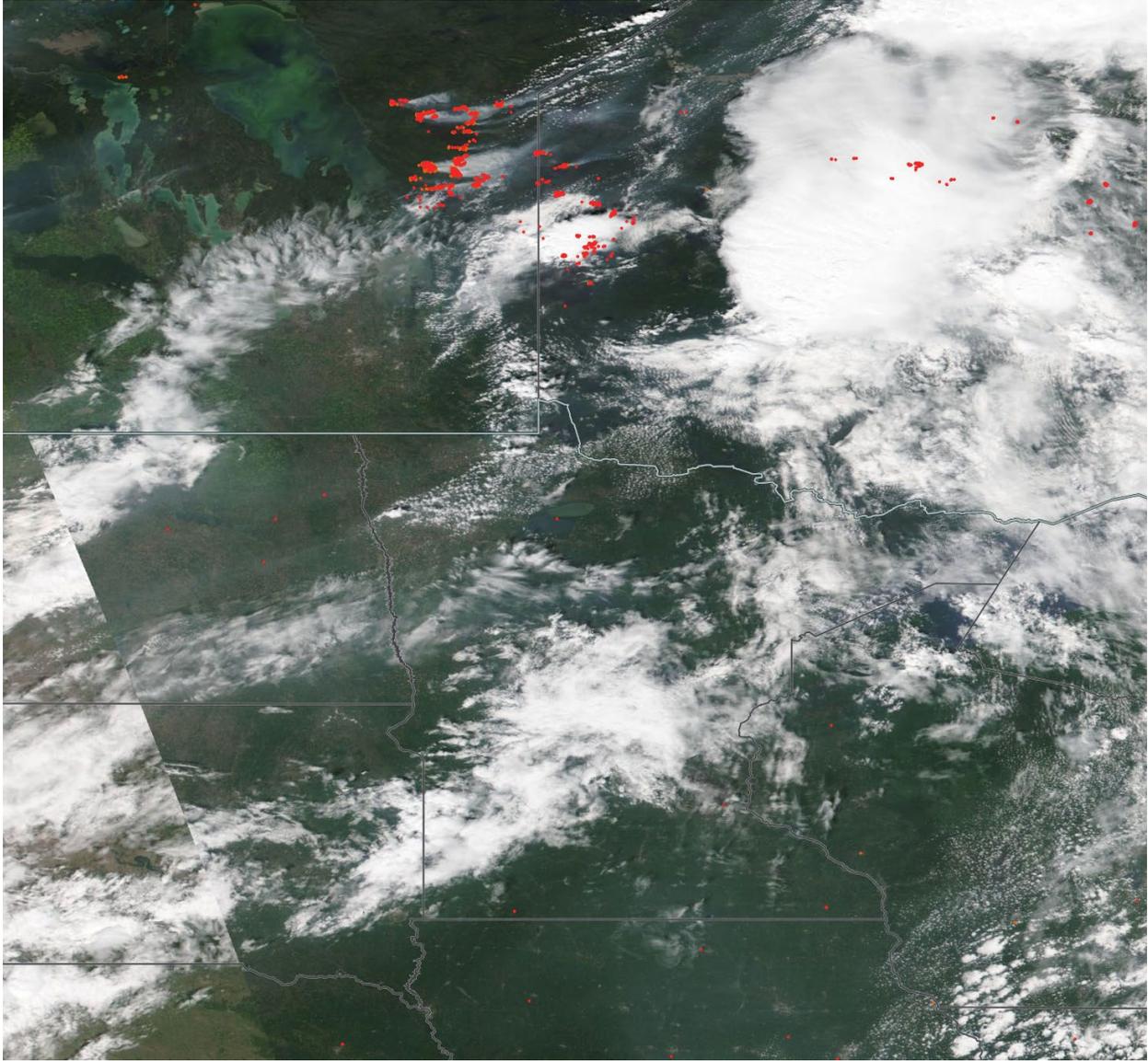
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 23, 2021.

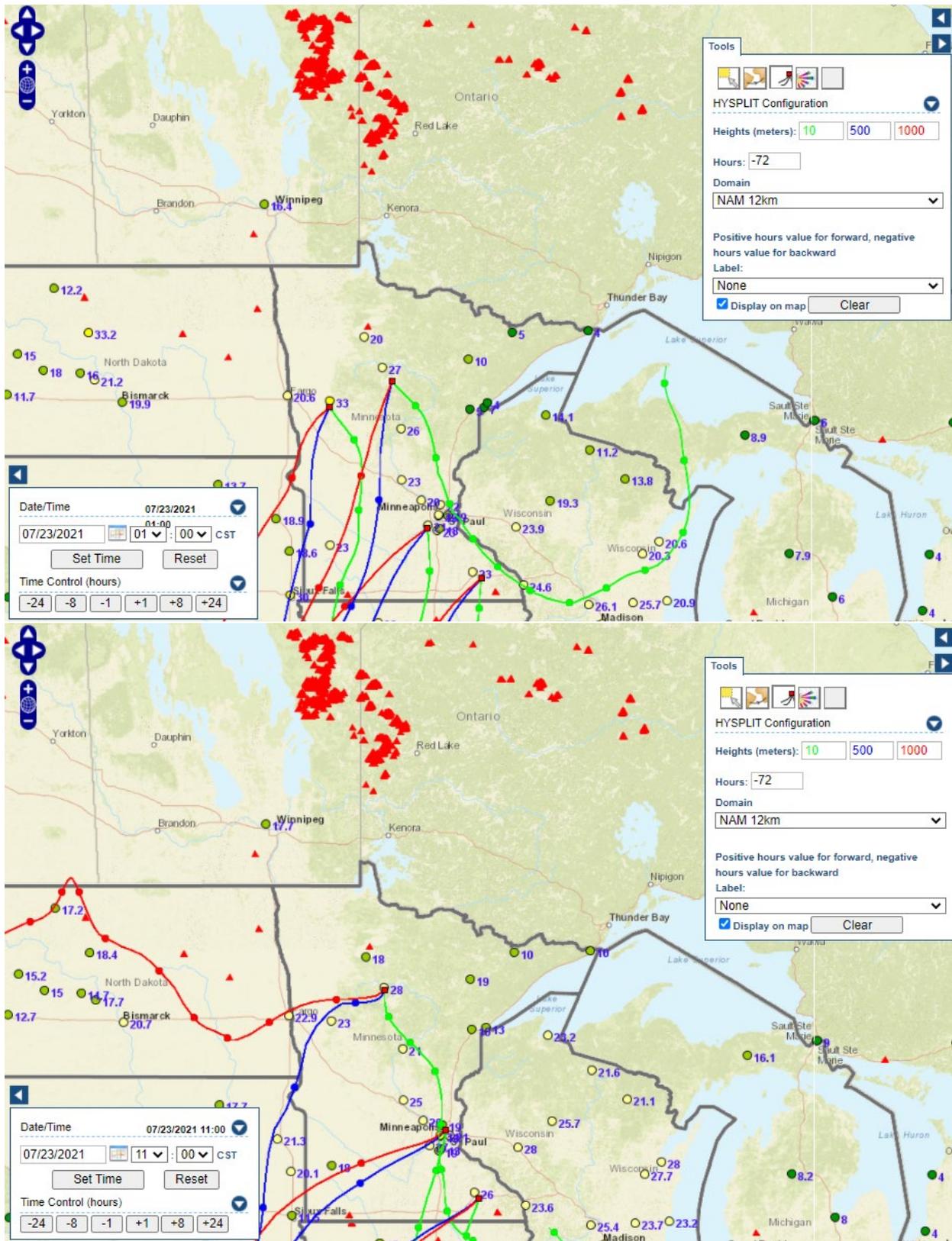
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Apple Valley	270370470	7/23/2021	17.0	25	Canada wildfire smoke
Blaine	270031002	7/23/2021	17.1	24	Canada wildfire smoke
Brainerd	270353204	7/23/2021	19.7	26	Canada wildfire smoke
Detroit Lakes	270052013	7/23/2021	23.5	33	Canada wildfire smoke
Fargo NW	380171004	7/23/2021	21.2	29.6	Canada wildfire smoke
Lacrosse DOT	550630012	7/23/2021	24.5	26.4	Canada wildfire smoke
Lakeville - Near Road	270370480	7/23/2021	17.9	25	Canada wildfire smoke
Leech Lake Nation	270213410	7/23/2021	25.6	31	Canada wildfire smoke
Marshall	270834210	7/23/2021	19.4	27	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/23/2021	17.0	39	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/23/2021	16.5	28	Canada wildfire smoke
Red Lake Nation	270072304	7/23/2021	16.4	23	Canada wildfire smoke
Rochester	271095008	7/23/2021	17.4	26	Canada wildfire smoke
Shakopee	271390505	7/23/2021	19.8	30	Canada wildfire smoke
St. Cloud	271453052	7/23/2021	20.8	25	Canada wildfire smoke
St. Michael	271713201	7/23/2021	19.8	26	Canada wildfire smoke
St. Paul-Harding	271230871	7/23/2021	19.0	27	Canada wildfire smoke
Virginia	271377001	7/23/2021	16.1	24	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 23, 2021.



MODIS visible satellite for July 23, 2021.



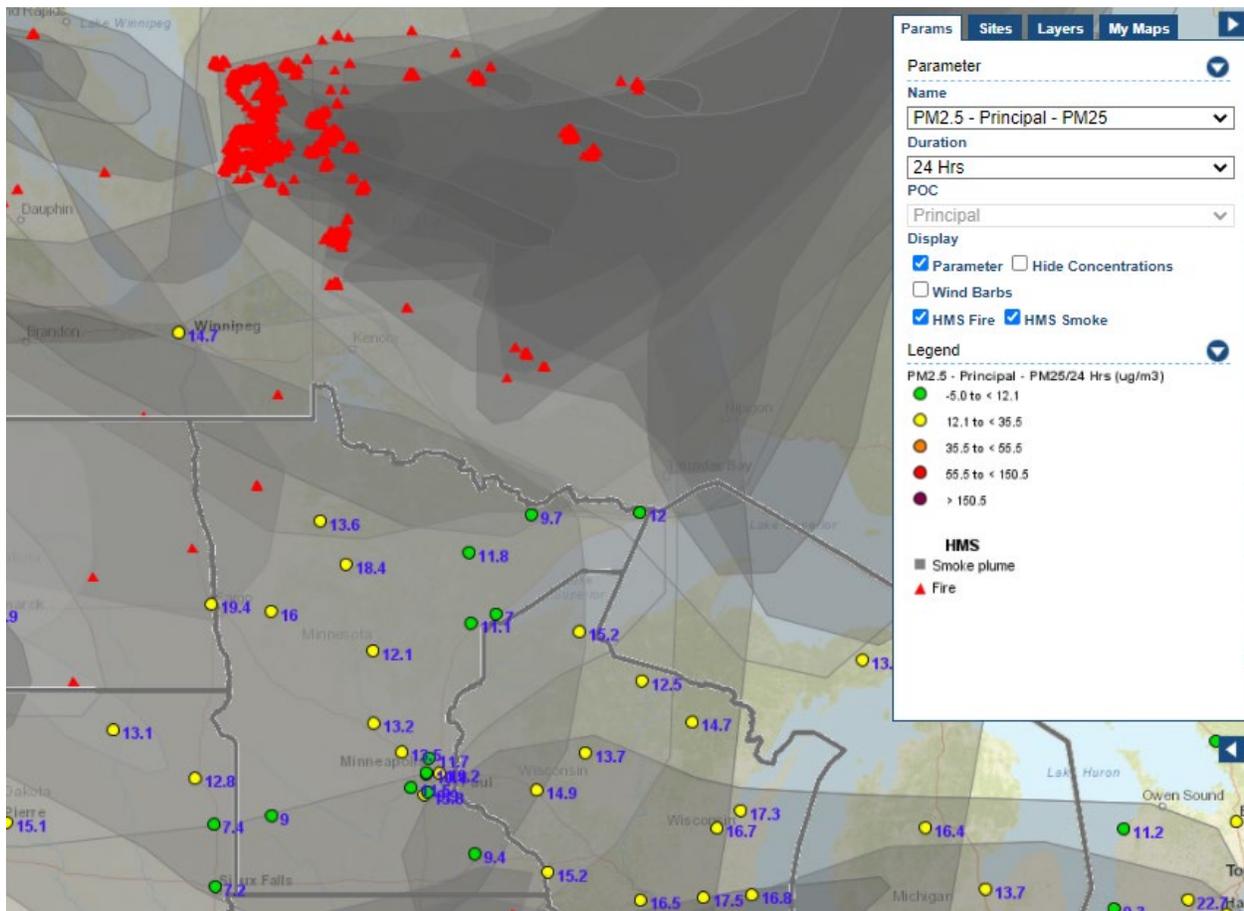
Backward trajectories for July 23, 2021.

7/24/2021 Impacts

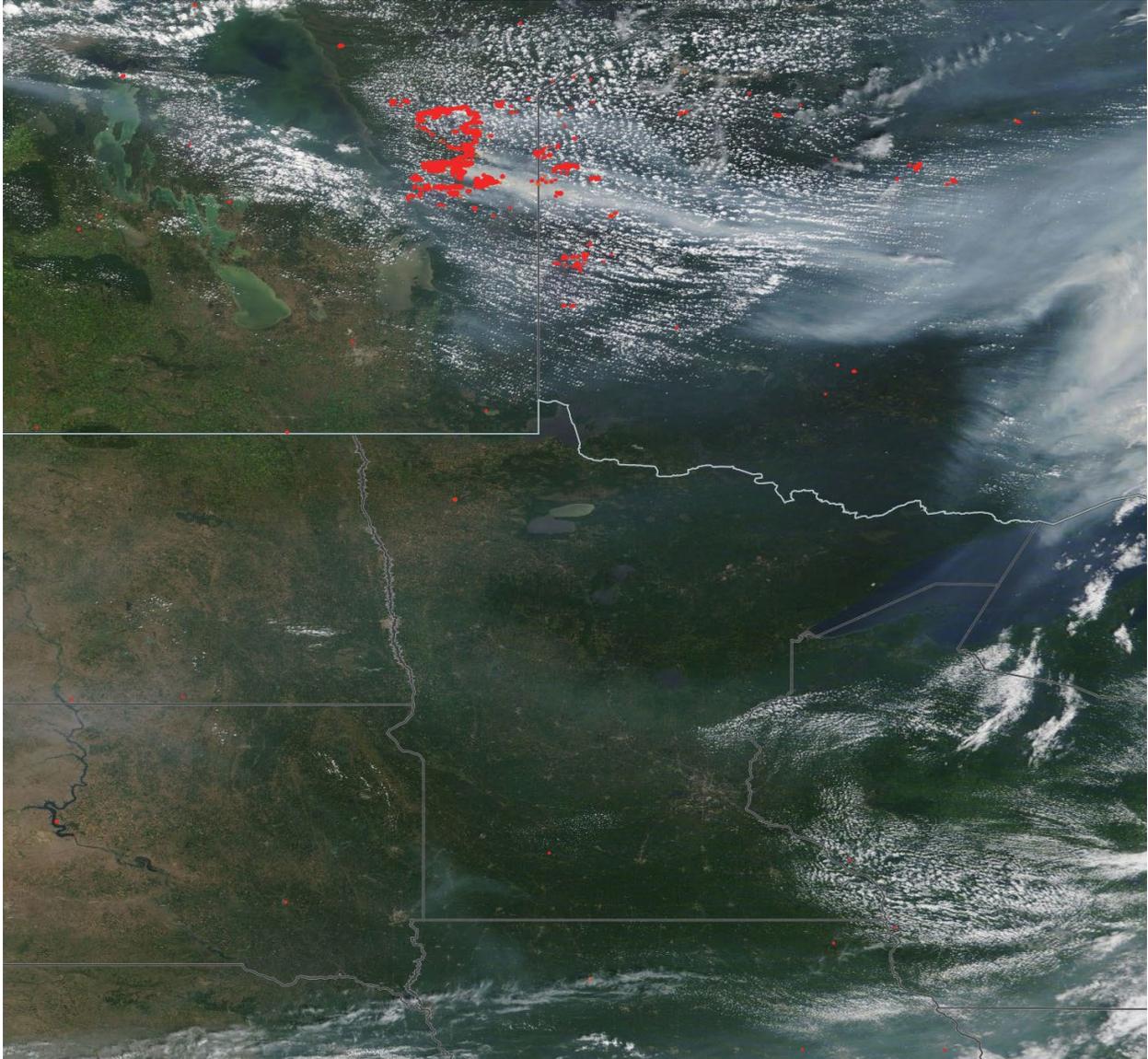
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 24, 2021.

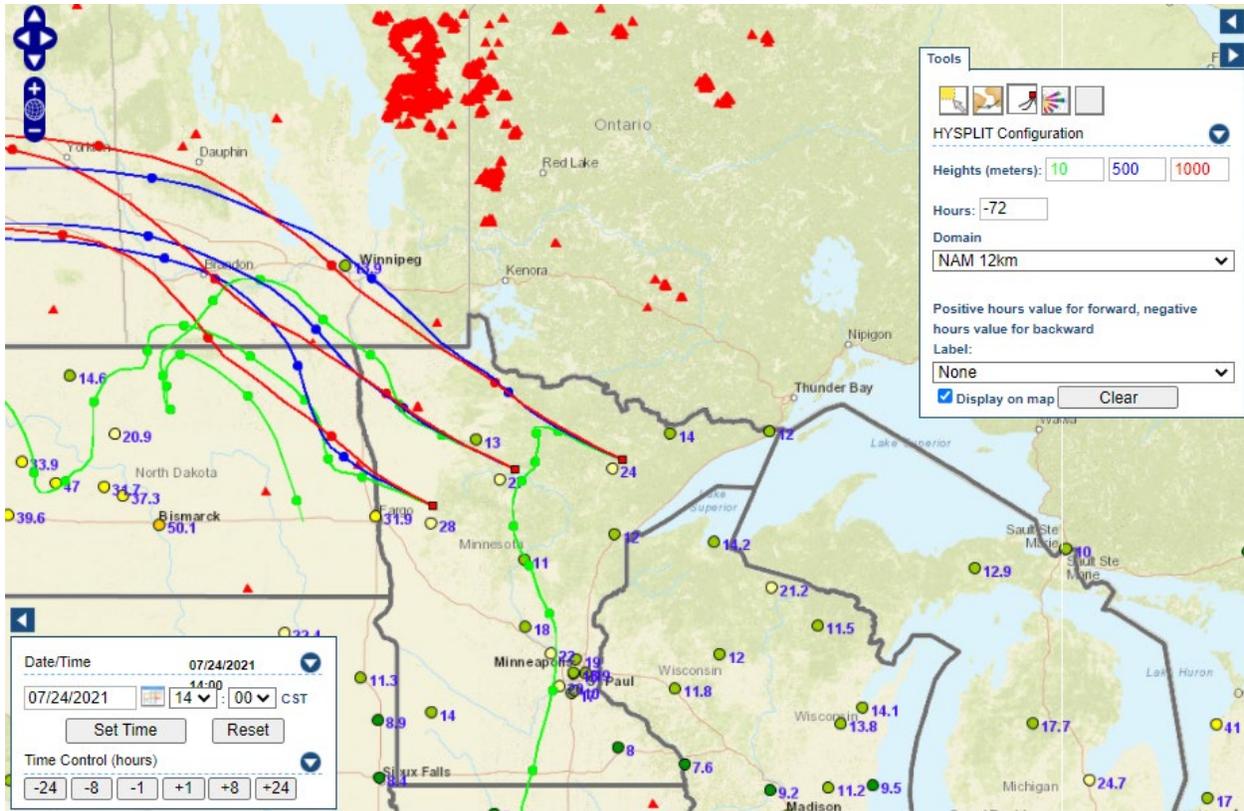
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Detroit Lakes	270052013	7/24/2021	16	28	Canada wildfire smoke
Fargo NW	380171004	7/24/2021	19.4	32.3	Canada wildfire smoke
Leech Lake Nation	270213410	7/24/2021	18.4	27	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 24, 2021.



MODIS visible satellite for July 24, 2021.



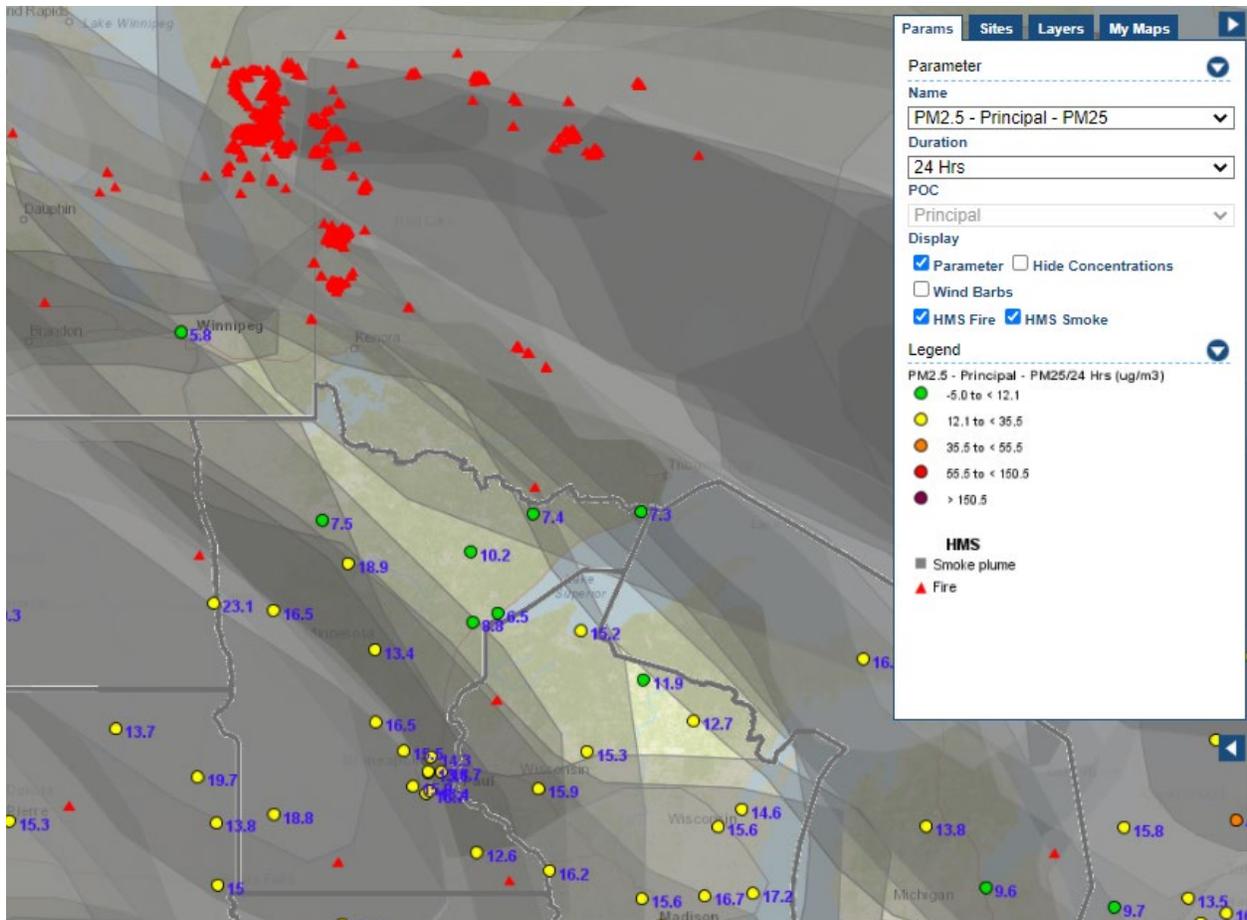
Backward trajectories for July 24, 2021.

7/25/2021 Impacts

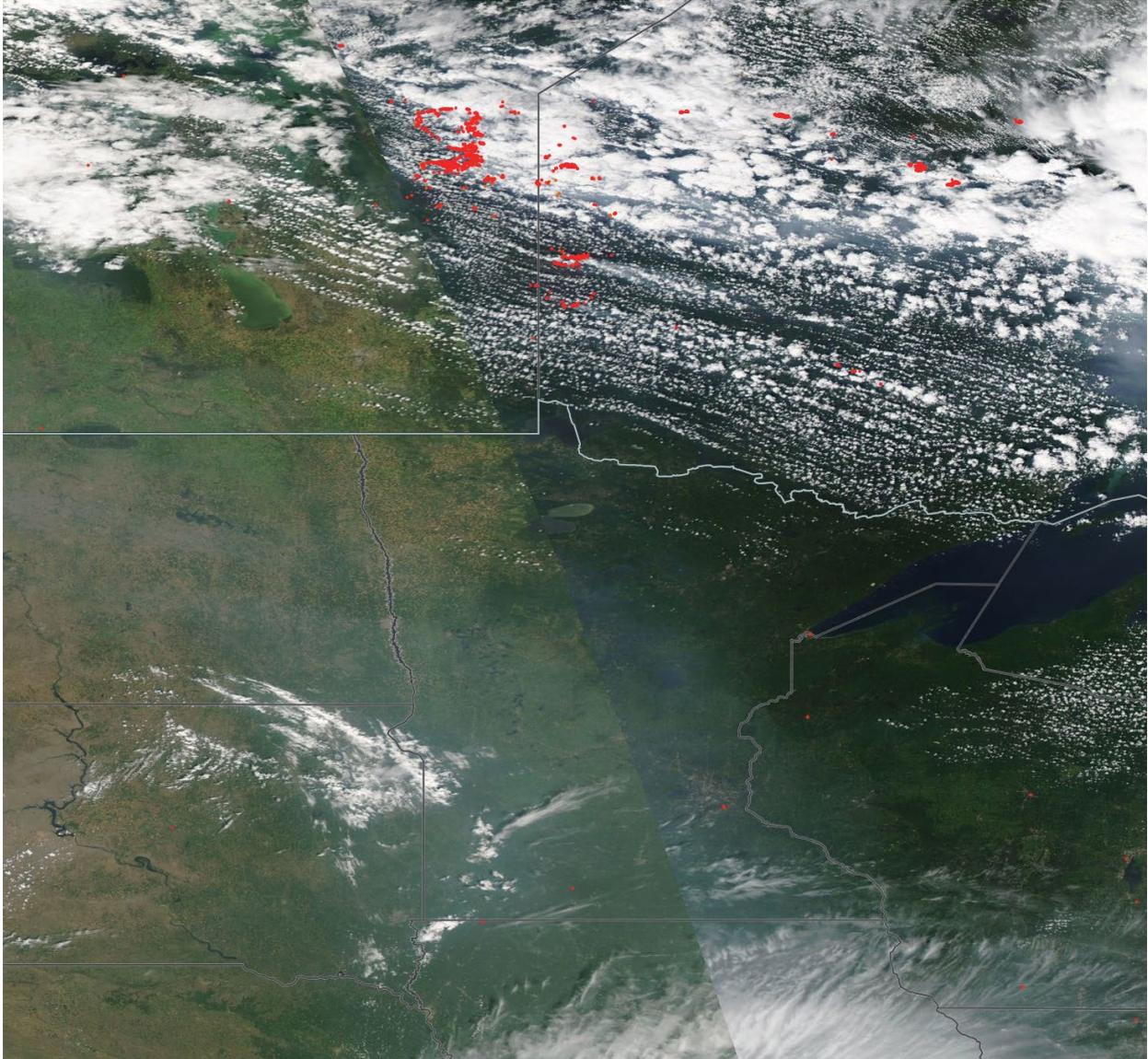
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 25, 2021.

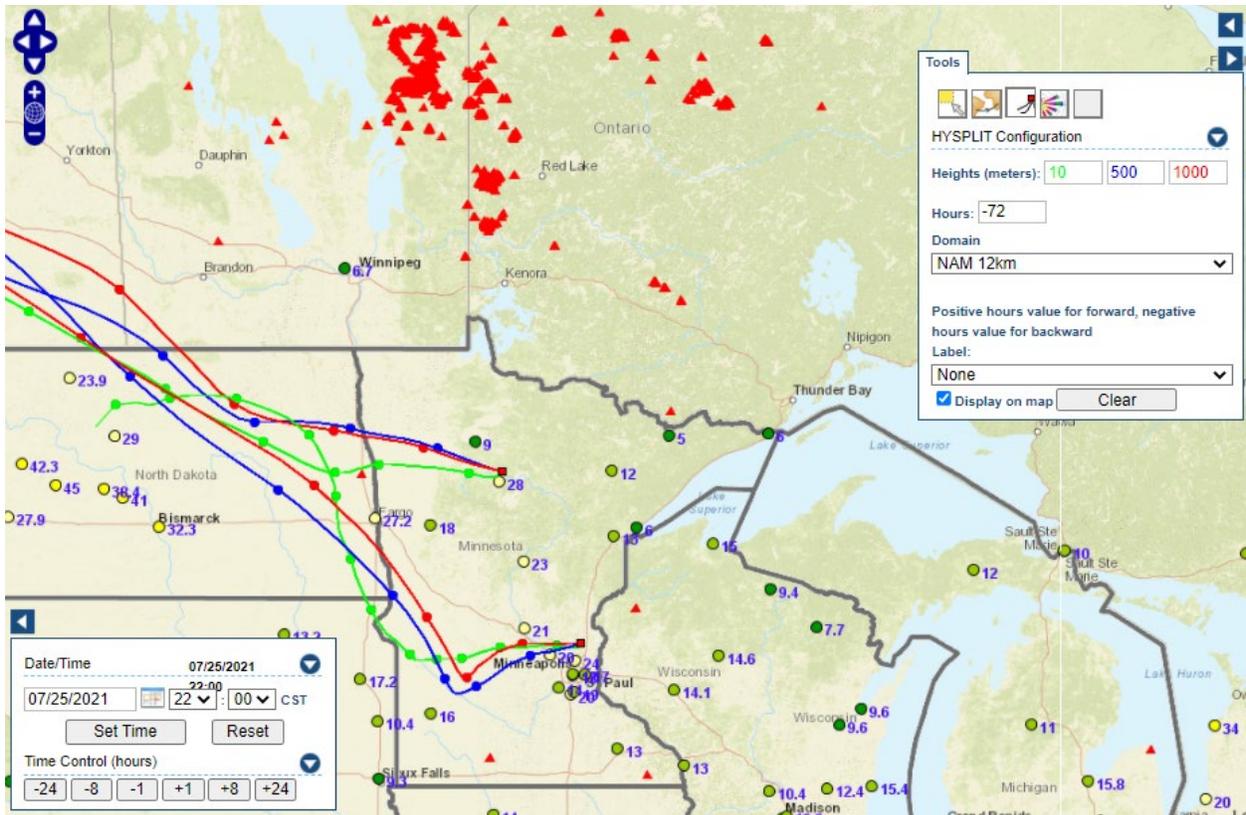
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Lacrosse DOT	550630012	7/25/2021	16.2	24.9	Canada wildfire smoke
Lakeville - Near Road	270370480	7/25/2021	16.7	24	Canada wildfire smoke
Leech Lake Nation	270213410	7/25/2021	18.9	83	Canada wildfire smoke
Marshall	270834210	7/25/2021	18.9	29	Canada wildfire smoke
St. Cloud	271453052	7/25/2021	16.5	27	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 25, 2021.



MODIS visible satellite for July 25, 2021.



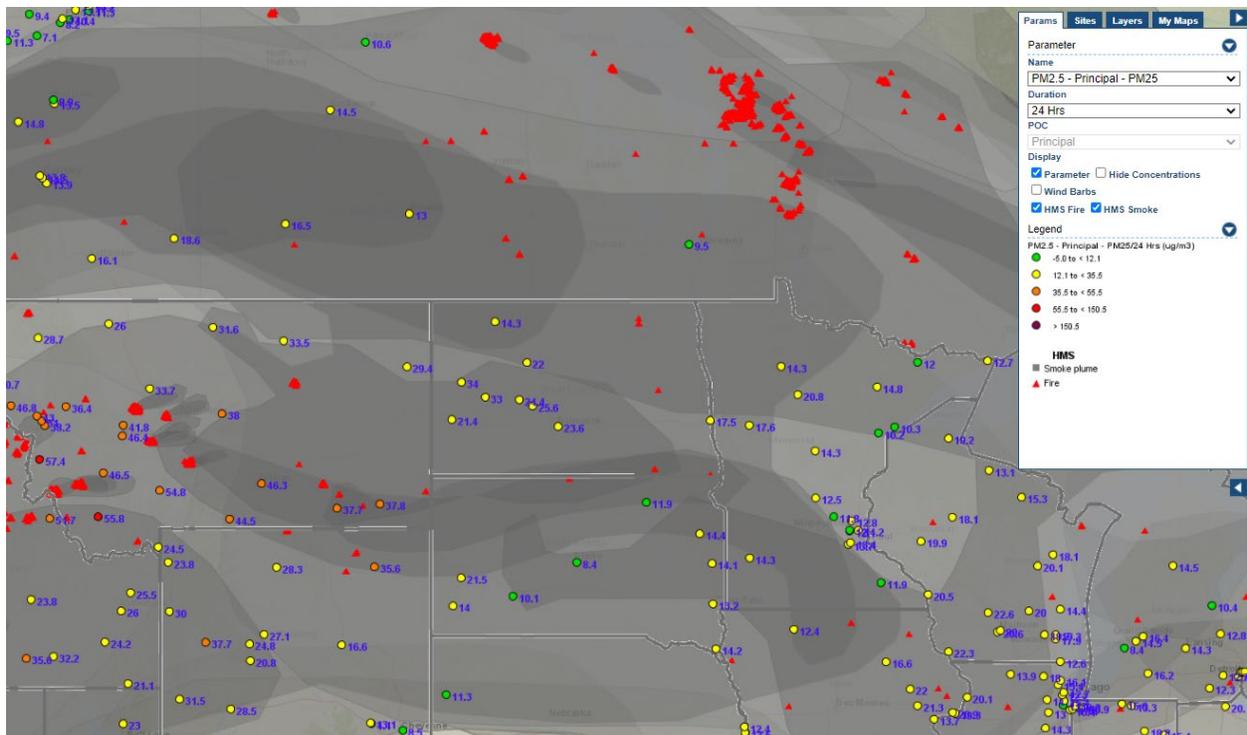
Backward trajectories for July 25, 2021.

7/26/2021 Impacts

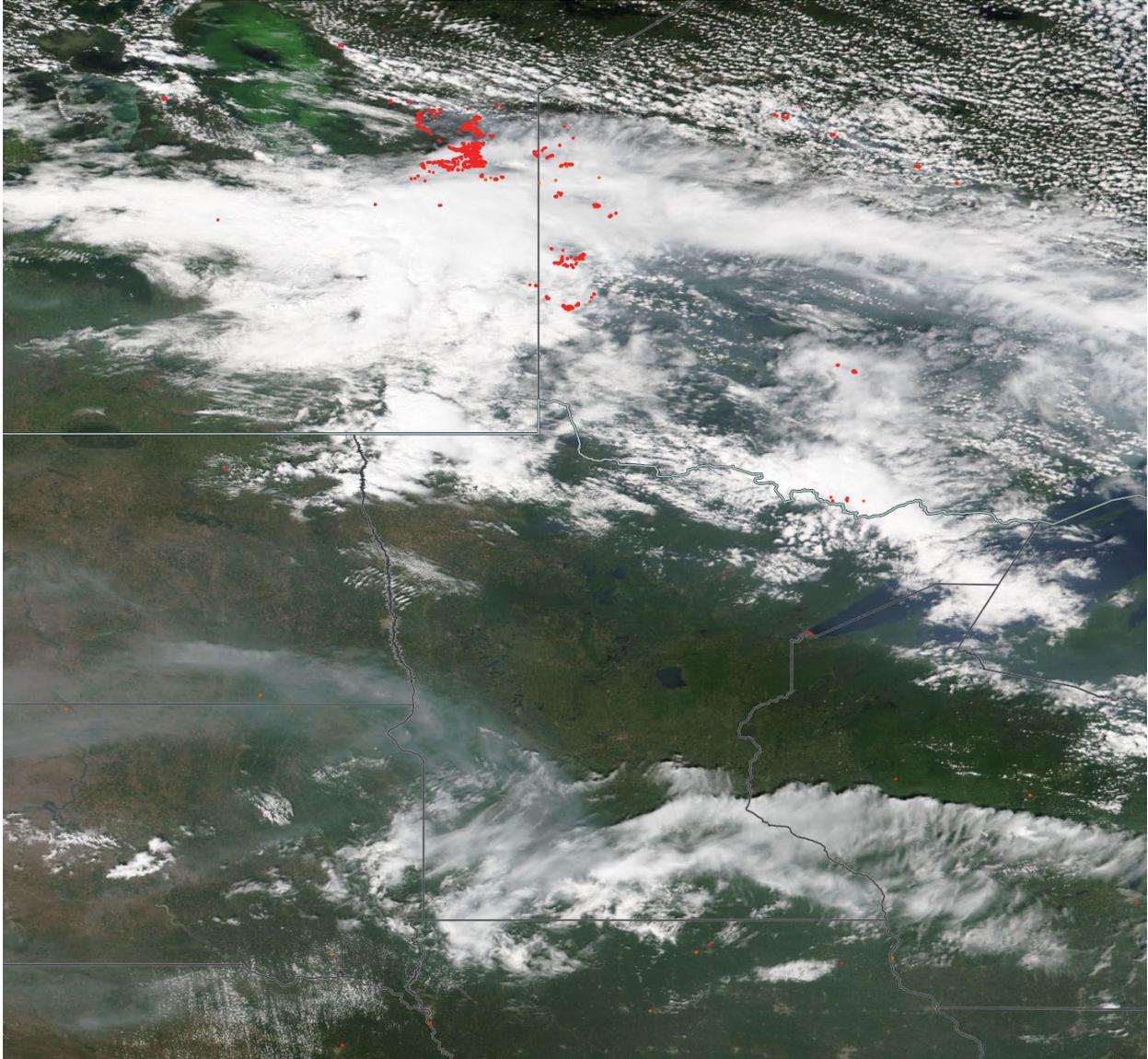
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 26, 2021.

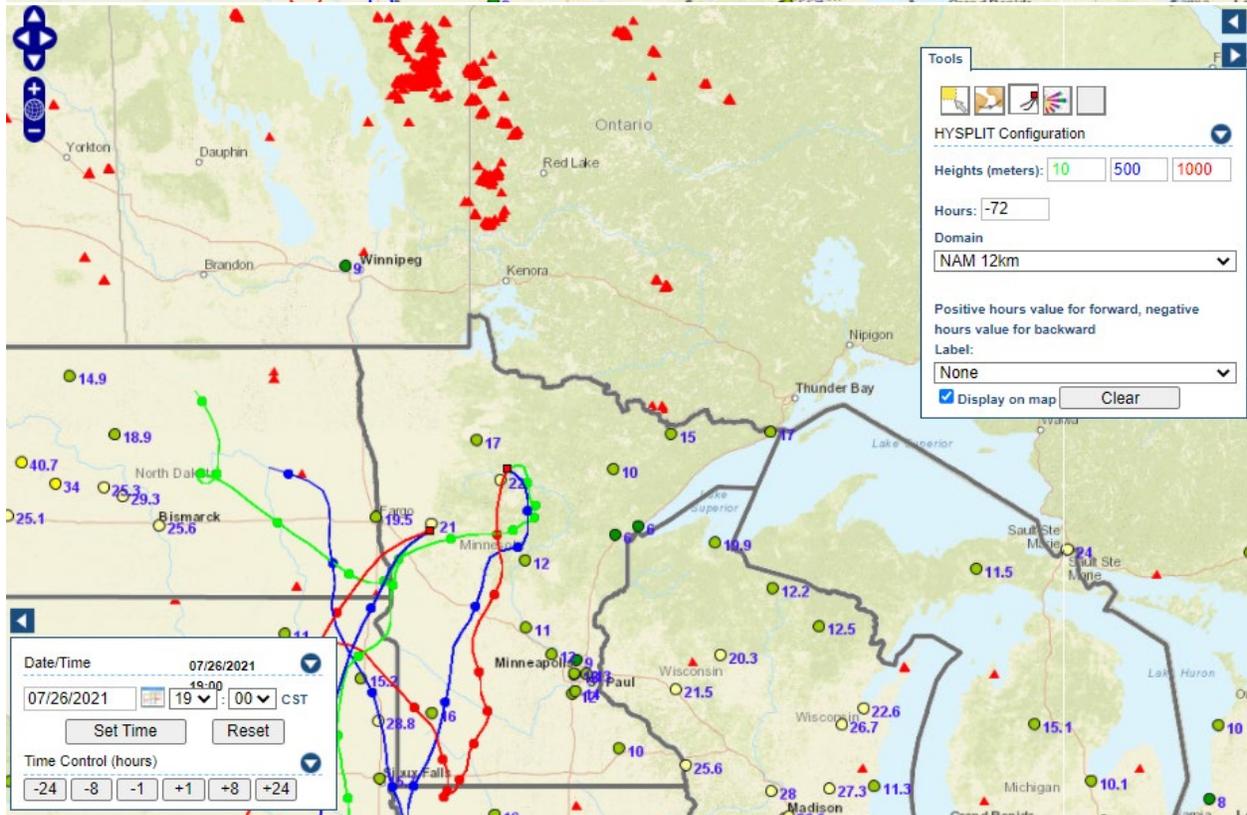
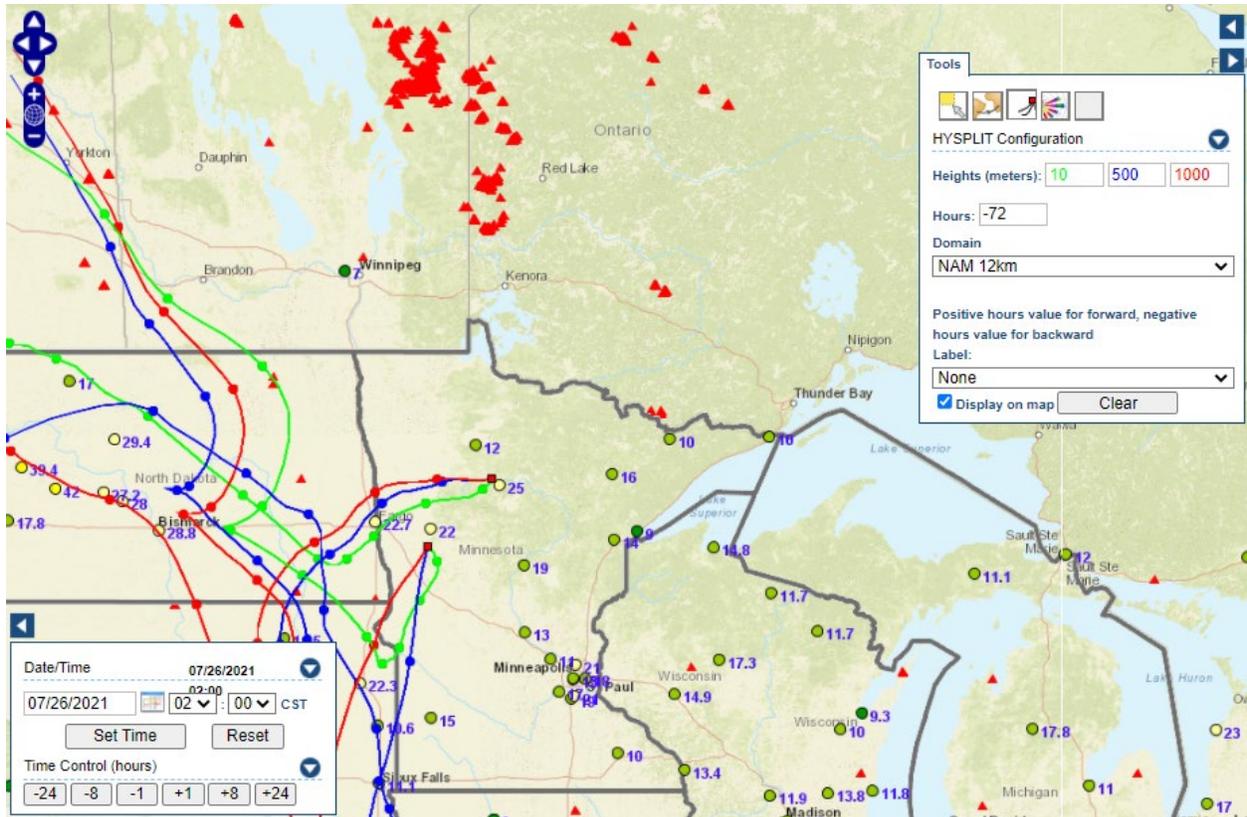
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Detroit Lakes	270052013	7/26/2021	17.6	23	Canada wildfire smoke
Fargo NW	380171004	7/26/2021	17.6	27.7	Canada wildfire smoke
Lacrosse DOT	550630012	7/26/2021	20.6	26.7	Canada wildfire smoke
Leech Lake Nation	270213410	7/26/2021	20.8	39	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 26, 2021.



MODIS visible satellite for July 26, 2021.



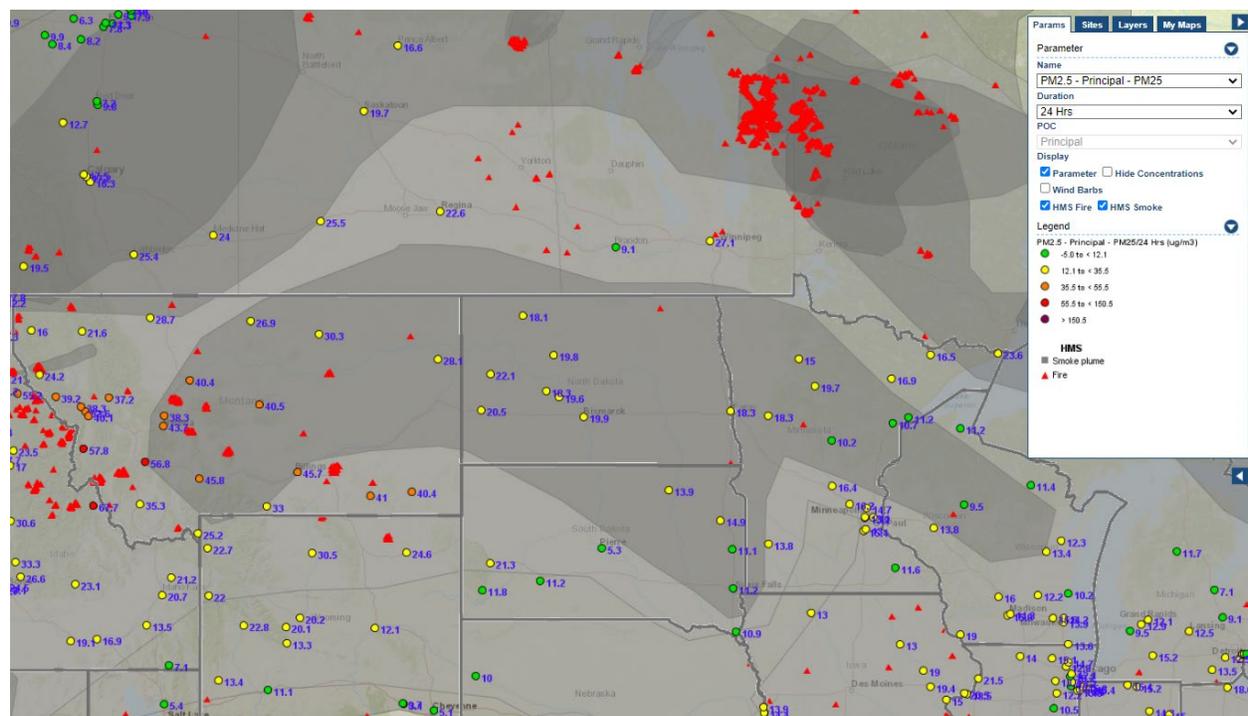
Backward trajectories for July 26, 2021.

7/27/2021 Impacts

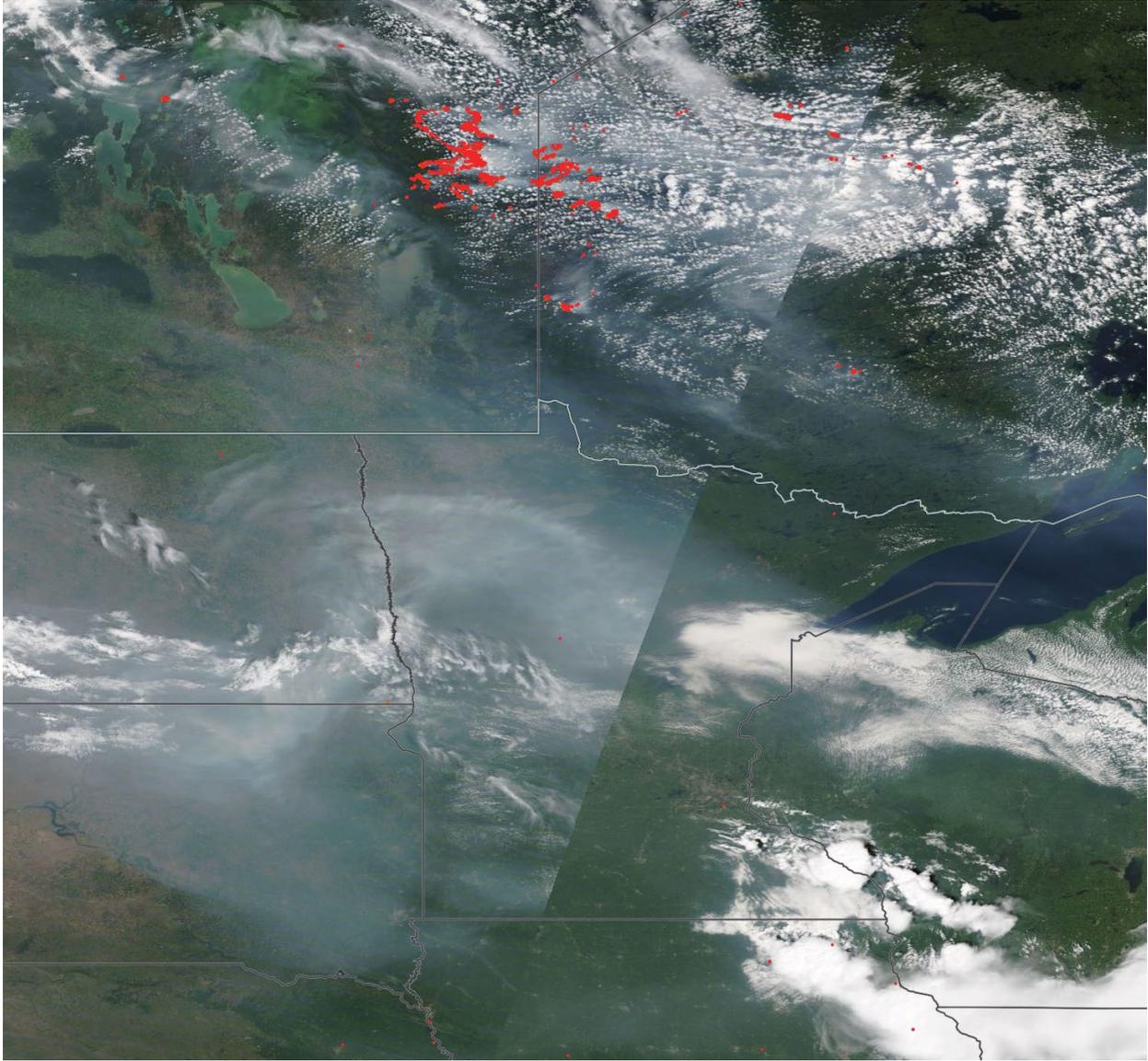
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 27, 2021.

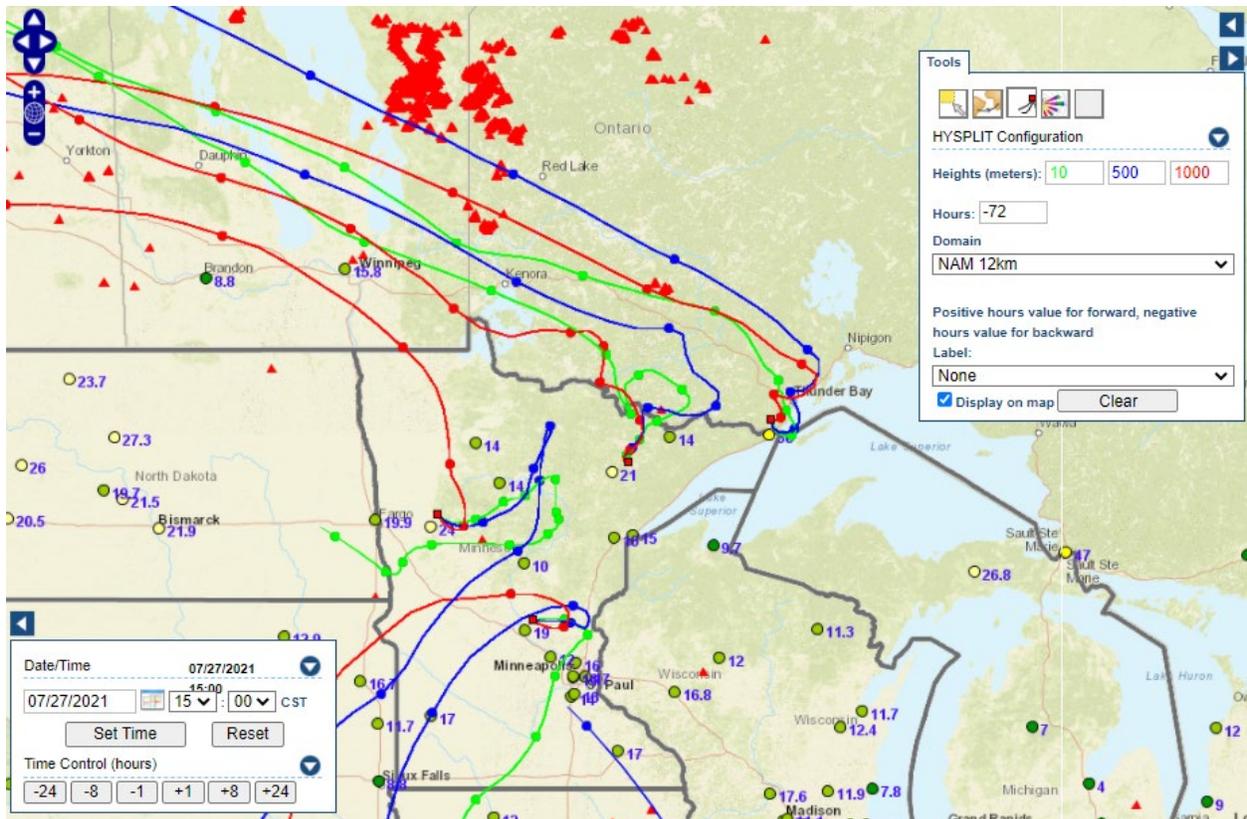
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Detroit Lakes	270052013	7/27/2021	18.3	25	Canada wildfire smoke
Ely	270750005	7/27/2021	16.5	21	Canada wildfire smoke
Fargo NW	380171004	7/27/2021	18.3	22.4	Canada wildfire smoke
Grand Portage	270317810	7/27/2021	23.6	35	Canada wildfire smoke
Leech Lake Nation	270213410	7/27/2021	19.7	29	Canada wildfire smoke
Red Lake Nation	270072304	7/27/2021	15	20	Canada wildfire smoke
St. Cloud	271453052	7/27/2021	16.4	27	Canada wildfire smoke
St. Michael	271713201	7/27/2021	16.2	21	Canada wildfire smoke
Virginia	271377001	7/27/2021	16.9	21	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 27, 2021.



MODIS visible satellite for July 27, 2021.



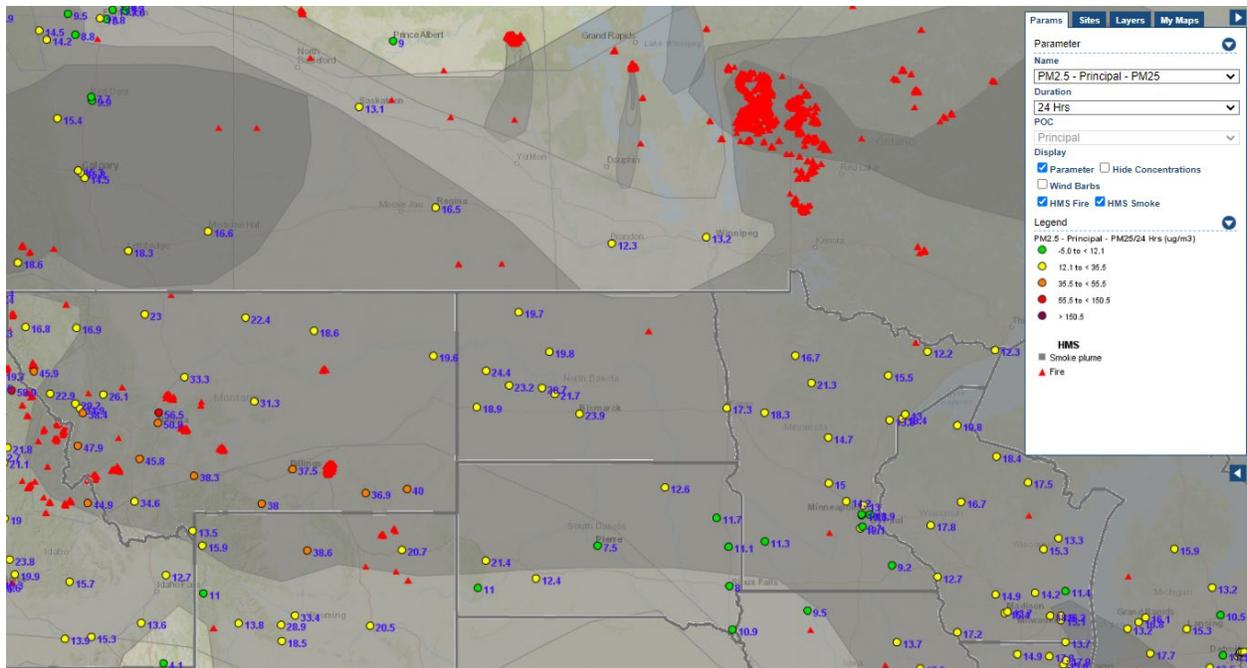
Backward trajectories for July 27, 2021.

7/28/2021 Impacts

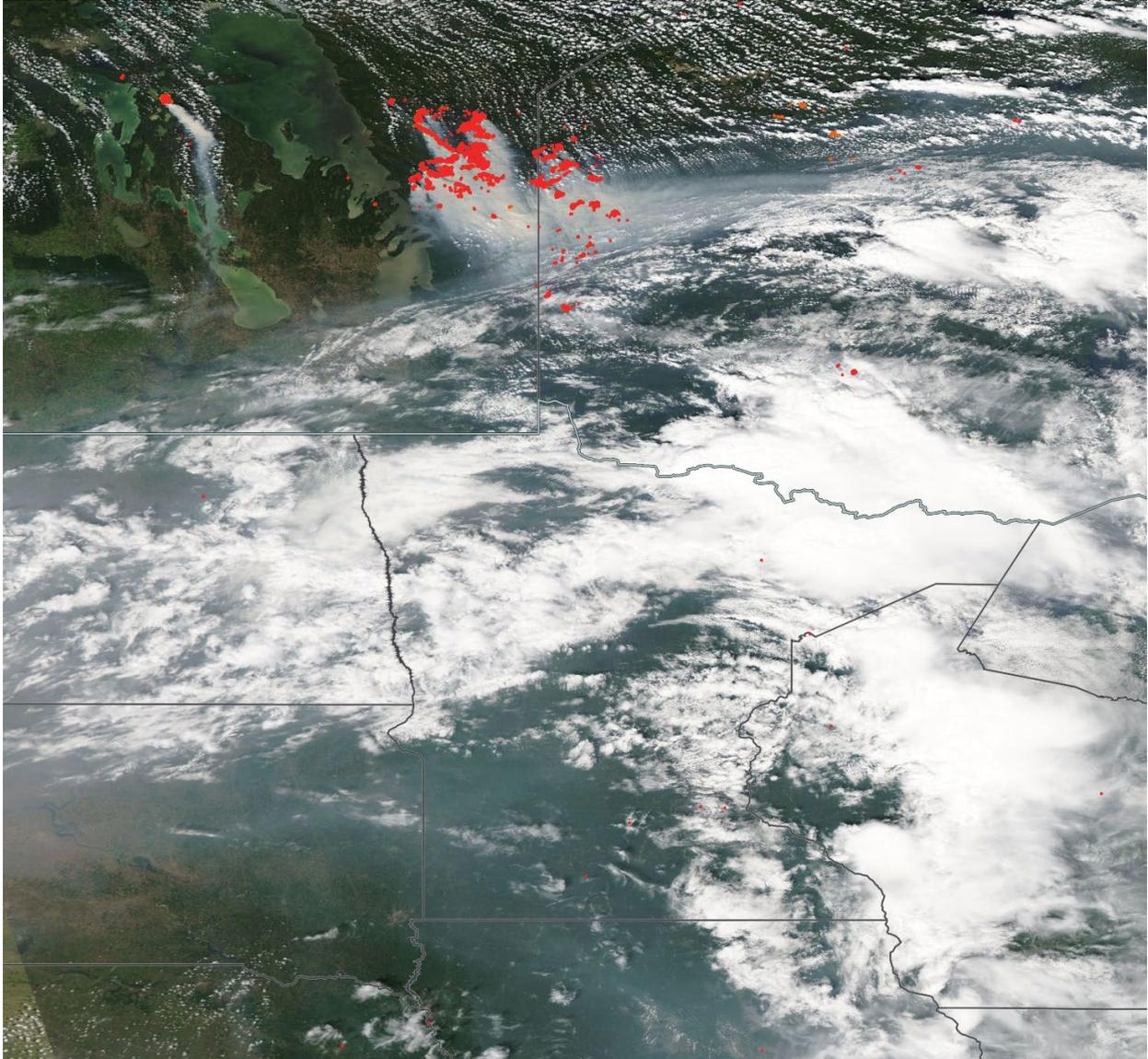
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 28, 2021.

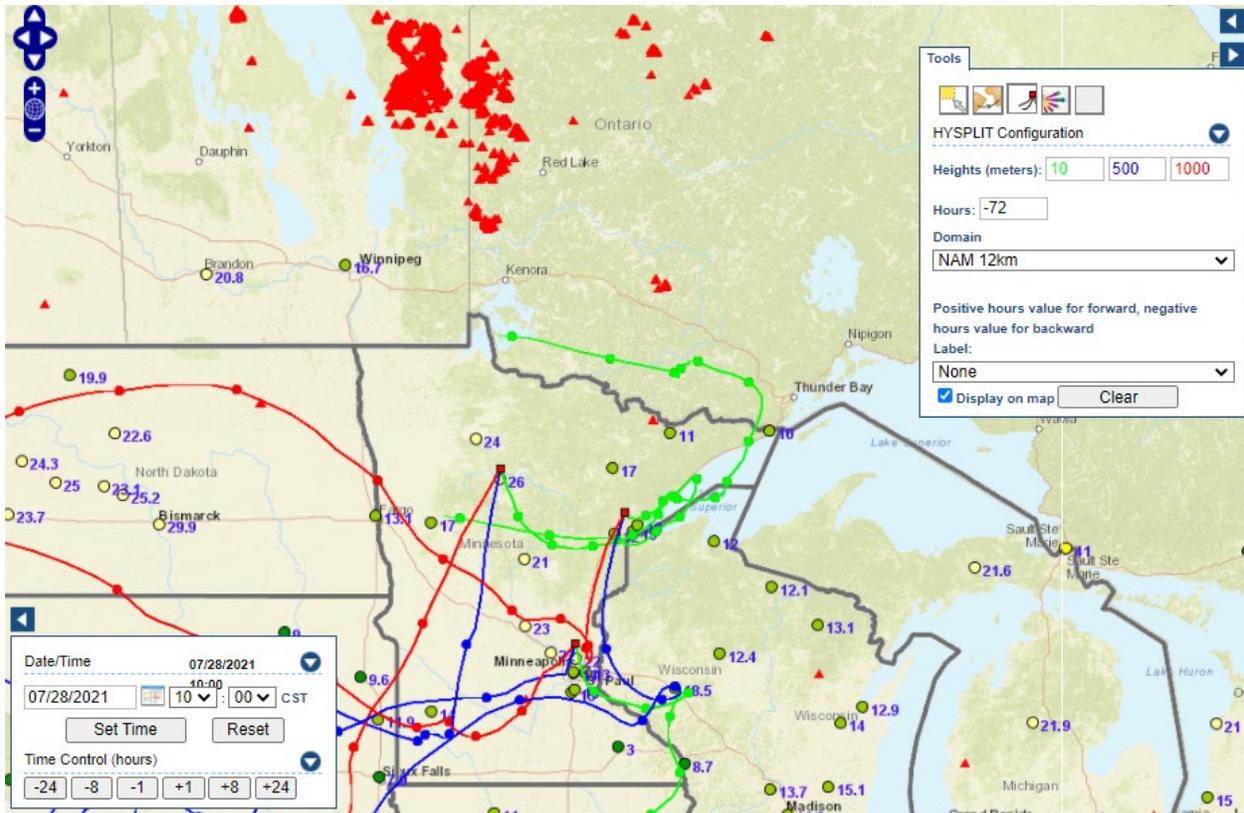
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Brainerd	270353204	7/28/2021	14.7	25	Canada wildfire smoke
Detroit Lakes	270052013	7/28/2021	18.3	25	Canada wildfire smoke
Fargo NW	380171004	7/28/2021	17.3	25.1	Canada wildfire smoke
Leech Lake Nation	270213410	7/28/2021	21.3	64	Canada wildfire smoke
Red Lake Nation	270072304	7/28/2021	16.7	49	Canada wildfire smoke
West Duluth	271377554	7/28/2021	18.4	24	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 28, 2021.



MODIS visible satellite for July 28, 2021.



Backward trajectories for July 28, 2021.

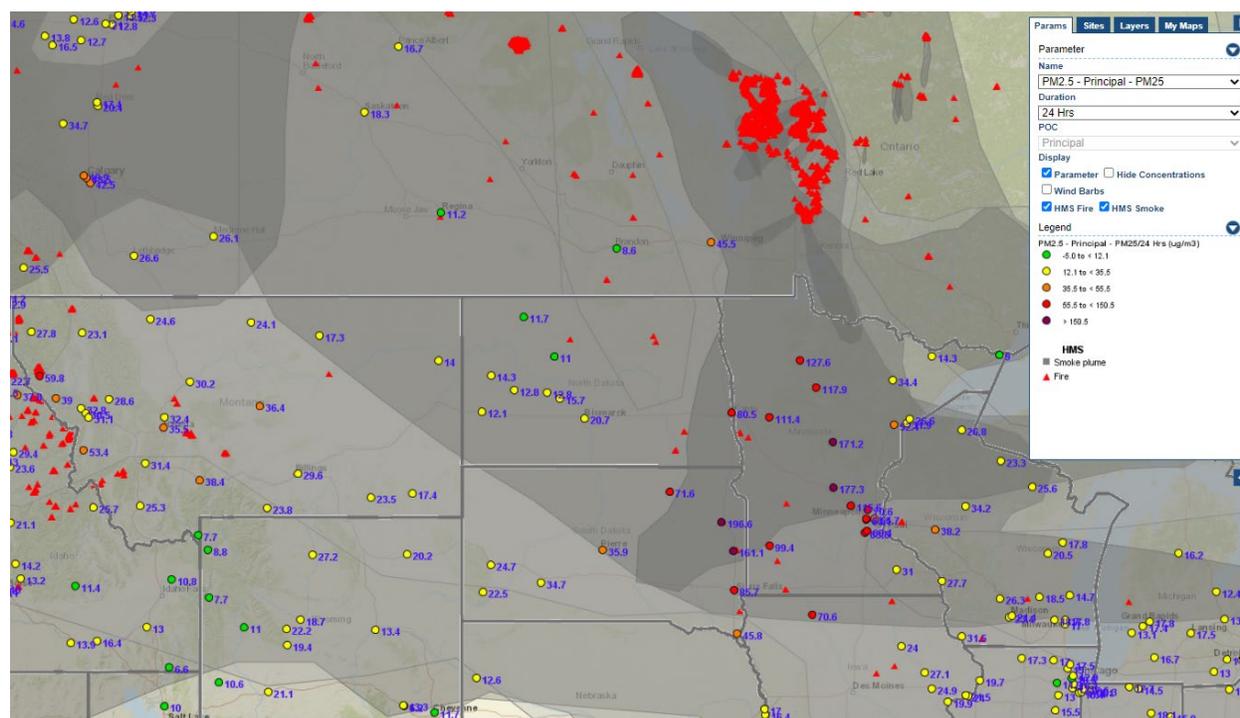
7/29/2021 Impacts

Smoke impacts from wildfires over Canada.

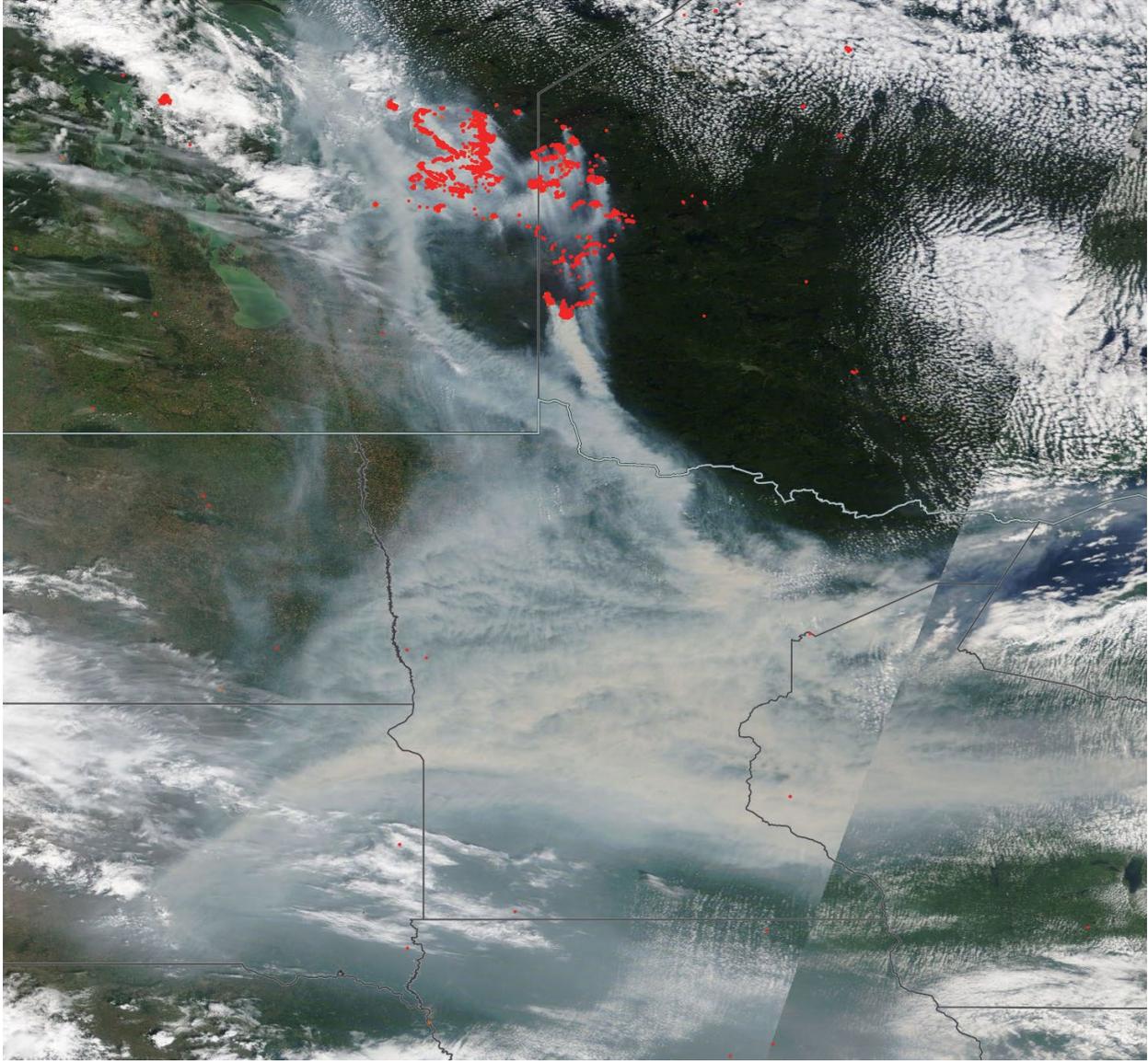
Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 29, 2021.

Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Apple Valley	270370470	7/29/2021	60.4	142	Canada wildfire smoke
Blaine	270031002	7/29/2021	70.6	155	Canada wildfire smoke
Brainerd	270353204	7/29/2021	171.2	401	Canada wildfire smoke
Detroit Lakes	270052013	7/29/2021	111.4	221	Canada wildfire smoke
Duluth-WDSE	271377550	7/29/2021	26.2	60	Canada wildfire smoke
Ely	270750005	7/29/2021	14.3	49	Canada wildfire smoke
Fargo NW	380171004	7/29/2021	80.5	338.8	Canada wildfire smoke
Fond du Lac	270177417	7/29/2021	52.4	130	Canada wildfire smoke
Lacrosse DOT	550630012	7/29/2021	27.7	88.8	Canada wildfire smoke
Lakeville - Near Road	270370480	7/29/2021	63.5	138	Canada wildfire smoke

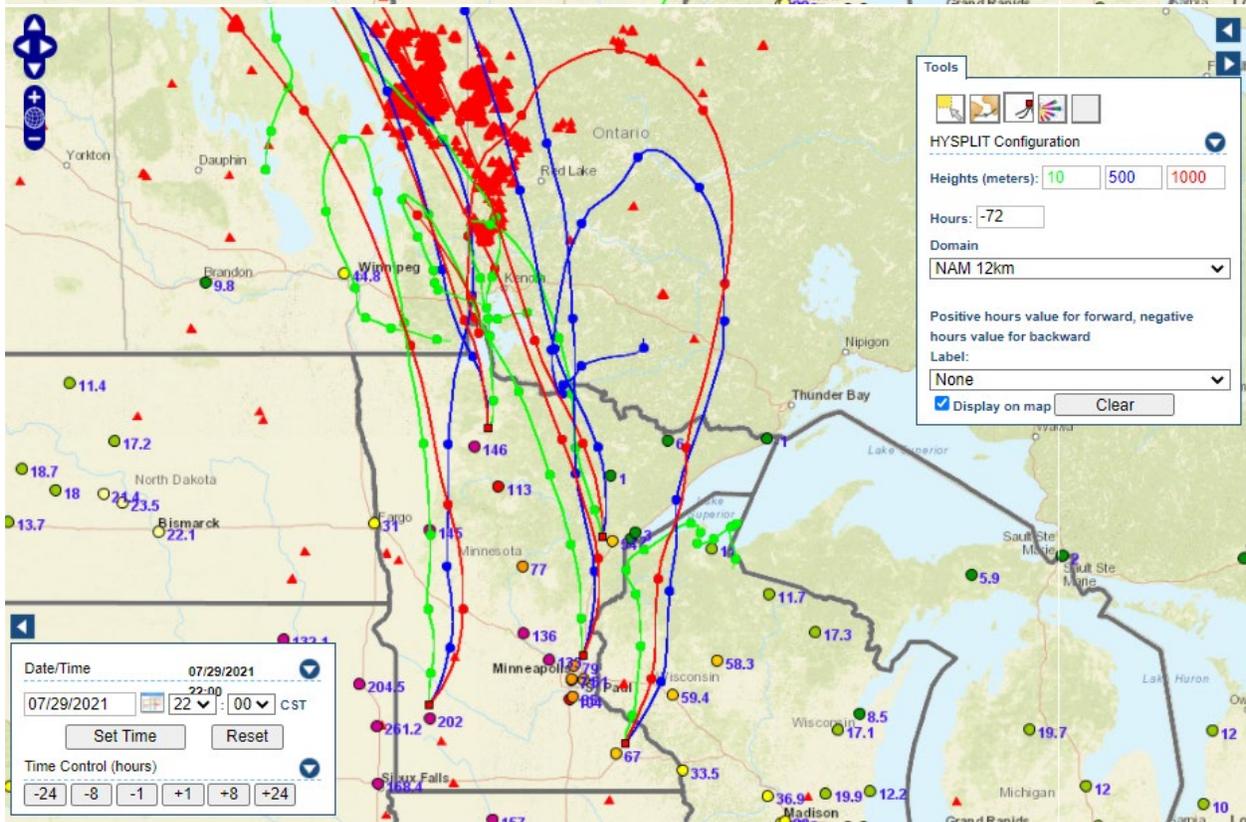
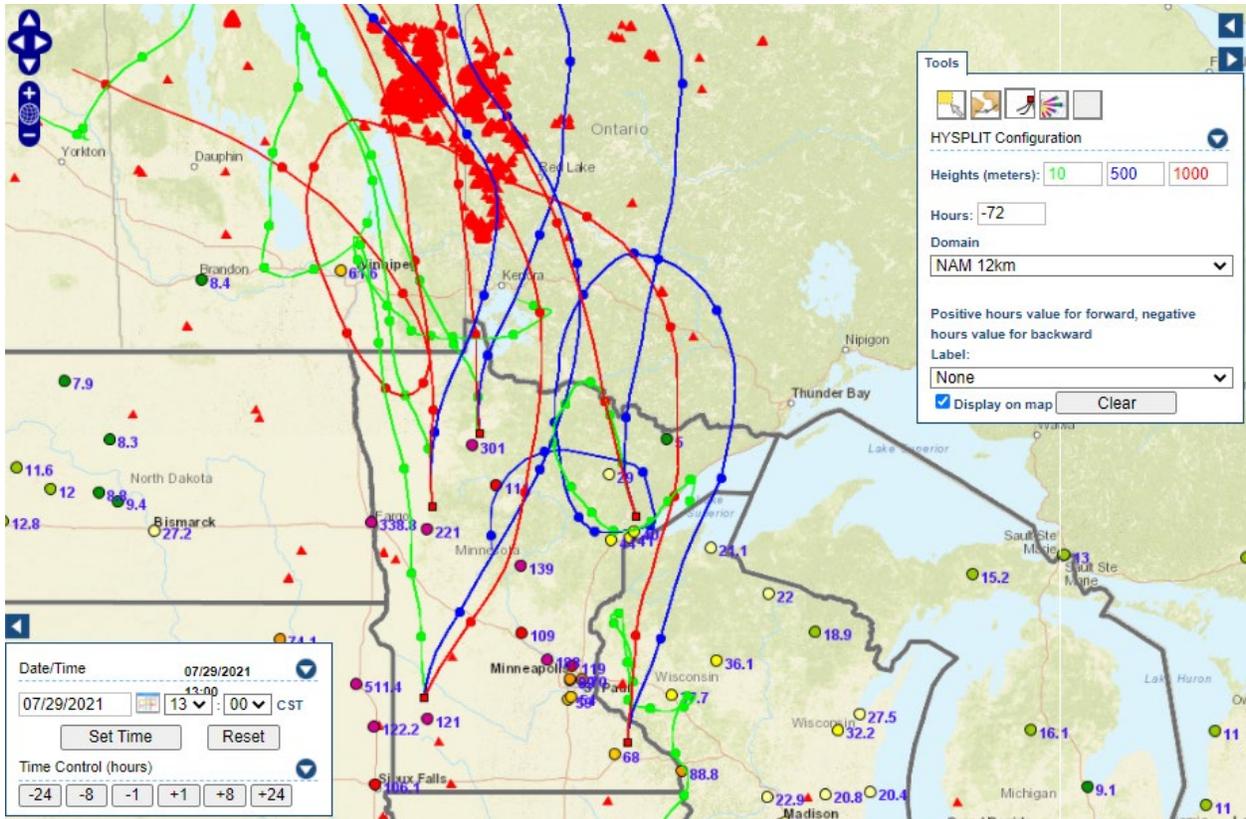
Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
Leech Lake Nation	270213410	7/29/2021	117.9	202	Canada wildfire smoke
Marshall	270834210	7/29/2021	99.4	210	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/29/2021	63.5	143	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/29/2021	64.1	152	Canada wildfire smoke
Red Lake Nation	270072304	7/29/2021	127.6	301	Canada wildfire smoke
Rochester	271095008	7/29/2021	31	68	Canada wildfire smoke
St. Cloud	271453052	7/29/2021	177.3	422	Canada wildfire smoke
St. Michael	271713201	7/29/2021	115.6	258	Canada wildfire smoke
St. Paul-Harding	271230871	7/29/2021	54.7	129	Canada wildfire smoke
Virginia	271377001	7/29/2021	34.4	142	Canada wildfire smoke
West Duluth	271377554	7/29/2021	31.9	62	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 29, 2021.



MODIS visible satellite for July 29, 2021.



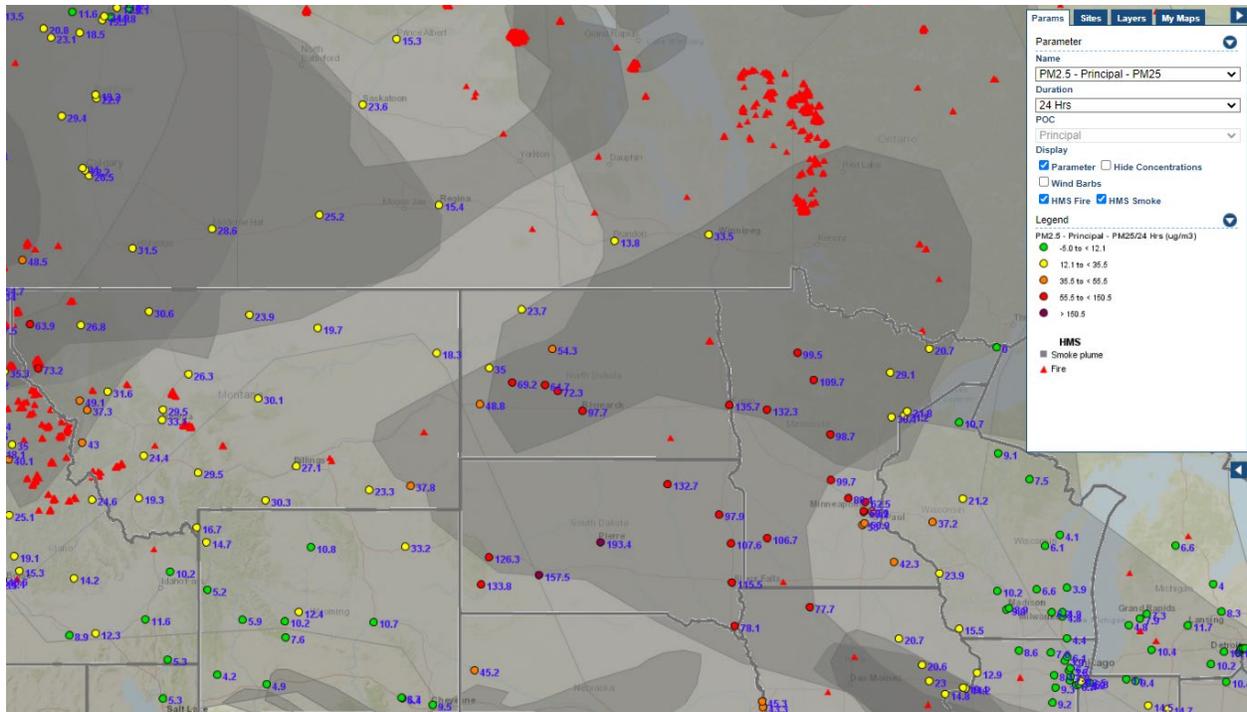
Backward trajectories for July 29, 2021.

7/30/2021 Impacts

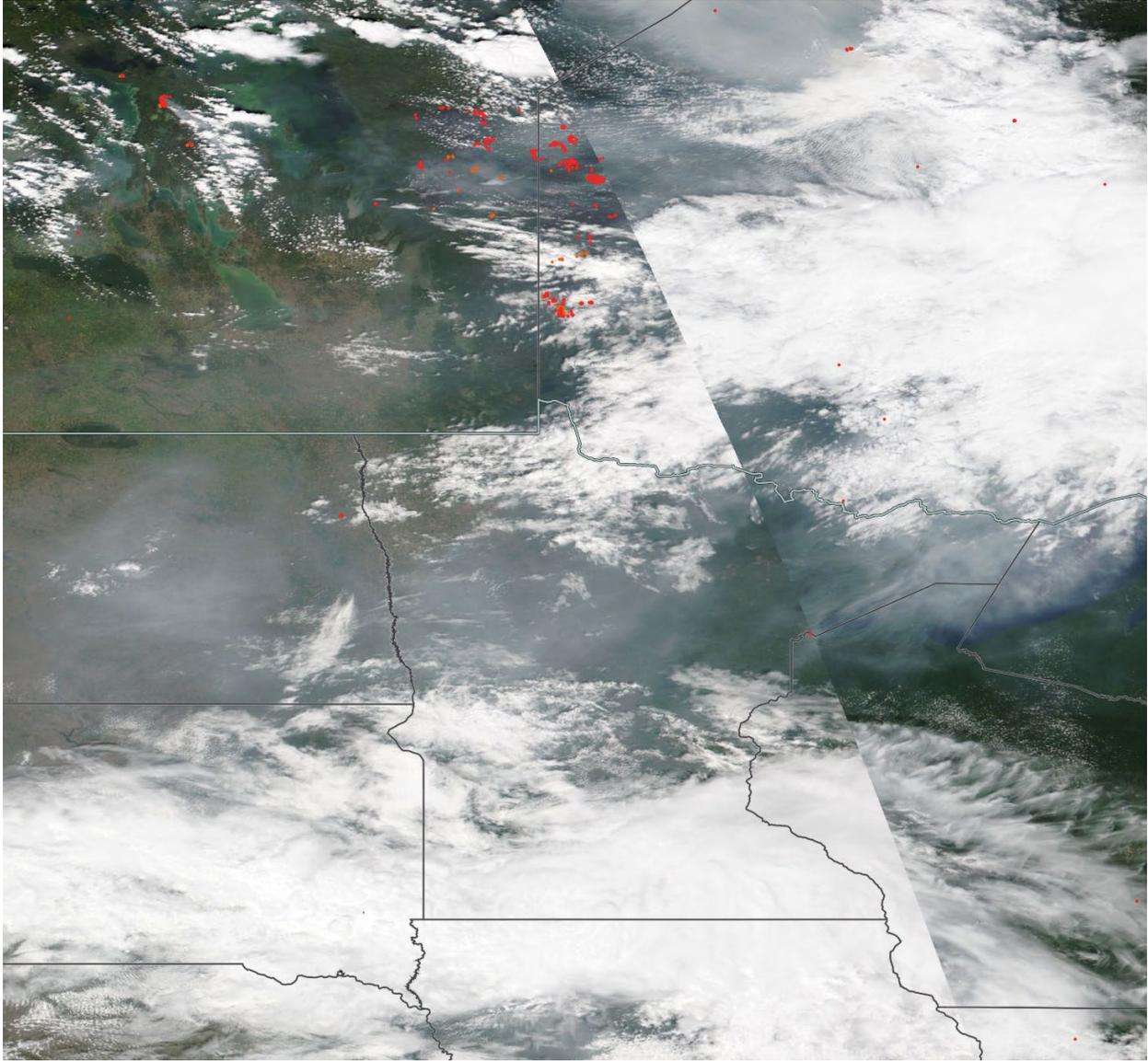
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 30, 2021.

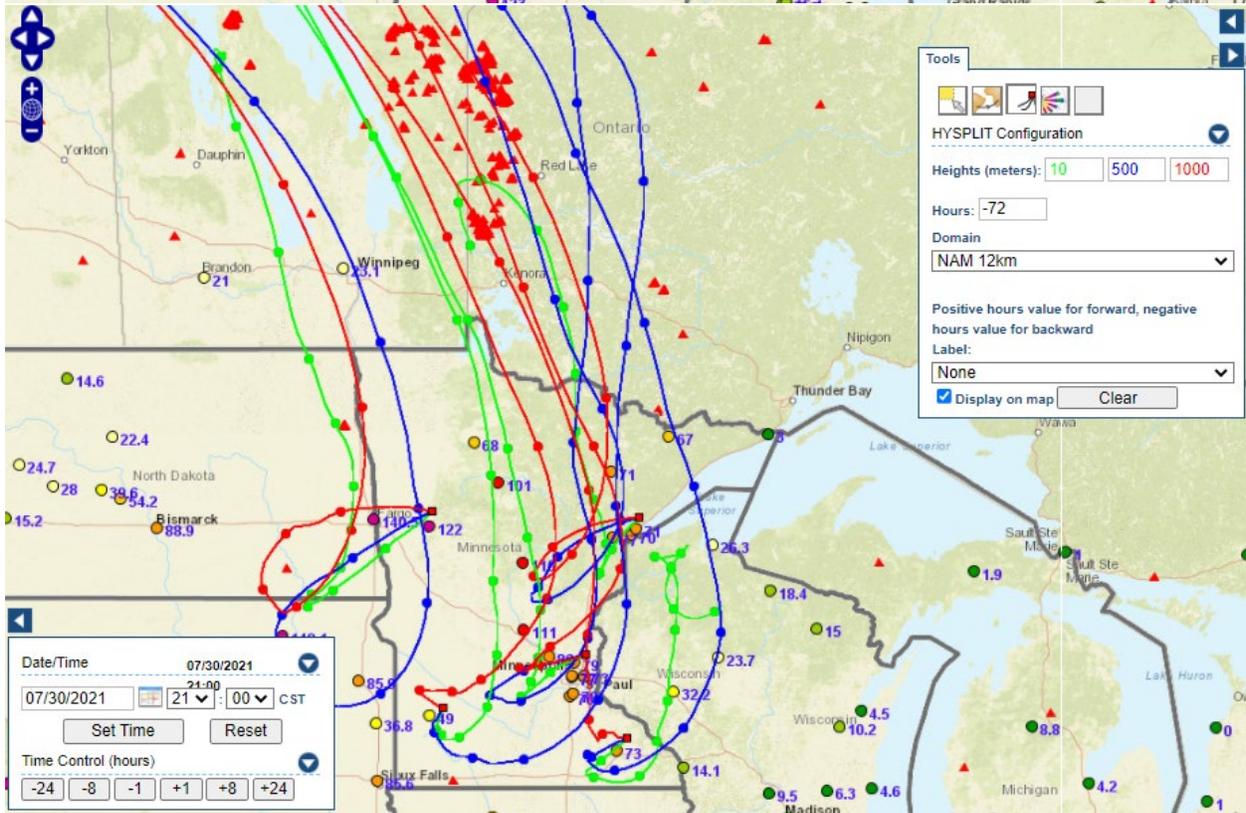
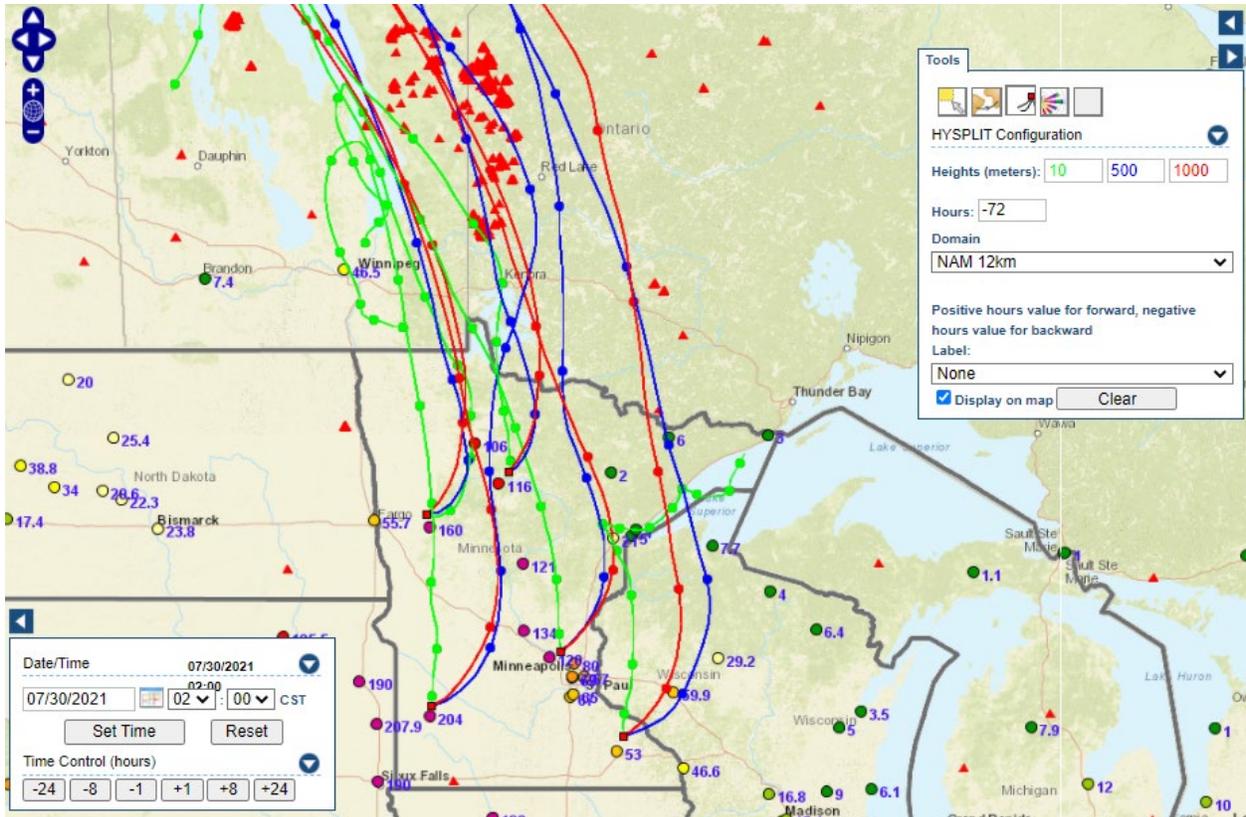
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Apple Valley	270370470	7/30/2021	51.0	79	Canada wildfire smoke
Blaine	270031002	7/30/2021	62.6	85	Canada wildfire smoke
Brainerd	270353204	7/30/2021	98.8	133	Canada wildfire smoke
Detroit Lakes	270052013	7/30/2021	132.3	163	Canada wildfire smoke
Duluth-WDSE	271377550	7/30/2021	22.7	103	Canada wildfire smoke
Ely	270750005	7/30/2021	22.8	77	Canada wildfire smoke
Fargo NW	380171004	7/30/2021	135.7	211.9	Canada wildfire smoke
Fond du Lac	270177417	7/30/2021	30.1	104	Canada wildfire smoke
Lacrosse DOT	550630012	7/30/2021	24.0	47.2	Canada wildfire smoke
Lakeville - Near Road	270370480	7/30/2021	53.0	76	Canada wildfire smoke
Leech Lake Nation	270213410	7/30/2021	109.7	147	Canada wildfire smoke
Marshall	270834210	7/30/2021	106.8	213	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/30/2021	60.0	79	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/30/2021	58.3	80	Canada wildfire smoke
Red Lake Nation	270072304	7/30/2021	99.5	126	Canada wildfire smoke
Rochester	271095008	7/30/2021	42.4	73	Canada wildfire smoke
St. Cloud	271453052	7/30/2021	99.7	143	Canada wildfire smoke
St. Michael	271713201	7/30/2021	80.2	132	Canada wildfire smoke
St. Paul-Harding	271230871	7/30/2021	51.0	80	Canada wildfire smoke
Virginia	271377001	7/30/2021	29.1	105	Canada wildfire smoke
West Duluth	271377554	7/30/2021	21.3	107	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 30, 2021.



MODIS visible satellite for July 30, 2021.



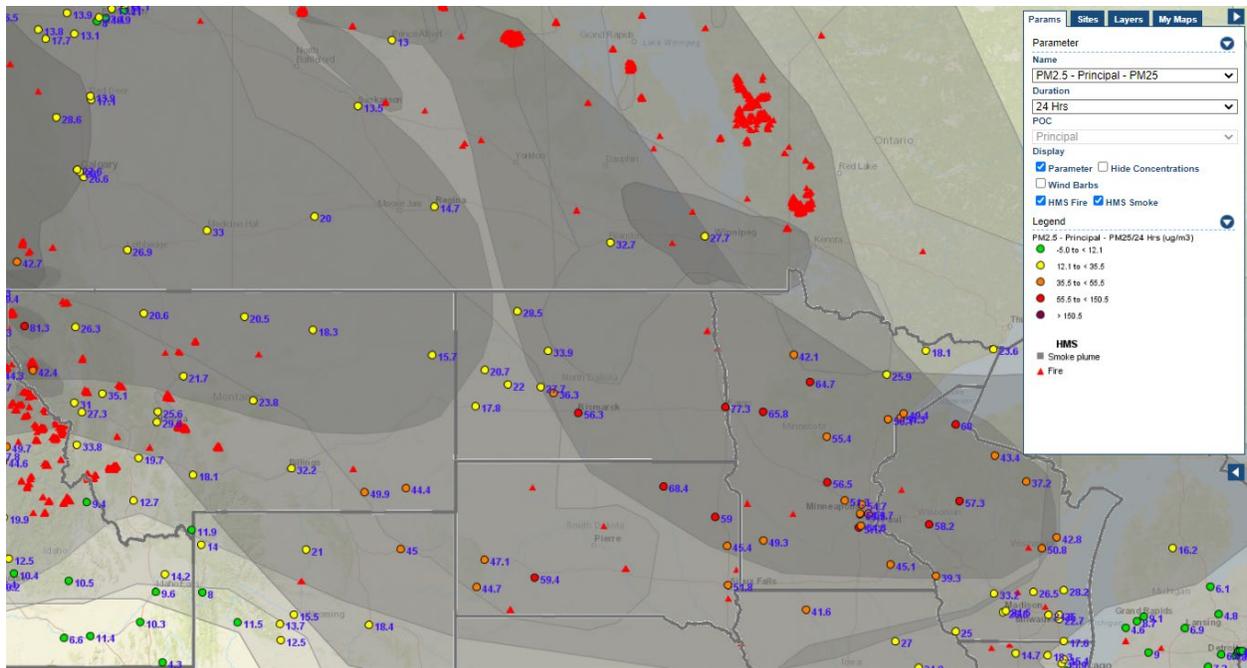
Backward trajectories for July 30, 2021.

7/31/2021 Impacts

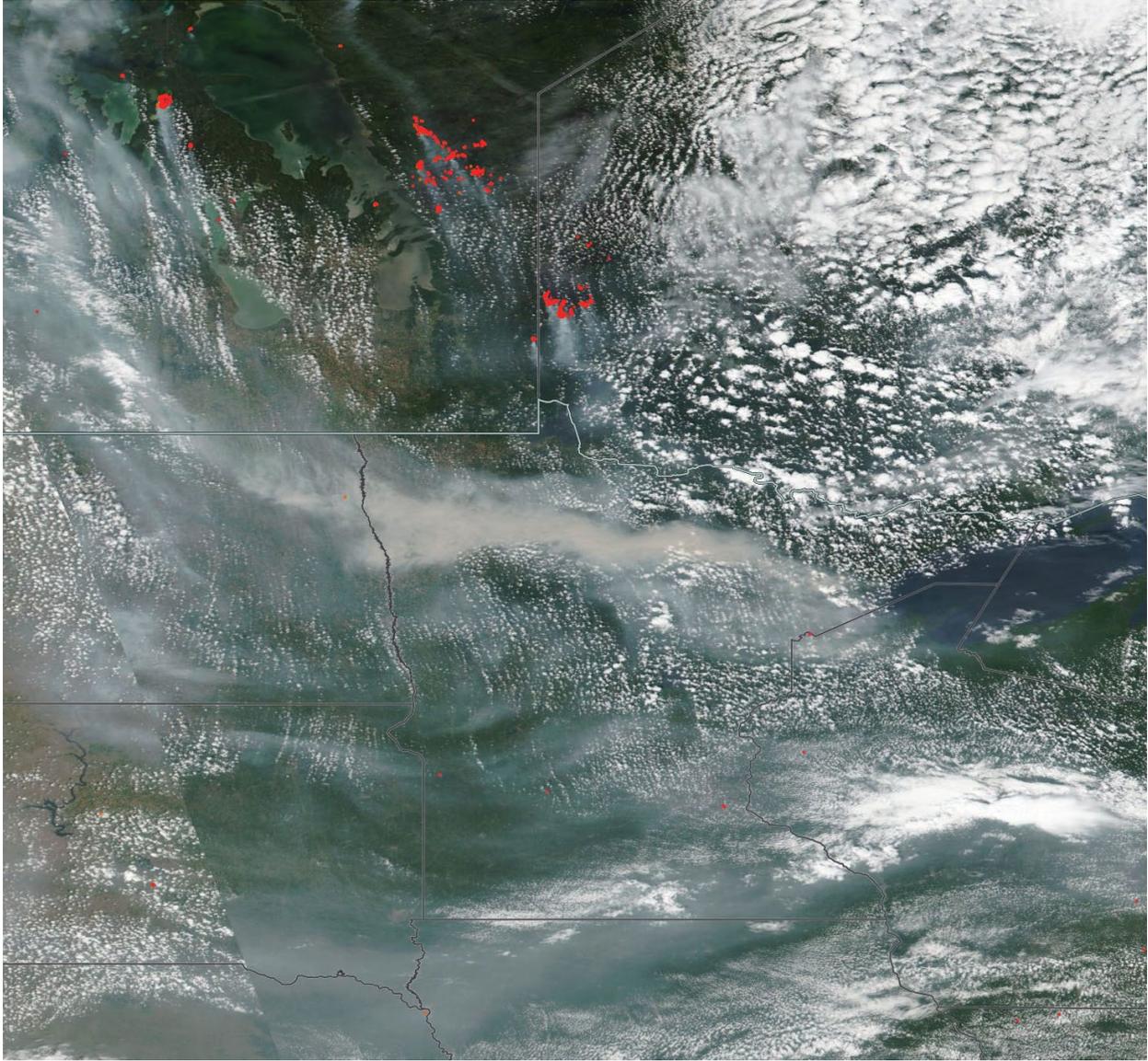
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on July 31, 2021.

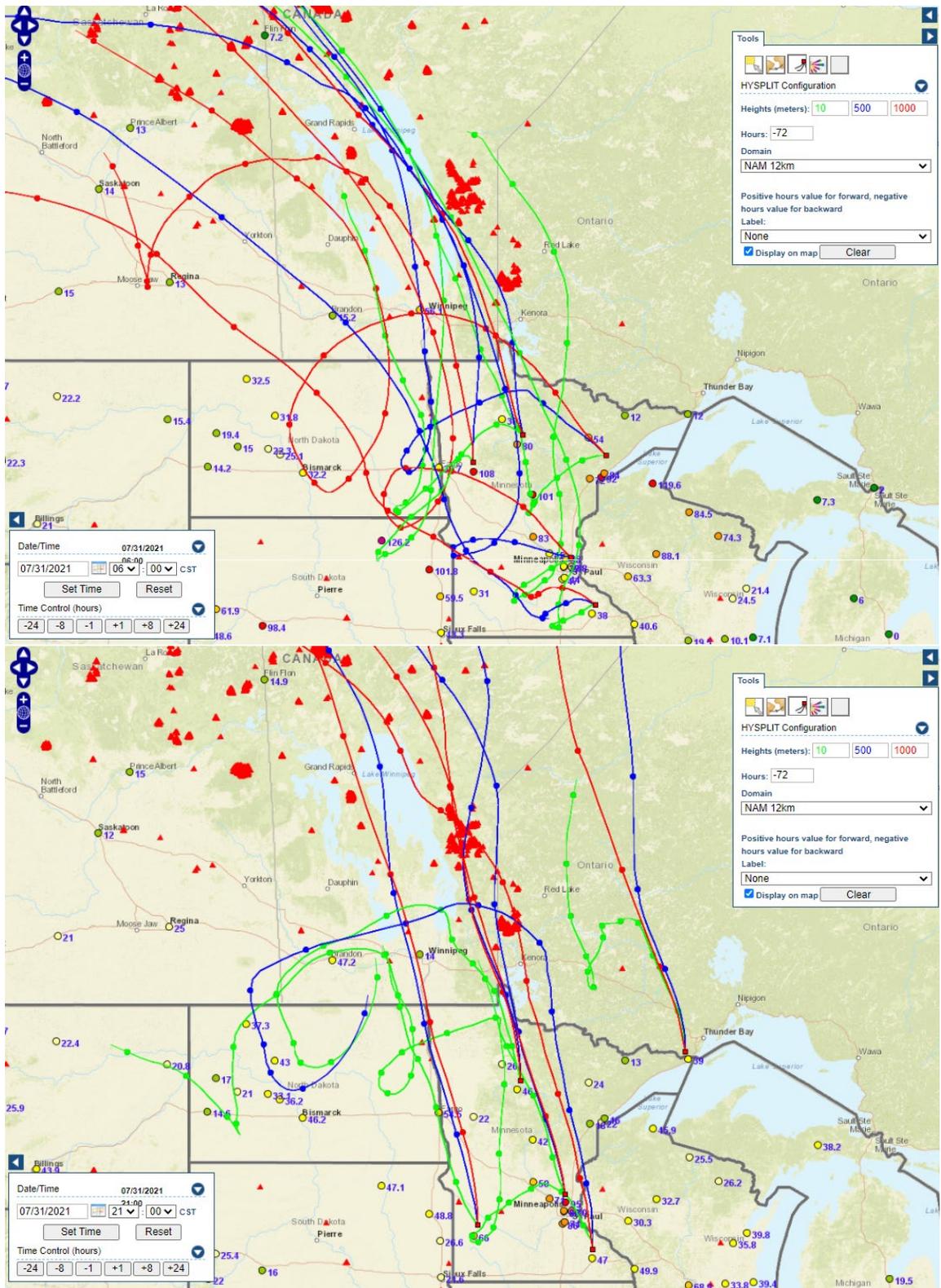
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Apple Valley	270370470	7/31/2021	54.4	92	Canada wildfire smoke
Blaine	270031002	7/31/2021	54.7	98	Canada wildfire smoke
Brainerd	270353204	7/31/2021	55.4	101	Canada wildfire smoke
Detroit Lakes	270052013	7/31/2021	65.9	138	Canada wildfire smoke
Duluth-WDSE	271377550	7/31/2021	47.9	101	Canada wildfire smoke
Ely	270750005	7/31/2021	18.2	27	Canada wildfire smoke
Fargo NW	380171004	7/31/2021	77.3	149.5	Canada wildfire smoke
Fond du Lac	270177417	7/31/2021	50.1	99	Canada wildfire smoke
Grand Portage	270317810	7/31/2021	23.6	45	Canada wildfire smoke
Lacrosse DOT	550630012	7/31/2021	39.3	59.9	Canada wildfire smoke
Lakeville - Near Road	270370480	7/31/2021	57.7	95	Canada wildfire smoke
Leech Lake Nation	270213410	7/31/2021	64.8	115	Canada wildfire smoke
Marshall	270834210	7/31/2021	49.4	104	Canada wildfire smoke
Minneapolis - Near Road	270530962	7/31/2021	54.3	98	Canada wildfire smoke
Minneapolis - Phillips	270530963	7/31/2021	55.5	96	Canada wildfire smoke
Red Lake Nation	270072304	7/31/2021	42.2	128	Canada wildfire smoke
Rochester	271095008	7/31/2021	45.2	69	Canada wildfire smoke
St. Cloud	271453052	7/31/2021	56.6	108	Canada wildfire smoke
St. Michael	271713201	7/31/2021	51.4	96	Canada wildfire smoke
St. Paul-Harding	271230871	7/31/2021	53.8	93	Canada wildfire smoke
Virginia	271377001	7/31/2021	25.9	80	Canada wildfire smoke
West Duluth	271377554	7/31/2021	54.3	108	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on July 31, 2021.



MODIS visible satellite for July 31, 2021.



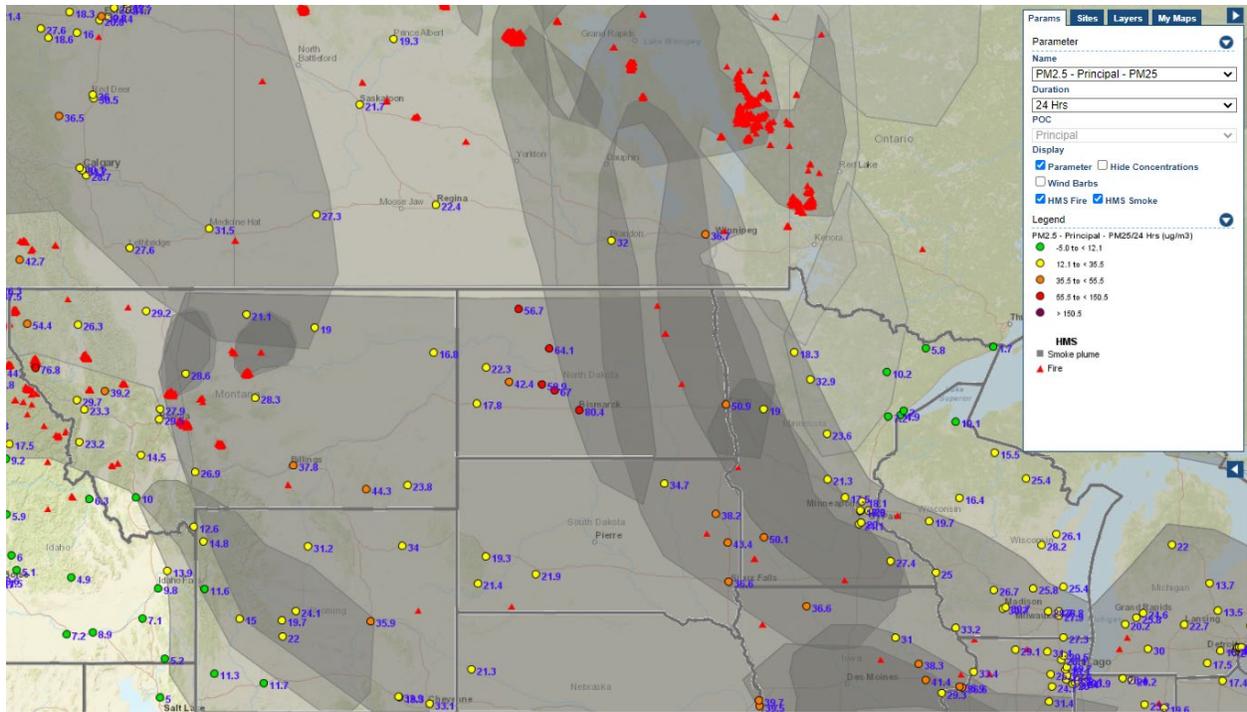
Backward trajectories for July 31, 2021.

8/1/2021 Impacts

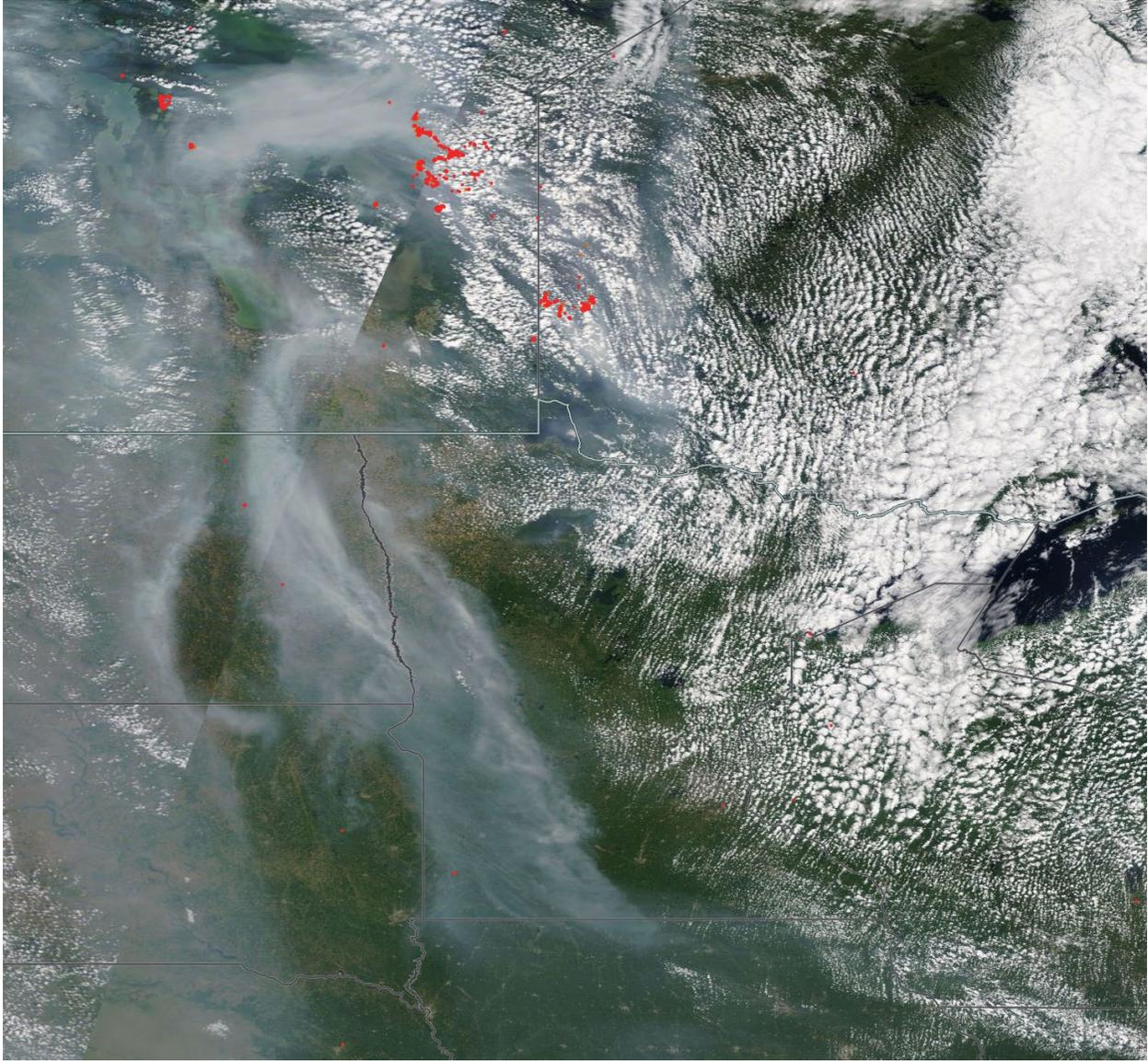
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on August 1, 2021.

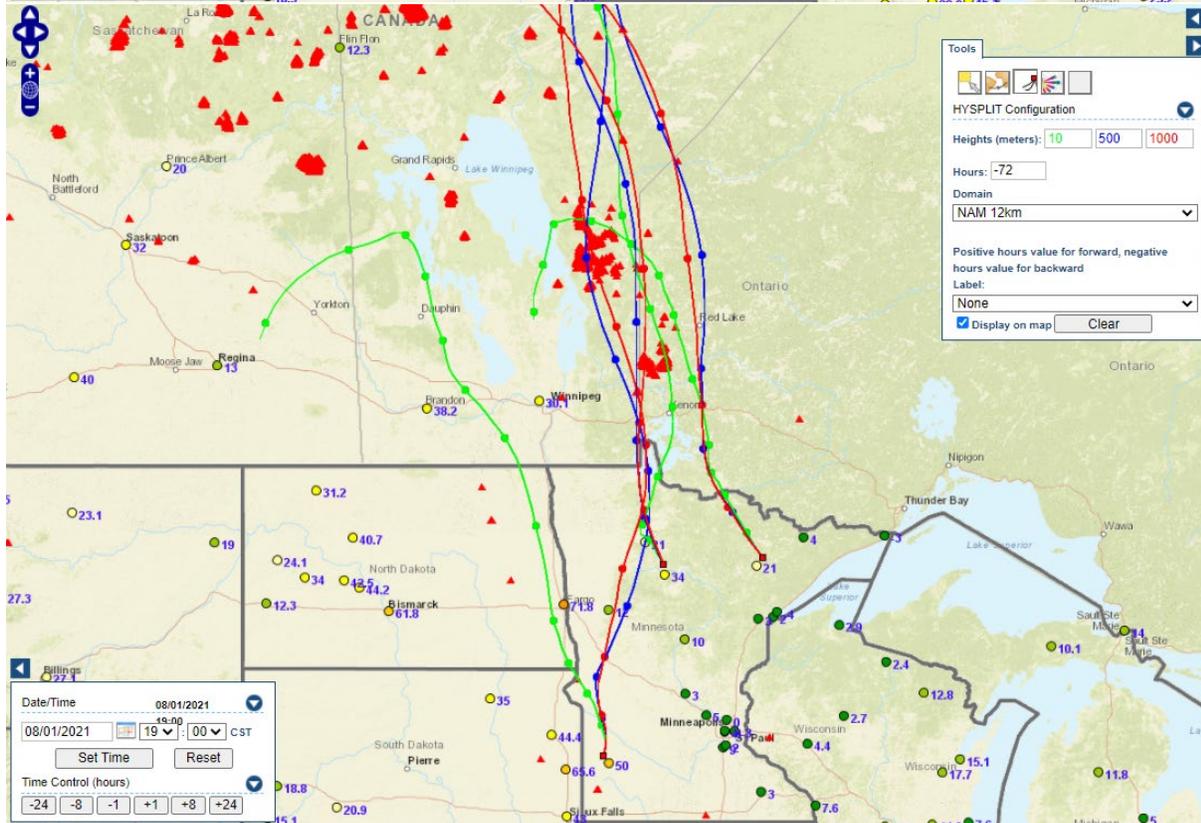
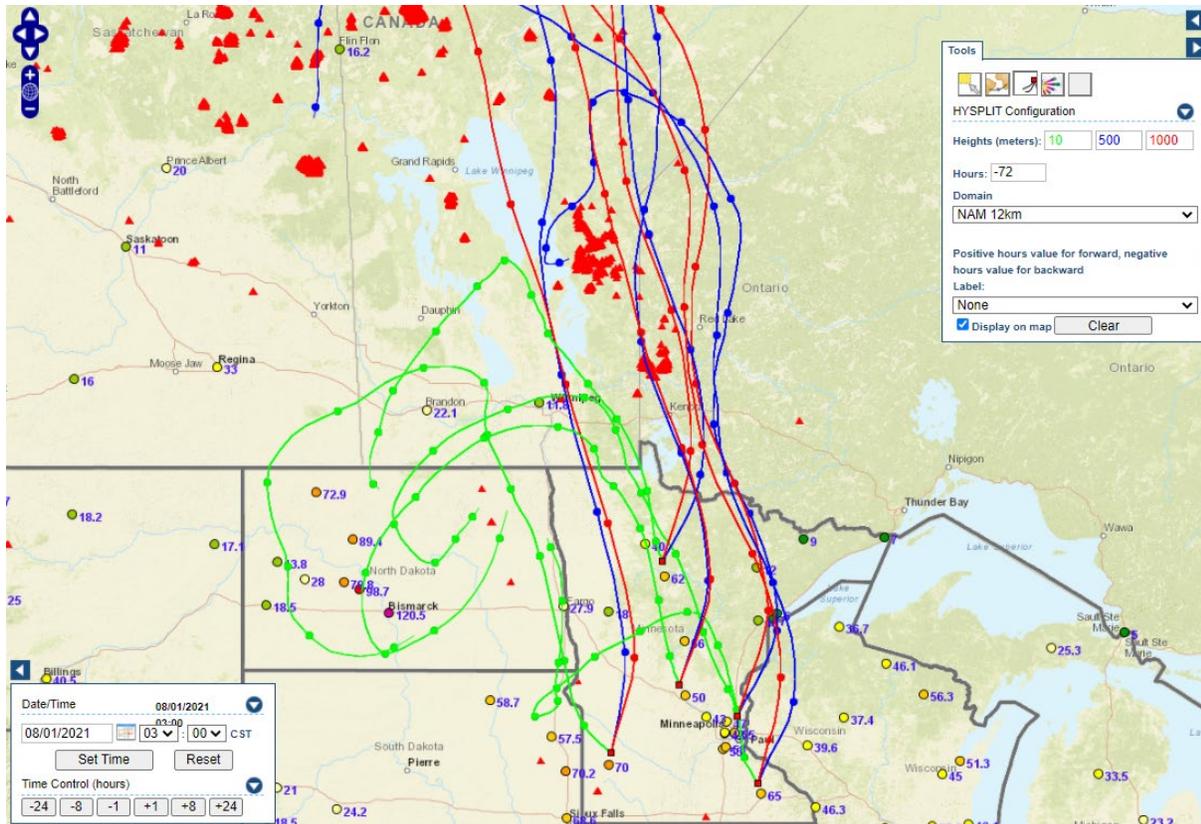
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Apple Valley	270370470	8/1/2021	20.0	76	Canada wildfire smoke
Blaine	270031002	8/1/2021	18.1	68	Canada wildfire smoke
Brainerd	270353204	8/1/2021	23.7	61	Canada wildfire smoke
Detroit Lakes	270052013	8/1/2021	19.0	45	Canada wildfire smoke
Fargo NW	380171004	8/1/2021	50.9	78.4	Canada wildfire smoke
Lacrosse DOT	550630012	8/1/2021	25.1	55.3	Canada wildfire smoke
Lakeville - Near Road	270370480	8/1/2021	24.1	81	Canada wildfire smoke
Leech Lake Nation	270213410	8/1/2021	33.0	63	Canada wildfire smoke
Marshall	270834210	8/1/2021	50.2	96	Canada wildfire smoke
Minneapolis - Near Road	270530962	8/1/2021	18.9	56	Canada wildfire smoke
Minneapolis - Phillips	270530963	8/1/2021	19.0	60	Canada wildfire smoke
Red Lake Nation	270072304	8/1/2021	18.4	40	Canada wildfire smoke
Rochester	271095008	8/1/2021	27.4	77	Canada wildfire smoke
St. Cloud	271453052	8/1/2021	21.4	52	Canada wildfire smoke
St. Michael	271713201	8/1/2021	17.5	51	Canada wildfire smoke
St. Paul-Harding	271230871	8/1/2021	21.1	70	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on August 1, 2021.



MODIS visible satellite for August 1, 2021.



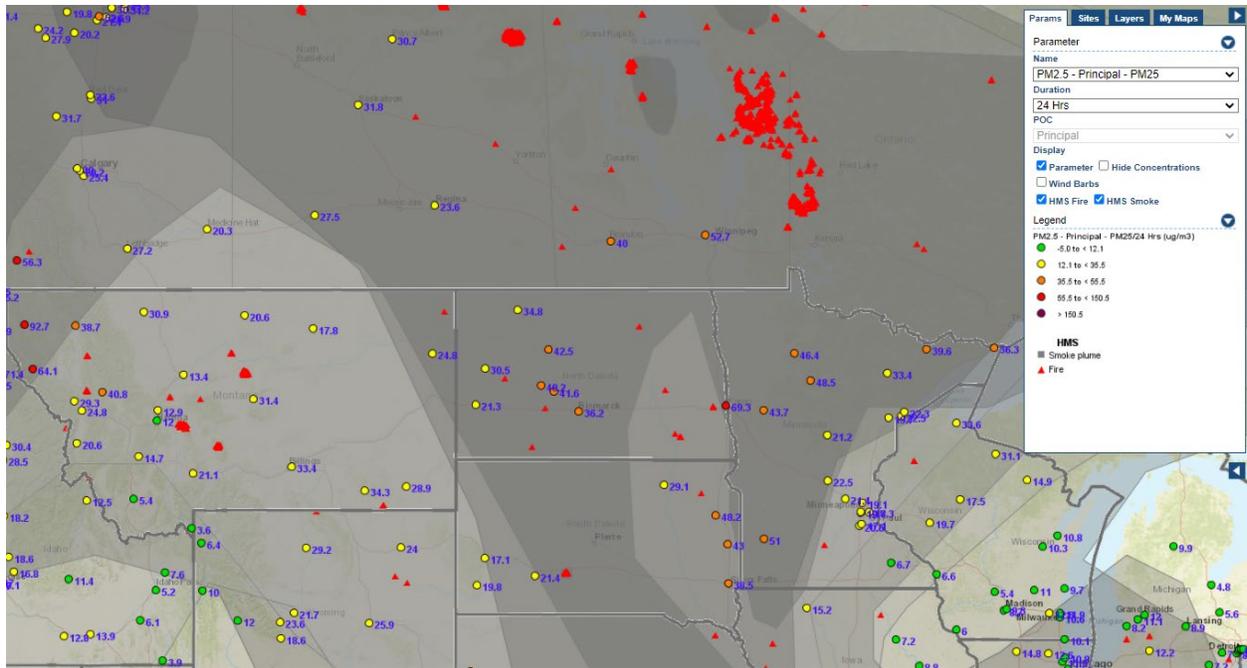
Backward trajectories for August 1, 2021.

8/2/2021 Impacts

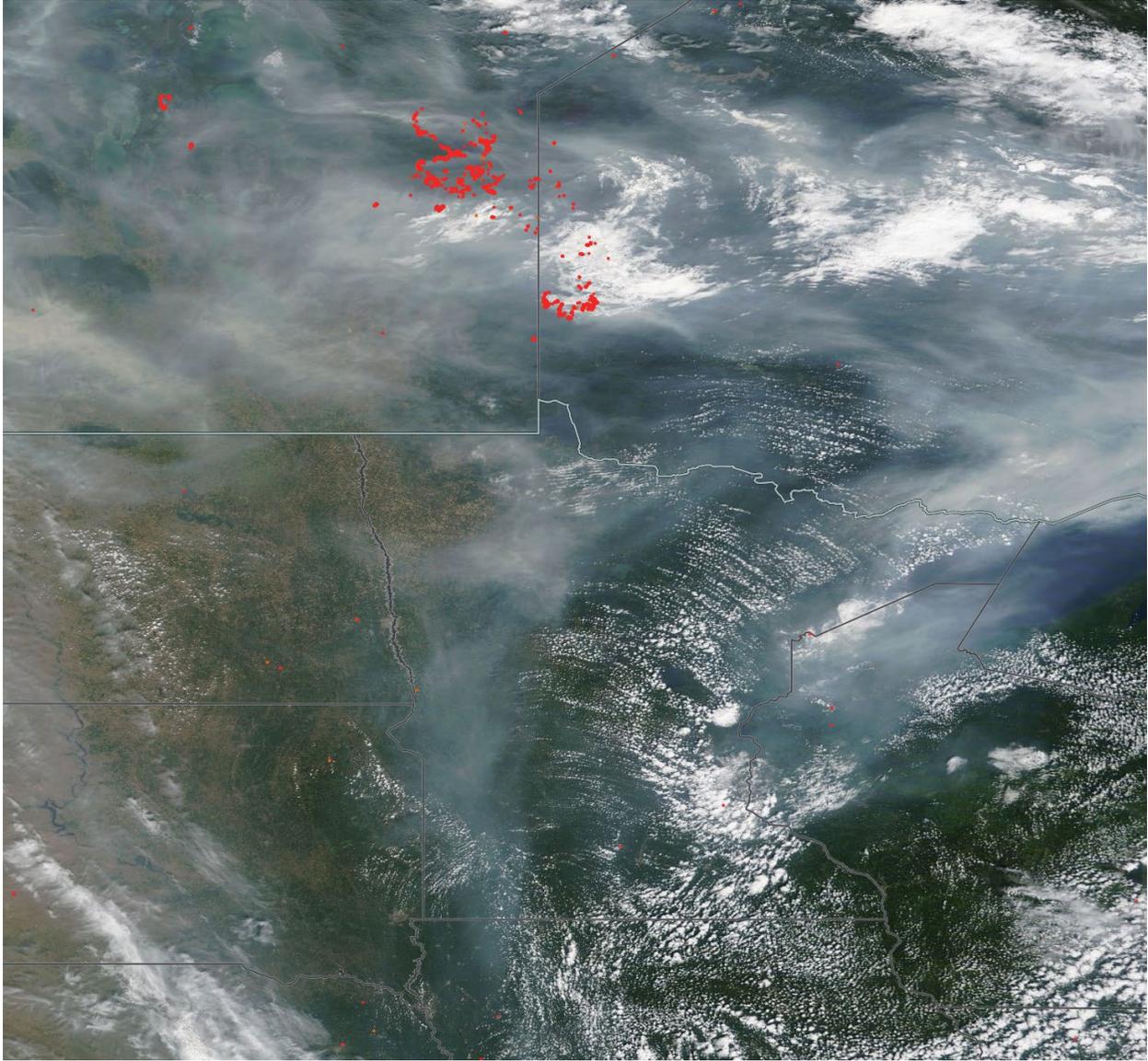
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on August 2, 2021.

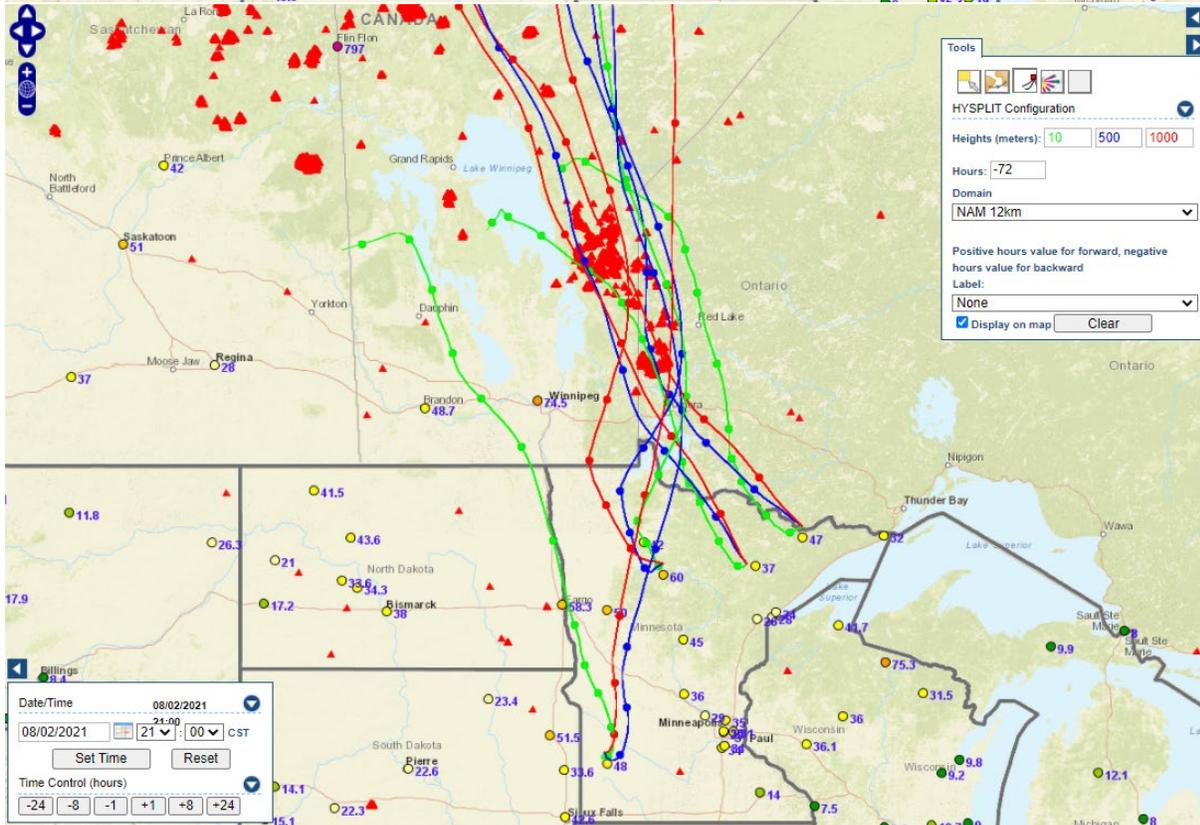
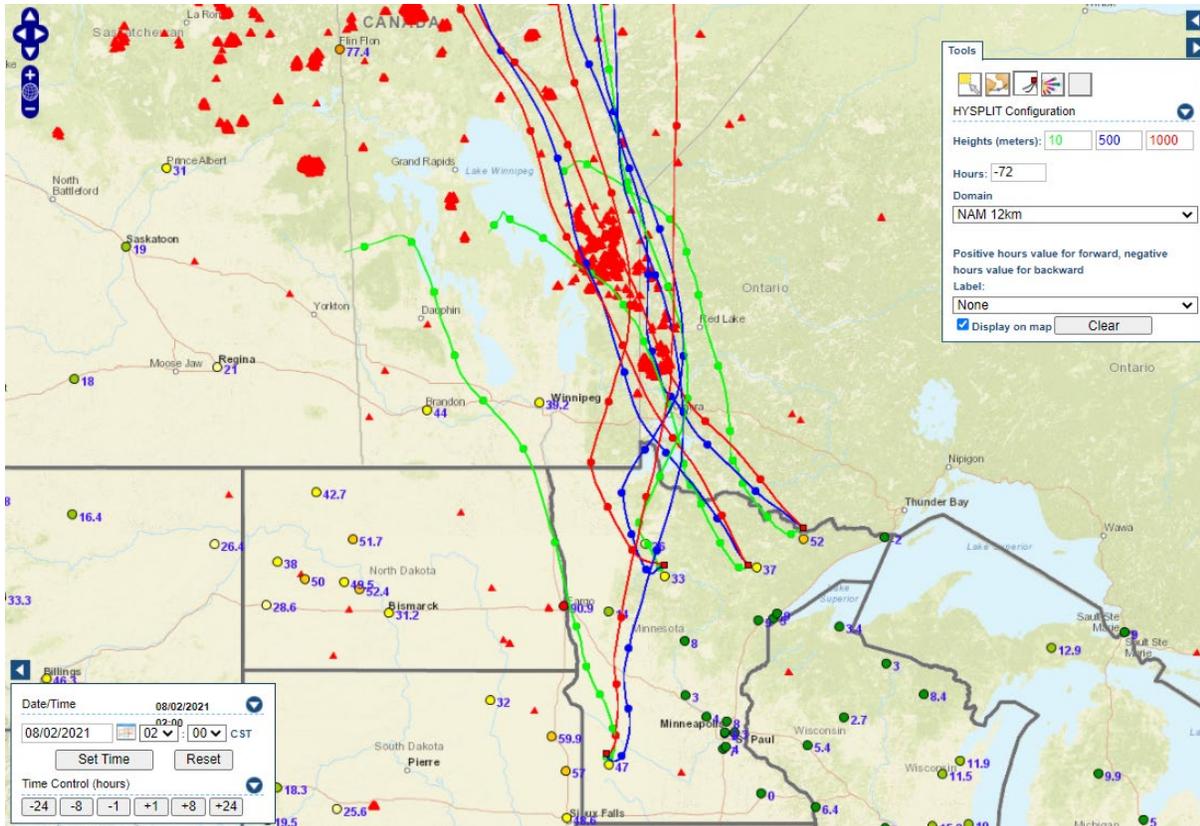
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Apple Valley	270370470	8/2/2021	17.1	34	Canada wildfire smoke
Blaine	270031002	8/2/2021	19.2	35	Canada wildfire smoke
Brainerd	270353204	8/2/2021	21.2	46	Canada wildfire smoke
Detroit Lakes	270052013	8/2/2021	43.7	81	Canada wildfire smoke
Duluth-WDSE	271377550	8/2/2021	22.1	40	Canada wildfire smoke
Ely	270750005	8/2/2021	39.6	52	Canada wildfire smoke
Fargo NW	380171004	8/2/2021	69.3	112.8	Canada wildfire smoke
Fond du Lac	270177417	8/2/2021	19.8	29	Canada wildfire smoke
Grand Portage	270317810	8/2/2021	46.3	131	Canada wildfire smoke
Lakeville - Near Road	270370480	8/2/2021	20.5	38	Canada wildfire smoke
Leech Lake Nation	270213410	8/2/2021	48.5	77	Canada wildfire smoke
Marshall	270834210	8/2/2021	51.1	65	Canada wildfire smoke
Minneapolis - Near Road	270530962	8/2/2021	19.8	33	Canada wildfire smoke
Minneapolis - Phillips	270530963	8/2/2021	19.1	34	Canada wildfire smoke
Red Lake Nation	270072304	8/2/2021	46.5	88	Canada wildfire smoke
St. Cloud	271453052	8/2/2021	22.5	38	Canada wildfire smoke
St. Michael	271713201	8/2/2021	21.4	40	Canada wildfire smoke
St. Paul-Harding	271230871	8/2/2021	18.4	34	Canada wildfire smoke
Virginia	271377001	8/2/2021	33.4	47	Canada wildfire smoke
West Duluth	271377554	8/2/2021	23.6	34	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on August 2, 2021.



MODIS visible satellite for August 2, 2021.



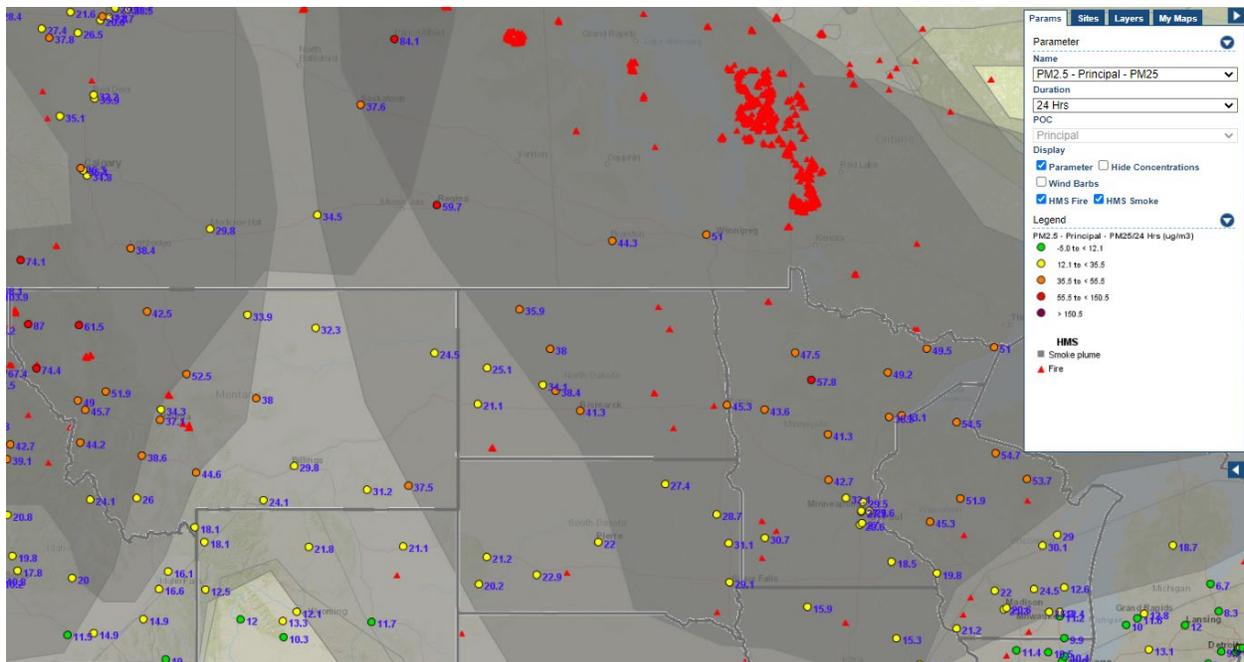
Backward trajectories for August 2, 2021.

8/3/2021 Impacts

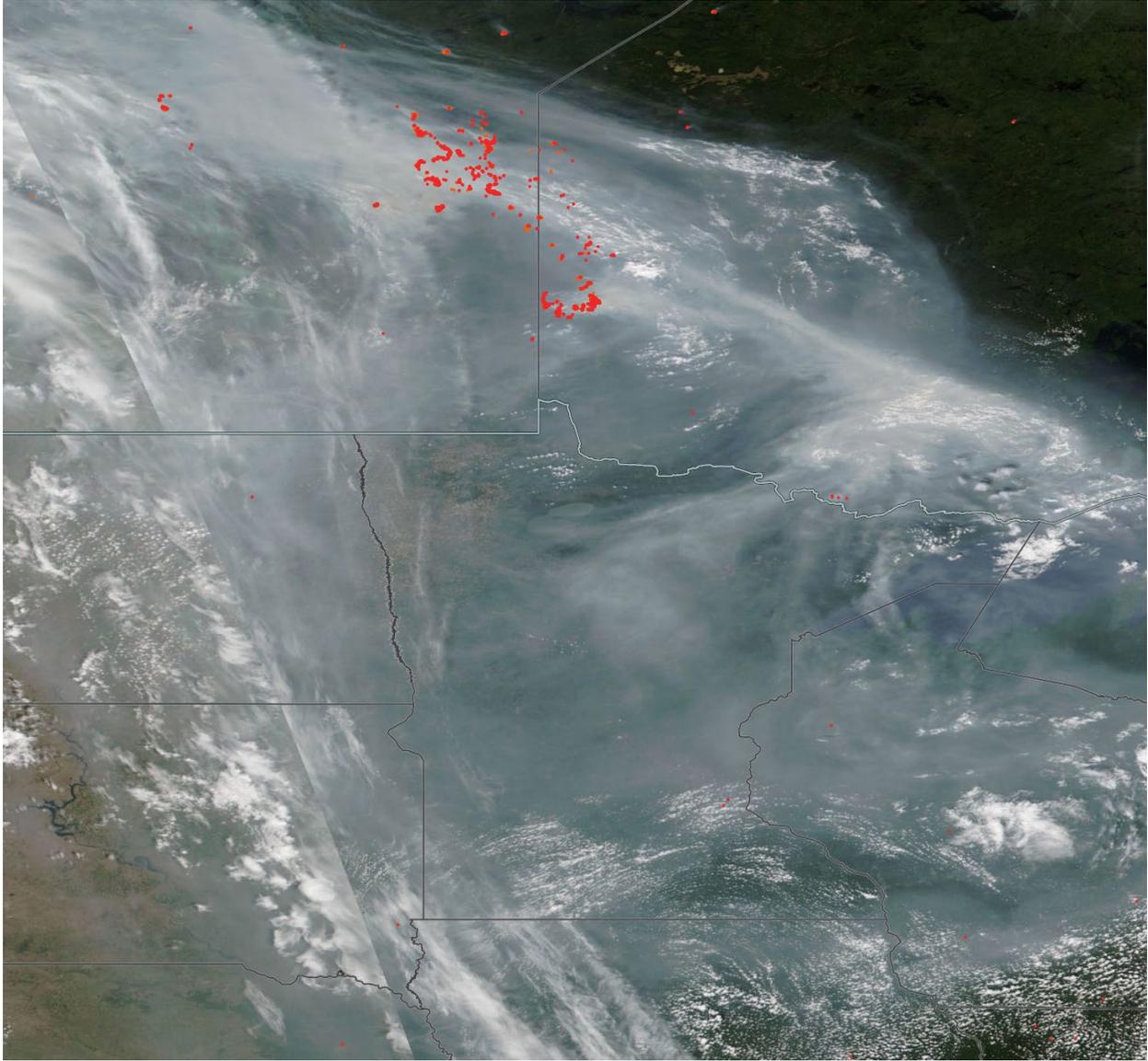
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on August 3, 2021.

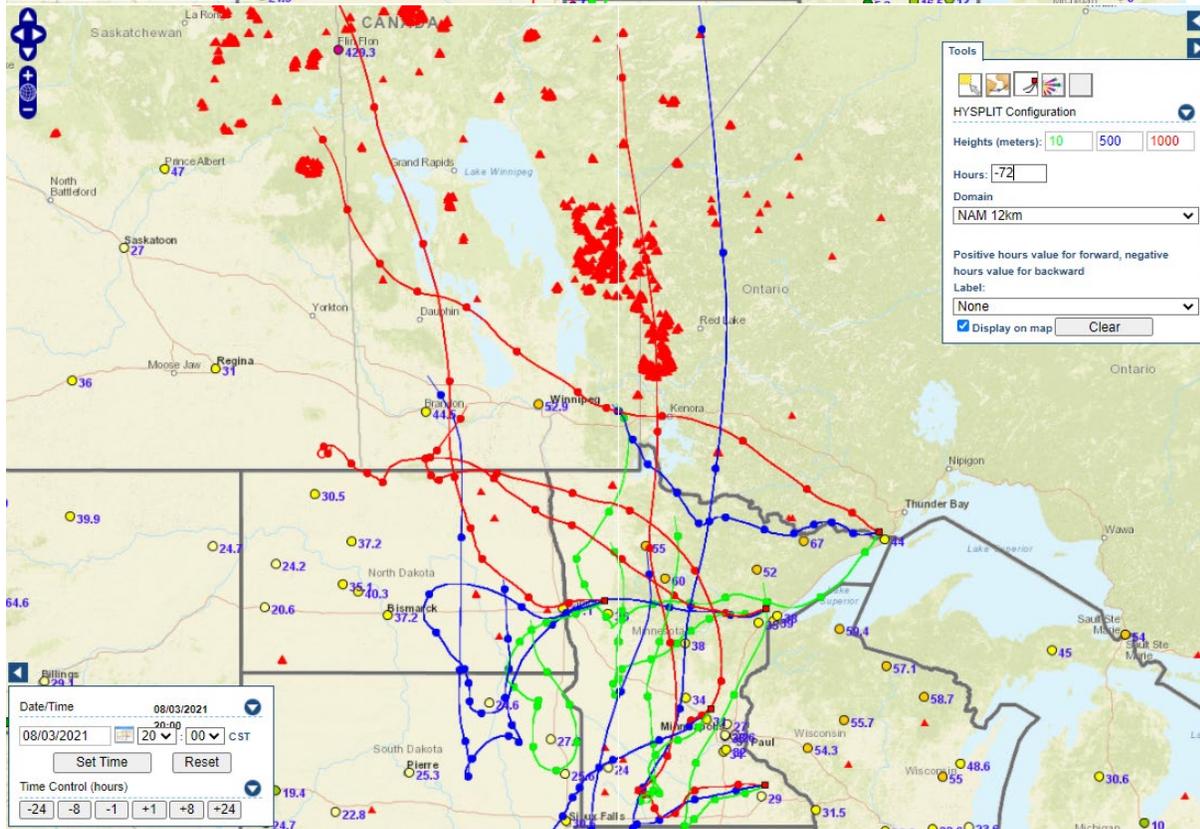
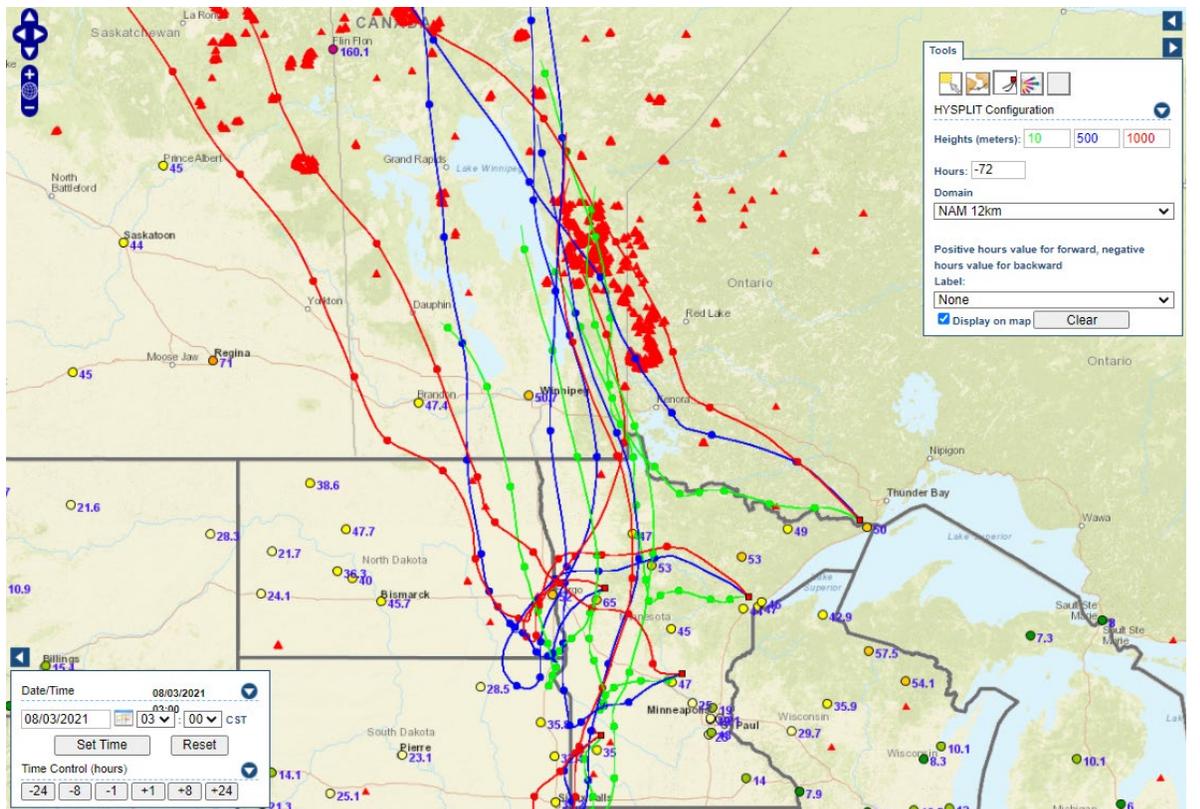
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Apple Valley	270370470	8/3/2021	27.0	35	Canada wildfire smoke
Blaine	270031002	8/3/2021	29.5	36	Canada wildfire smoke
Brainerd	270353204	8/3/2021	41.3	63	Canada wildfire smoke
Detroit Lakes	270052013	8/3/2021	43.7	73	Canada wildfire smoke
Duluth-WDSE	271377550	8/3/2021	39.2	48	Canada wildfire smoke
Ely	270750005	8/3/2021	49.5	67	Canada wildfire smoke
Fargo NW	380171004	8/3/2021	45.4	63.6	Canada wildfire smoke
Fond du Lac	270177417	8/3/2021	38.3	48	Canada wildfire smoke
Grand Portage	270317810	8/3/2021	51.0	68	Canada wildfire smoke
Lacrosse DOT	550630012	8/3/2021	19.8	32.8	Canada wildfire smoke
Lakeville - Near Road	270370480	8/3/2021	29.7	40	Canada wildfire smoke
Leech Lake Nation	270213410	8/3/2021	57.8	77	Canada wildfire smoke
Marshall	270834210	8/3/2021	30.7	45	Canada wildfire smoke
Minneapolis - Near Road	270530962	8/3/2021	27.8	39	Canada wildfire smoke
Minneapolis - Phillips	270530963	8/3/2021	27.4	40	Canada wildfire smoke
Red Lake Nation	270072304	8/3/2021	47.5	60	Canada wildfire smoke
Rochester	271095008	8/3/2021	18.5	32	Canada wildfire smoke
St. Cloud	271453052	8/3/2021	42.8	55	Canada wildfire smoke
St. Michael	271713201	8/3/2021	32.2	40	Canada wildfire smoke
St. Paul-Harding	271230871	8/3/2021	29.6	42	Canada wildfire smoke
Virginia	271377001	8/3/2021	49.3	56	Canada wildfire smoke
West Duluth	271377554	8/3/2021	43.2	53	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on August 3, 2021.



MODIS visible satellite for August 3, 2021.



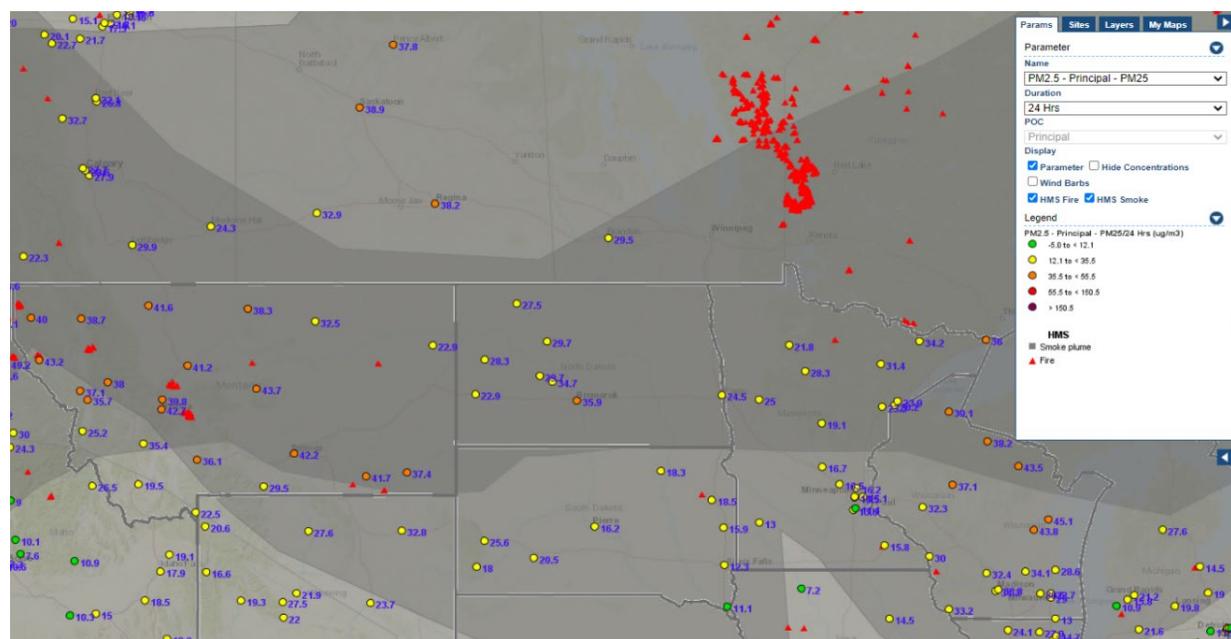
Backward trajectories for August 3, 2021.

8/4/2021 Impacts

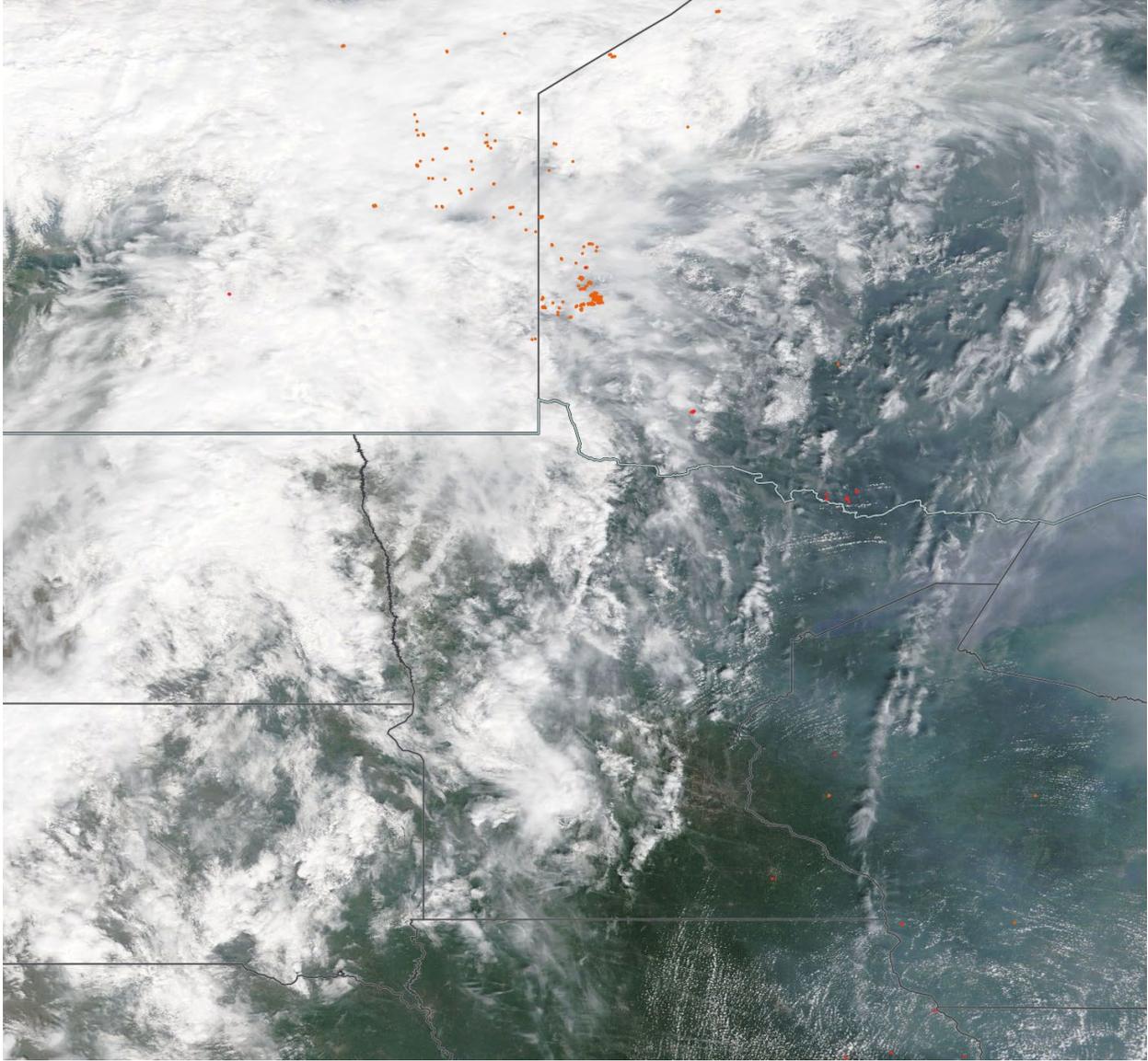
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on August 4, 2021.

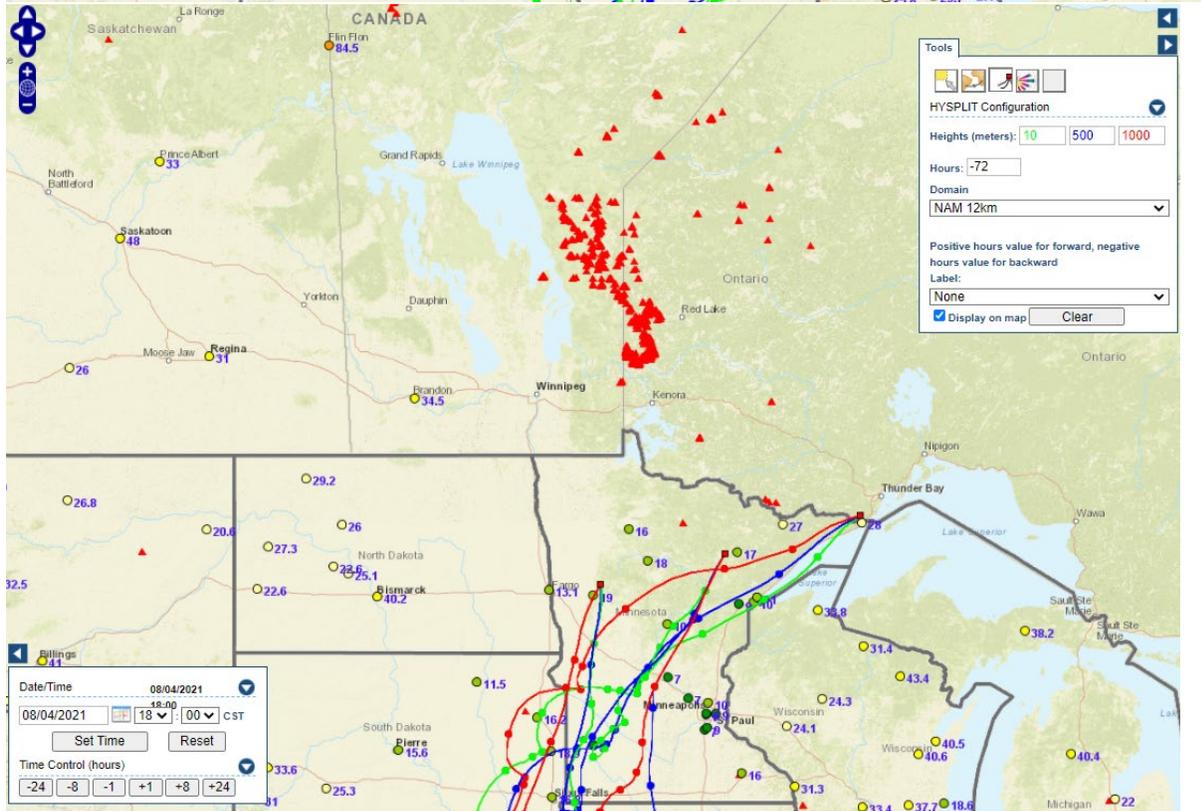
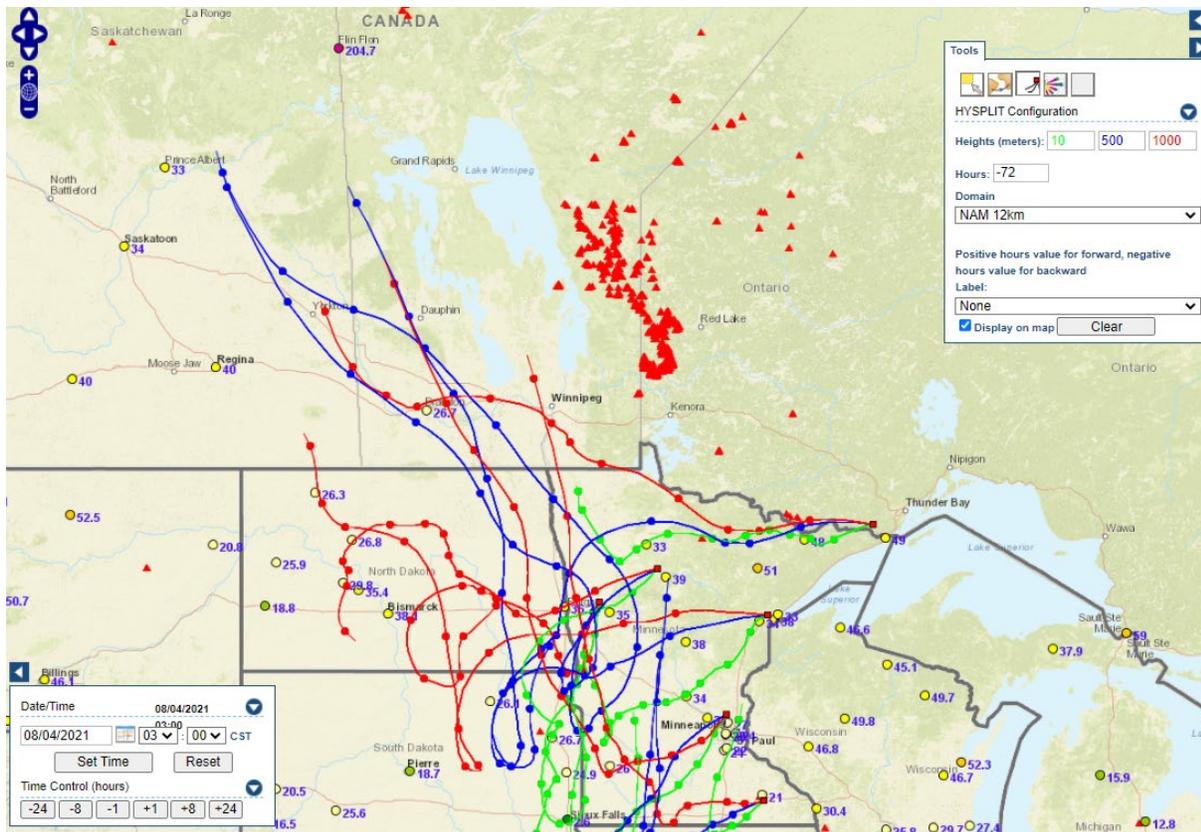
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Blaine	270031002	8/4/2021	16.3	33	Canada wildfire smoke
Brainerd	270353204	8/4/2021	19.1	38	Canada wildfire smoke
Detroit Lakes	270052013	8/4/2021	25.0	38	Canada wildfire smoke
Duluth-WDSE	271377550	8/4/2021	22.7	38	Canada wildfire smoke
Ely	270750005	8/4/2021	34.2	56	Canada wildfire smoke
Fargo NW	380171004	8/4/2021	24.5	37.6	Canada wildfire smoke
Fond du Lac	270177417	8/4/2021	23.3	34	Canada wildfire smoke
Grand Portage	270317810	8/4/2021	36.0	51	Canada wildfire smoke
Lacrosse DOT	550630012	8/4/2021	30.0	36.4	Canada wildfire smoke
Leech Lake Nation	270213410	8/4/2021	28.4	46	Canada wildfire smoke
Red Lake Nation	270072304	8/4/2021	21.8	33	Canada wildfire smoke
St. Cloud	271453052	8/4/2021	16.7	34	Canada wildfire smoke
St. Michael	271713201	8/4/2021	16.6	37	Canada wildfire smoke
Virginia	271377001	8/4/2021	31.5	52	Canada wildfire smoke
West Duluth	271377554	8/4/2021	26.3	45	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on August 4, 2021.



MODIS visible satellite for August 4, 2021.



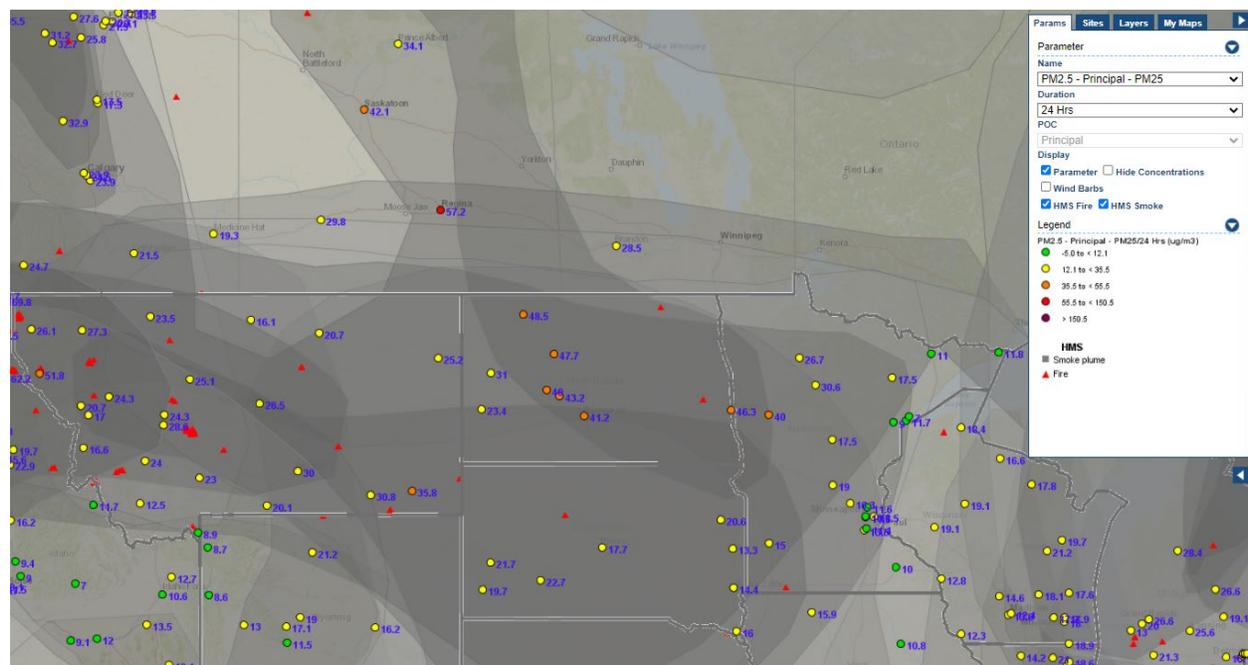
Backward trajectories for August 4, 2021.

8/5/2021 Impacts

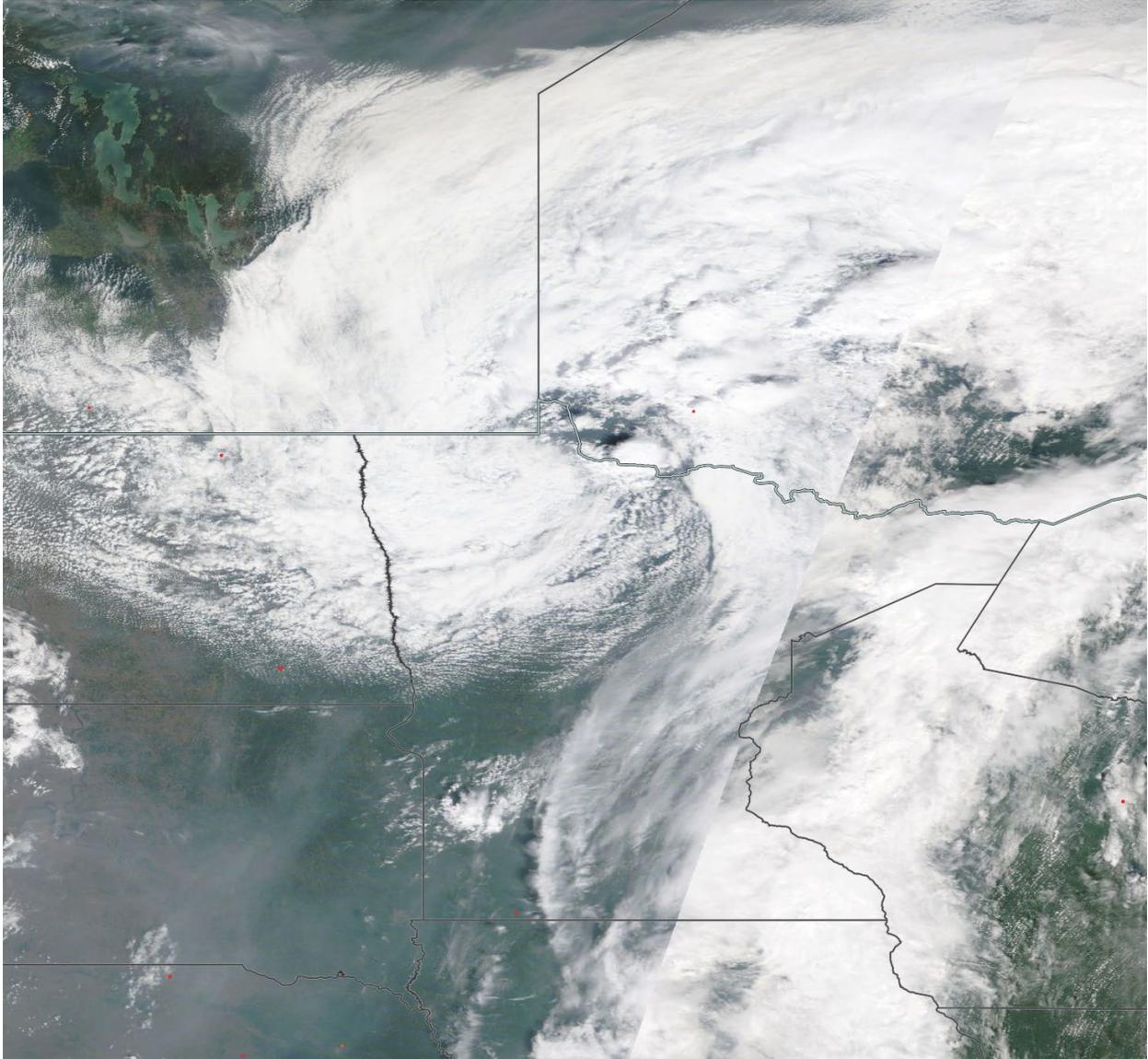
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on August 5, 2021.

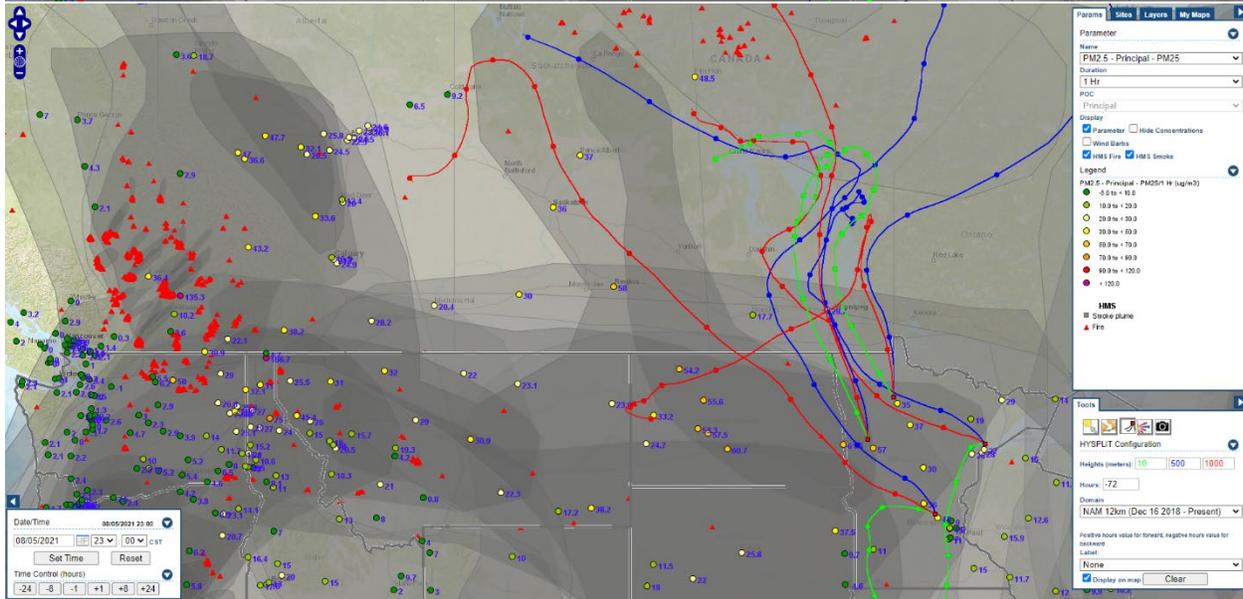
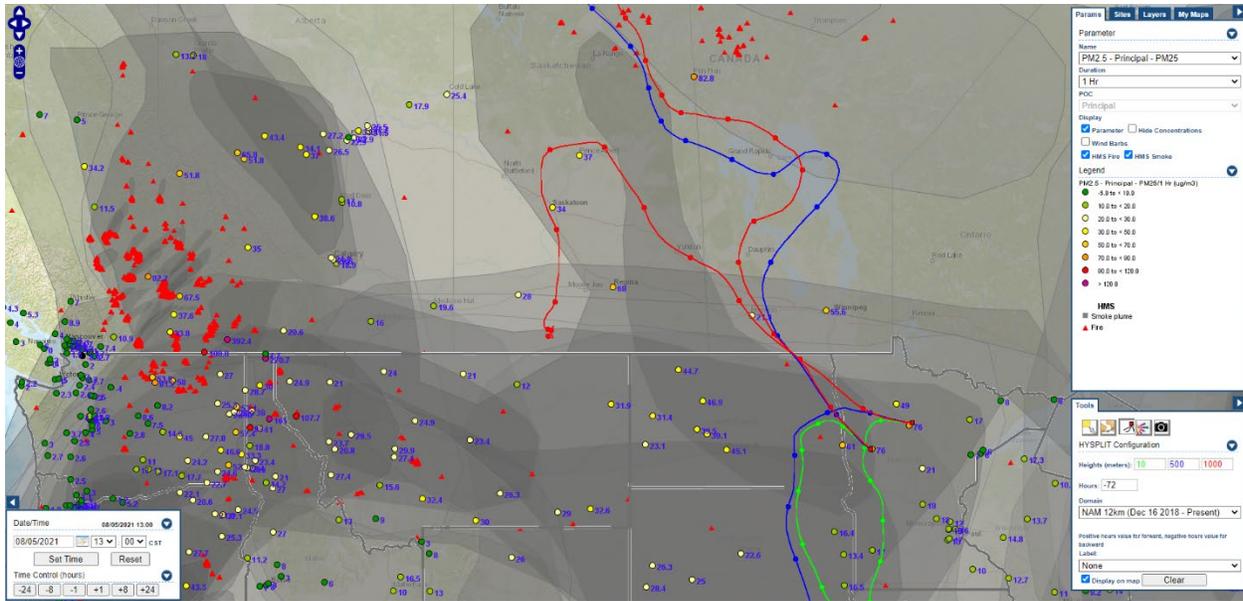
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Brainerd	270353204	8/5/2021	17.5	45	Canada wildfire smoke
Detroit Lakes	270052013	8/5/2021	40	79	Canada wildfire smoke
Fargo NW	380171004	8/5/2021	46.3	71	Canada wildfire smoke
Leech Lake Nation	270213410	8/5/2021	30.6	76	Canada wildfire smoke
Marshall	270834210	8/5/2021	15	20	Canada wildfire smoke
Red Lake Nation	270072304	8/5/2021	26.7	73	Canada wildfire smoke
St. Cloud	271453052	8/5/2021	19	48	Canada wildfire smoke
St. Michael	271713201	8/5/2021	16.3	46	Canada wildfire smoke
Virginia	271377001	8/5/2021	17.5	48	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on August 5, 2021.



MODIS visible satellite for August 5, 2021.



Backward trajectories for August 5, 2021.

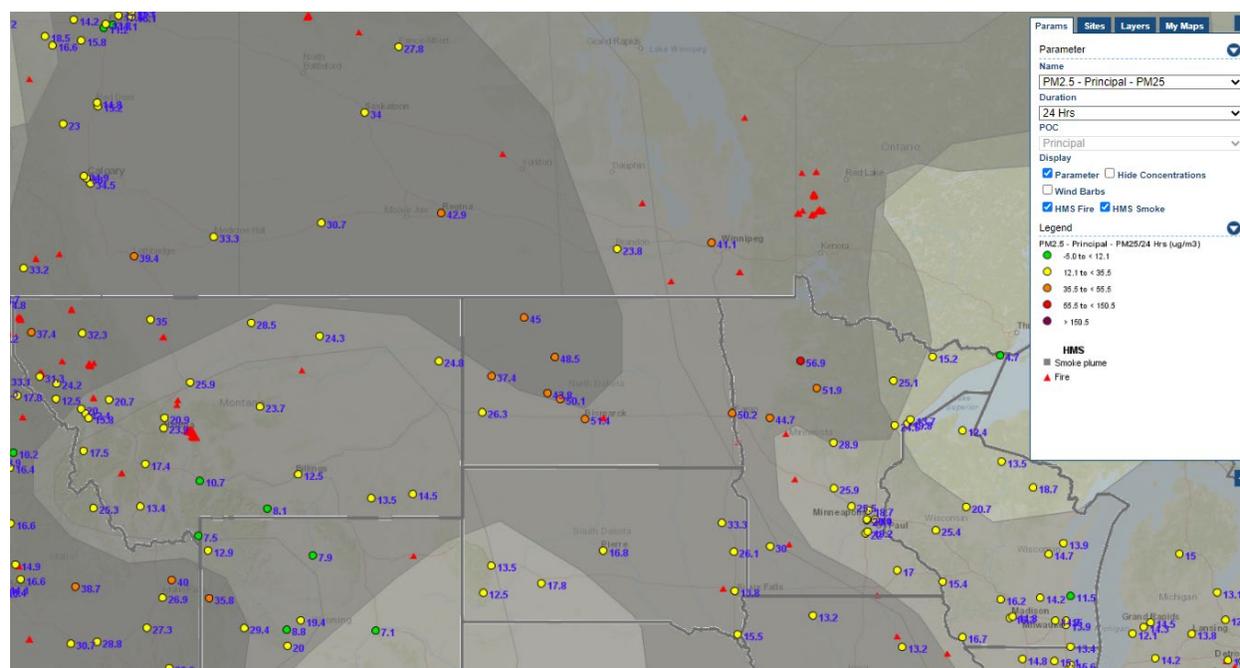
8/6/2021 Impacts

Smoke impacts from wildfires over Canada.

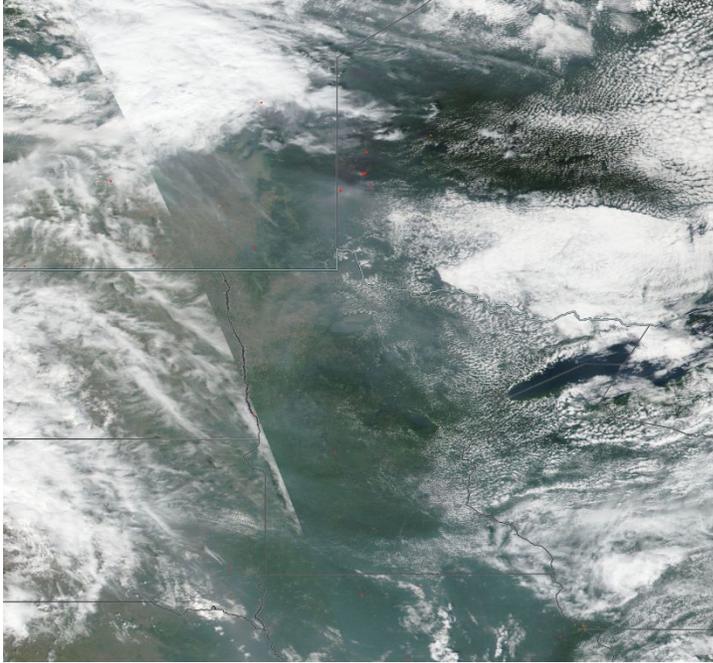
Monitored 24-hour PM_{2.5} concentrations impacted by smoke on August 6, 2021.

Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Apple Valley	270370470	8/6/2021	19.2	27	Canada wildfire smoke
Blaine	270031002	8/6/2021	18.7	26	Canada wildfire smoke

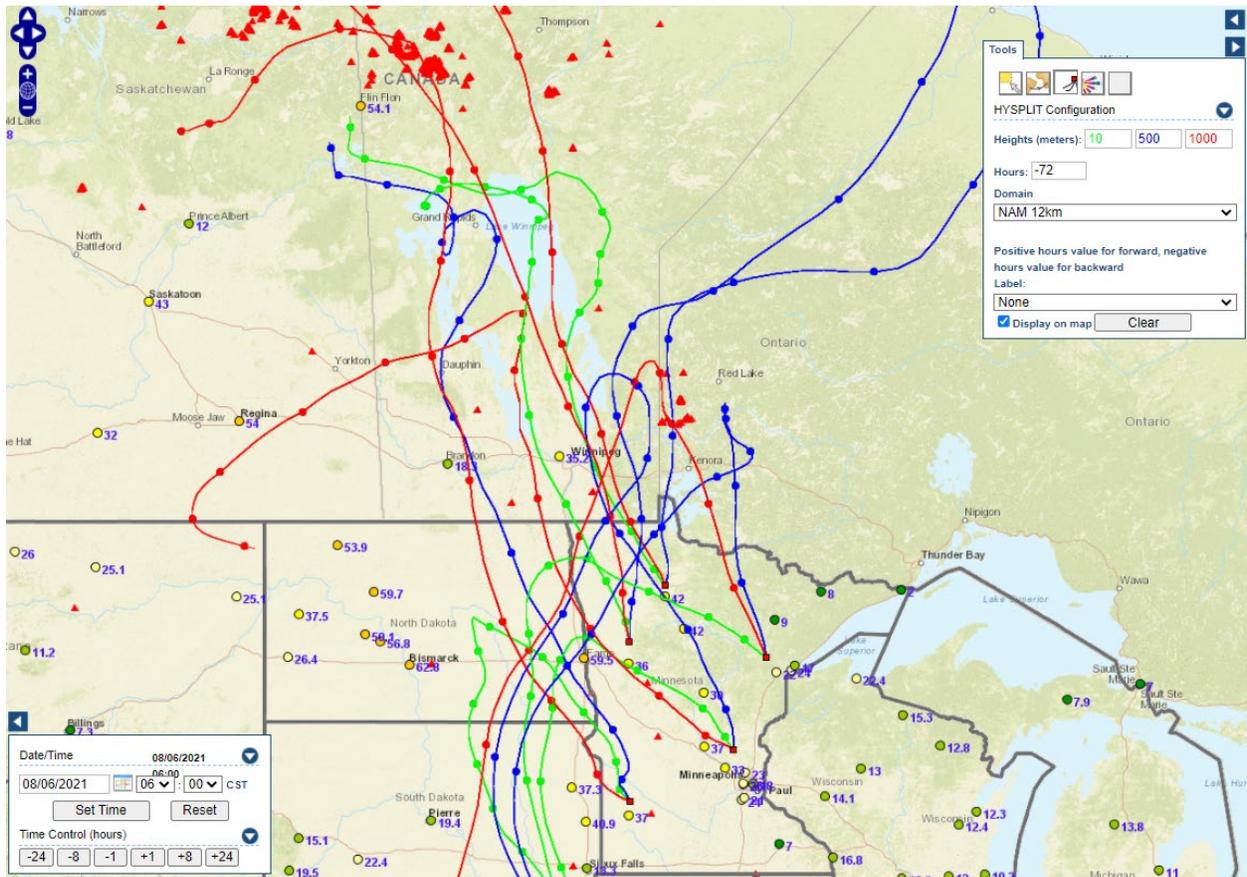
Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
Brainerd	270353204	8/6/2021	28.9	41	Canada wildfire smoke
Detroit Lakes	270052013	8/6/2021	44.7	70	Canada wildfire smoke
Ely	270750005	8/6/2021	15.2	32	Canada wildfire smoke
Fargo NW	380171004	8/6/2021	50.2	76.8	Canada wildfire smoke
Fond du Lac	270177417	8/6/2021	24.5	37	Canada wildfire smoke
Lakeville - Near Road	270370480	8/6/2021	22	29	Canada wildfire smoke
Leech Lake Nation	270213410	8/6/2021	51.9	62	Canada wildfire smoke
Marshall	270834210	8/6/2021	30	40	Canada wildfire smoke
Minneapolis - Near Road	270530962	8/6/2021	20.4	26	Canada wildfire smoke
Minneapolis - Phillips	270530963	8/6/2021	21	28	Canada wildfire smoke
Red Lake Nation	270072304	8/6/2021	56.9	76	Canada wildfire smoke
Rochester	271095008	8/6/2021	17	27	Canada wildfire smoke
St. Cloud	271453052	8/6/2021	25.9	37	Canada wildfire smoke
St. Michael	271713201	8/6/2021	25.5	38	Canada wildfire smoke
St. Paul-Harding	271230871	8/6/2021	19	33	Canada wildfire smoke
Virginia	271377001	8/6/2021	25.1	38	Canada wildfire smoke
West Duluth	271377554	8/6/2021	19.8	34	Canada wildfire smoke

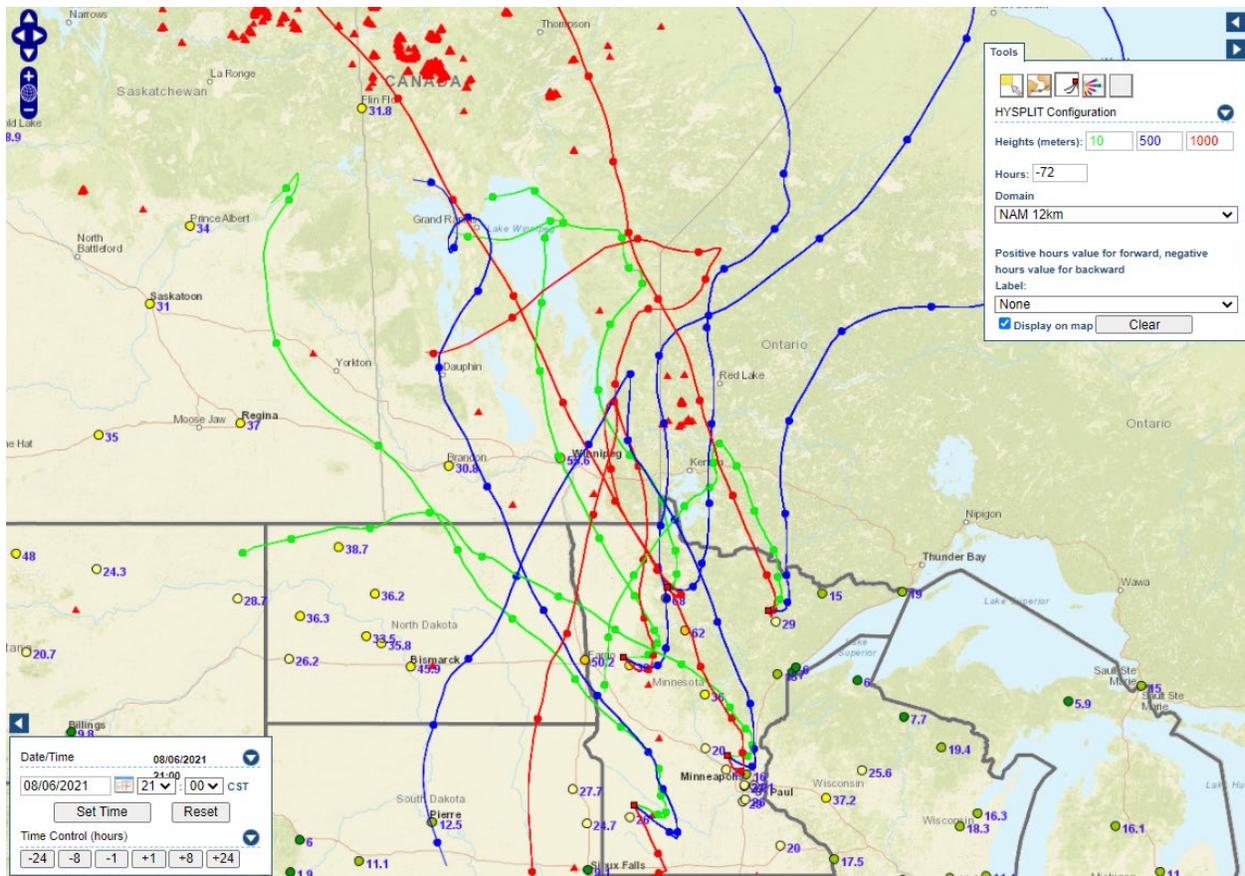


Analyzed smoke, hotspots, and 24-hour PM_{2.5} on August 6, 2021.



MODIS visible satellite for August 6, 2021.





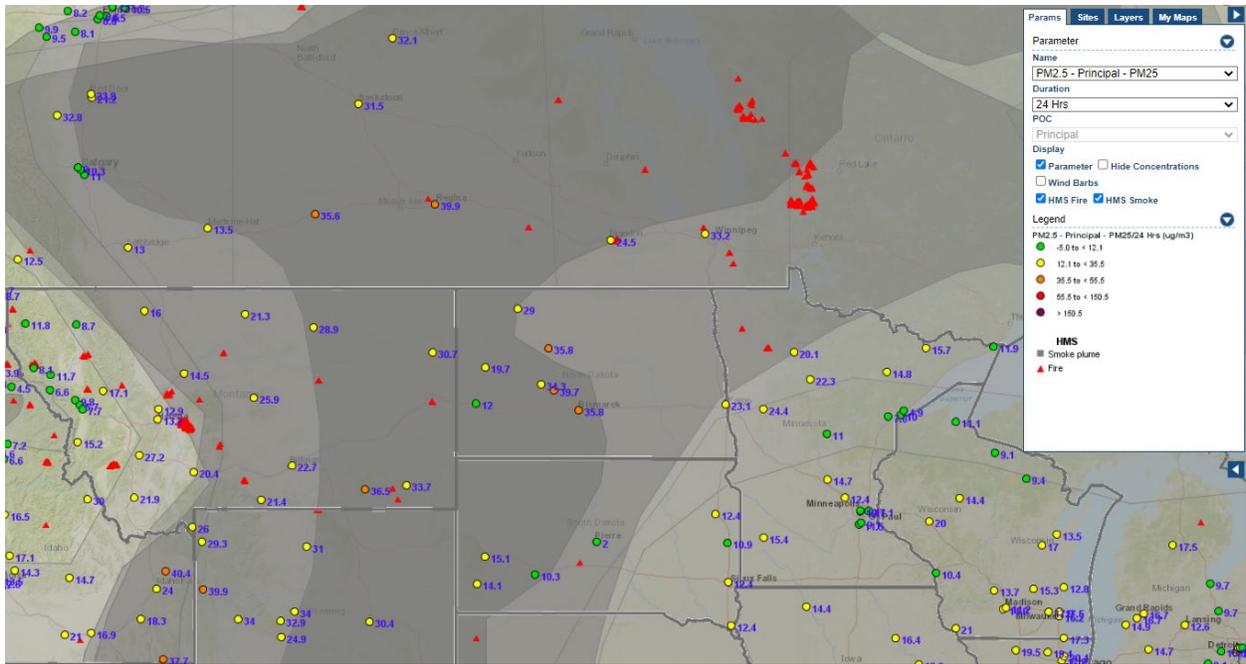
Backward trajectories for August 6, 2021.

8/7/2021 Impacts

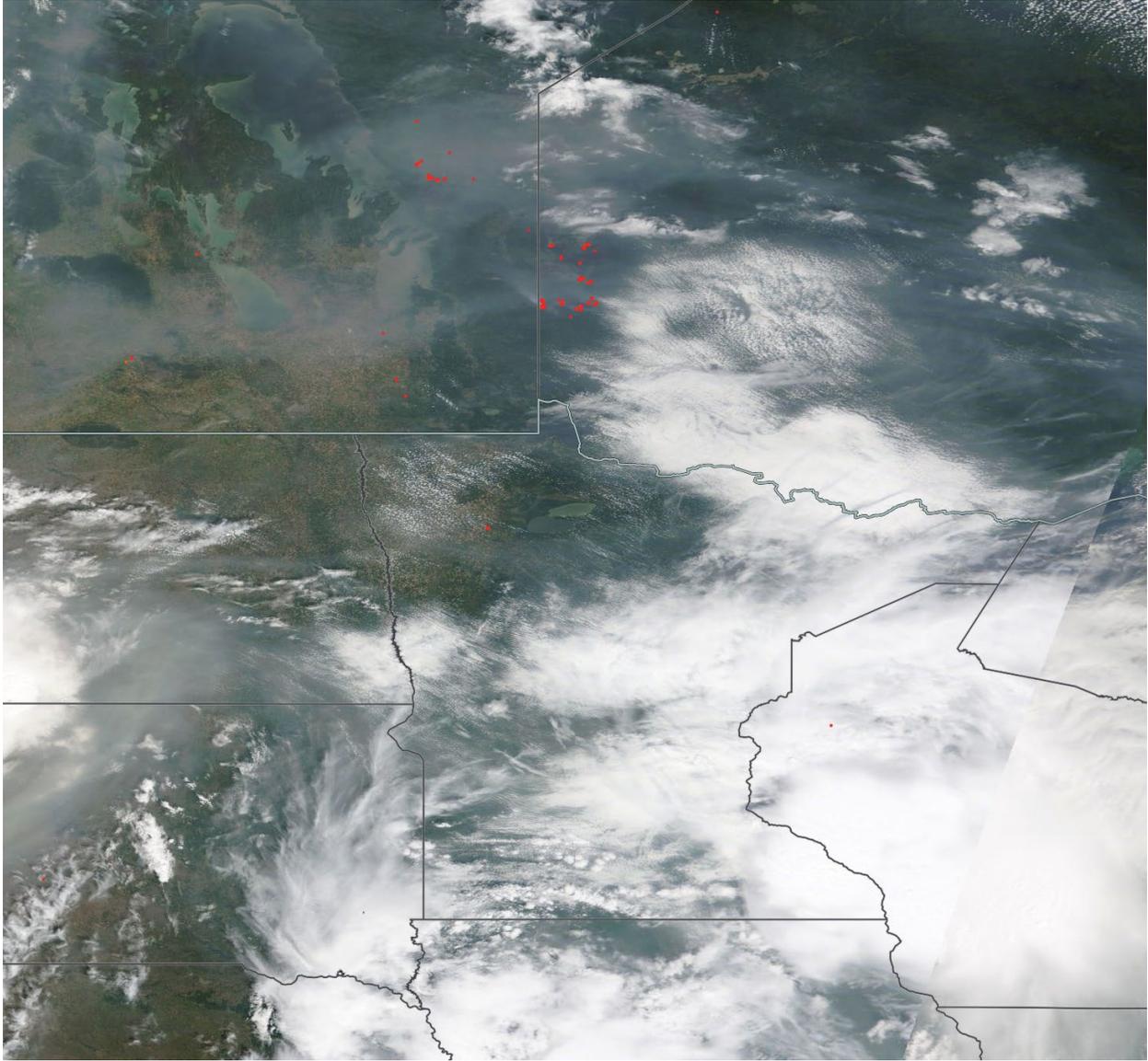
Smoke impacts from wildfires over Canada.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on August 7, 2021.

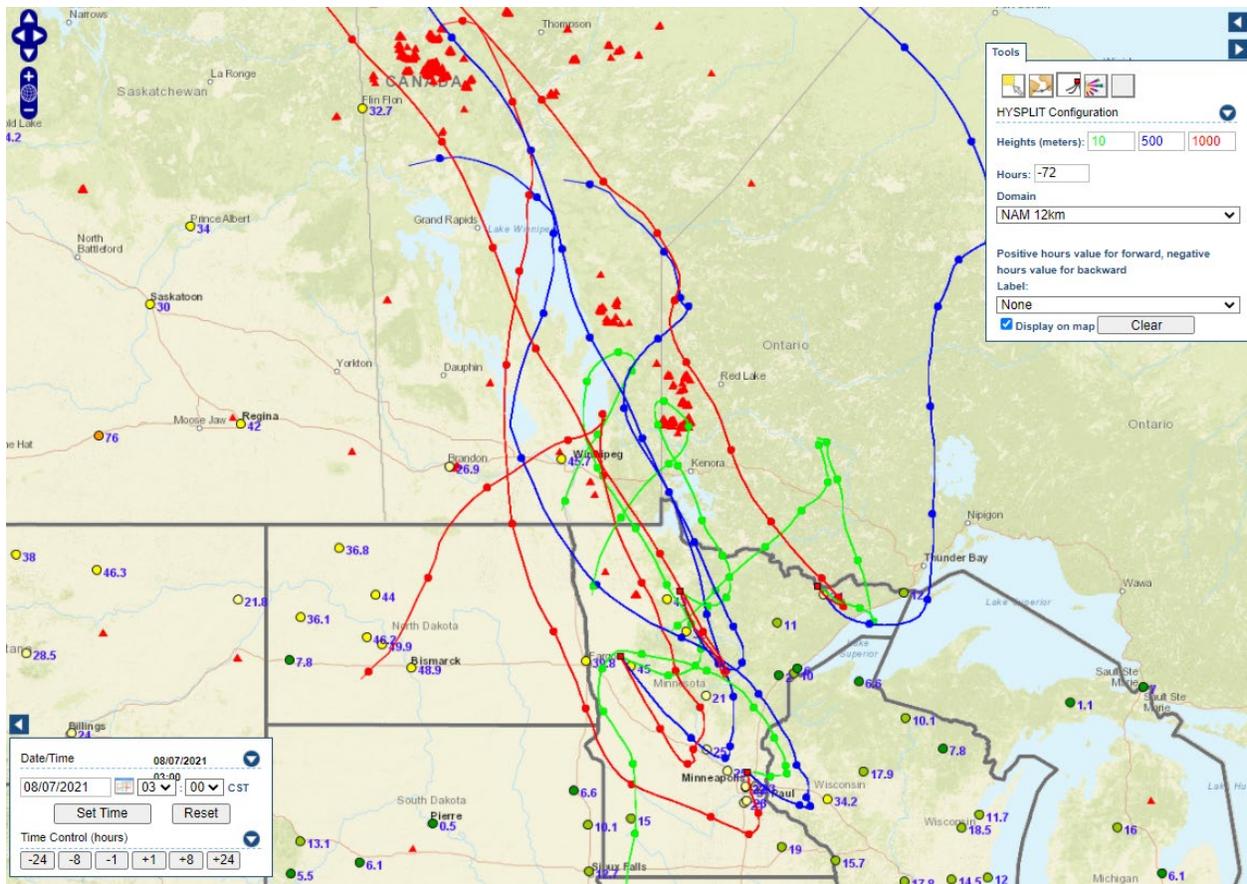
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Detroit Lakes	270052013	8/7/2021	24.4	45	Canada wildfire smoke
Fargo NW	380171004	8/7/2021	23.1	48	Canada wildfire smoke
Ely	270750005	8/7/2021	15.7	21	Canada wildfire smoke
Leech Lake Nation	270213410	8/7/2021	22.3	63	Canada wildfire smoke
Red Lake Nation	270072304	8/7/2021	20.1	54	Canada wildfire smoke
St. Cloud	271453052	8/7/2021	14.7	25	Canada wildfire smoke
Virginia	271377001	8/7/2021	14.8	22	Canada wildfire smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on August 7, 2021.



MODIS visible satellite for August 7, 2021.



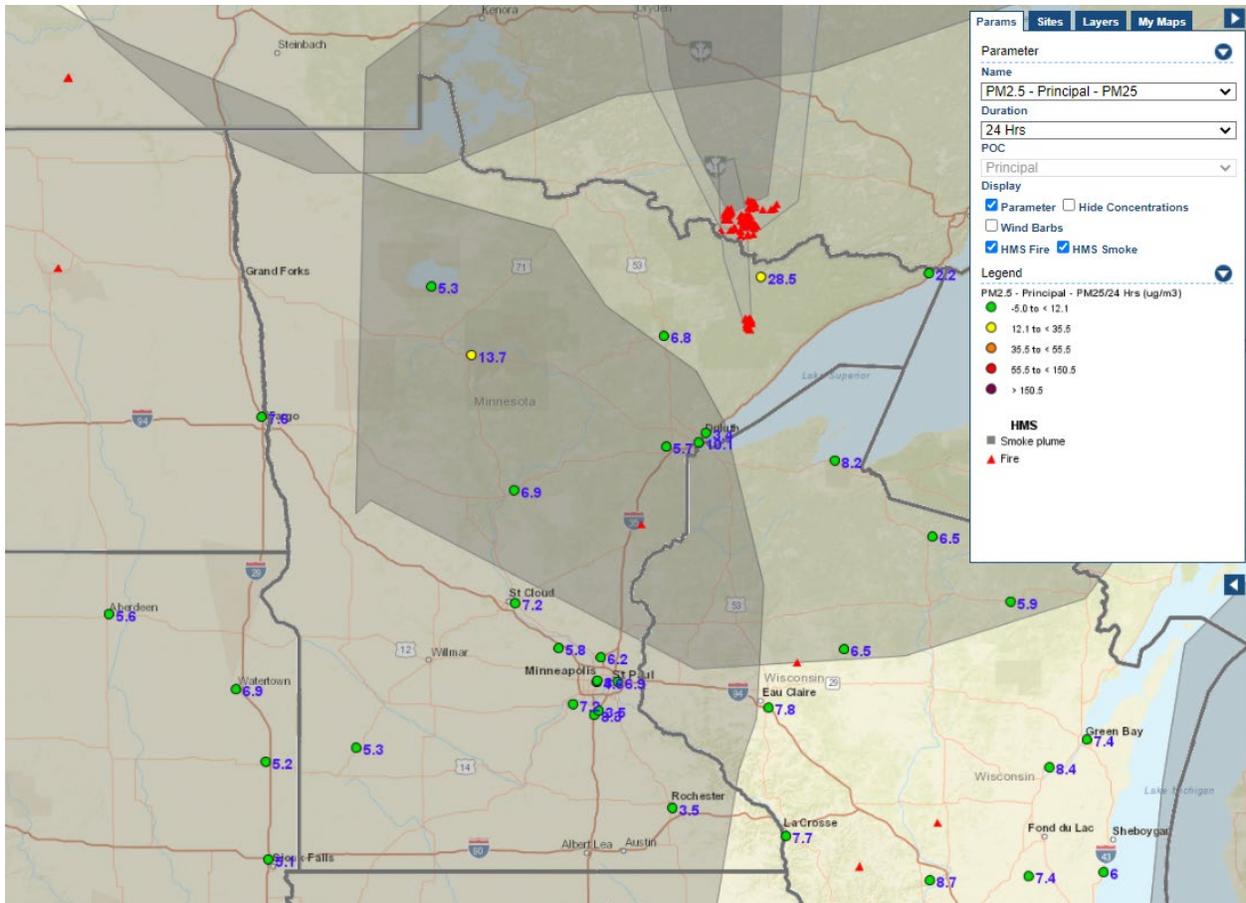
Backward trajectories for August 7, 2021.

8/22/2021 Impacts

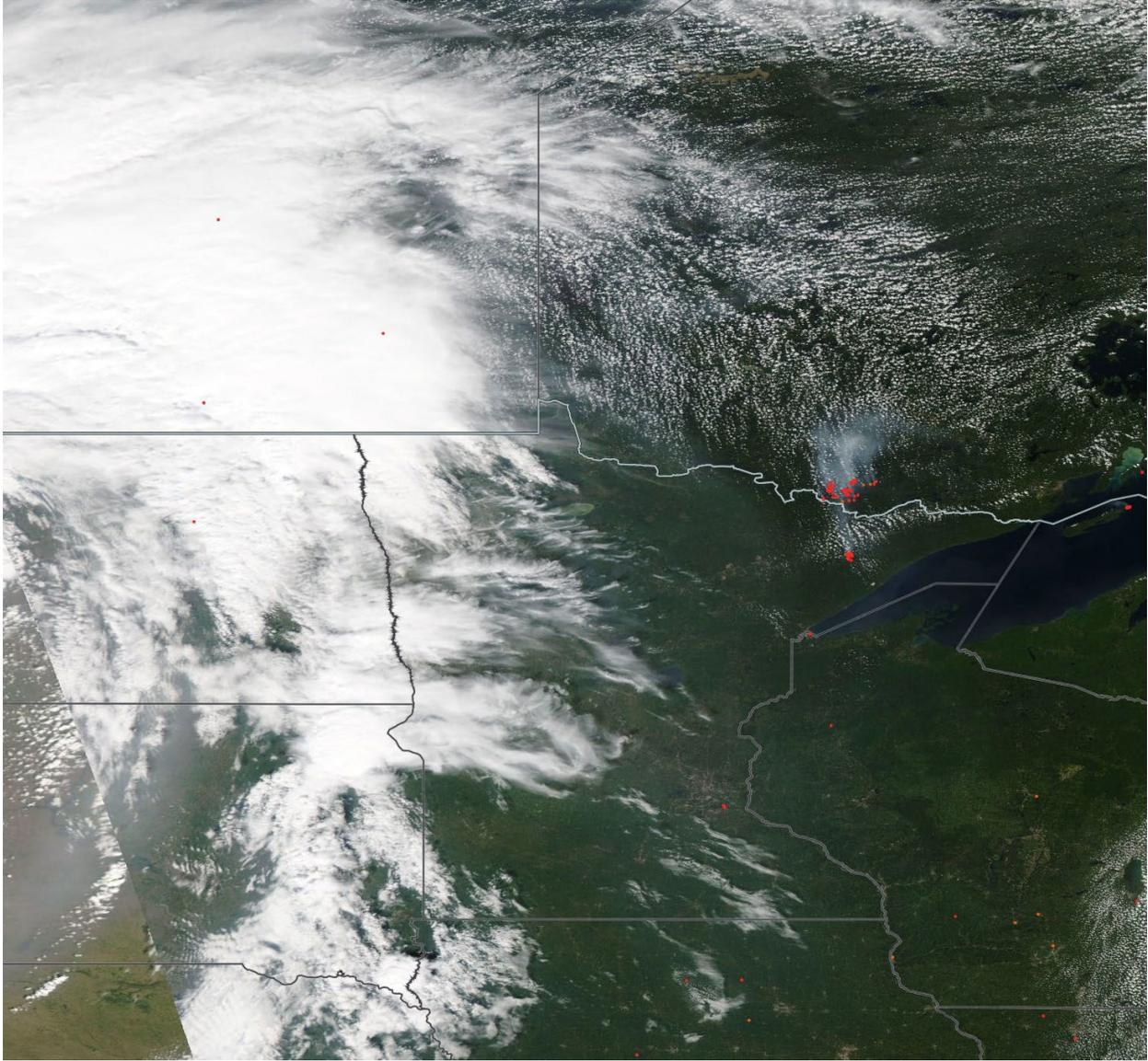
Smoke impacts from wildfires over northeast Minnesota and Quetico Provincial Park.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on August 22, 2021.

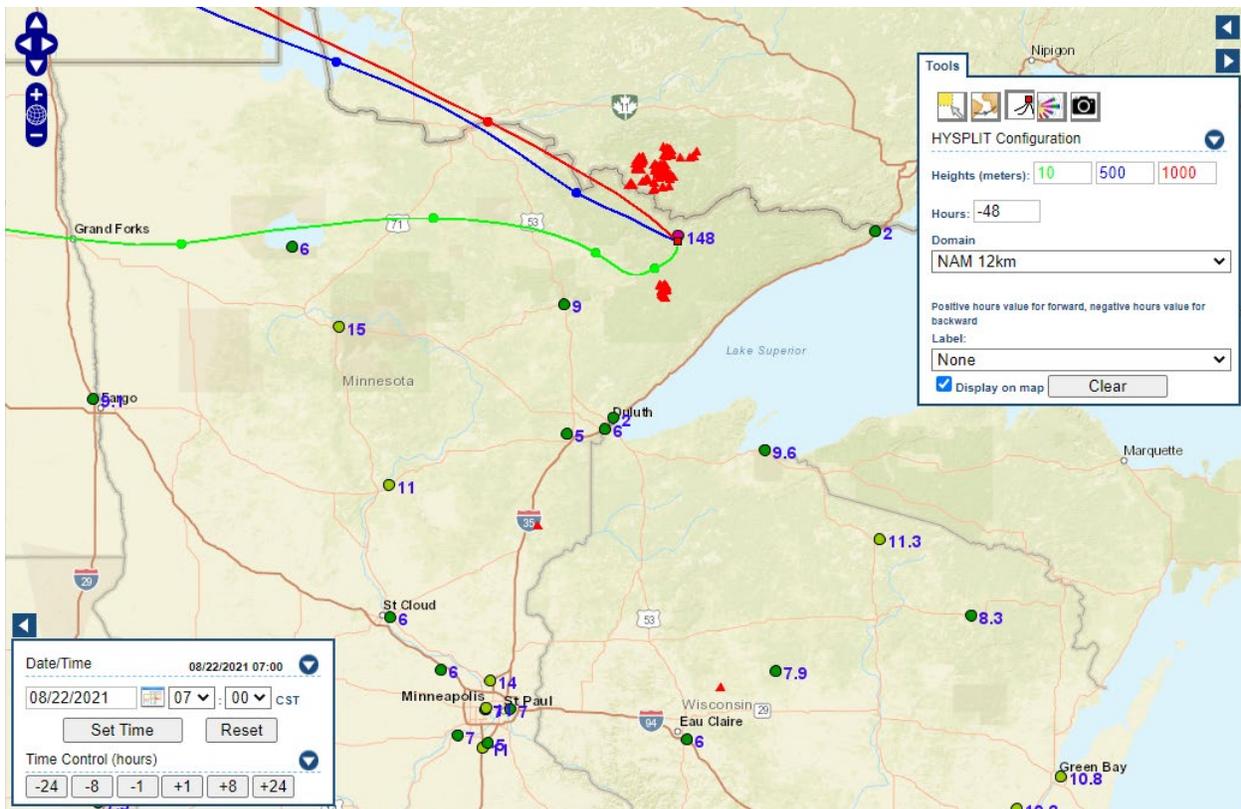
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Ely	270750005	8/22/2021	28.5	199	Northeast MN fires



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on August 22, 2021.



MODIS visible satellite for August 22, 2021.



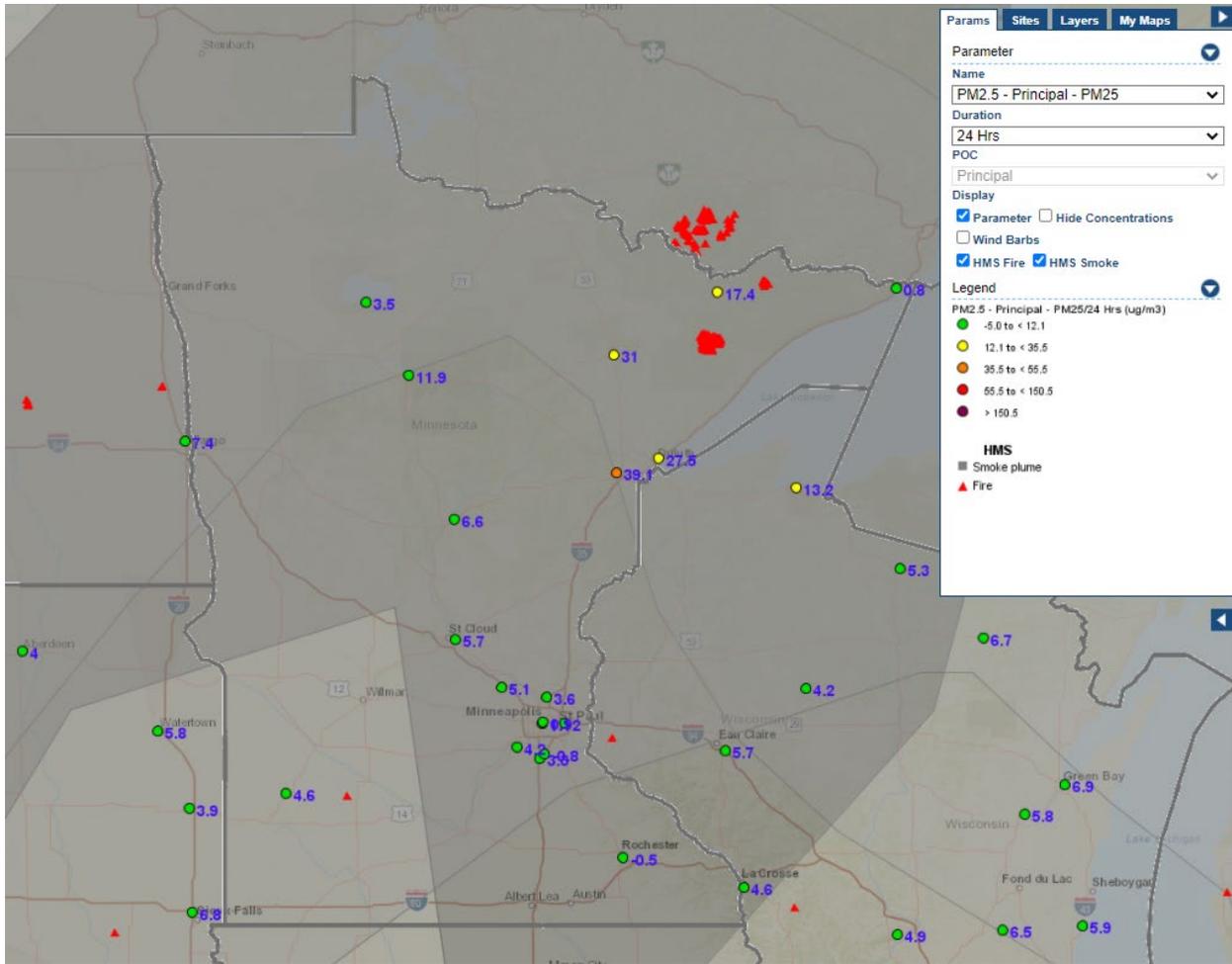
Backward trajectories for August 22, 2021.

8/24/2021 Impacts

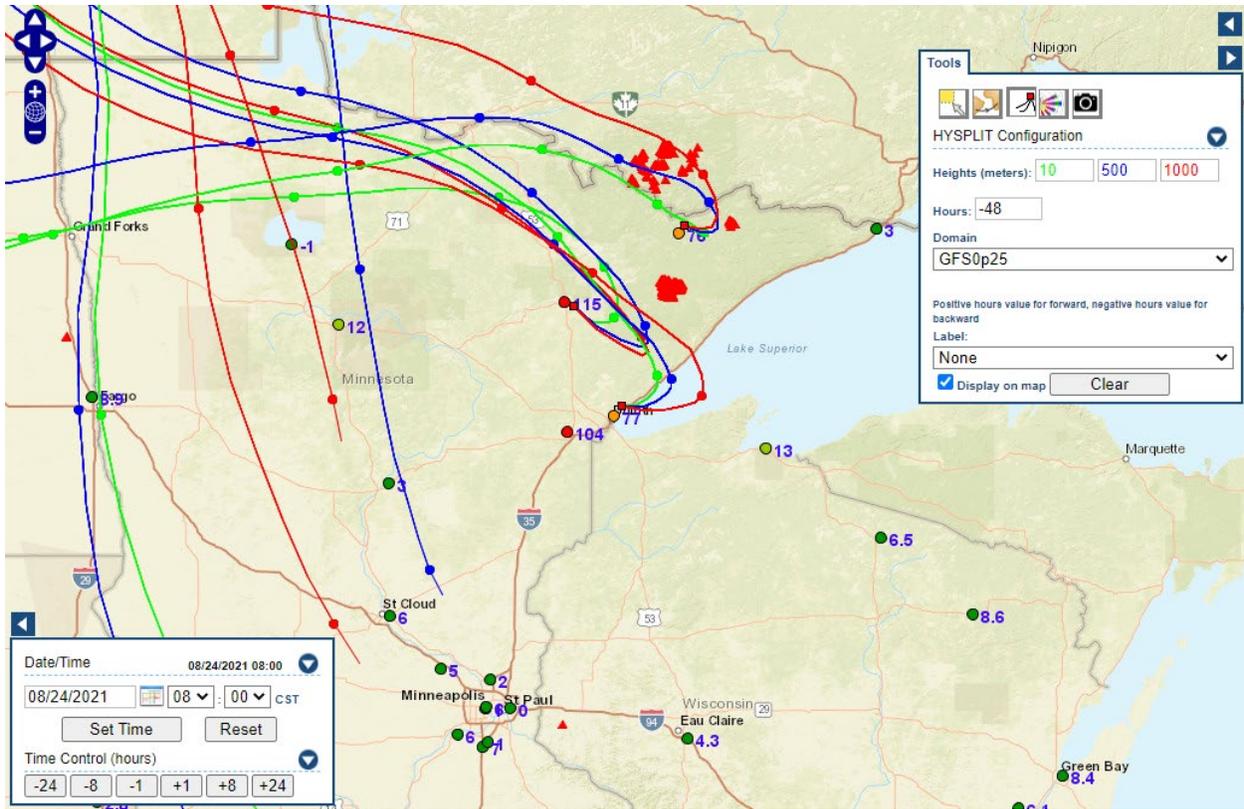
Smoke impacts from wildfires over northeast Minnesota and Quetico Provincial Park.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on August 24, 2021.

Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Duluth-WDSE	271377550	8/24/2021	43.3	101	Northeast MN fires
Ely	270750005	8/24/2021	18.3	76	Northeast MN fires
Fond du Lac	270177417	8/24/2021	39.2	137	Northeast MN fires
Virginia	271377001	8/24/2021	34.0	115	Northeast MN fires



MODIS visible satellite for August 24, 2021.



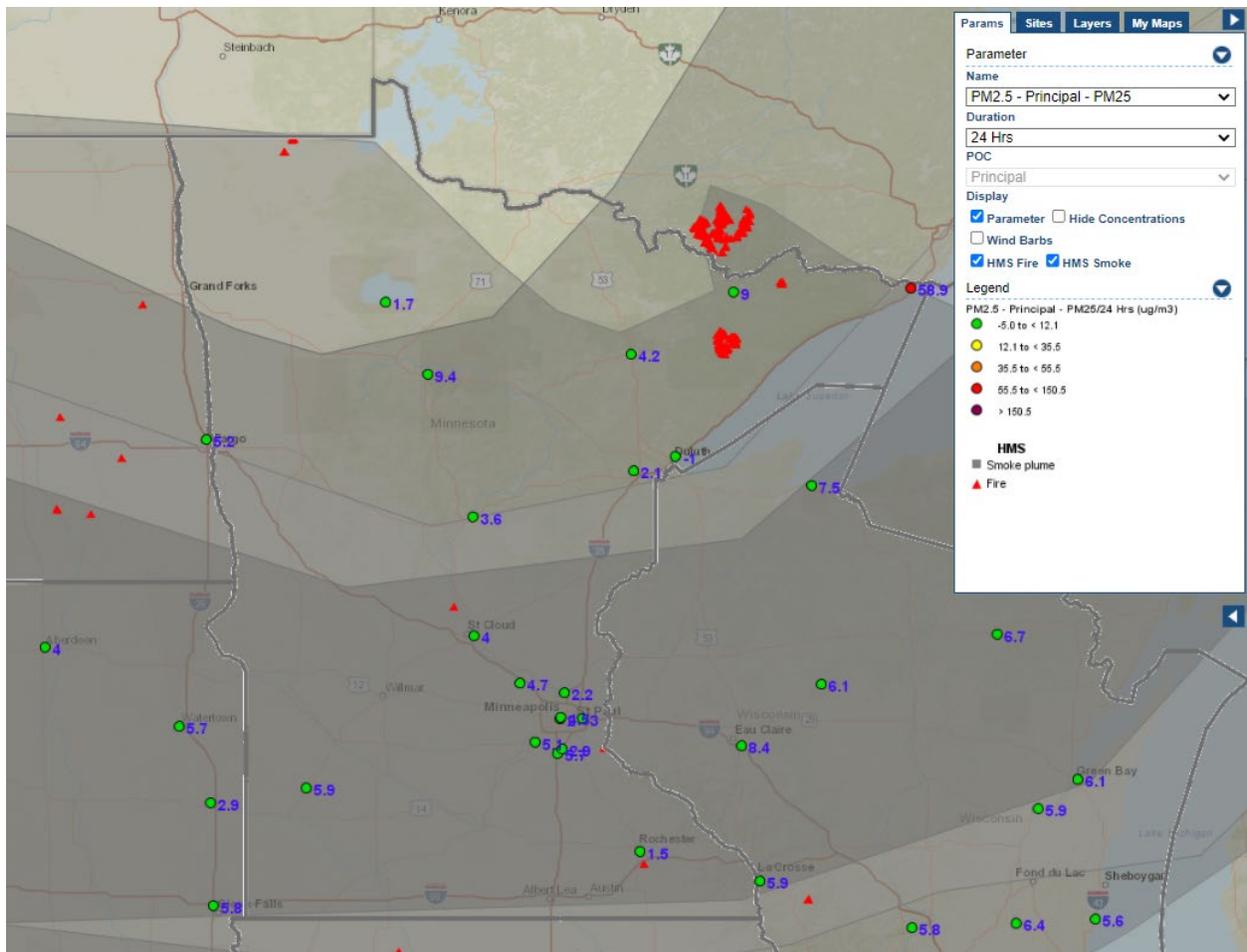
Backward trajectories for August 24, 2021.

8/25/2021 Impacts

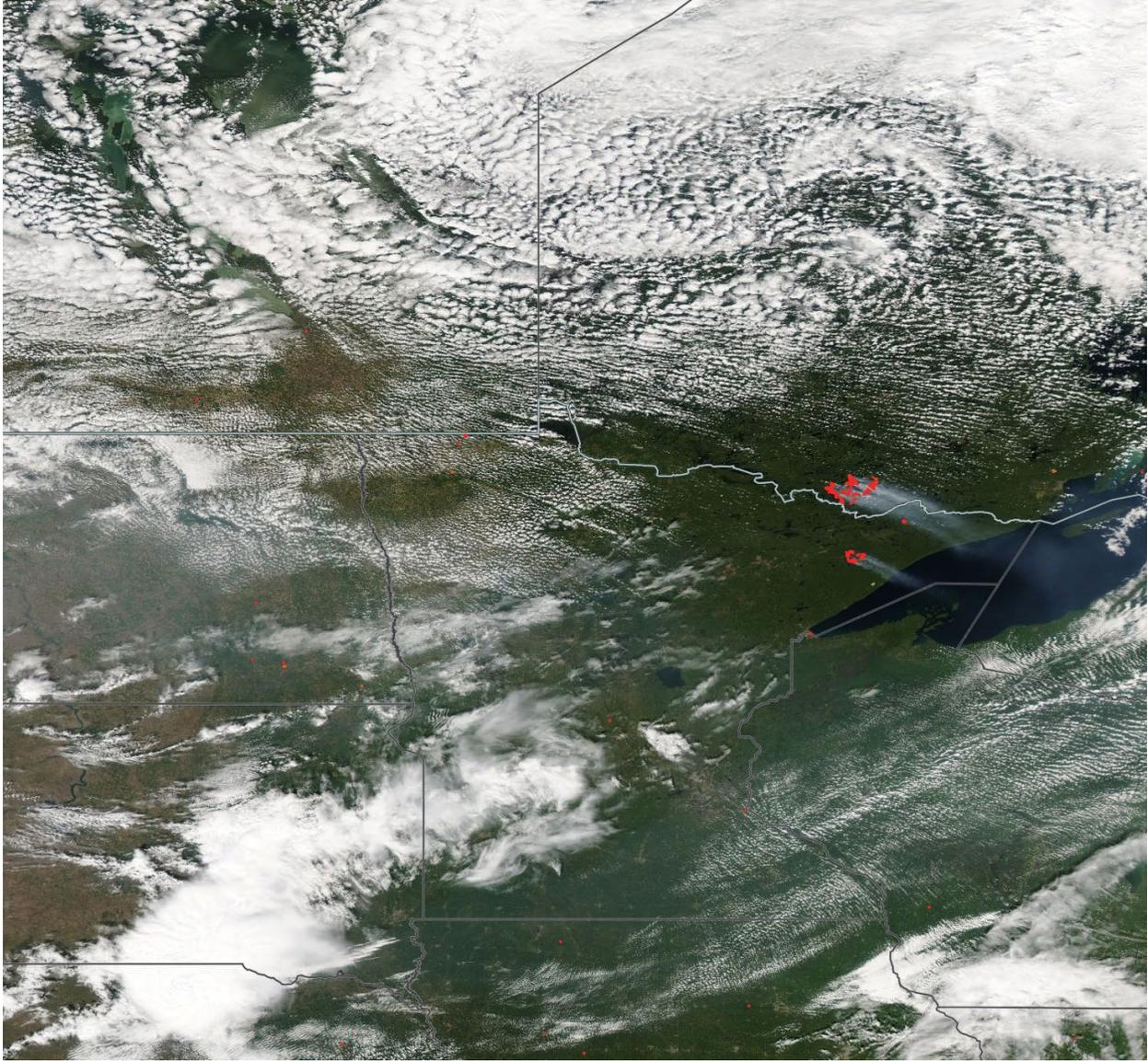
Smoke impacts from wildfires over northeast Minnesota and Quetico Provincial Park.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on August 25, 2021.

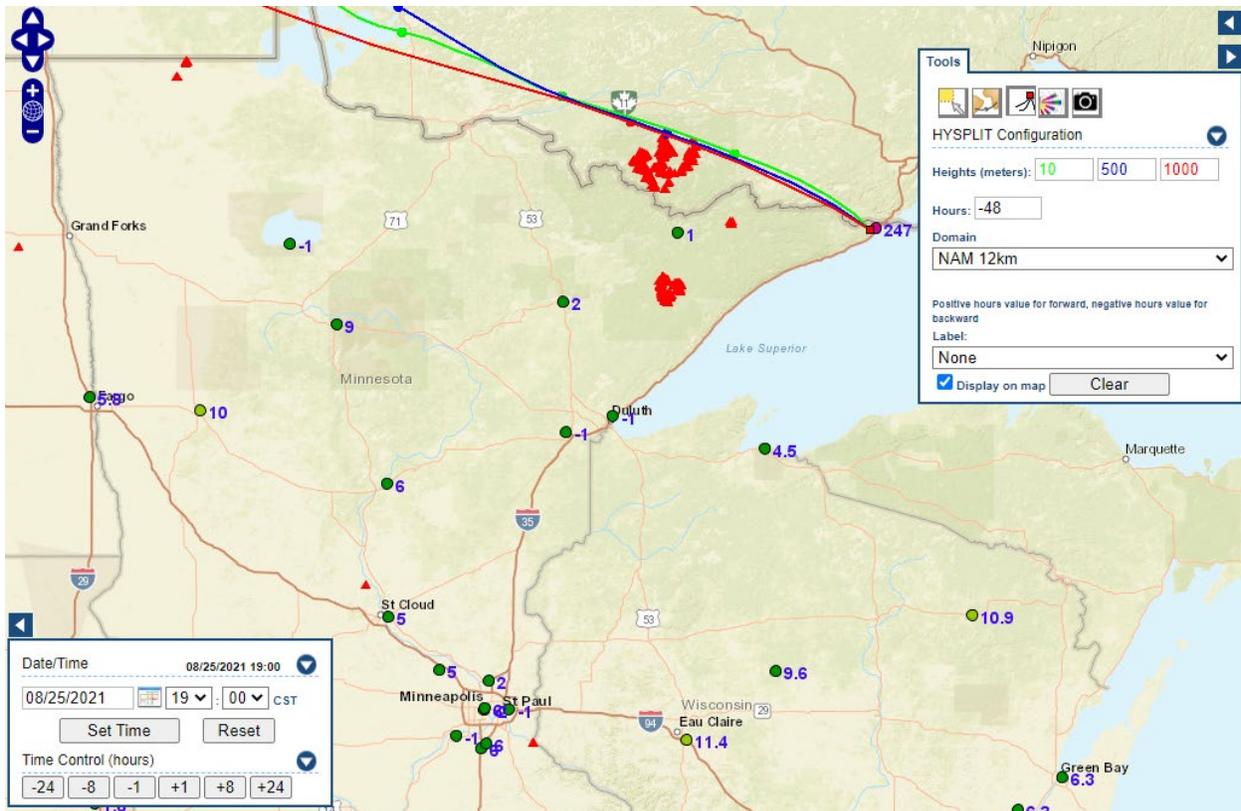
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Grand Portage	270317810	8/25/2021	61.6	267	Northeast MN fires



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on August 25, 2021.



MODIS visible satellite for August 25, 2021.



Backward trajectories for August 25, 2021.

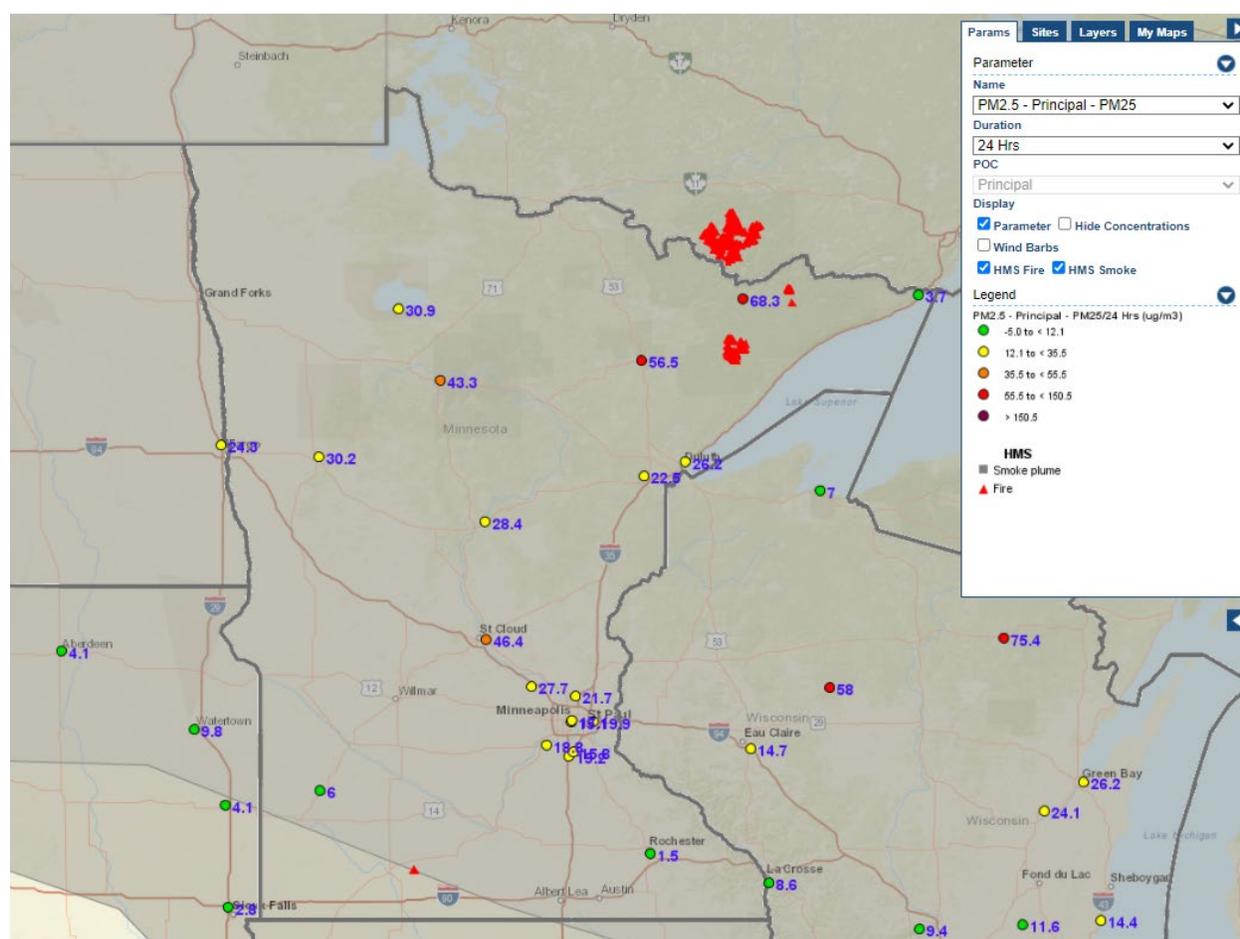
8/26/2021 Impacts

Smoke impacts from wildfires over northeast Minnesota and Quetico Provincial Park.

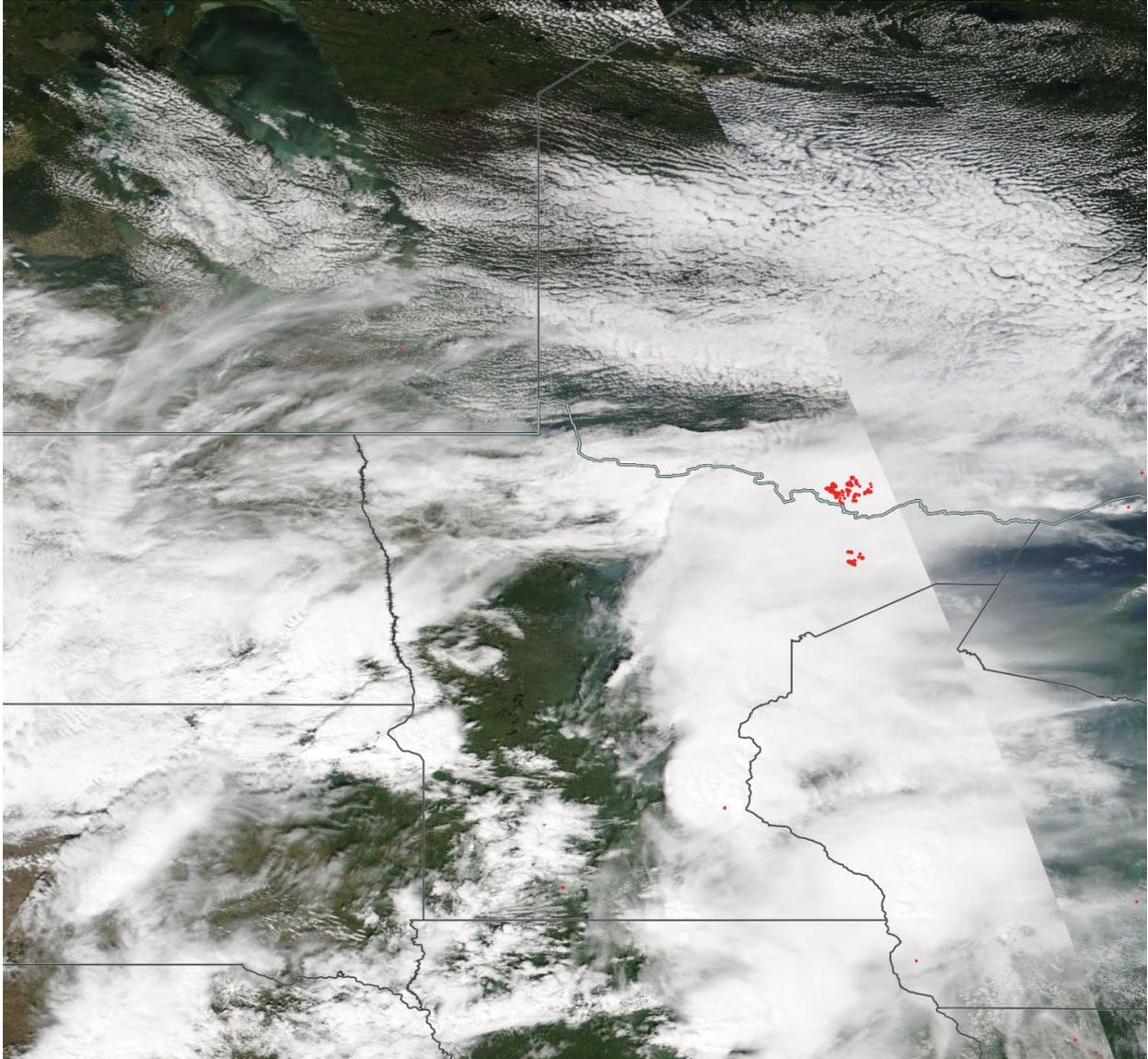
Monitored 24-hour PM_{2.5} concentrations impacted by smoke on August 26, 2021.

Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Apple Valley	270370470	8/26/2021	16.6	47	Northeast MN fires
Blaine	270031002	8/26/2021	21.7	79	Northeast MN fires
Brainerd	270353204	8/26/2021	29.7	127	Northeast MN fires
Detroit Lakes	270052013	8/26/2021	30.3	107	Northeast MN fires
Duluth-WDSE	271377550	8/26/2021		179	Northeast MN fires
Ely	270750005	8/26/2021	74.7	280	Northeast MN fires
Fargo NW	380171004	8/26/2021	24.3	132.3	Northeast MN fires
Fond du Lac	270177417	8/26/2021	25.9	169	Northeast MN fires
Grand Portage	270317810	8/26/2021		43	Northeast MN fires
Lakeville - Near Road	270370480	8/26/2021	19.2	47	Northeast MN fires

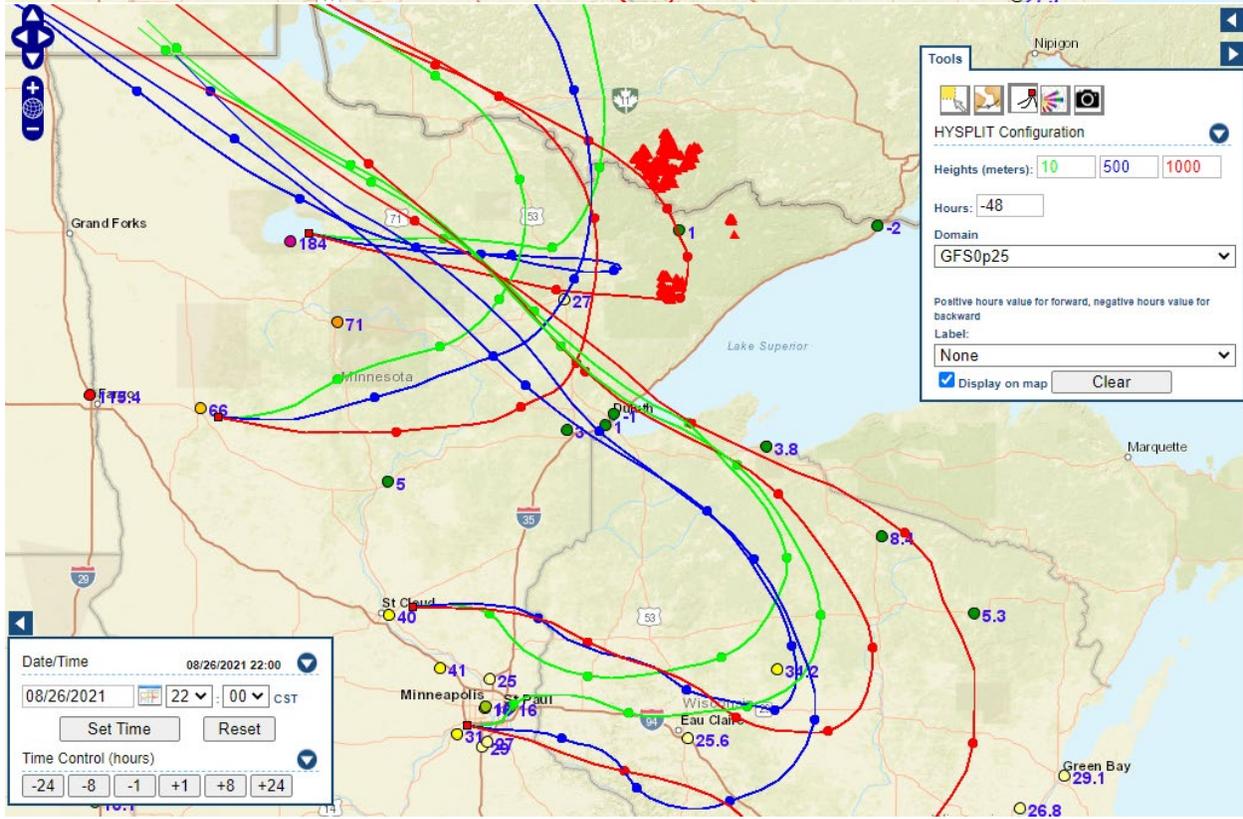
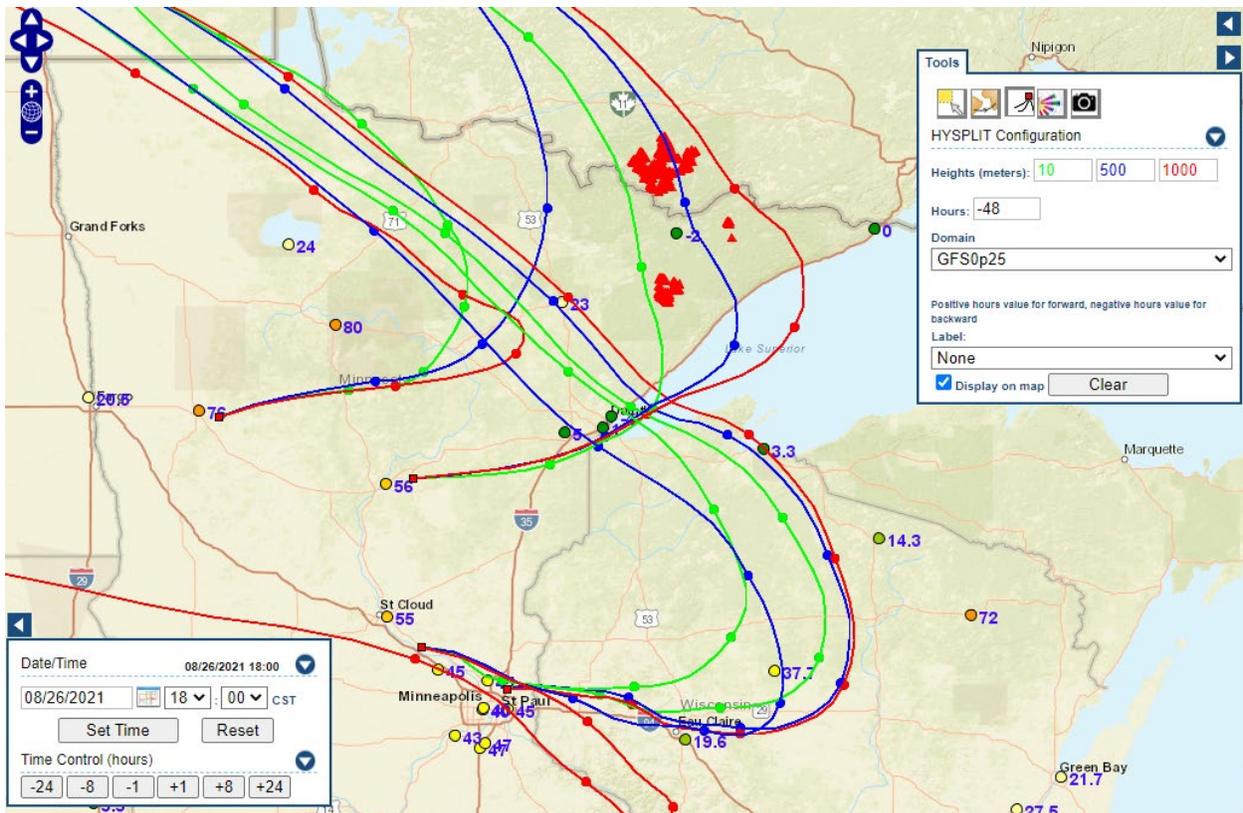
Site	Site AQS	Date (LST)	Daily average ($\mu\text{g}/\text{m}^3$)	Max hour ($\mu\text{g}/\text{m}^3$)	Notes
Leech Lake Nation	270213410	8/26/2021	43.3	130	Northeast MN fires
Minneapolis - Near Road	270530962	8/26/2021	17.1	60	Northeast MN fires
Minneapolis - Phillips	270530963	8/26/2021	17.5	59	Northeast MN fires
Red Lake Nation	270072304	8/26/2021	31.0	184	Northeast MN fires
Shakopee	271390505	8/26/2021	18.8	53	Northeast MN fires
St. Cloud	271453052	8/26/2021	46.5	170	Northeast MN fires
St. Michael	271713201	8/26/2021	27.7	135	Northeast MN fires
St. Paul-Harding	271230871	8/26/2021	20.0	73	Northeast MN fires
Virginia	271377001	8/26/2021	56.5	225	Northeast MN fires
West Duluth	271377554	8/26/2021		74	Northeast MN fires



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on August 26, 2021.



MODIS visible satellite for August 26, 2021.



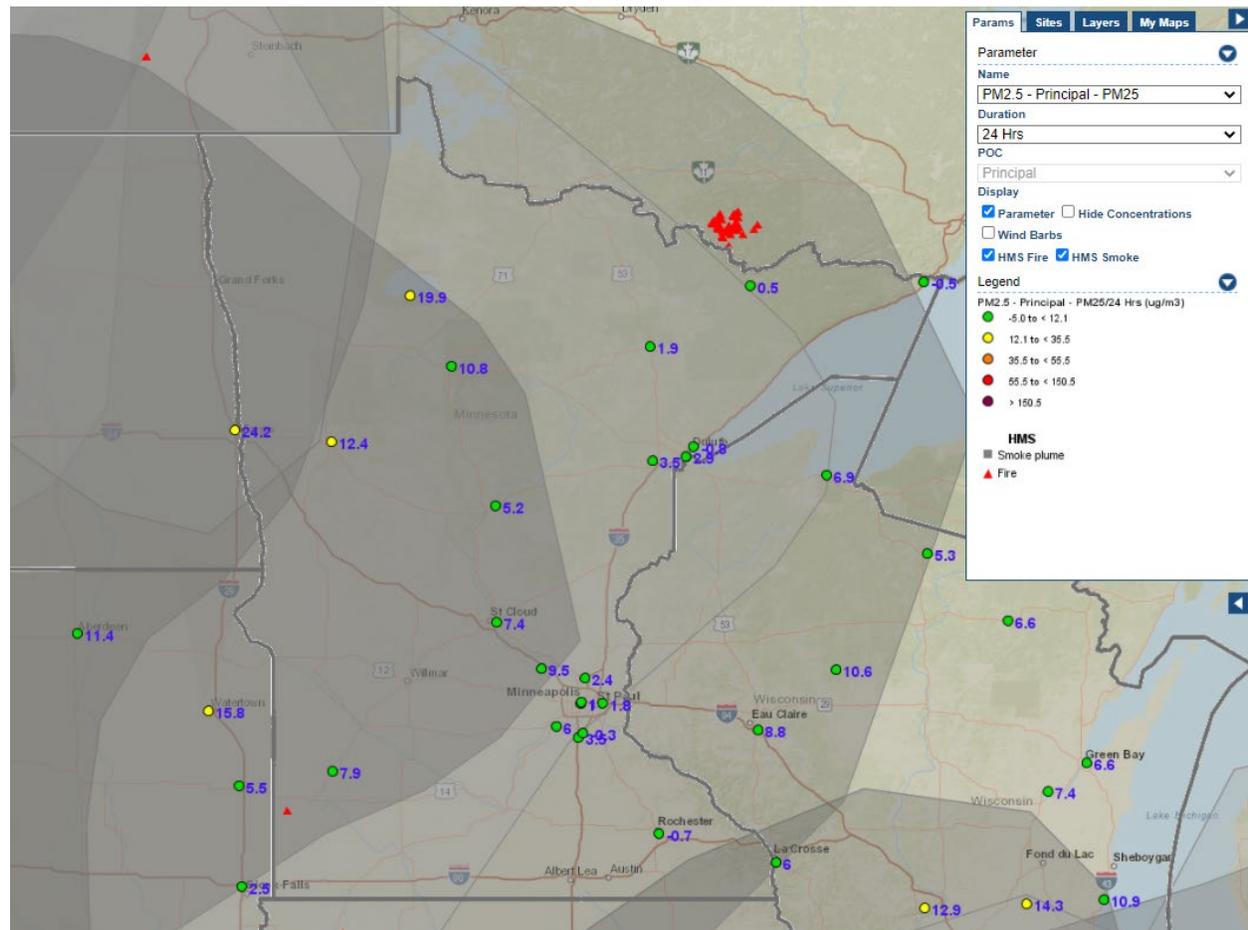
Backward trajectories for August 26, 2021.

8/27/2021 Impacts

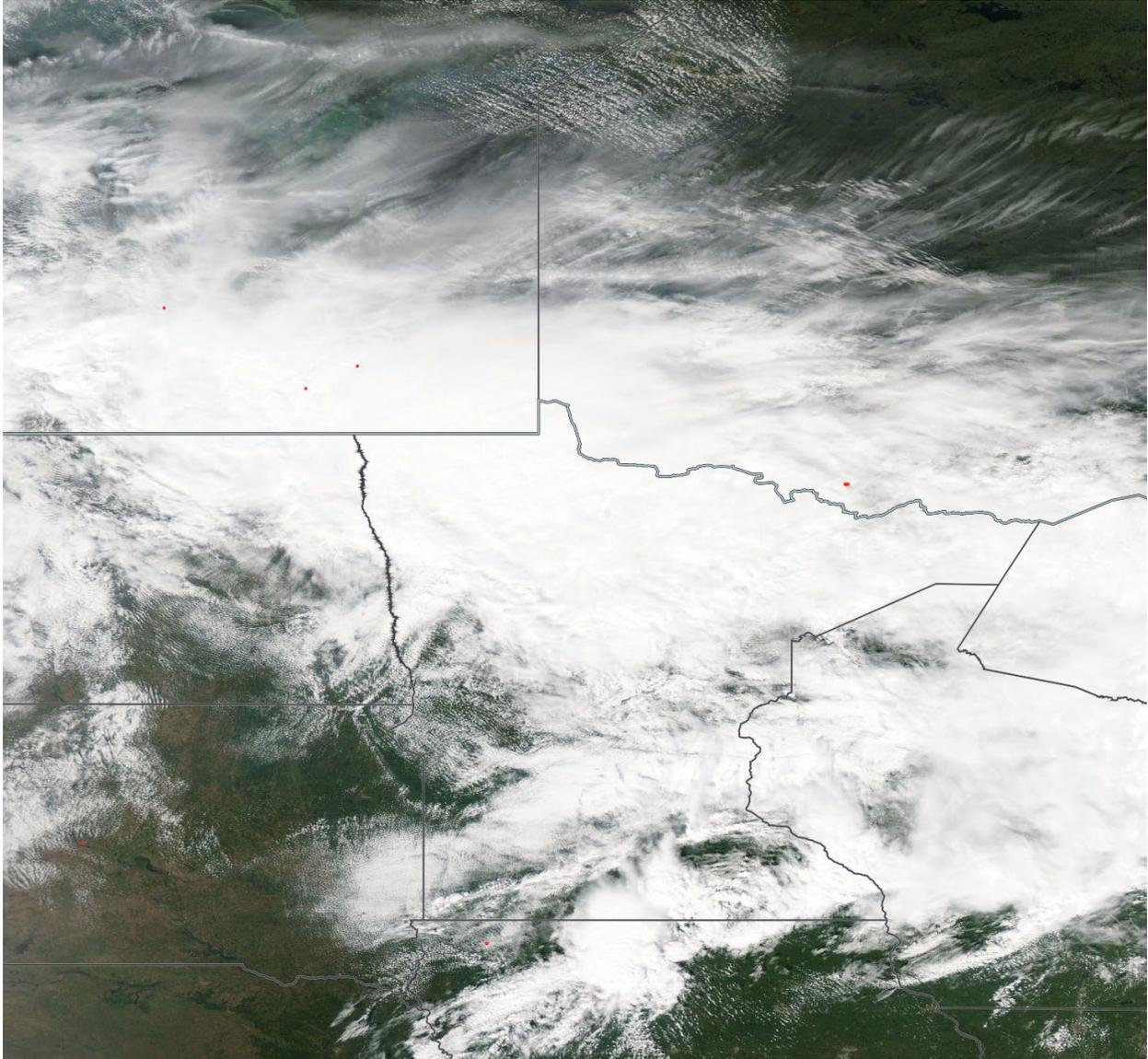
Smoke impacts from wildfires over northeast Minnesota and Quetico Provincial Park.

Monitored 24-hour PM_{2.5} concentrations impacted by smoke on August 27, 2021.

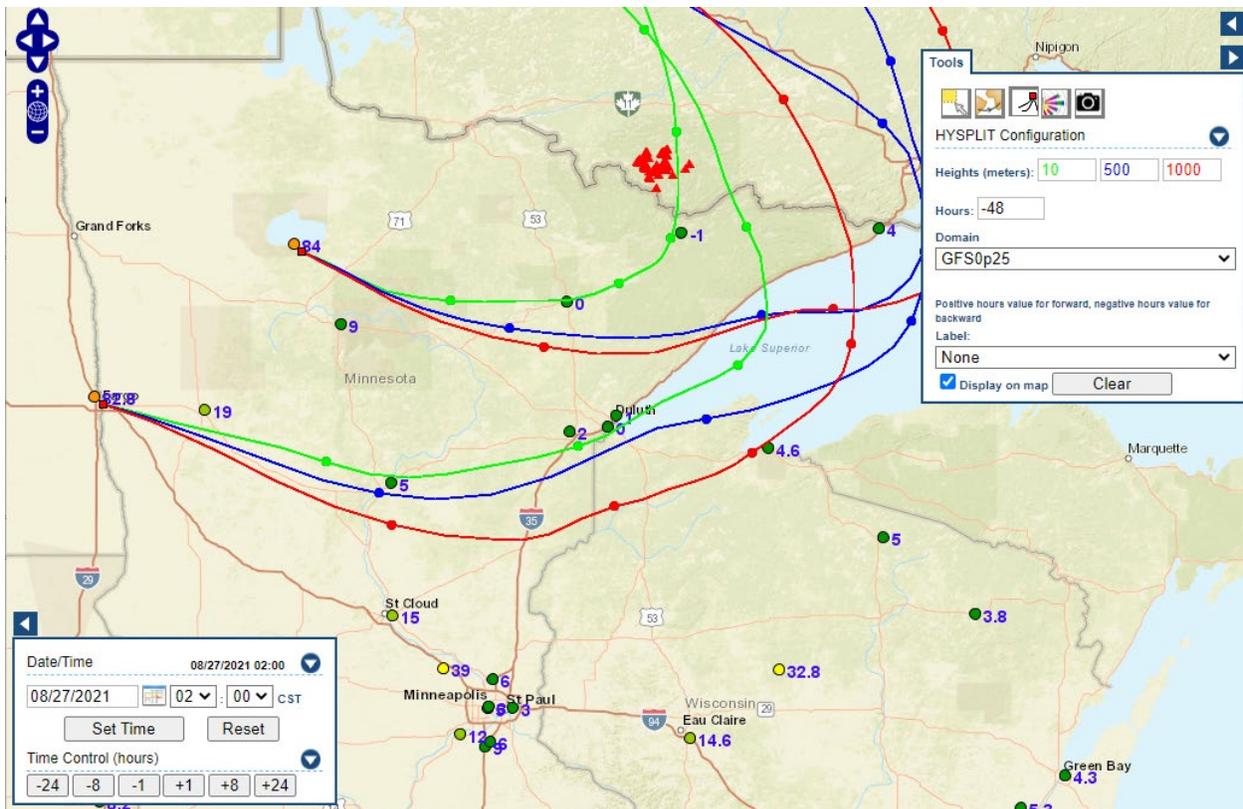
Site	Site AQS	Date (LST)	Daily average (µg/m ³)	Max hour (µg/m ³)	Notes
Fargo NW	380171004	8/27/2021	24.2	132.6	Northeast MN fires
Red Lake Nation	270072304	8/27/2021	20.0	122	Northeast MN fires



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on August 27, 2021.



MODIS visible satellite for August 27, 2021.



Backward trajectories for August 27, 2021.

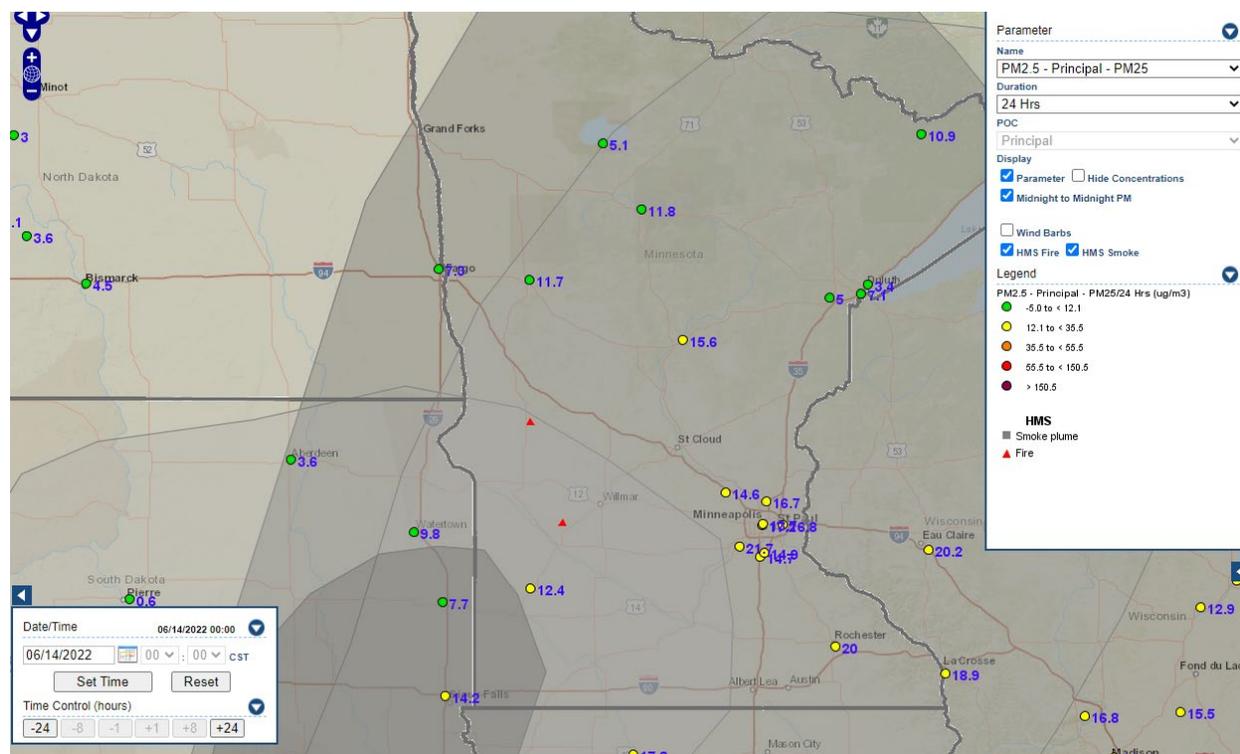
6/14/2022 Impacts

Smoke impacts from wildfires in the southwestern US.

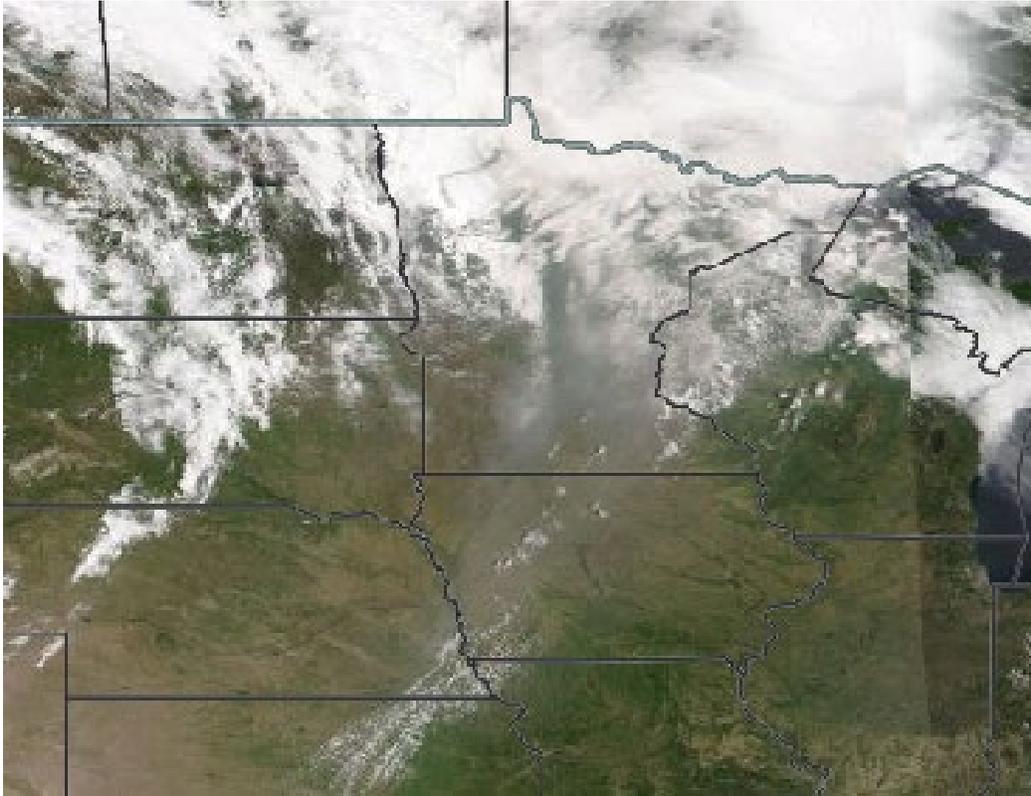
Monitored 24-hour PM_{2.5} concentrations impacted by smoke on June 14, 2022.

Site	Site AQS	Date (LST)	Daily Average (µg/m ³)	Max Hour (µg/m ³)	Notes
Apple Valley	270370470	6/14/2022	14.96	27	Smoke from southwest US wildfires
Blaine	270031002	6/14/2022	16.71	30	Smoke from southwest US wildfires
Brainerd	270353204	6/14/2022	15.63	34	Smoke from southwest US wildfires
Detroit Lakes	270052013	6/14/2022	11.71	28	Smoke from southwest US wildfires
Ely	270750005	6/14/2022	10.91	18	Smoke from southwest US wildfires
LACROSSE DOT	550630012	6/14/2022	18.91	24.3	Smoke from southwest US wildfires

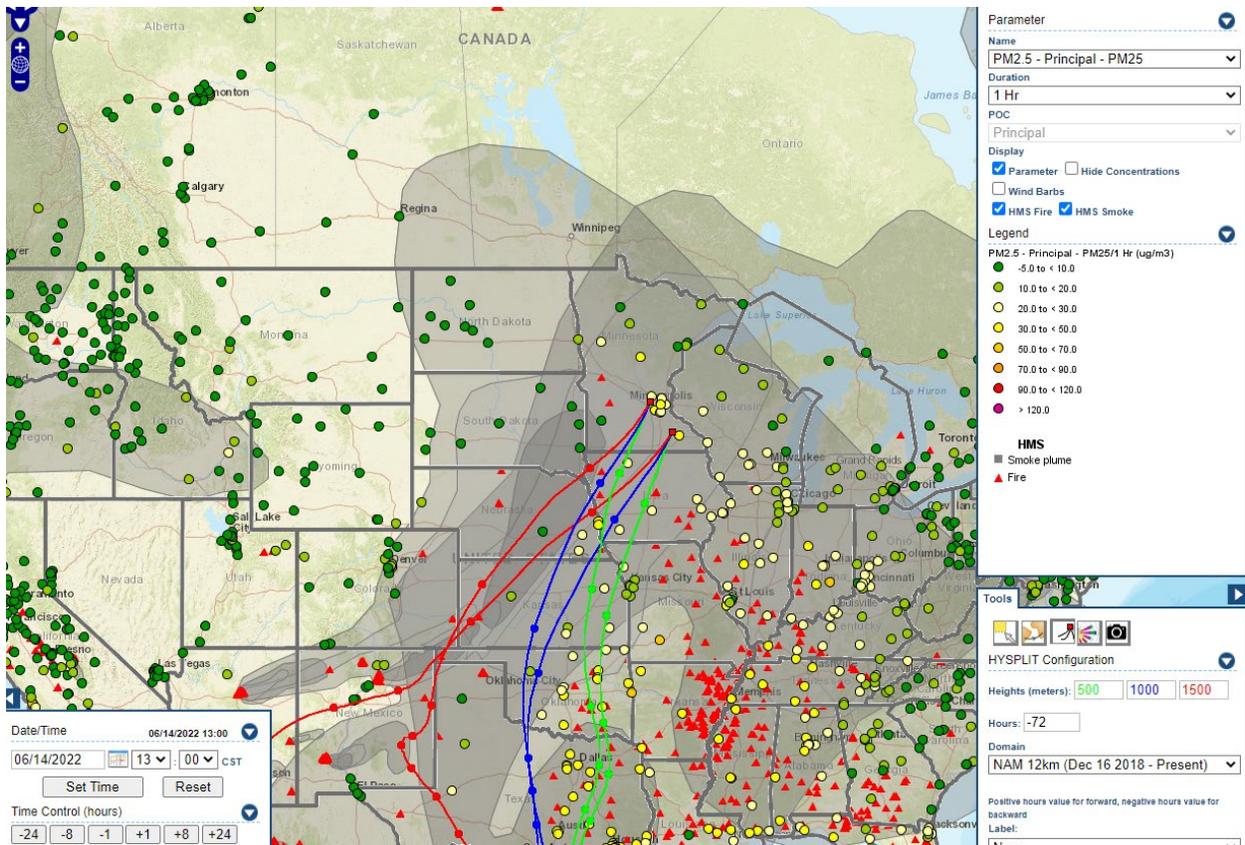
Site	Site AQS	Date (LST)	Daily Average ($\mu\text{g}/\text{m}^3$)	Max Hour ($\mu\text{g}/\text{m}^3$)	Notes
Lakeville – Near Road	270370480	6/14/2022	14.75	29	Smoke from southwest US wildfires
Leech Lake Nation	270213410	6/14/2022	11.83	33	Smoke from southwest US wildfires
Marshall	270834210	6/14/2022	12.42	31	Smoke from southwest US wildfires
Minneapolis - Near Road	270530962	6/14/2022	13.75	27	Smoke from southwest US wildfires
Minneapolis-Phillips	270530963	6/14/2022	17.25	33	Smoke from southwest US wildfires
Rochester	271095008	6/14/2022	20.04	38	Smoke from southwest US wildfires
Shakopee	271390505	6/14/2022	21.77	43	Smoke from southwest US wildfires
St. Michael	271713201	6/14/2022	14.63	29	Smoke from southwest US wildfires
St. Paul-Harding	271230871	6/14/2022	16.87	32	Smoke from southwest US wildfires



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on June 14, 2022



MODIS visible satellite for June 14, 2022



Backward trajectories for June 14, 2022.

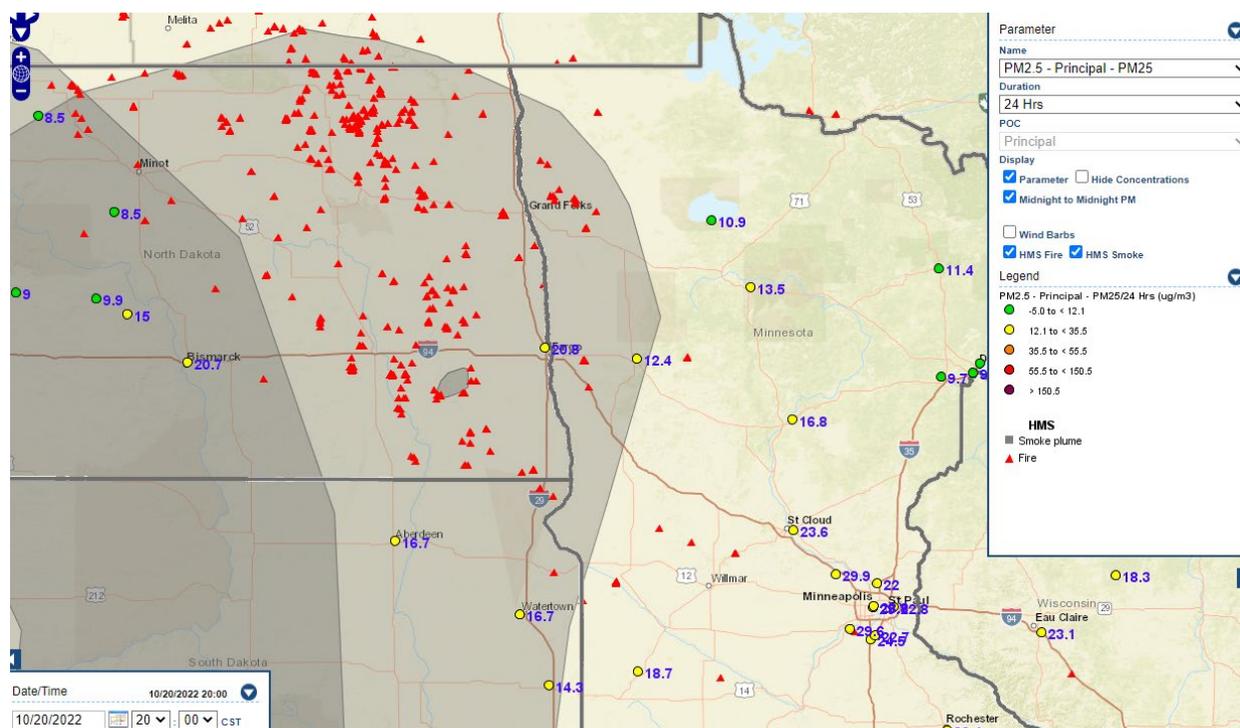
10/20/2022 Impacts

Smoke impacts from wildfires in western Canada. Agricultural and prescribed burning in North Dakota and southern Canada may have also contributed smoke.

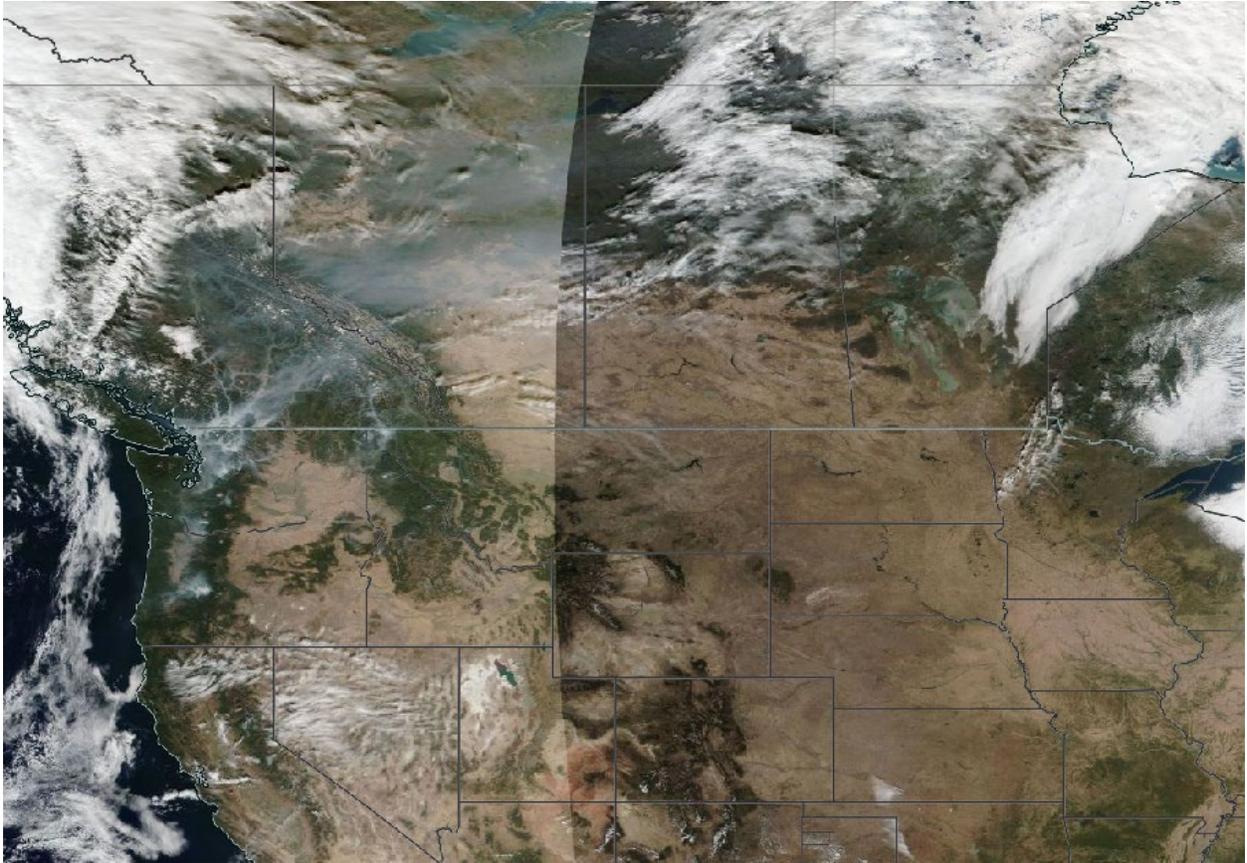
Monitored 24-hour PM_{2.5} concentrations impacted by smoke on October 20, 2022.

Site	Site AQS	Date (LST)	Daily Average (µg/m ³)	Max Hour (µg/m ³)	Notes
Apple Valley	270370470	10/20/2022	14.98	23	Canada Wildfire Smoke
Blaine	270031002	10/20/2022	11.87	20	Canada Wildfire Smoke
Brainerd	270353204	10/20/2022	11.82	18.3	Canada Wildfire Smoke
Detroit Lakes	270052013	10/20/2022	12.82	20	Canada Wildfire Smoke
Fargo NW	380171004	10/20/2022	31.78	45.1	Canada Wildfire Smoke
LACROSSE DOT	550630012	10/20/2022	13.47	18.5	Canada Wildfire Smoke
Lakeville – Near Road	270370480	10/20/2022	15.74	26.6	Canada Wildfire Smoke
Leech Lake Nation	270213410	10/20/2022	13.21	19	Canada Wildfire Smoke
Marshall	270834210	10/20/2022	17.54	27	Canada Wildfire Smoke

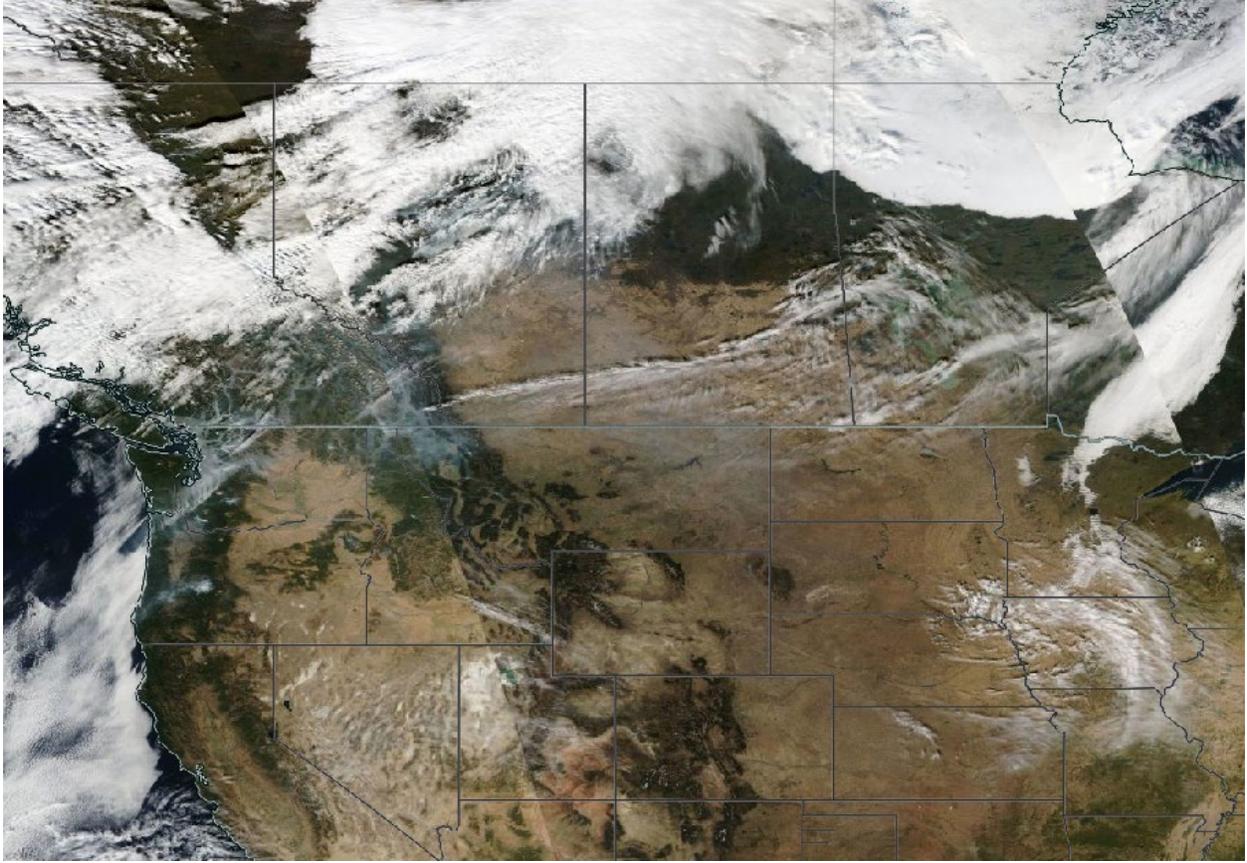
Site	Site AQS	Date (LST)	Daily Average ($\mu\text{g}/\text{m}^3$)	Max Hour ($\mu\text{g}/\text{m}^3$)	Notes
Minneapolis - Near Road	270530962	10/20/2022	19.22	72.4	Canada Wildfire Smoke
Minneapolis-Phillips	270530963	10/20/2022	16.37	25.9	Canada Wildfire Smoke
Red Lake Nation	270072304	10/20/2022	9.38	17	Canada Wildfire Smoke
Rochester	271095008	10/20/2022	17.93	32.3	Canada Wildfire Smoke
Shakopee	271390505	10/20/2022	17.3	26.9	Canada Wildfire Smoke
St. Cloud	271453052	10/20/2022	14.64	26.8	Canada Wildfire Smoke
St. Michael	271713201	10/20/2022	14.77	24.4	Canada Wildfire Smoke
St. Paul-Harding	271230871	10/20/2022	12.46	21	Canada Wildfire Smoke



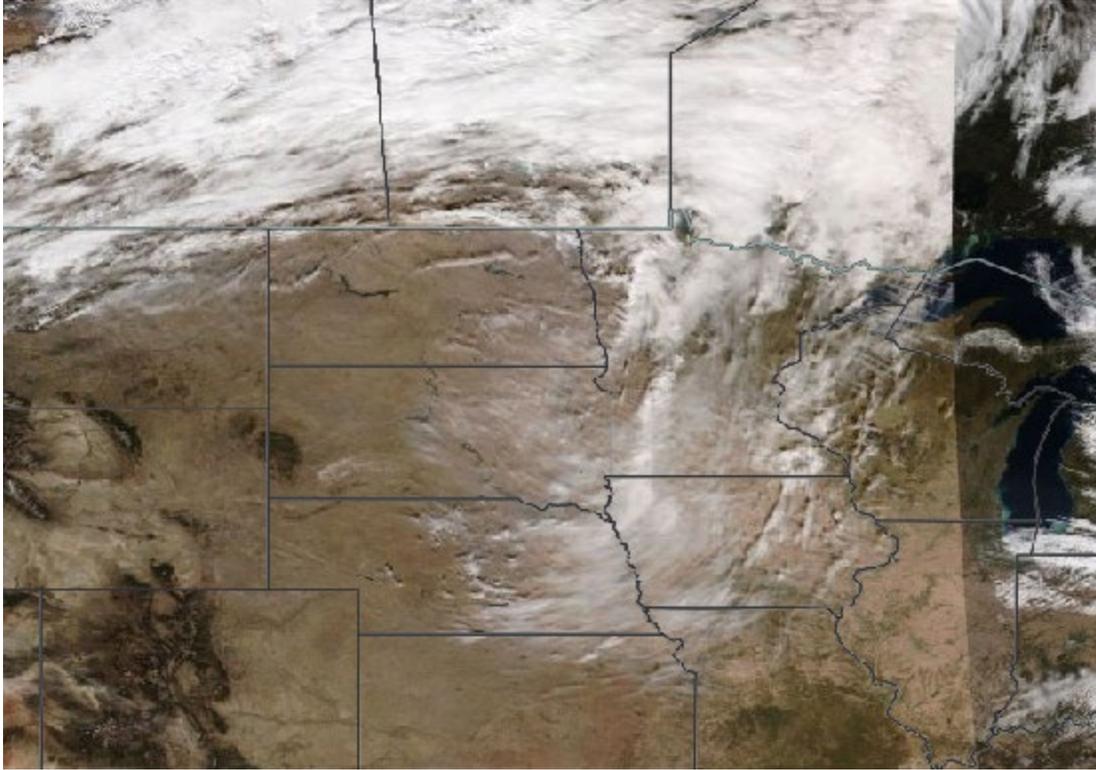
Analyzed smoke, hotspots, and 24-hour PM_{2.5} on October 20, 2022



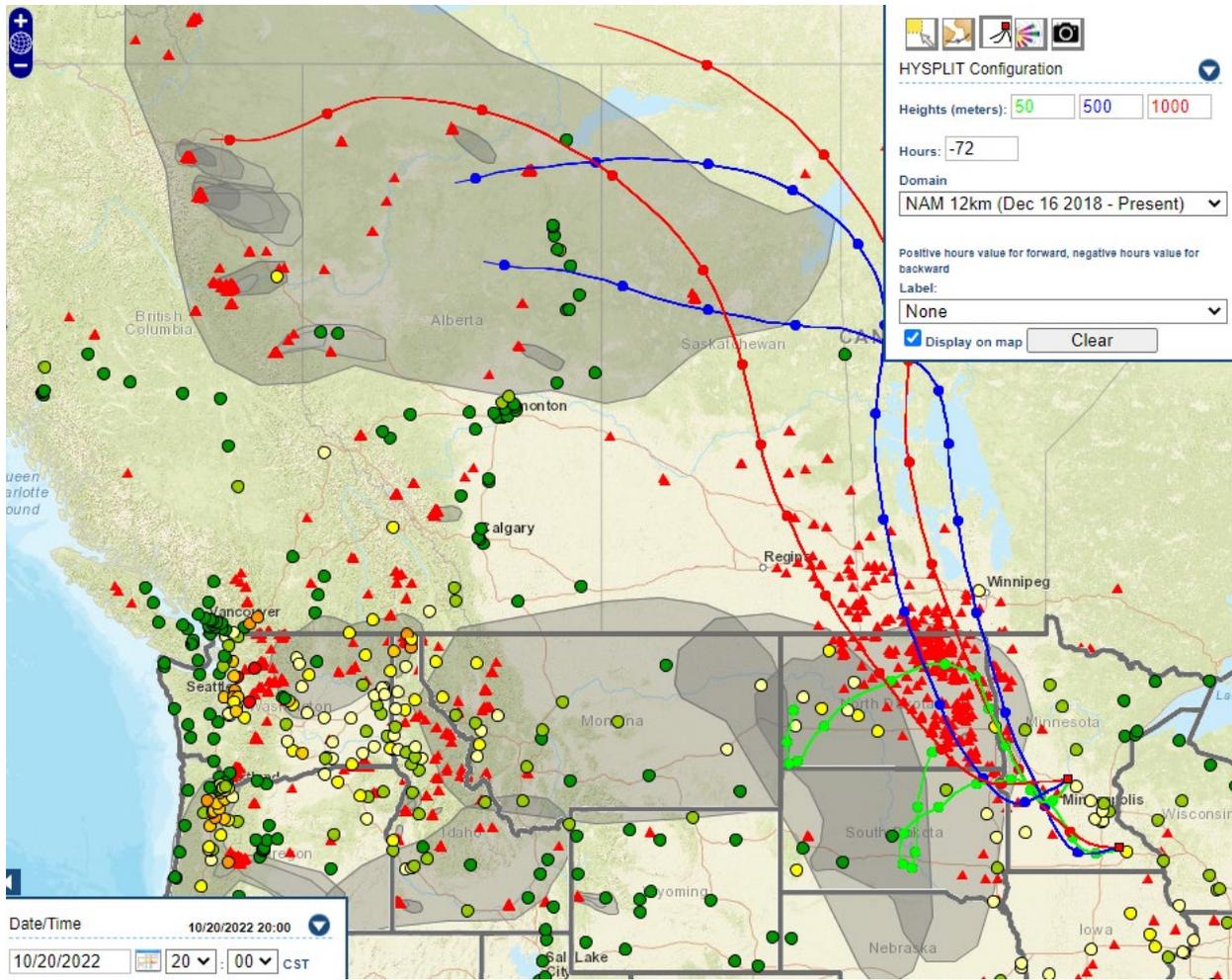
MODIS visible satellite for October 18, 2022



MODIS visible satellite for October 19, 2022



MODIS visible satellite for October 20, 2022



Backward trajectories for October 20, 2022.

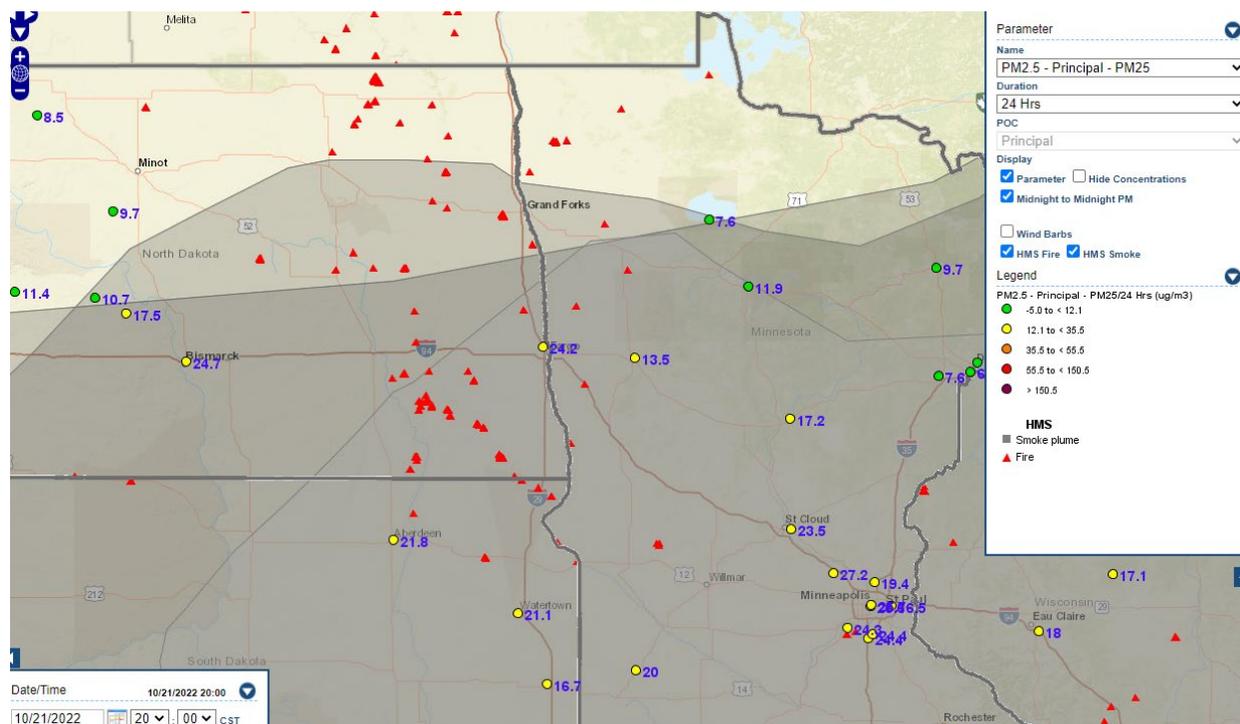
10/21/2022 Impacts

Smoke impacts from wildfires in western Canada. Agricultural and prescribed burning in North Dakota and southern Canada may have also contributed smoke.

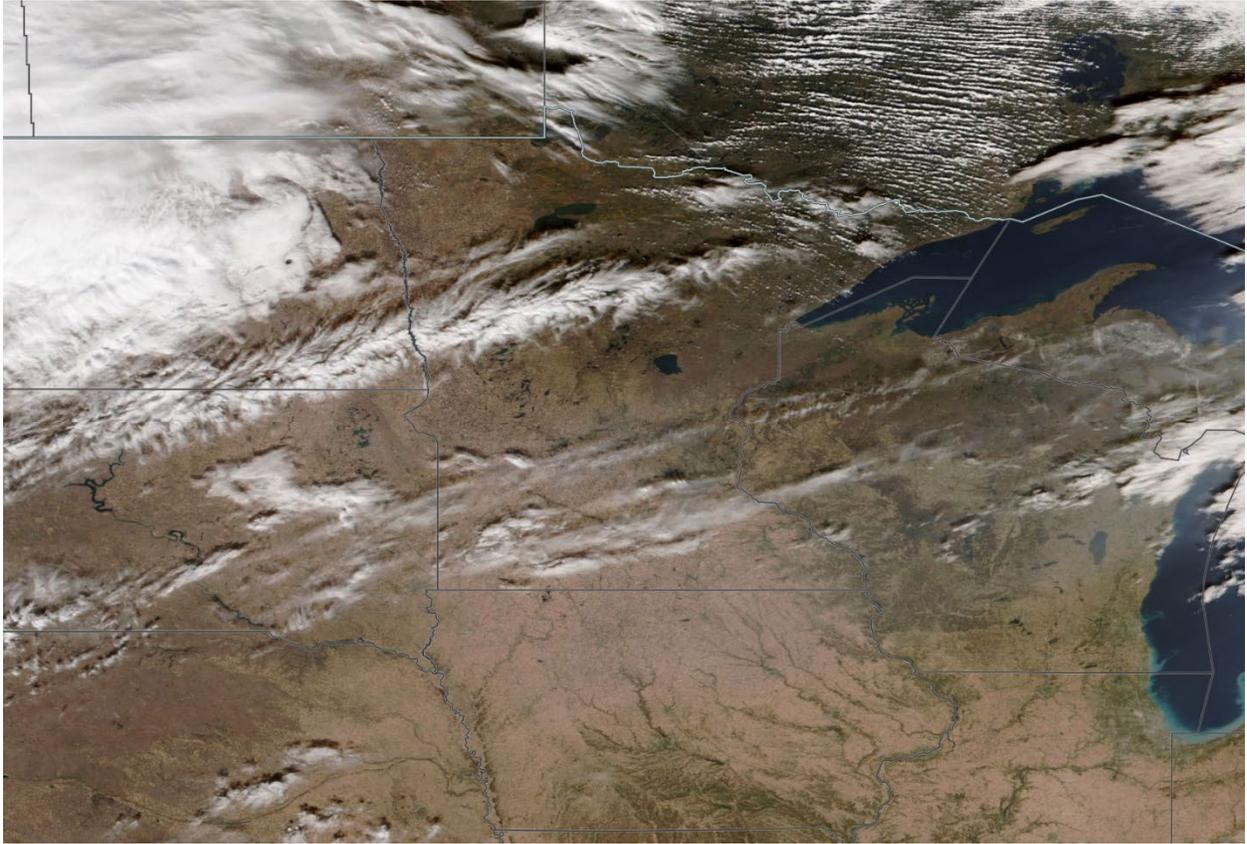
Monitored 24-hour PM_{2.5} concentrations impacted by smoke on October 21, 2022.

Site	Site AQS	Date (LST)	Daily Average (µg/m ³)	Max Hour (µg/m ³)	Notes
Apple Valley	270370470	10/21/2022	22.78	34.3	Canada Wildfire Smoke
Blaine	270031002	10/21/2022	22.08	45	Canada Wildfire Smoke
Brainerd	270353204	10/21/2022	16.82	25.3	Canada Wildfire Smoke
Detroit Lakes	270052013	10/21/2022	12.42	25	Canada Wildfire Smoke
Duluth-WDSE	271377550	10/21/2022	12.04	41	Canada Wildfire Smoke
Ely	270750005	10/21/2022	9	19	Canada Wildfire Smoke

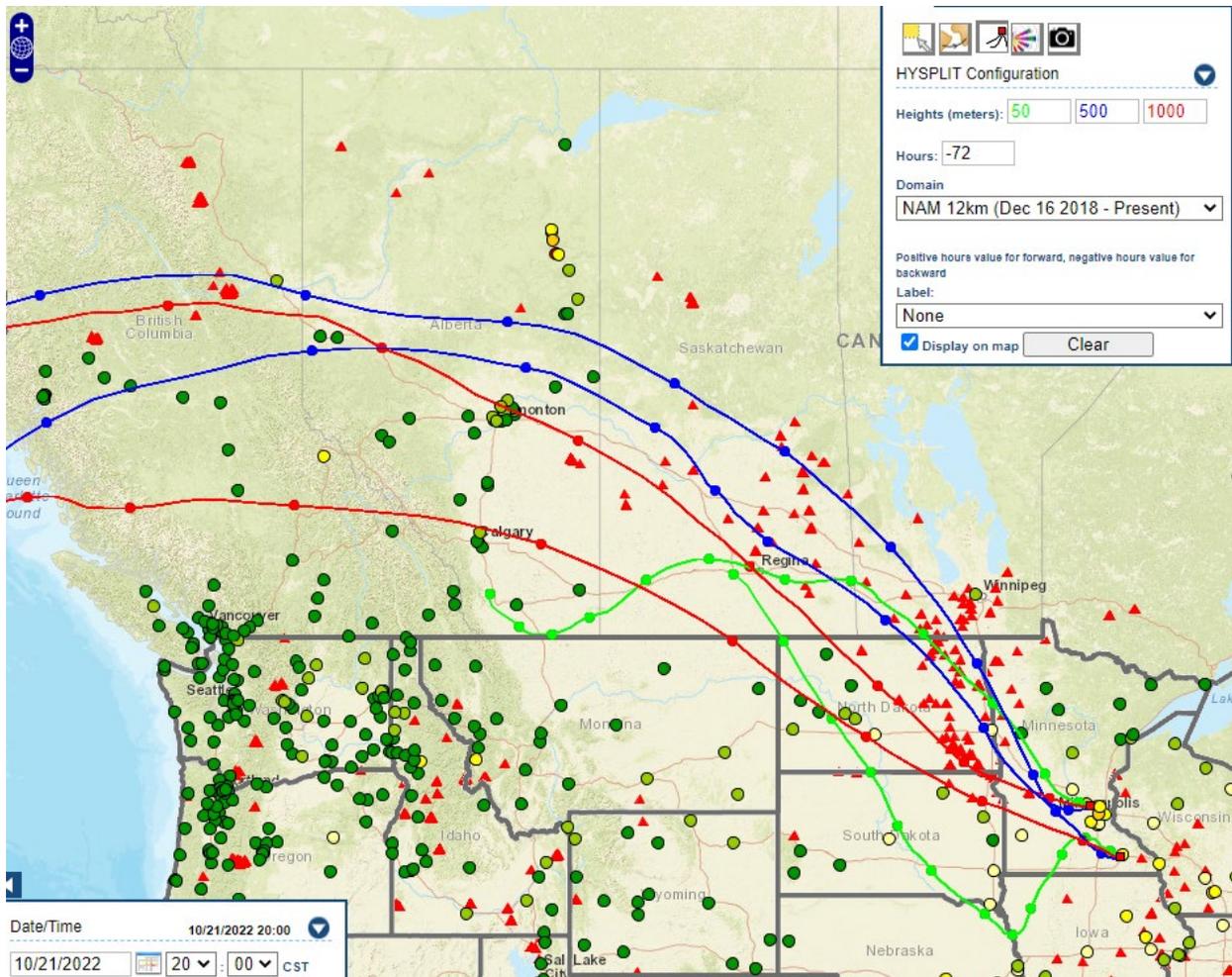
Site	Site AQS	Date (LST)	Daily Average ($\mu\text{g}/\text{m}^3$)	Max Hour ($\mu\text{g}/\text{m}^3$)	Notes
Fargo NW	380171004	10/21/2022	20.85	31	Canada Wildfire Smoke
Fond du Lac	270177417	10/21/2022	9.79	18	Canada Wildfire Smoke
Grand Portage	270317810	10/21/2022	3.92	16	Canada Wildfire Smoke
LACROSSE DOT	550630012	10/21/2022	27.2	48.8	Canada Wildfire Smoke
Lakeville – Near Road	270370480	10/21/2022	24.58	31.6	Canada Wildfire Smoke
Leech Lake Nation	270213410	10/21/2022	13.5	27	Canada Wildfire Smoke
Marshall	270834210	10/21/2022	18.79	26	Canada Wildfire Smoke
Minneapolis - Near Road	270530962	10/21/2022	28.81	52.6	Canada Wildfire Smoke
Minneapolis-Phillips	270530963	10/21/2022	29.78	53.4	Canada Wildfire Smoke
Red Lake Nation	270072304	10/21/2022	10.92	29	Canada Wildfire Smoke
Rochester	271095008	10/21/2022	30.45	44.3	Canada Wildfire Smoke
Shakopee	271390505	10/21/2022	29.62	57.5	Canada Wildfire Smoke
St. Cloud	271453052	10/21/2022	23.68	27.7	Canada Wildfire Smoke
St. Michael	271713201	10/21/2022	29.92	51.1	Canada Wildfire Smoke
St. Paul-Harding	271230871	10/21/2022	22.88	54	Canada Wildfire Smoke
Virginia	271377001	10/21/2022	11.46	21	Canada Wildfire Smoke
West Duluth	271377554	10/21/2022	9.83	21	Canada Wildfire Smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on October 21, 2022



MODIS visible satellite for October 21, 2022



Backward trajectories for October 21, 2022.

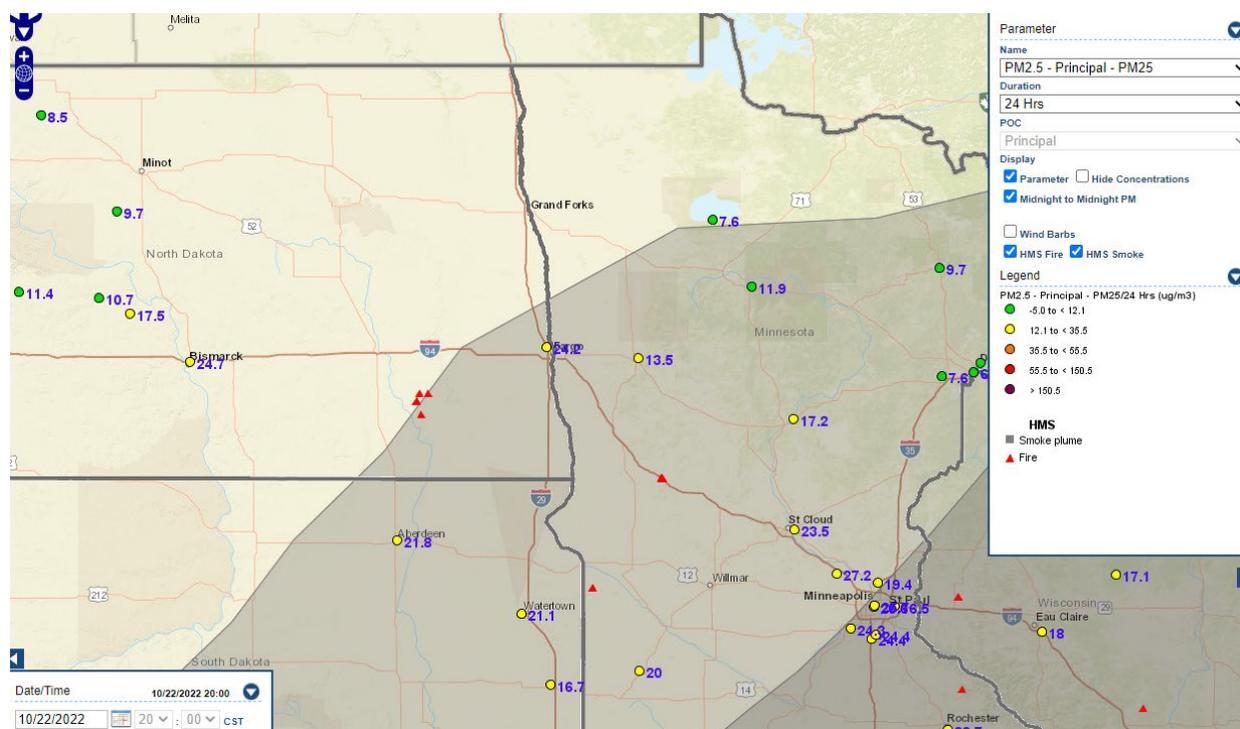
10/22/2022 Impacts

Smoke impacts from wildfires in western Canada. Agricultural and prescribed burning in North Dakota and southern Canada may have also contributed smoke.

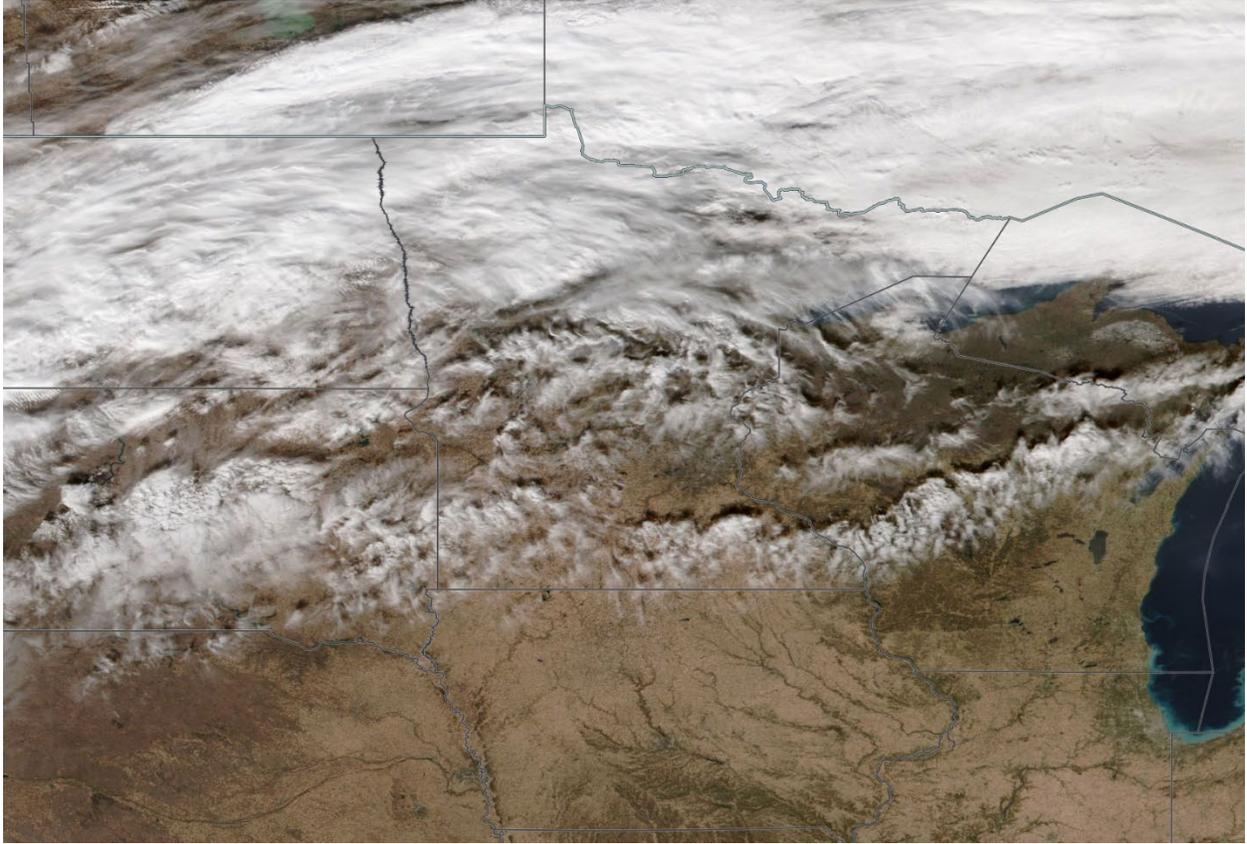
Monitored 24-hour PM_{2.5} concentrations impacted by smoke on October 22, 2022.

Site	Site AQS	Date (LST)	Daily Average (µg/m ³)	Max Hour (µg/m ³)	Notes
Apple Valley	270370470	10/22/2022	24.41	32.3	Canada Wildfire Smoke
Blaine	270031002	10/22/2022	19.46	35	Canada Wildfire Smoke
Brainerd	270353204	10/22/2022	17.25	21.8	Canada Wildfire Smoke
Detroit Lakes	270052013	10/22/2022	13.5	19	Canada Wildfire Smoke
Fargo NW	380171004	10/22/2022	24.2	31.8	Canada Wildfire Smoke
LACROSSE DOT	550630012	10/22/2022	19.17	33.7	Canada Wildfire Smoke

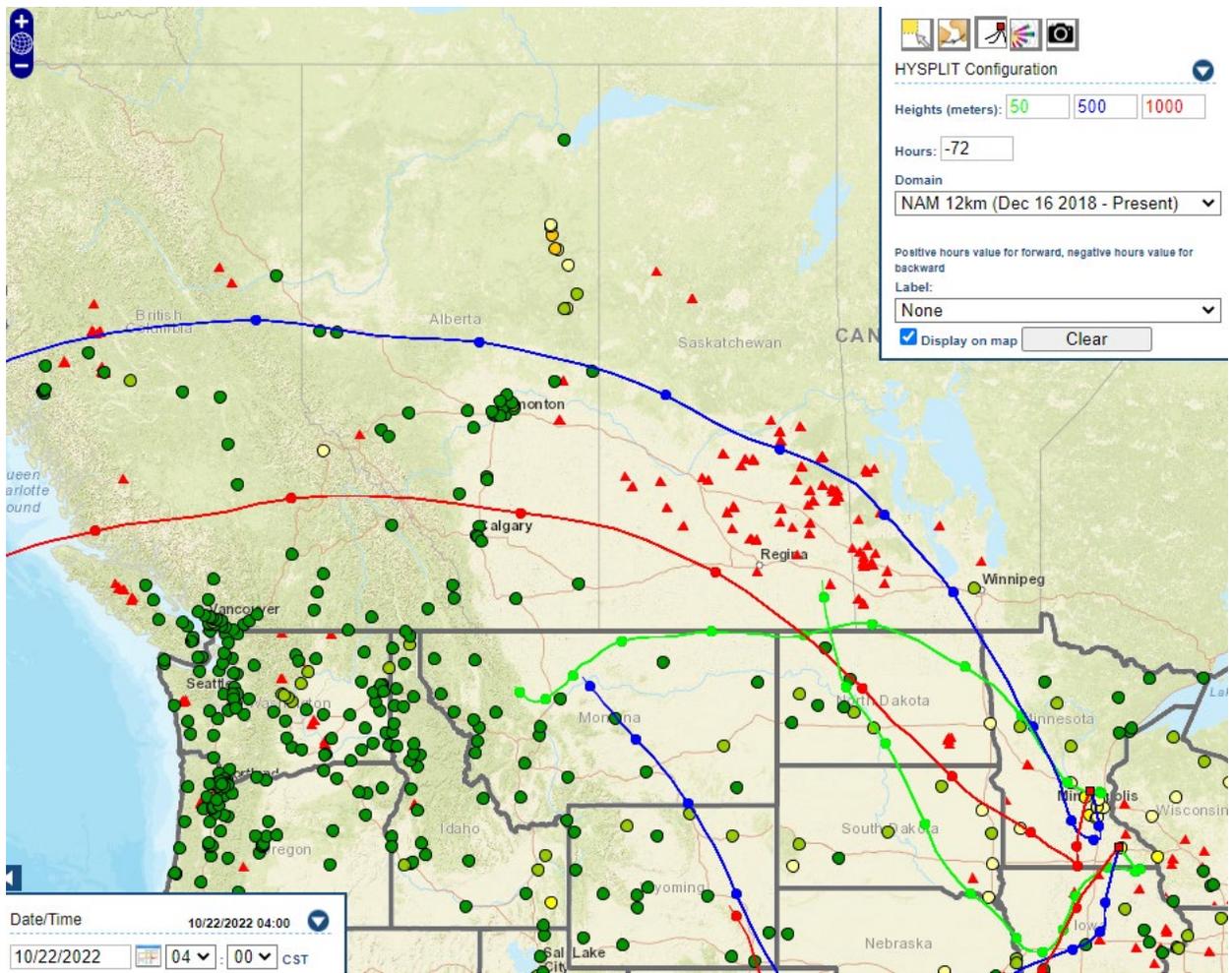
Site	Site AQS	Date (LST)	Daily Average ($\mu\text{g}/\text{m}^3$)	Max Hour ($\mu\text{g}/\text{m}^3$)	Notes
Lakeville – Near Road	270370480	10/22/2022	24.4	36.9	Canada Wildfire Smoke
Leech Lake Nation	270213410	10/22/2022	11.96	18	Canada Wildfire Smoke
Marshall	270834210	10/22/2022	20.04	32	Canada Wildfire Smoke
Minneapolis - Near Road	270530962	10/22/2022	25.79	44.8	Canada Wildfire Smoke
Minneapolis-Phillips	270530963	10/22/2022	26.61	43.1	Canada Wildfire Smoke
Rochester	271095008	10/22/2022	22.75	39	Canada Wildfire Smoke
Shakopee	271390505	10/22/2022	24.34	37.5	Canada Wildfire Smoke
St. Cloud	271453052	10/22/2022	23.56	40.1	Canada Wildfire Smoke
St. Michael	271713201	10/22/2022	27.29	46.3	Canada Wildfire Smoke
St. Paul-Harding	271230871	10/22/2022	16.5	35	Canada Wildfire Smoke



Analyzed smoke, hotspots, and 24-hour PM_{2.5} on October 22, 2022



MODIS visible satellite for October 22, 2022



Backward trajectories for October 22, 2022.