

Appendix A

Local PM₁₀ Observed Concentrations from Transported Particles of a Saharan Dust Storm

August 1, 2024

Summary of the Event

On August 1, 2024, dust that originated from Saharan Desert dust storms and was transported across the Atlantic Ocean arrived over the Memphis TN-AR-MS CBSA (as well as other portions of the southeastern United States). The report within Appendix A will illustrate how the air parcel carrying the enormous amount of particulate matter moved into the Memphis TN-AR-MS CBSA and impacted the monitors. The report will place a significant focus on the Teledyne-API T640x continuous PM_{2.5}/PM₁₀/PM coarse air monitor at Shelby Farms (NCore) in Memphis, TN. The PM₁₀ monitor recorded a daily average of 148 µg/m³ on 8/1/2024, which is 98.7% of the PM₁₀ NAAQS. Although this day did not show regulatory significance, there was reason to focus on the value of that day, as the causation was beyond the control of the Shelby County Health Department. According to 40 CFR Part 58 Appendix D, a medium concentration (>80% of the NAAQS) of PM₁₀ would require a CBSA with a population over 1 million to operate monitors. Currently, there are two PM₁₀ monitors in the Memphis TN-AR-MS CBSA with a third planning to be installed later this year at the Macon Cove (Near Road) site in Memphis, TN. The Shelby County Health Department plans to show that the event on August 1, 2024 was beyond regulatory control and is requesting the EPA to waive the requirement for a fourth PM₁₀ monitoring site.

In mid-July of 2024, a series of large dust storms created several dust parcels that moved off the coast of western Africa and were carried by strong mid- and high tropospheric jet streams toward North America. Satellite images within Appendix A will illustrate the progression of the air parcels carrying vast amounts of dust. These air parcels moved into the Caribbean Sea and were carried northwest toward the Texas coastline where they wrapped around a high-pressure system as they impacted the Gulf Coast before moving inland over Louisiana before affecting the Memphis TN-AR-MS CBSA. The high pressure not only steered the parcels, but pulled them closer to the surface of the Earth.

In addition to the satellite images, AirNOW average PM_{2.5} concentration graphics (along with AQI color categories) were used to show how the air parcels affected the monitor concentrations along the trajectory, as widespread PM₁₀ continuous data is not reported on the AirNow site to the same degree as PM_{2.5}. A 48-hour HYSPLIT back-trajectory model was also used to show the path of the air parcel that affected Memphis on 8/1/2024. Since there are continuous PM₁₀ air monitors in the Memphis TN-AR-MS CBSA that report data to the AirNOWTech system, PM_{2.5} data from the metro sites (Shelby Farms along with Marion, AR and Hernando, MS) are displayed to represent the changes in particulate matter concentrations associated with the

movement of the air parcel. AirVision charts showing the concurrent PM₁₀ hourly data from Shelby Farms prior, during, and after the event occurred are placed adjacent to the PM_{2.5} AirNowTech charts.

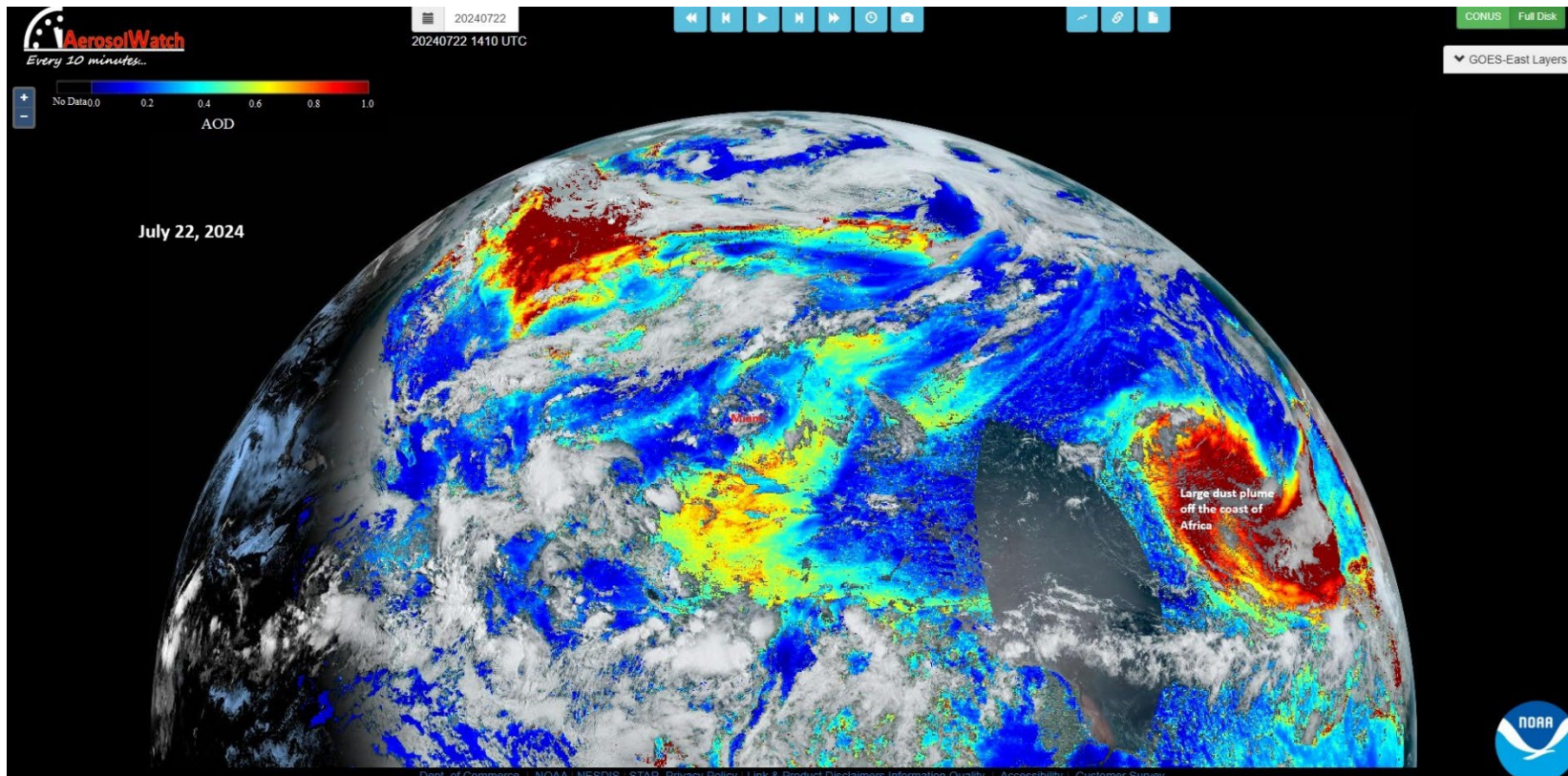
All values are measured in micrograms/cubic meter (µg/m³)-24-hr-**1st MAX**

Year	GSC PM10- Max	Fite Rd. PM10-Max	Alabama Ave. PM10-Max	Shelby Farms PM10-Max	PM 10 NAAQS
2008	61	53			150
2009	36	59			150
2010	42	58			150
2011	35	58			150
2012	31	59			150
2013	52		59		150
2014	37		61		150
2015	82		70		150
2016	54		55		150
2017				34	150
2018			96	71	150
2019			58	38	150
2020			116	60	150
2021			61	41	150
2022			110	103	150
2023			72	92	150
2024			118	148	150

Appendix A-Table 1. Historic PM₁₀ 24-hr Maximum average concentrations per site per year

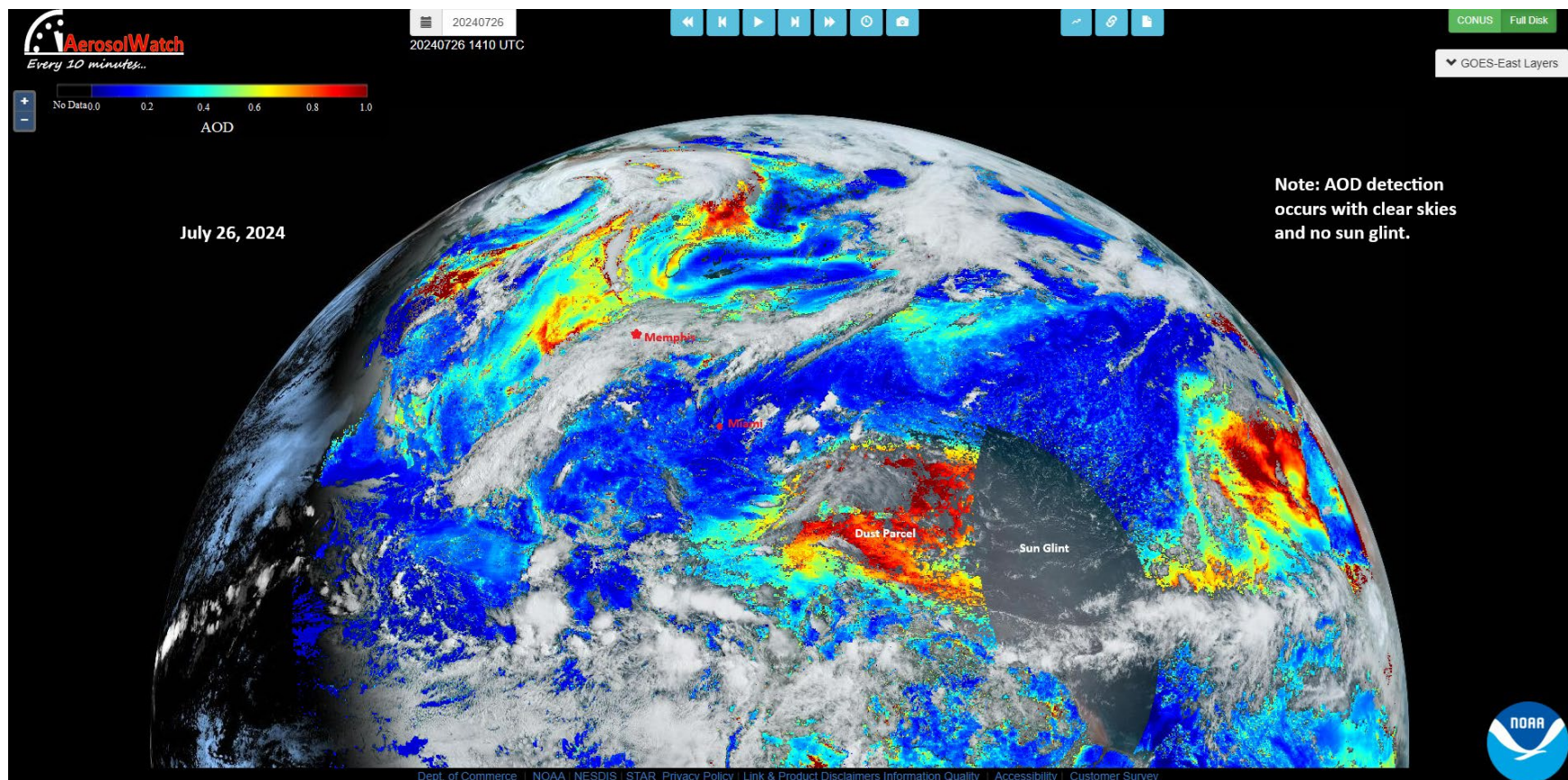
As seen in Appendix A-Table 1, there were no 24-hr daily average values over $120 \mu\text{g}/\text{m}^3$ in Shelby County from 2008-2023. The 2024 maximum 24-hr daily average of $118 \mu\text{g}/\text{m}^3$ occurred on the same day as the maximum 24-hr daily average at Shelby Farms (NCore) on August 1, 2024. The other 24-hr daily averages that exceeded $100 \mu\text{g}/\text{m}^3$ in 2020 and 2022 also derived from Saharan dust storms.

The series of massive dust storms over Africa began during mid-July of 2024. By July 22nd, the large air parcel containing a massive amount of dust particles was well off the coast of West Africa moving east across the Atlantic Ocean. It would arrive in the Memphis area starting July 31st and peaking on August 1st before moving out of the area by late morning/early afternoon on August 2nd.

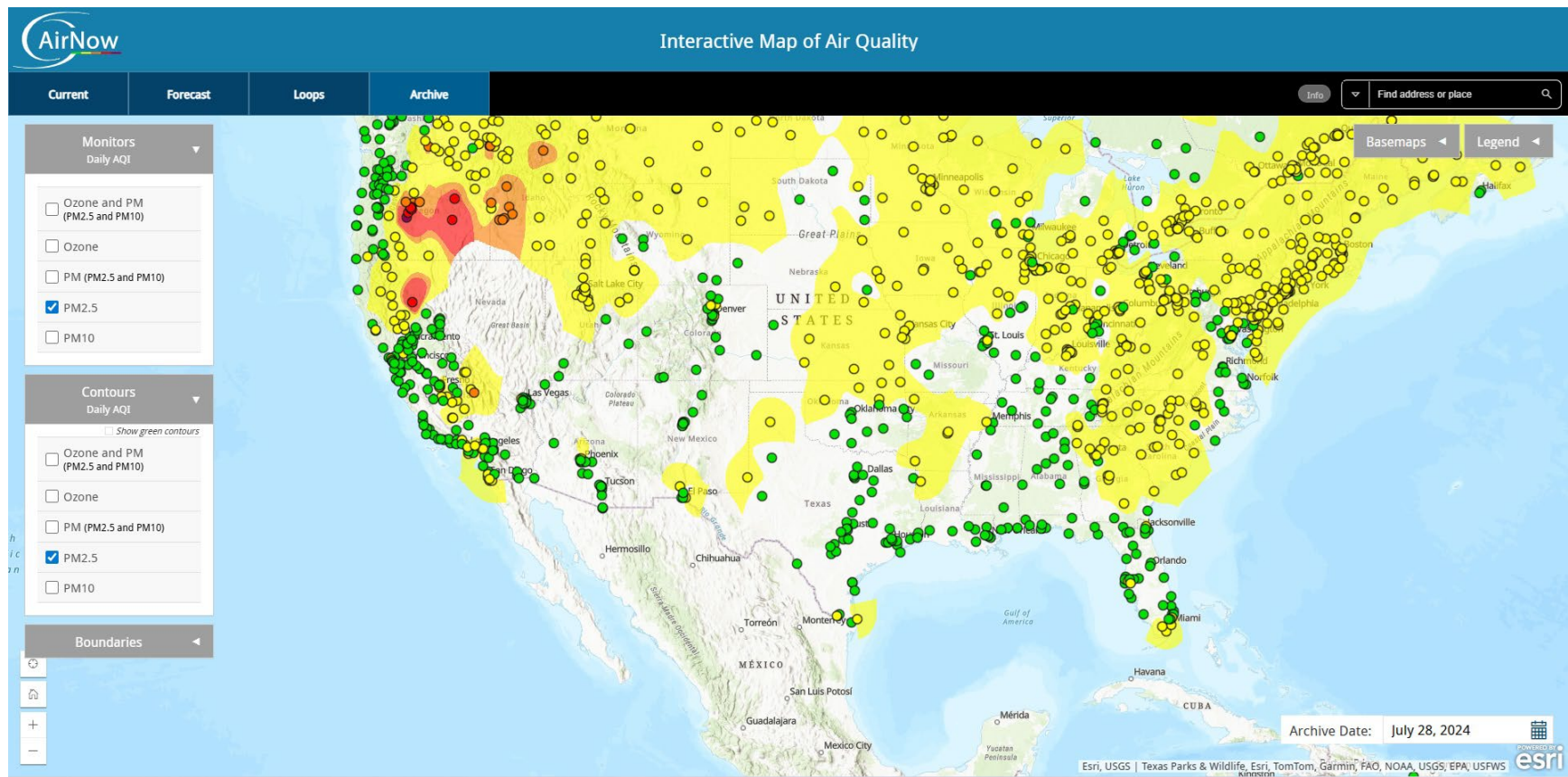


Appendix A-Figure 1. Satellite imagery displaying Aerosol Optical Depth (AOD) of a large air parcel carrying a massive amount of particulate matter off the west coast of Africa on July 22, 2024 at 1410 UTC (810 CST). The semi-circle pattern to the west of the plume is a combination of the shadow of the sun, and the glint of the sunlight off the open water.

By July 26th, 2024, the dust storm air parcel had moved into the Caribbean Sea affecting the Lesser and Greater Antilles. The sun shadow with the sunlight glint prevents the AOD sensors from any detection. The sensors are also unable to detect AOD through cloud cover.

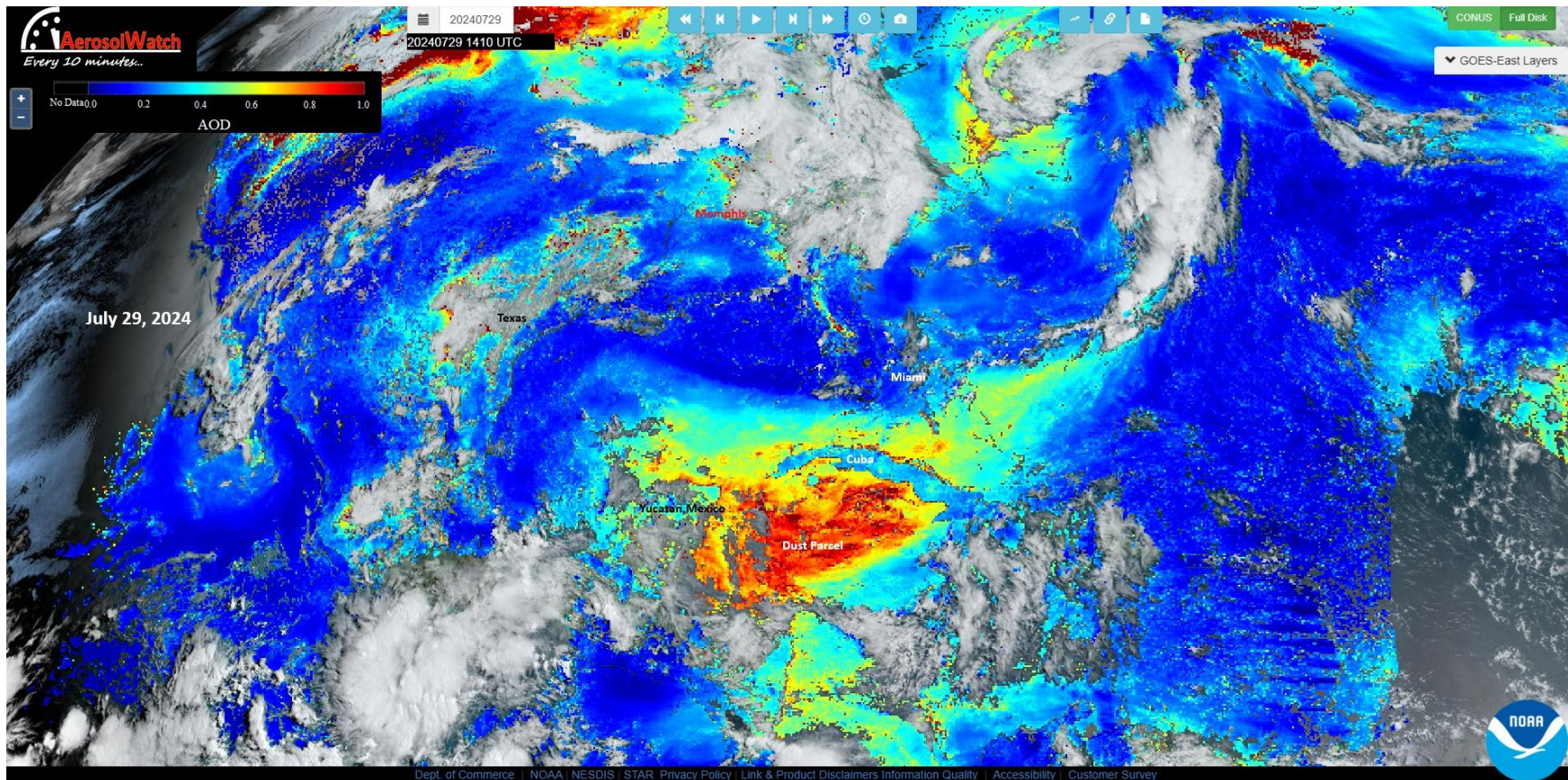


Appendix A-Figure 2. Satellite imagery displaying Aerosol Optical Depth (AOD) of the large particulate-laden air parcel over the eastern Caribbean Sea on July 26, 2024 at 1410 UTC (810 CST).



Appendix A-Figure 3. Average 24-hr daily PM_{2.5} AQI concentrations on 7/28/2024.

Since there are not many PM₁₀ monitors that report continuous data on the EPA AirNow site, we will use PM_{2.5} monitors as a surrogate to show the progression of the air mass and how it affected the monitoring sites. Note that most monitors in the Southeastern region as well as Texas were reporting daily AQI concentrations in the good (green) and moderate (yellow) ranges (typical PM₁₀ concentrations) on 7/28/2024.



Appendix A-Figure 3. Satellite imagery displaying Aerosol Optical Depth (AOD) of the large particulate-laden air parcel over the southern and western Caribbean Sea on July 29, 2024 at 1410 UTC (810 CST).

By the morning of July 29th, the dust storm was affecting the western Caribbean Sea affecting Cuba, Jamaica, the Cayman Islands and portions of Central America. It would be moving to the northwest toward Texas over the next 36 hours.

Table Output

Table Key

Search:

Site/Site AQS/Param/POC	Date	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Avg	Max
HERNANDO/280330002/PM2.5-88101/3	07/28/24	9	8.3	9.1	9	9	9.4	8.7	7.9	7.6	7.6	8	8.7	7.3	6.3	5.7	5.8	5.7	5.6	4.8	5.3	5.8	6.2	6.5	6.8	7.25	9.4
HERNANDO/280330002/PM2.5-88101/3	07/29/24	6.1	6.7	7.2	7.6	8.1	8.1	7.7	7.9	8.3	8.8	8.6	8.4	8.3	8.2	8.1	7.6	7.2	7.5	7	7.4	7.9	8.6	8.9	8.9	7.88	8.9
MARION/050350005/PM2.5-88502/3	07/28/24	16.1	12.3	13.4	12.8	12.9	12.3	10.3	12.3	10.3	10.9	10.6	12.3	14.7	4.6	7.2	10	10.2	11.2	10.9	11.9	9.8	9.3	7.9	9.8	11	16.1
MARION/050350005/PM2.5-88502/3	07/29/24	8.3	5.9	7.5	8.5	8.8	8.9	10.8	11.4	13.2	12.9	14.6	11.8	9.9	9.4	9.7	8.8	8.7	10.6	13.1	10.8	10	10.6	10.5	12.1	10.28	14.6
SHELBY FARMS/471570075/PM2.5-88101/3	07/28/24	10.6	9.9	9	8.7	9.1	9.5	8.8	8.9	9.1	9.4	9.9	10.7	6.7	3.9	5.6	6.2	7.1	7.2	7.5	5.7	6.3	6.3	6.6	6.7	7.89	10.7
SHELBY FARMS/471570075/PM2.5-88101/3	07/29/24	6.7	6.7	6.8	7.6	8.2	8.6	8.8	9.2	9.6	11	11.4	12.2	12.2	12.4	11.7	11	11.3	10.9	10.7	9.9	9.7	10.1	10.3	11.1	9.92	12.4

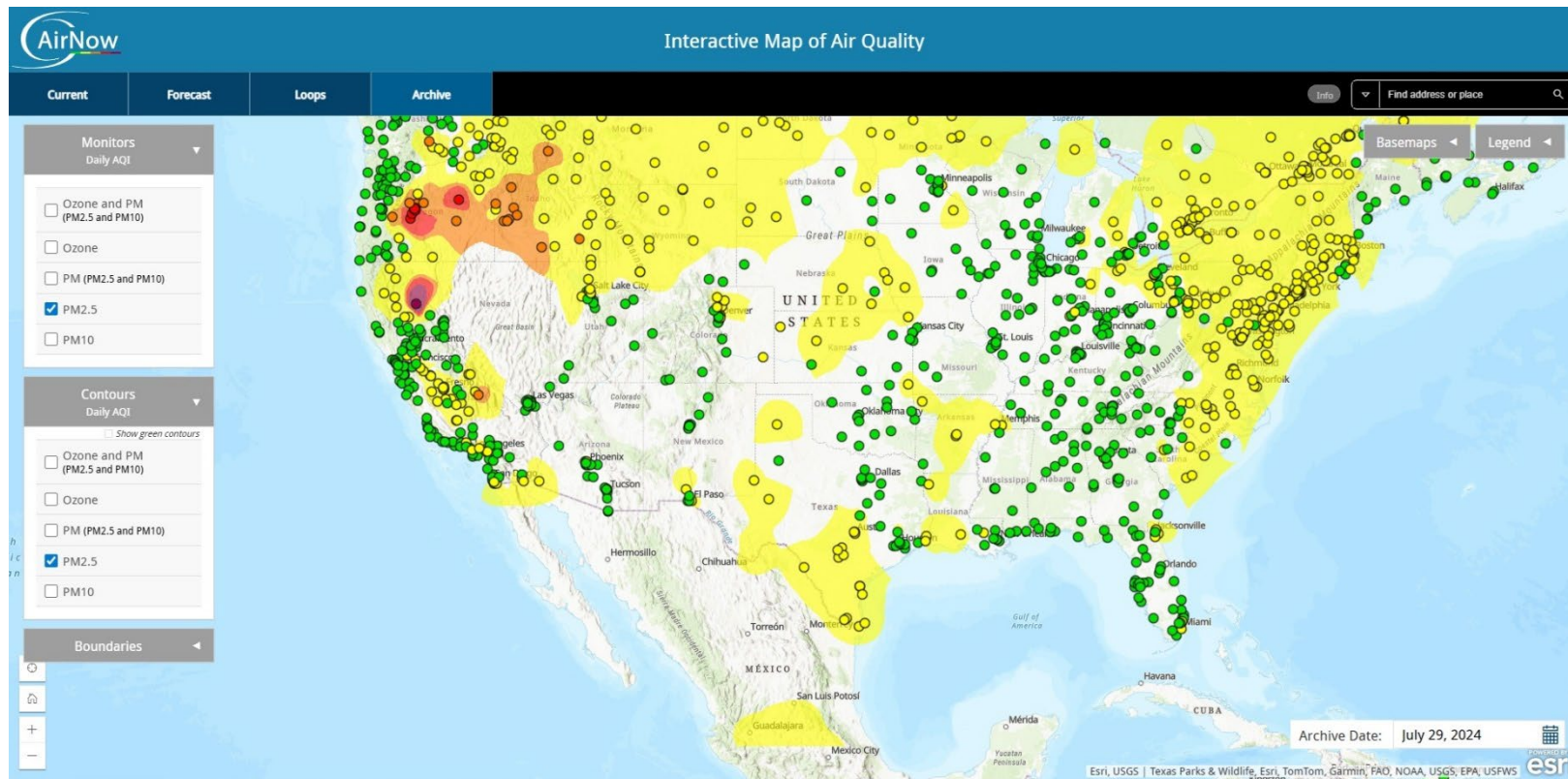
Showing 1 to 6 of 6 entries

Appendix A-Table 2. AirNowTech Memphis TN-AR-MS CBSA continuous hourly PM_{2.5} data (pre-validation) on 7/28-7/29/2024.

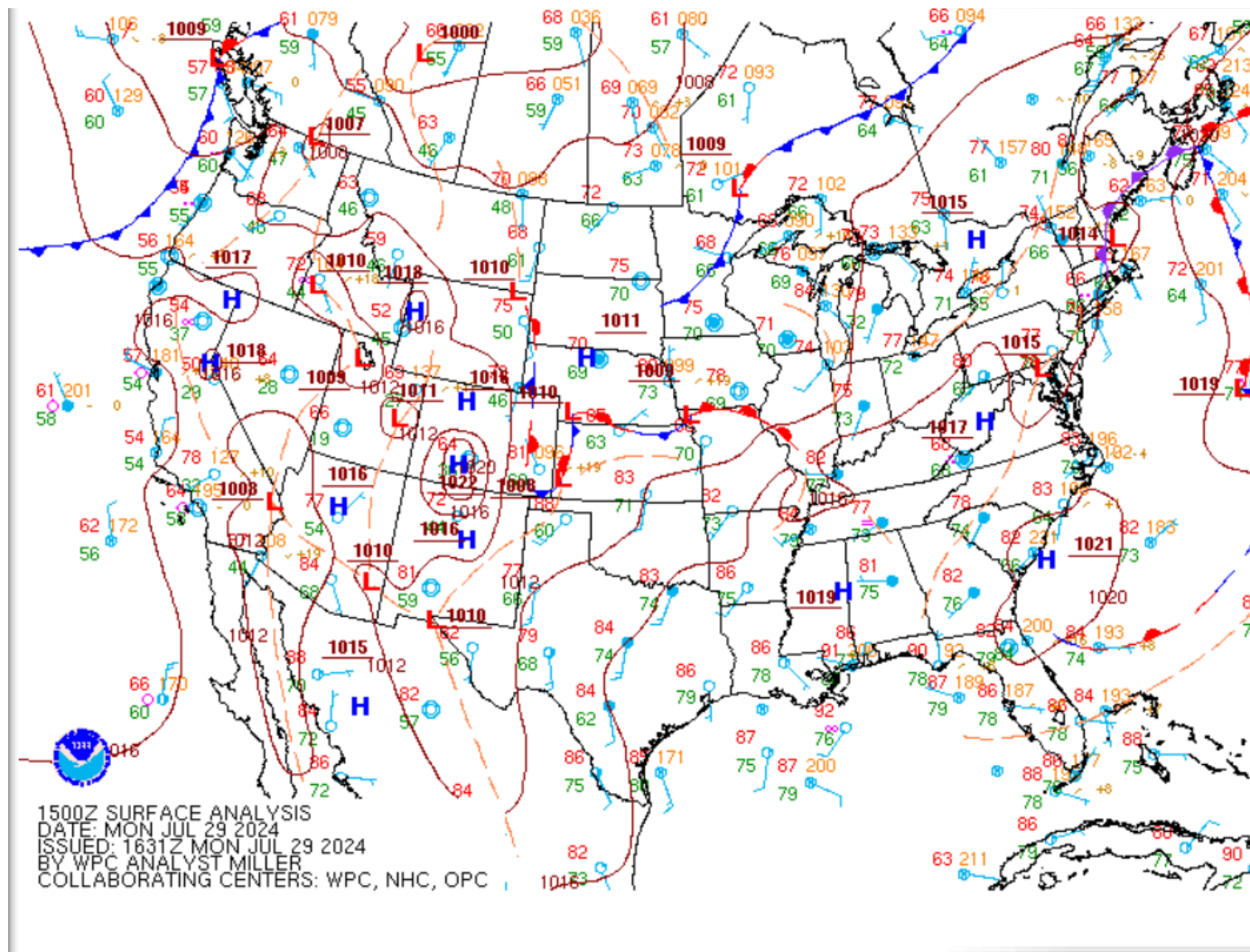
Tables 2 (Memphis metro PM_{2.5}) and 3 (Shelby Farms-NCore PM₁₀) show the hourly observations on 7/28-7/29/2024 as typical concentrations for July. As the particulate-rich air mass would move closer to the area, these concentrations would rise.

Current Date: 07/29/2024		07:21 PM		Monthly Report																							
Site Name: 75_NCORE		157 0075		July 2024										Avg Interval: 1 hour													
Parameter: PM10STP		81102												Units: UG/M3 001		Method: 239											
		Hours																									
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Summary		
																									Max	Avg	RDS
28	25.9	24.3	22.9	22.3	25.3	29.1	26.2	23.1	23.6	23.4	23.4	26.3	18.6	11.0	13.3	14.6	17.0	16.9	18.3	15.8	15.2	15.4	16.4	18.6	29.1	20.2	24
29	20.3	21.5	22.6	22.6	22.9	22.5	21.2	21.2	20.5	23.2	23.4	26.3	24.0	27.7	25.0	24.4	23.6	21.4	21.8	19.9	19.5	20.7	19.9	20.6	27.7	22.3	24

Appendix A-Table 3. AirVision Shelby Farms T640x continuous hourly PM₁₀ data (validated) on 7/28-7/29/2024.

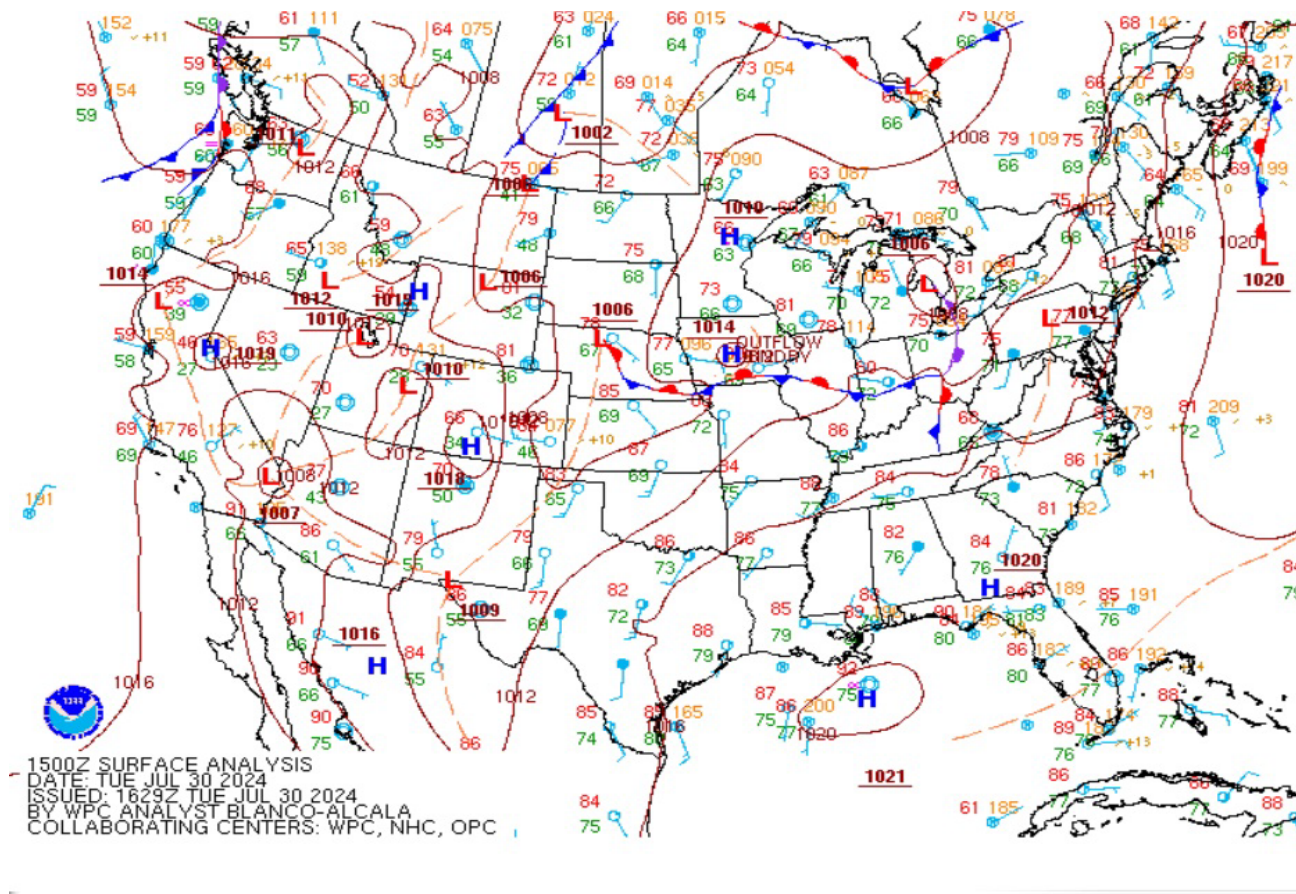


Appendix A-Figure 4. Average 24-hr daily PM_{2.5} AQI concentrations on 7/29/2024. Note that the PM_{2.5} over south Texas is increasing (many more yellow AQI monitors) as the air parcel moves closer toward the coastline.



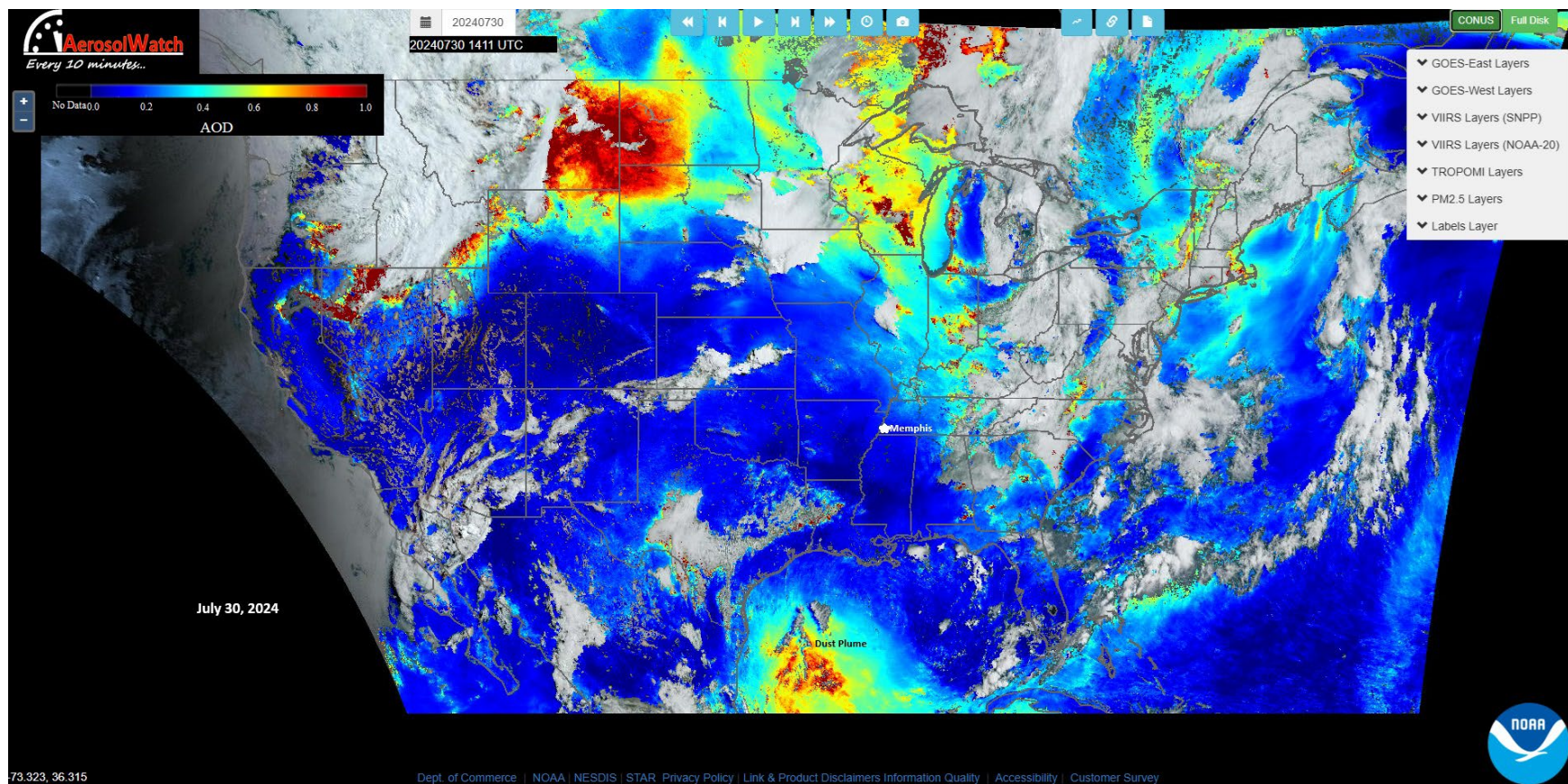
Appendix A-Figure 5. NOAA WPC Surface analysis for 1500Z (UTC) on 7/29/2024.

Figure 5 shows high pressure along the Gulf States. This would bring no resistance to the air mass as it moves closer toward Texas.



Appendix A-Figure 6. NOAA WPC Surface analysis for 1500Z (UTC) on 7/30/2024.

Surface high over the northern Gulf off the Louisiana coast helped to steer the air mass in an anti-cyclonic (clockwise) pattern over East Texas into northern Louisiana before the air mass reached the Memphis TN-AR-MS CBSA on 8/1/2024.



Appendix A-Figure 7. Satellite imagery displaying Aerosol Optical Depth (AOD) of the large particulate-laden air parcel remaining off the Texas and Mexican coastlines on July 30, 2024 at 1411 UTC (811 CST).

The large air mass was steered around the surface high that was off the Louisiana coast and moved north toward Texas. The particulate monitor ($PM_{2.5}/PM_{10}$) data would increase as the air mass approached the Texas coast.

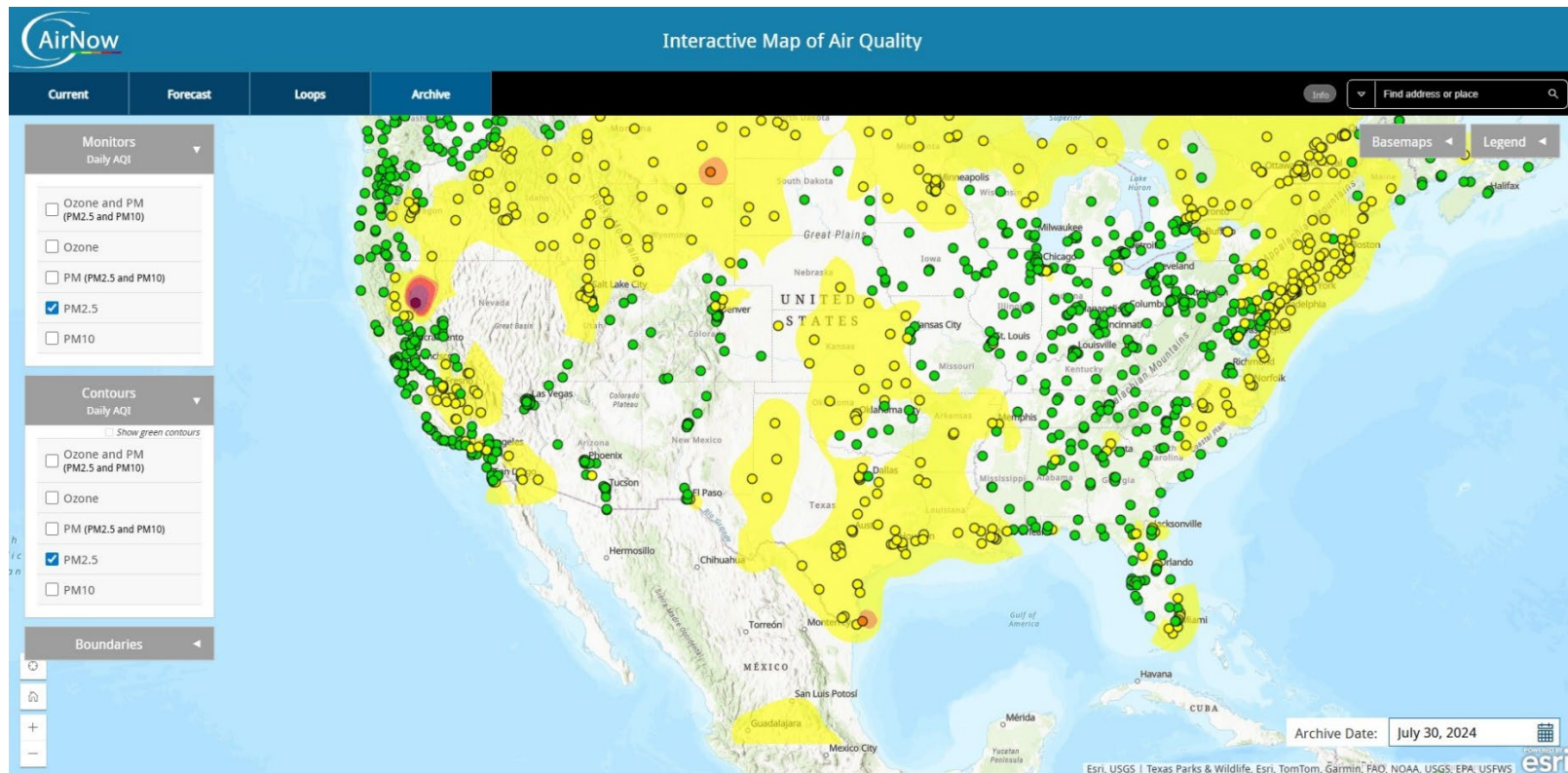
Monthly Report																												
Site Name:		75_NCORE			157 0075			July			2024			Avg Interval:			1 hour			Units:			UG/M3 001			Method: 239		
Parameter:		PM10STP			81102			Hours																				
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Summary			
																									Max	Avg	RDS	
30	20.6	20.4	22.0	21.5	20.2	29.7	24.3	27.3	27.9	31.2	33.0	29.3	30.7	32.2	31.6	27.0	26.1	25.1	27.8	24.0	29.0	28.0	22.3	22.8	33.0	26.4	24	

Appendix A-Table 4. AirVision Shelby Farms T640x continuous hourly PM₁₀ data (validated) on 7/30/2024.

Tables 4 (PM₁₀) and 5 (PM_{2.5}) show concentrations that remain in the typical range for the end of July. The air mass is still too far away from impacting the Memphis TN-AR-MS CBSA on July 30th.

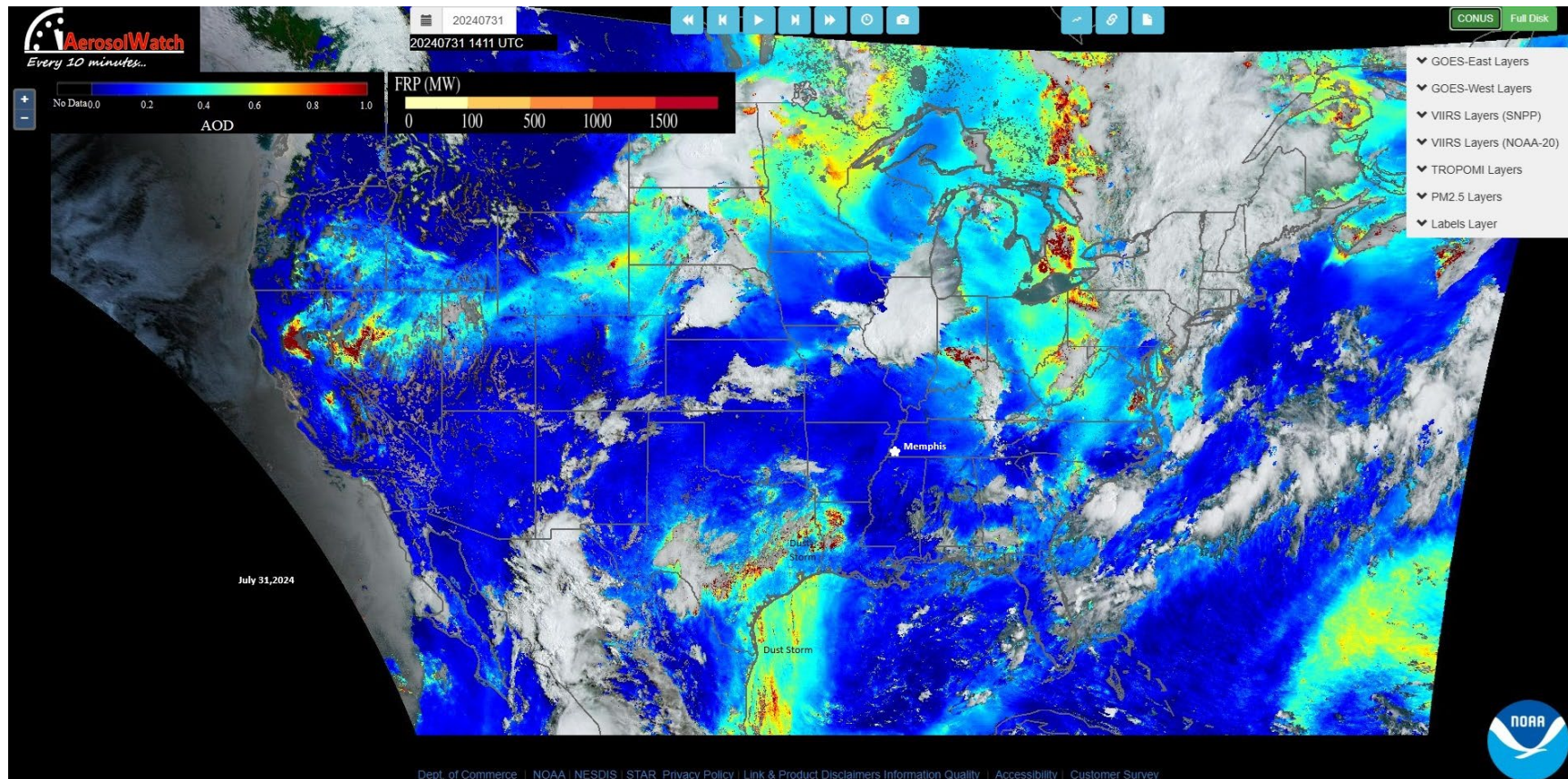
Table Output																											Table Key
Search:																											
Site/Site AQS/Param/POC	Date	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Avg	Max
HERNANDO/280330002/PM2.5-88101/3	07/30/24	9	9.3	9.8	9.8	10.3	10.2	10	10.1	10.1	8.8	7.7	7.6	7.8	7.3	7.1	7	6.7	6.9	6.9	7.1	7.1	6.9	7.2	7.5	8.26	10.3
MARION/050350005/PM2.5-88502/3	07/30/24	11.8	10.8	11.6	11	12.4	12.5	13.4	14.1	14.9	12.7	10.6	11.2	13.1	12	9.3	10.9	13.1	11.9	13.3	14	14.5	9.6	8.1	9.5	11.93	14.9
SHELBY FARMS/471570075/PM2.5-88101/3	07/30/24	10.8	10.9	11	11.3	11.1	11.9	12.1	12.7	13.7	14.3	13.8	13	12.7	13.1	13.6	13.2	12.7	12.3	12.4	11.7	11.3	11.1	10.2	10.2	12.13	14.3

Appendix A-Table 5. AirNowTech Memphis TN-AR-MS CBSA continuous hourly PM_{2.5} data (pre-validation) on 7/30/2024.



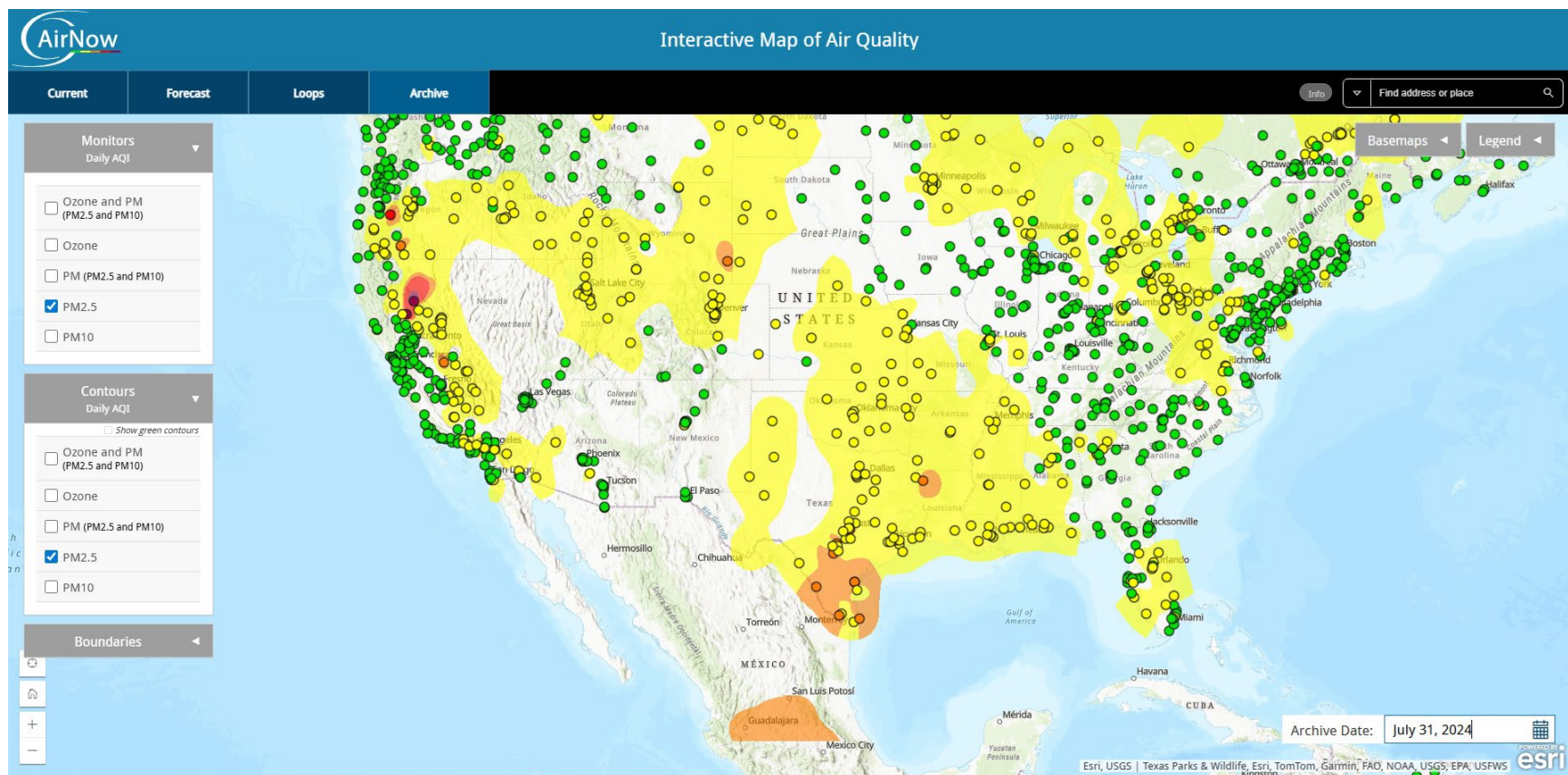
Appendix A-Figure 8. Average 24-hr daily PM_{2.5} AQI concentrations on 7/30/2024. Particulate matter concentrations continued to increase over the Gulf Coast and inland.

The satellite image on 7/30 was from the morning hours (1411 UTC), but the air mass moved into Texas later in the day with particulate matter concentrations increasing well inland and across Louisiana and portions of Arkansas and Mississippi. A south Texas monitoring site recorded a Code Orange 24-hr average for 7/30/2024.



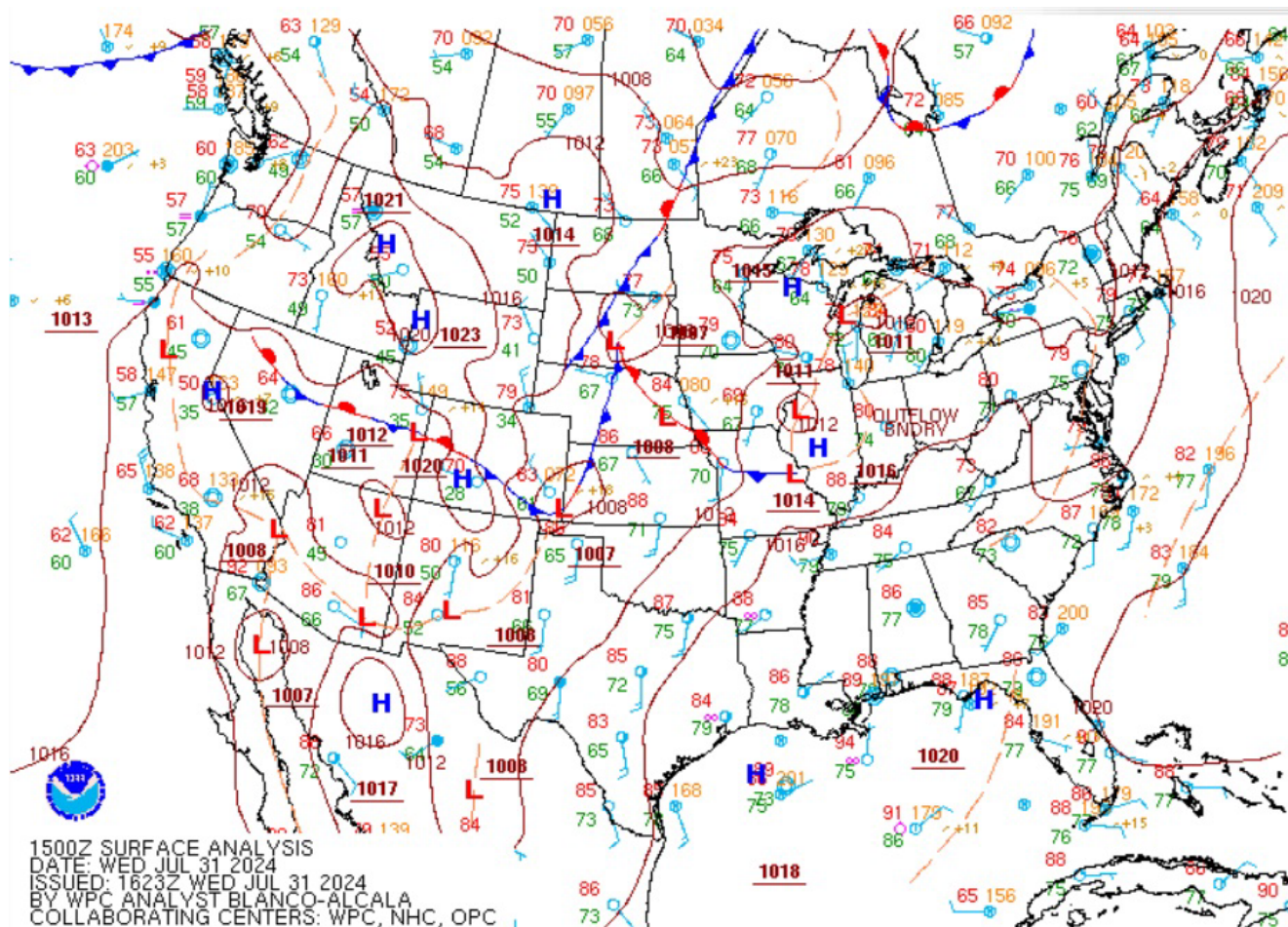
Appendix A-Figure 9. Satellite imagery displaying Aerosol Optical Depth (AOD) of the large particulate-laden air parcel stretched from the Arkansas/Louisiana border south off the Texas and Mexican coastlines on July 31, 2024 at 1411 UTC (811 CST).

As the air mass arrived over western Gulf states, particulate matter concentrations showed a rapid increase in concentrations on July 31st.



Appendix A-Figure 10. Average 24-hr daily PM_{2.5} AQI concentrations on 7/31/2024. Particulate matter concentrations continued to increase over the Gulf Coast and inland.

Figure 10 shows several sites over Texas and Louisiana averaging Code Orange AQI conditions for the day on 7/31/2024. This would translate to high PM₁₀ concentrations, as well. As the day progressed, the Memphis TN-AR-MS CBSA PM₁₀ and PM_{2.5} concentrations would increase significantly as the edge of the air parcel would move into the area.



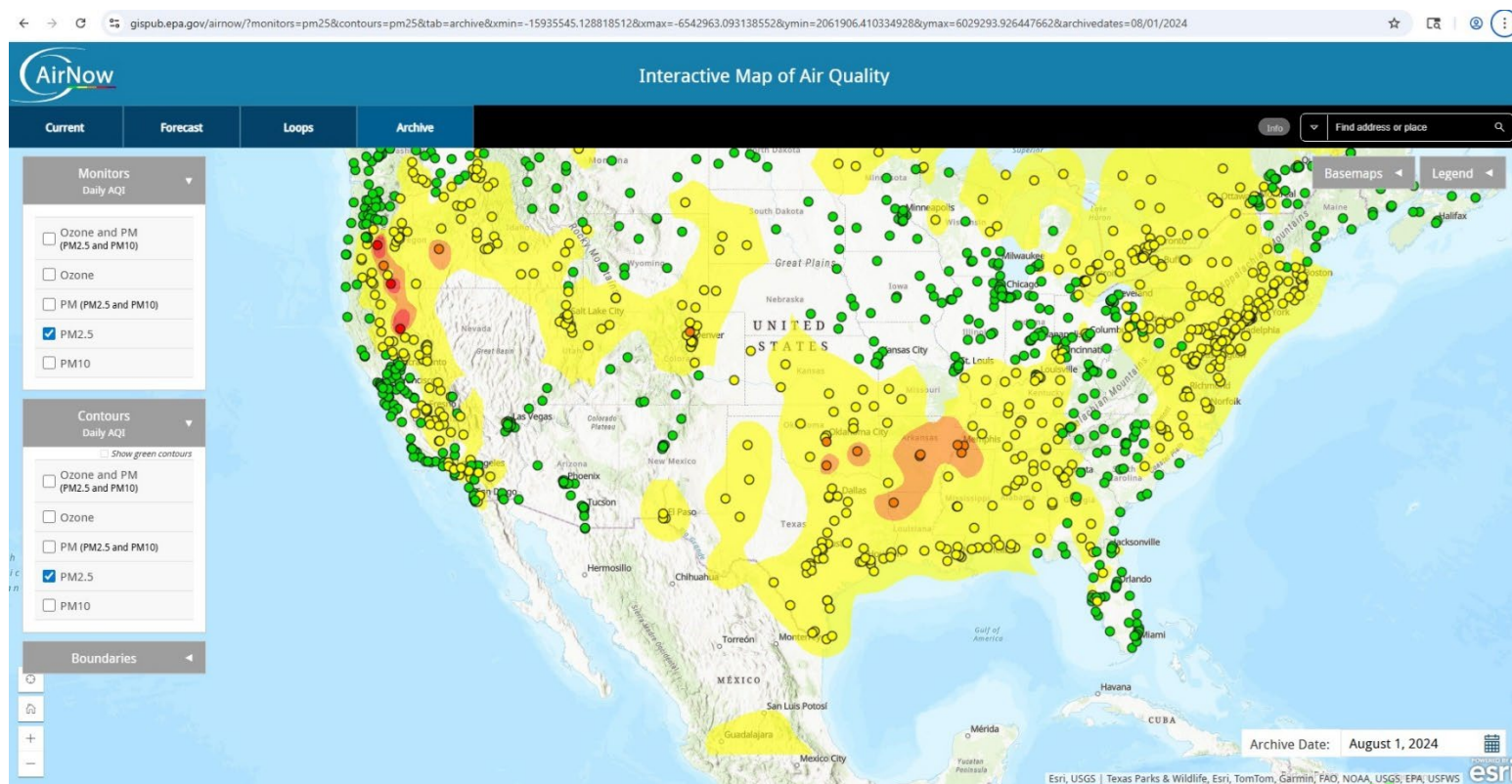
Appendix A-Figure 11. NOAA WPC Surface analysis for 1500Z (UTC) on 7/31/2024.

Table Output																											Table Key
Search:																											
Site/Site AQS/Param/POC	Date	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Avg	Max
HERNANDO/280330002/PM2.5-88101/3	07/31/24	8	8.8	9.3	9.8	10.3	10.1	10.5	10.4	11.5	11.1	10.3	10.7	12	13.6	15.2	15.6	16.8	18.1	18.6	18.8	18.6	20.3	20.2	19.3	13.66	20.3
HERNANDO/280330002/PM2.5-88101/3	08/01/24	19.7	21.8	24.8	26.7	27.4	27.2	30.9	35.9	39.8	40.9	41.8	43.1	43.1	43.3	43	45.2	46.2	43.8	40.7	40.2	40.3	41.5	41.4	41.6	37.1	46.2
MARION/050350005/PM2.5-88502/3	07/31/24	10.3	8.2	10.5	11.5	12.5	14	15.3	17.4	18.8	16.9	17.3	17.9	18.3	18.7	21.5	21.5	22.6	24.5	28.4	30.9	34.1	34.1	32.1	34.6	20.5	34.6
MARION/050350005/PM2.5-88502/3	08/01/24	34.8	35	41.7	41.4	41.7	42.6	45.1	47.9	49.8	49.5	51.1	51.7	53.1	48.6	50.2	53.6	46.5	53.8	55.4	46.2	45.6	47.5	50.9	45.9	47.07	55.4
SHELBY FARMS/471570075/PM2.5-88101/3	07/31/24	10.5	10.7	10.8	12	13.3	13.9	14.5	15.1	15.3	15.4	17.7	17.9	17.8	18.6	18.6	19	20	21	22.9	24	24.6	24.5	25.6	26.3	17.92	26.3
SHELBY FARMS/471570075/PM2.5-88101/3	08/01/24	27.2	32.2	39.8	40	40.8	42.3	44.5	46.2	46.9	49.2	50.3	51.5	51	51.2	51.4	51.8	52.4	52.8	51.2	48.5	47.8	46.1	47.4	47.6	46.25	52.8

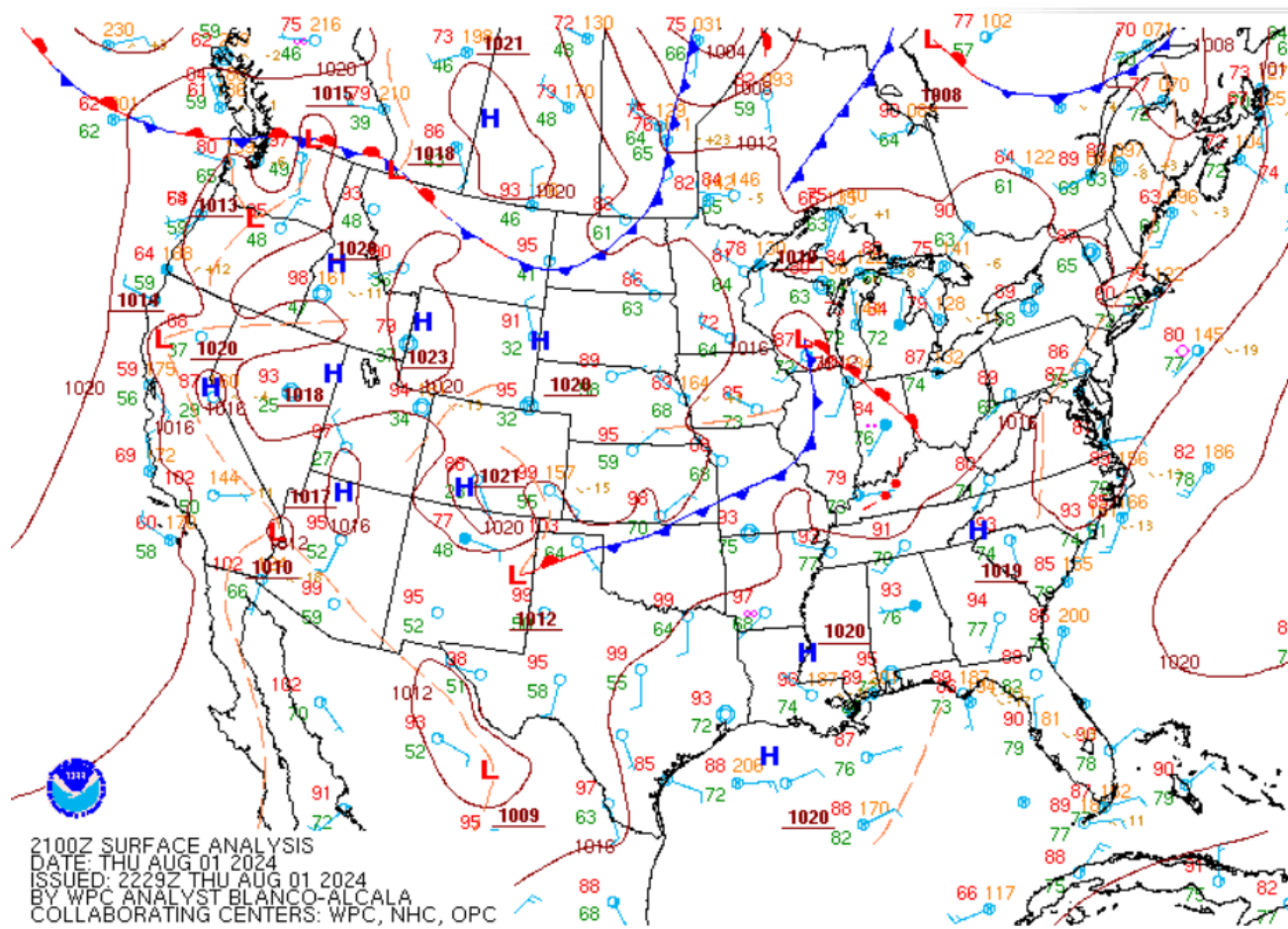
Appendix A-Table 6. AirNowTech Memphis TN-AR-MS CBSA continuous hourly PM_{2.5} data (pre-validation) on 7/31-8/1/2024.

Note that each PM_{2.5} monitor in the Memphis TN-AR-MS CBSA saw significant increases on July 31st as the particulate-laden air parcel began to move into the metro area. The concentration levels would further increase on August 1st reporting the highest PM_{2.5} values in years. The PM₁₀ monitor at Shelby Farms-NCore would also see a similar massive increase on July 31st almost tripling in concentration value from the early morning hours to the late evening hours. These concentrations would reach as high as 176.2 µg/m³ during the early evening on August 1st. There was increased media attention leading up to and continuing on August 1st regarding the air pollution over the Memphis area originating from Saharan dust storms. Links to the articles are located at the end of Appendix A. In addition, the Shelby County Health Department issued a Code Orange Air Quality Advisory (PM_{2.5}) for the Memphis metropolitan area to address the high particulate matter concentrations during the day. The Code Orange Air Quality Advisory (PM_{2.5}) will be shown as Appendix B.

Appendix A-Table 9. AirNowTech Memphis TN-AR-MS CBSA continuous hourly PM_{2.5} data (pre-validation) on 8/2/2024.



Appendix A-Figure 12. Average 24-hr daily PM_{2.5} AQI concentrations on 8/1/2024. Note the Code Orange PM_{2.5} 24-hr averages over the Memphis TN-AR-MS CBSA as well as Little Rock, Shreveport, and a few PM_{2.5} monitor locations in Oklahoma. These concentrations would be reduced to normal or near-normal conditions on August 2nd when a cold front would sweep the air mass to the south and east.



Appendix A-Figure 12. NOAA WPC Surface analysis for 2100Z UTC (3pm CST) on 8/1/2024. The cold front seen moving across the southern Great Plains would sweep through Memphis on 8/2 clearing the particulate-laden air mass.

Site Name:		Near Road		157 0100		Monthly Report		July 2024		Avg Interval:		1 hour		Units:		PPB		008		Method: 099						
Parameter:		NO2		42602		Hours																				
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Summary	
																									Max	Avg
28	AX I	1.12	.88	1.05	1.08	1.77	1.57	1.70	1.42	1.98	1.90	.85	.32	1.17	.50	.54	.53	.44	.79	.41	54 C	AY I	1.50 C	AX I	1.98	1.05
29	AX I	1.07	1.44	1.67	.93	1.38	1.89	1.94	3.17	2.97	3.99	4.26	3.90	2.95	2.31	1.73	.96	.54	.81	1.22	1.75	1.68	2.89 C	AX I	4.26	2.06
30	AX I	1.73	2.69	2.37	3.11	3.12	5.66	8.21	6.29	4.95	5.25	6.14	7.01	3.47	1.75	1.26	1.17	1.27	1.71	1.42	2.50	2.25	1.92 C	AX I	8.21	3.42
31	AX I	1.15	2.19	3.22	4.80	4.12	4.29	4.26	5.80	6.75	5.60	3.43	5.16	4.03	2.69	2.07	1.96	1.86	1.10	1.28	1.46	1.38	1.93 C	AX I	6.75	3.20

Appendix A-Table 9. AirVision Macon Cove-Near Rd continuous hourly NO₂ data (validated) from 7/28-7/31.

Site Name:		Near Road		157 0100		Monthly Report		August 2024		Avg Interval:		1 hour		Units:		PPB		008		Method: 099							
Parameter:		NO2		42602		Hours																					
Day	Hours																							Summary			
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	Avg	RDS
	01	AX I	2.75	3.35	5.21	6.77	5.18	4.32	7.00	QV I	QV I	2.51	2.53	5.34	4.77	4.07	4.05	1.48	1.79	1.01	1.77	3.39	3.76	3.91 C	AX I	7.00	3.74
02	AX I	4.43	4.52	4.30	7.02	8.65	9.14	8.94	10.04	8.33	10.42	10.57	11.02	11.15	11.94	12.09	9.49	12.72	12.44	14.92	14.01	4.74	6.01 C	AX I	14.92	9.40	22

Appendix A-Table 10. AirVision Macon Cove-Near Rd continuous hourly NO₂ data (validated) from 7/28-7/31.

NO₂ data can be used to determine dust particles from smoke particles. If NO₂ concentrations are elevated or unusually higher than normal when particulate concentrations are abnormally high, this may show evidence that the particles derive from smoke (or other forms of combustion). If the particulate concentrations are high, but the NO₂ are low, it is more likely that the particulate matter contains more dust than smoke.

Figures 9 and 10 show continuous NO₂ data from the Macon Cove (Near Road) monitoring site, which is located approximately 1.3 miles northwest of the Shelby Farms (NCore) air monitoring site. As a near road site, it will usually record higher levels of nitrogen oxides than the Shelby Farms site, especially during morning and evening rush hour periods. Figure 9 shows the last few days of July including NO₂ concentrations prior to the arrival of the transported air parcel. Although there was a slight increase over the previous days, the average NO₂ at the Macon Cove (Near Road) site in July was 6.24 ppb. The average NO₂ at the Macon Cove (Near Road) site in August was 7.15 ppb. In the afternoon and evening hours on 7/31 when the PM₁₀ concentrations significantly increased, the NO₂ concentrations fell. The 8/1 concentrations on average were below average when the PM₁₀ concentrations were reaching unusually high values. This comparison

leads us to believe that the particulate matter in question was a dust event. The afternoon NO_2 concentrations rose somewhat on 8/2 after the cold front passed through the area. Although the concentrations were not concerning, it provided more evidence that the prior air mass that created the very high PM_{10} concentrations contained very little NO_2 .

The following page illustrates the NOAA HYSPLIT model (Figure 13). As this was a 48-hr backward trajectory model, it was produced to show the origination point of the air mass that was located over the Shelby Farms-NCore air monitoring site in Memphis, Tennessee at 2300 UTC (5pm CST) on August 1, 2024. It also shows the trajectories of the air mass from the origination points to the air monitoring site when they arrived at 2300 UTC. Along with the path, the graph at the lower portion of figure shows a generalized view of the height differences along the trajectories. These would not be true to form as radiational lifting would not be considered. The model does concur that the air mass wrapped around the surface high pressure skirting the northwest Gulf Coast and Texas before moving into the Memphis TN-AR-MS CBSA on the August 1st. This was likely the same pattern that occurred the entire day and throughout the night judging by the particulate concentrations.

NOAA HYSPLIT MODEL
Backward trajectories ending at 2300 UTC 01 Aug 24
CDC1 Meteorological Data

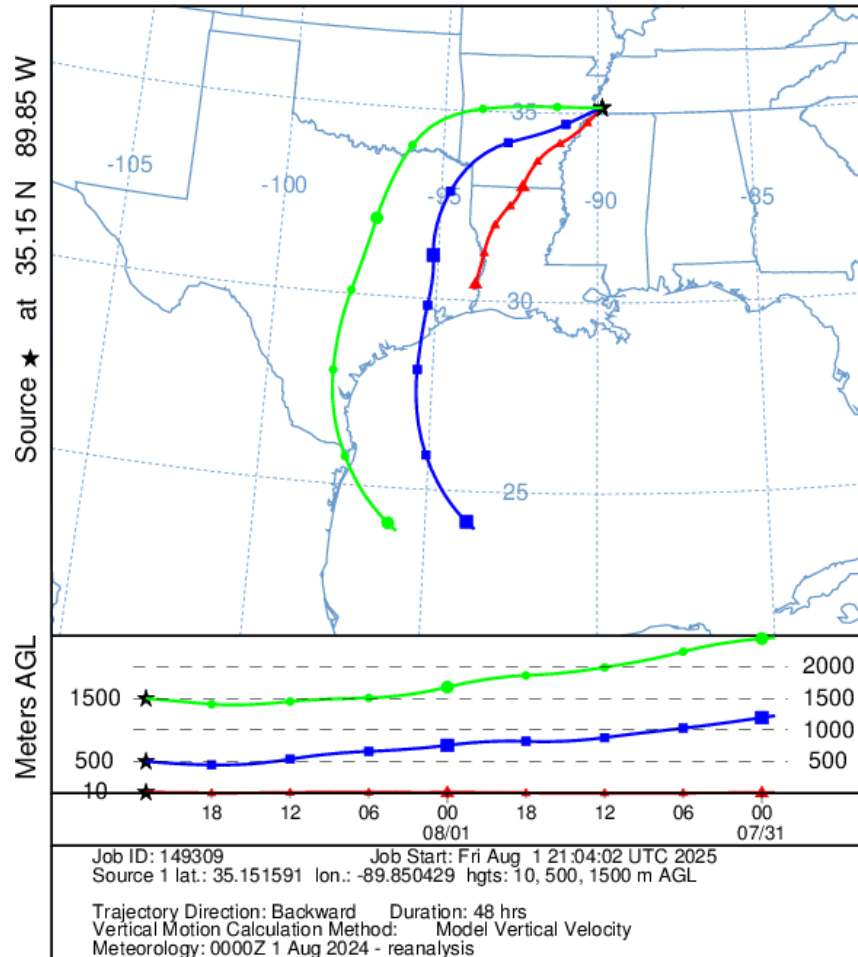
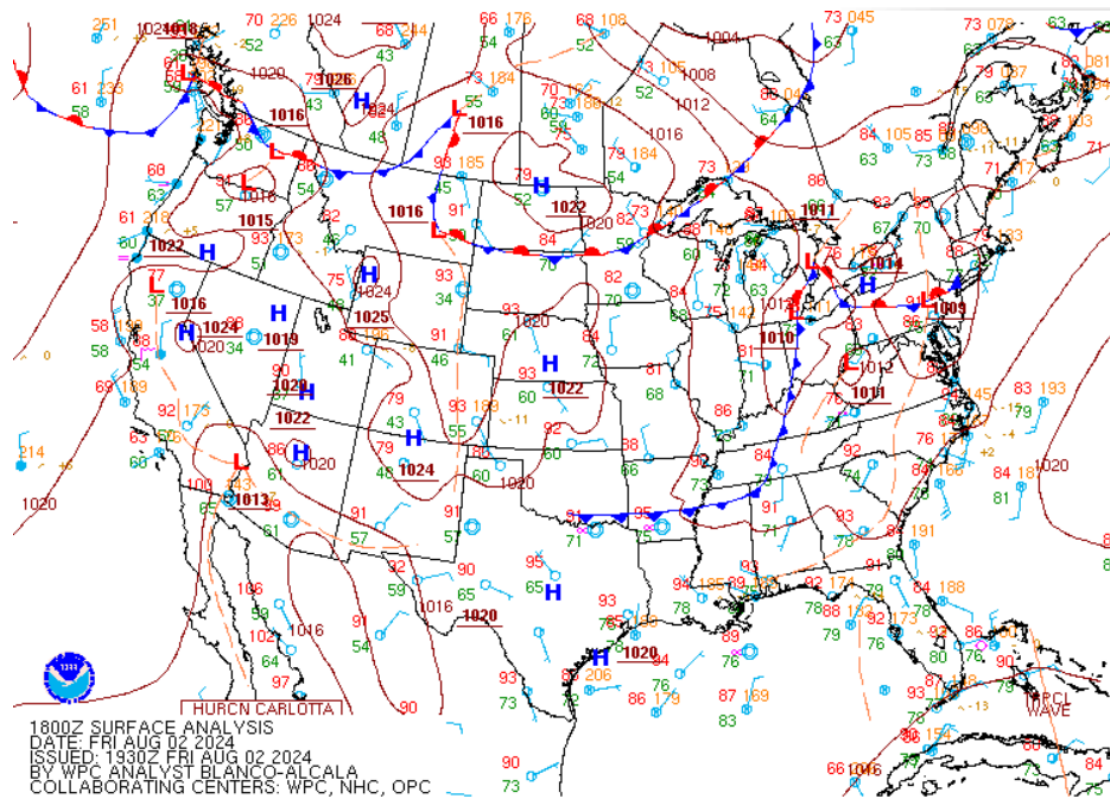
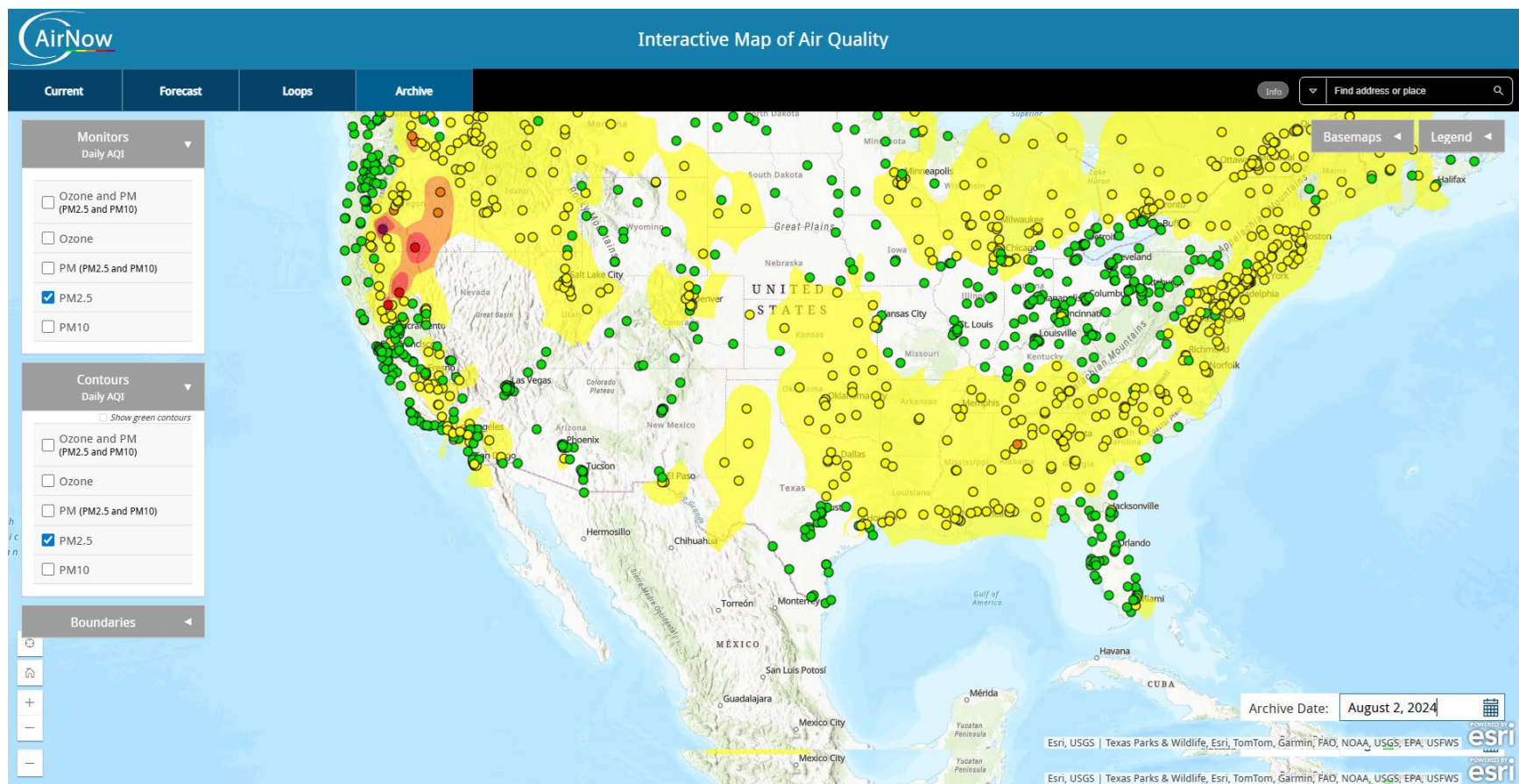


Figure 13. NOAA HYSPLIT model showing a 48-hr backward trajectory and vertical cross-section ending at 2300 UTC (5pm CST) on 8/1/2024. These trajectories support the hypothesis that the particulate air mass originating from Africa moved around

the surface high off the Louisiana coast and moved into Memphis by 2300 UTC. This air mass had likely been moving in this direction for many hours prior to this point seeing how the PM concentrations increased since 7/31.



Appendix A-Figure 14. NOAA WPC Surface analysis for 1800Z UTC (12pm CST) on 8/2/2024. Note the cold front had just recently passed through the Memphis TN-AR-MS CBSA.



Appendix A-Figure 15. Average 24-hr daily PM_{2.5} AQI concentrations on 8/2/2024. The PM_{2.5} concentrations remained very high during the overnight hours and began to diminish as the day progressed reaching normal values by mid-afternoon. Birmingham, AL experienced Code Orange conditions for 24-hr daily average PM_{2.5} concentration.

Media Articles Related to the Saharan Dust Event

<https://www.expressnews.com/san-antonio-weather/article/saharan-dust-plume-tuesday-wednesday-19606749.php>

<https://www.houstonpublicmedia.org/articles/news/weather/2024/07/30/495187/saharan-dust-could-arrive-in-houston-on-wednesday-national-weather-service-says/>

<https://www.ksla.com/2024/07/31/air-quality-action-day-issued-shreveport-due-saharan-dust/>

<https://www.commercialappeal.com/story/weather/2024/08/02/saharan-dust-wildfires-bring-hazy-skies-over-memphis/74646357007/>

<https://www.localmemphis.com/article/weather/hazy-sky-dust-texas-saharan-desert-united-states/522-7765b8b4-62d8-42a4-8e65-2e30e0c56bca>

In addition, the Shelby County Health Department issued a Code Orange Air Quality Advisory on August 1st (PM_{2.5}). Appendix B will show the content of the SCHD Code Orange Air Quality Advisory (PM_{2.5}).