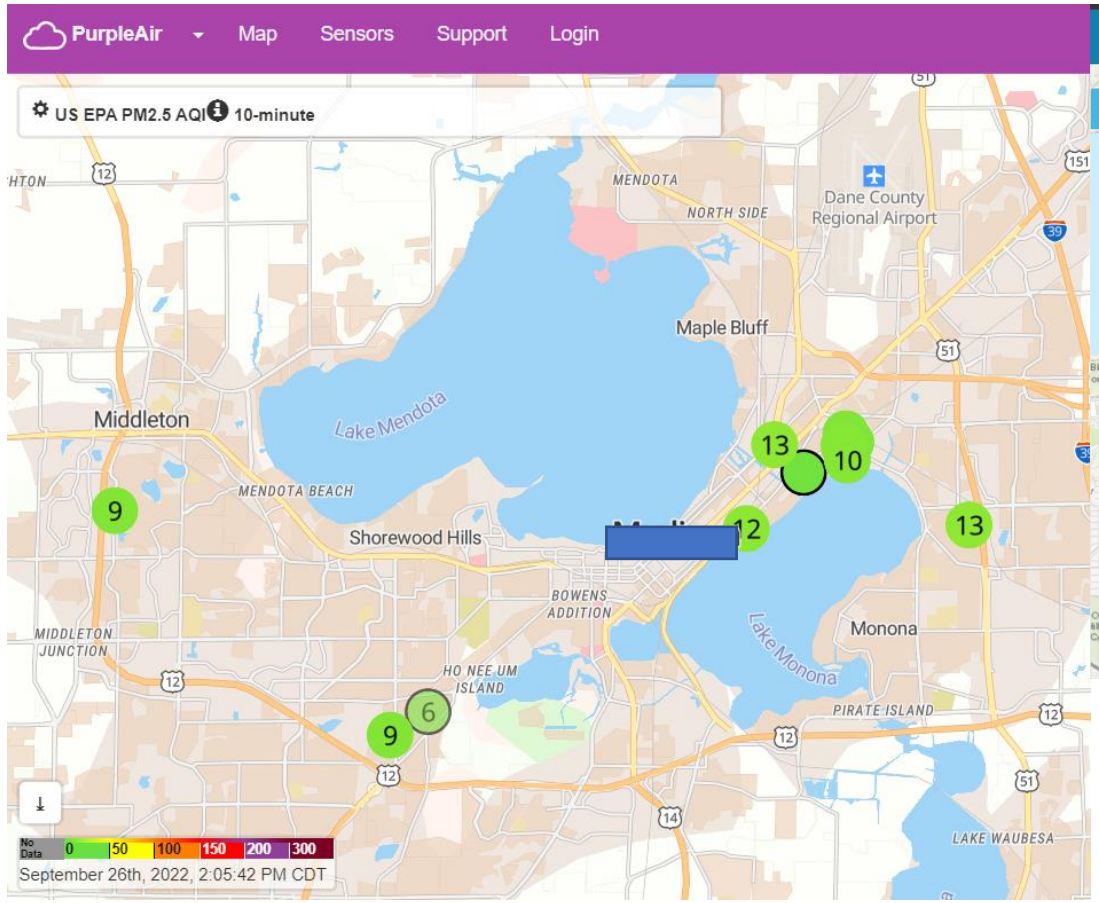
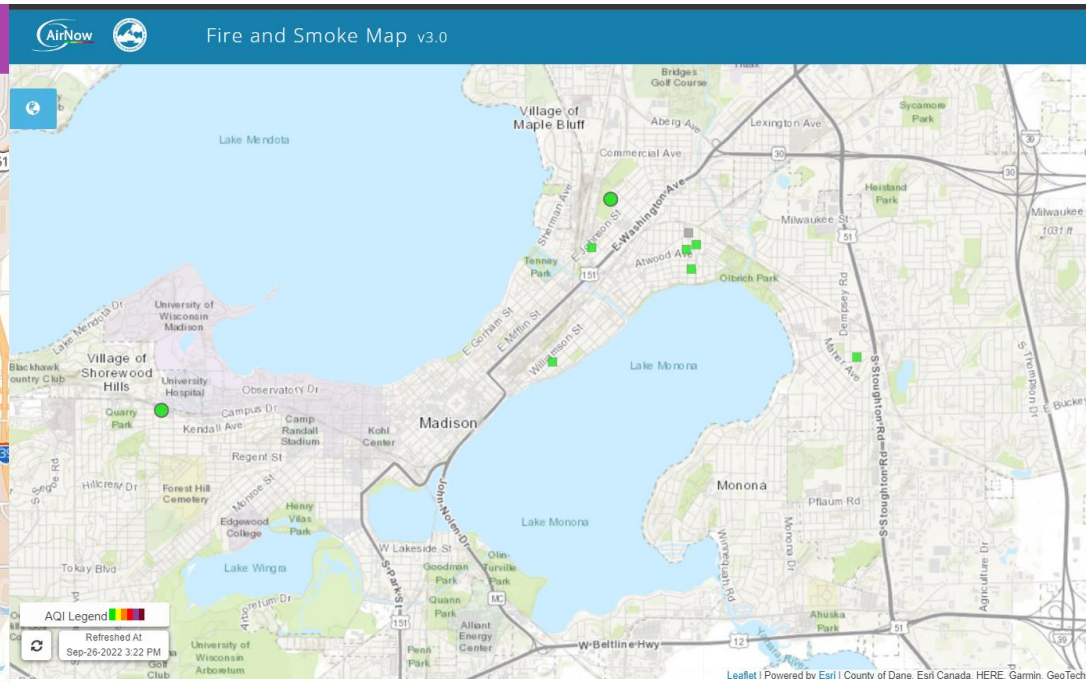
Episode 40. Please stop the video to look closely at charts, if necessary.

Slide 1: How to correlate PurpleAir PM 2.5 data to EPA standard data, to use data side by side on AirNow Smoke and Fire Maps, or to use PM 2.5 levels as evidence to enforce regulation of local ordinances against hyper-localized wood burning pollution.

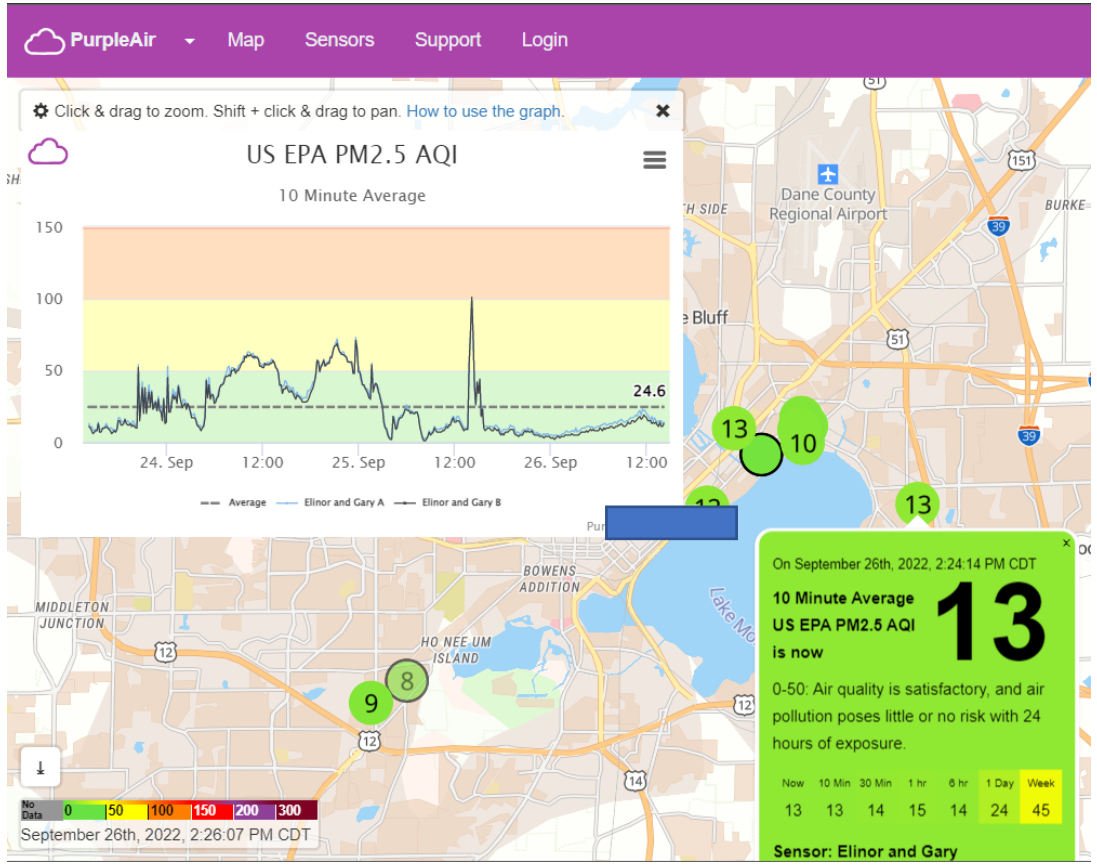
Example of data correlation using State of Wisconsin Department of Natural Resources mathematical formula using data column PM2.5_ATM_ug/m3 value and equation Pac = (PA * 0.5140) +1.8304

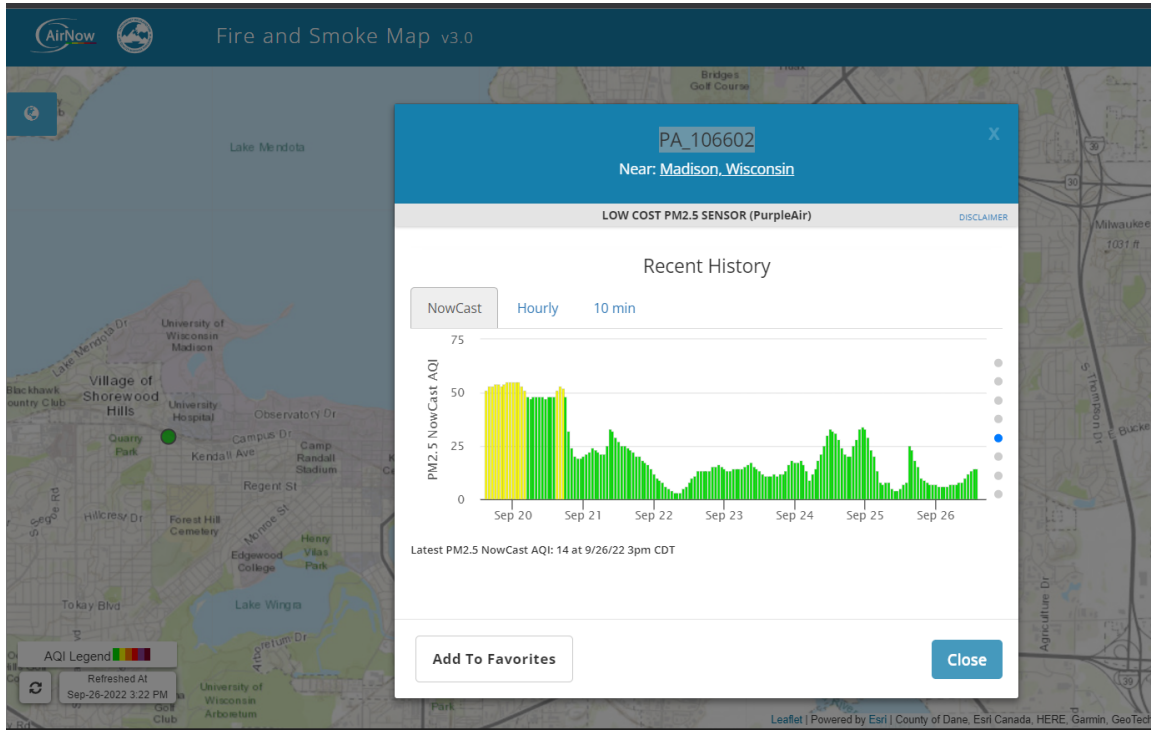
Slide 2: Go to PurpleAir map and choose the sensor of a near neighbor of a wood burner, in this case the right most sensor registering 13, with its own name, “Elinor and Gary”. See same sensor alongside EPA monitors on an AirNow Fire and Smoke map.





Slide 3: On the PurpleAir map after clicking on the right most sensor registering 13, current data for “Elinor and Gary” will be displayed. Compare to the same sensor on U S AirNow map.





Data

PurpleAir

Oct '21

You can easily download historical data from PurpleAir sensors in CSV format. Access the “Sensor data download tool” page by one of the following methods:

1.After selecting an area of interest within the PurpleAir map, click the Download Data button (downward facing arrow) in the bottom-left corner. This will open the

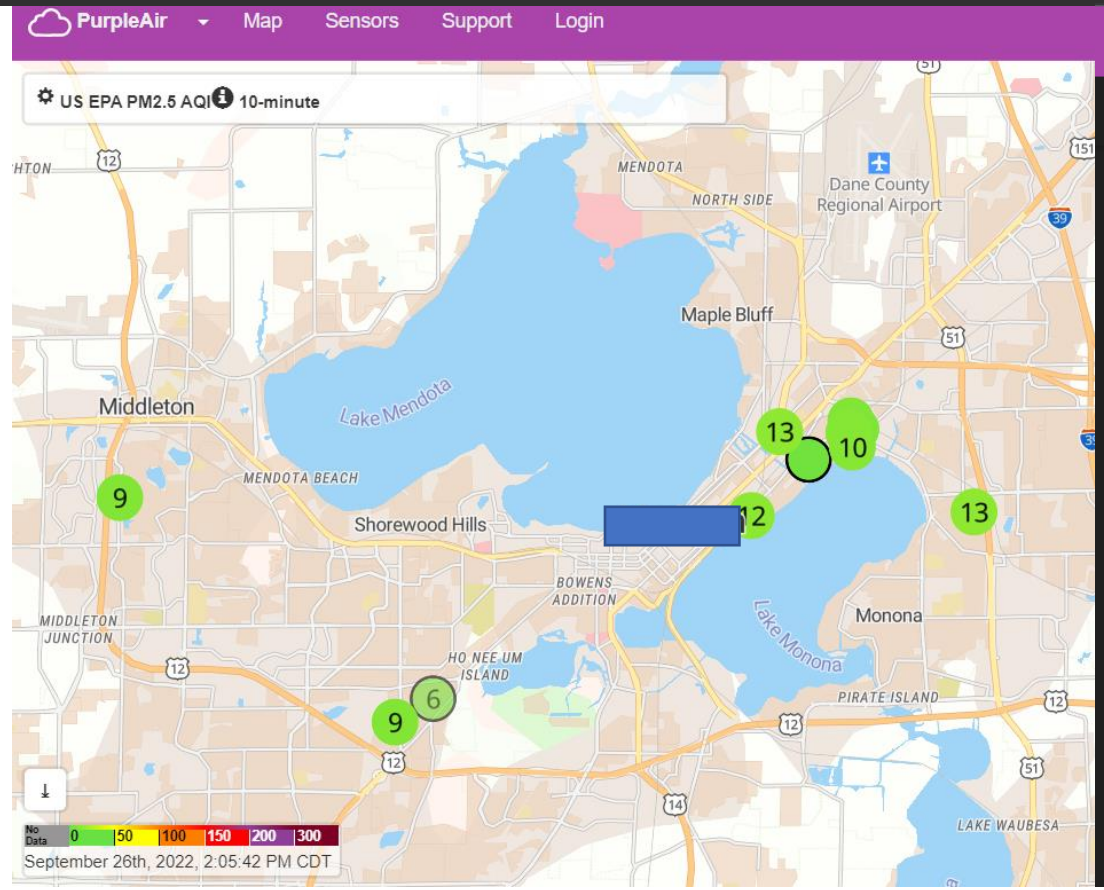
2. “Sensor data download tool” page for all sensors within the map view you’ve chosen.

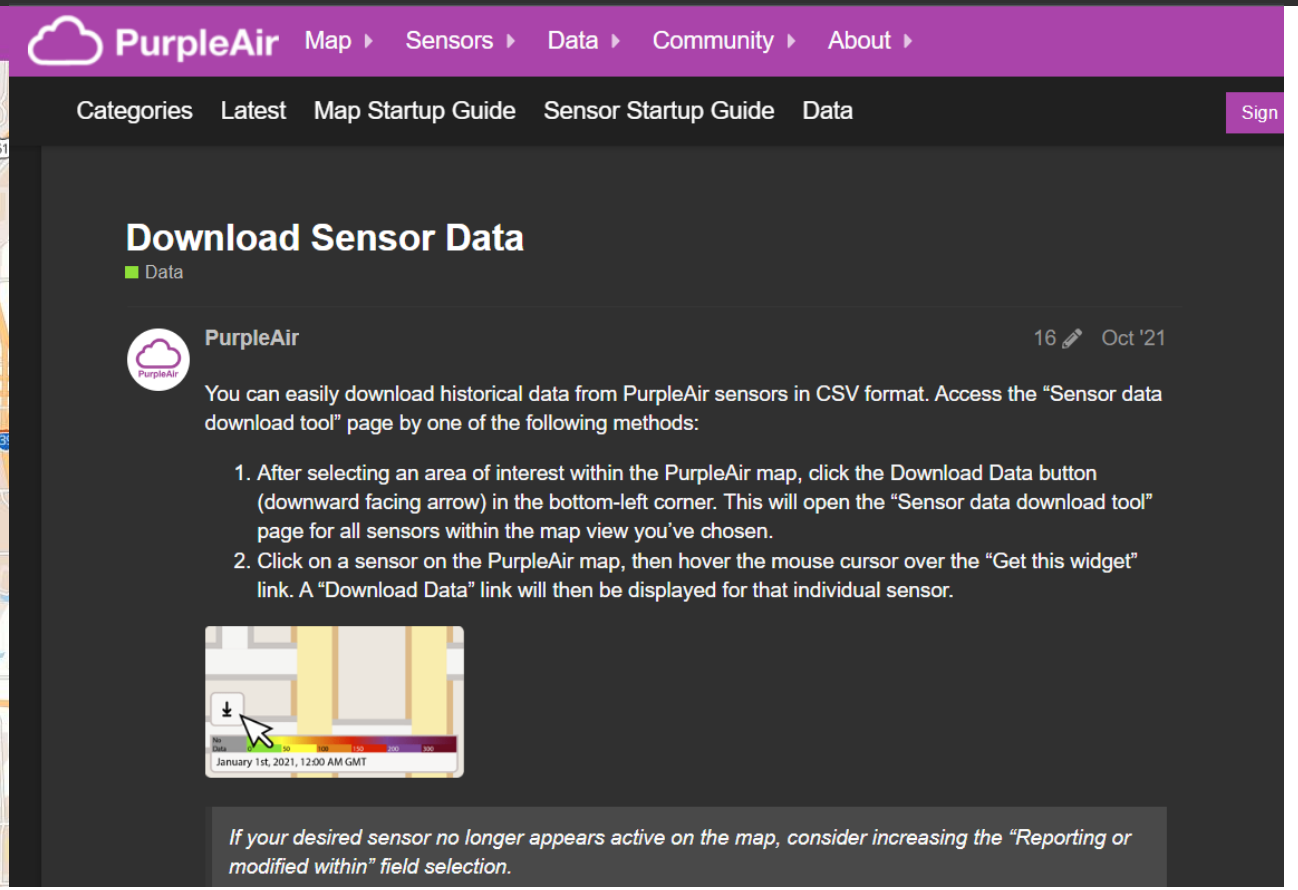
2.Click on a sensor on the PurpleAir map, then hover the mouse cursor over the “Get this widget” link. A “Download Data” link will then be displayed for that individual sensor.

Once on the “Sensor data download tool” page, enter the desired date range in the Start Date and End Date fields. Select the checkboxes on the left side for the data channels you’d like to download (Channels A and/or B). Now either click Download Selected, or use the individual buttons on the right side to download only Primary or Secondary data for these channels.

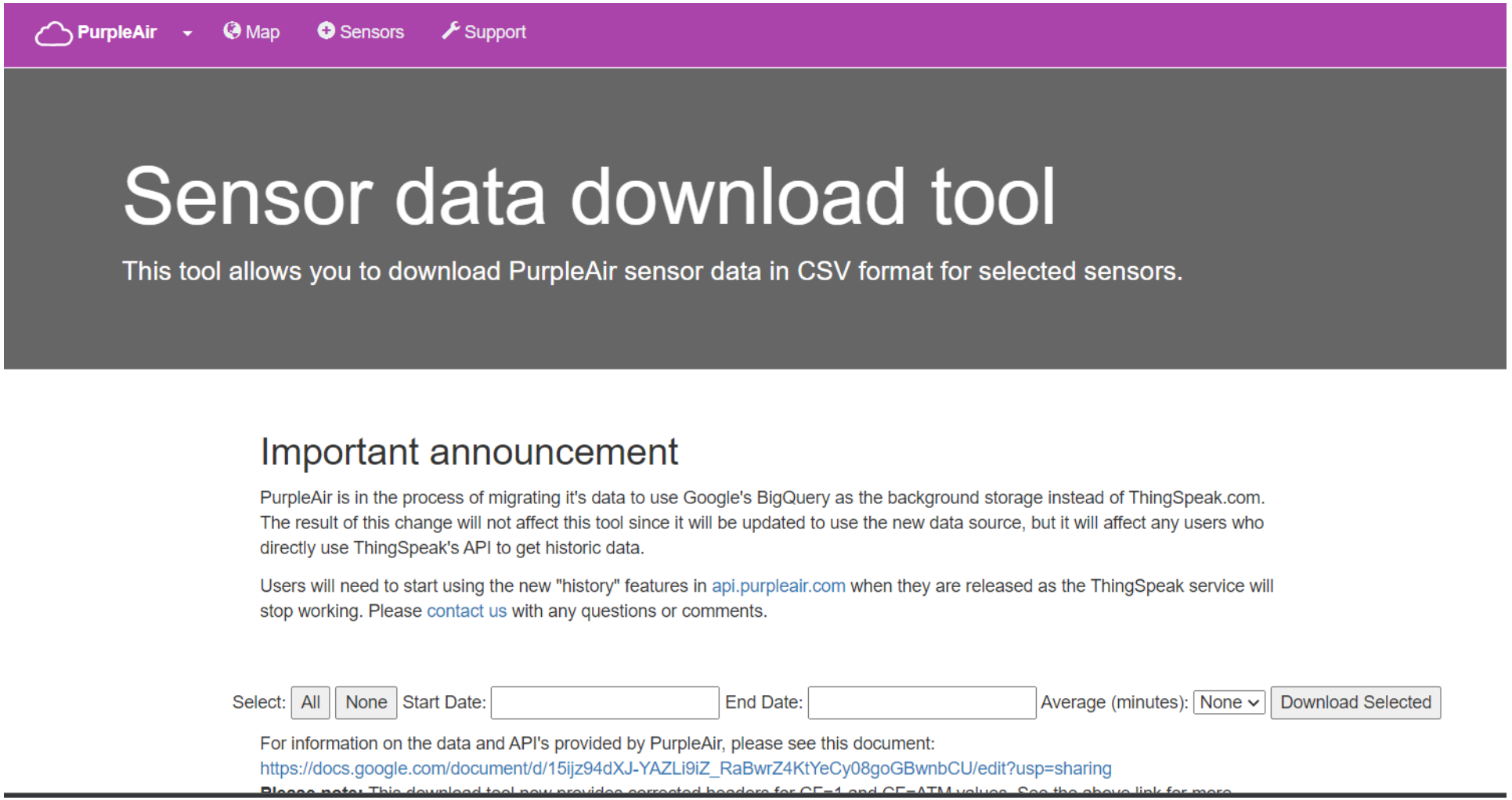
For more information on the “Sensor data download tool” page and the data included in each channel, view the topic “Download Data with the Sensor Data Download Tool .”

We recommend the use of the Google Chrome browser to download data.

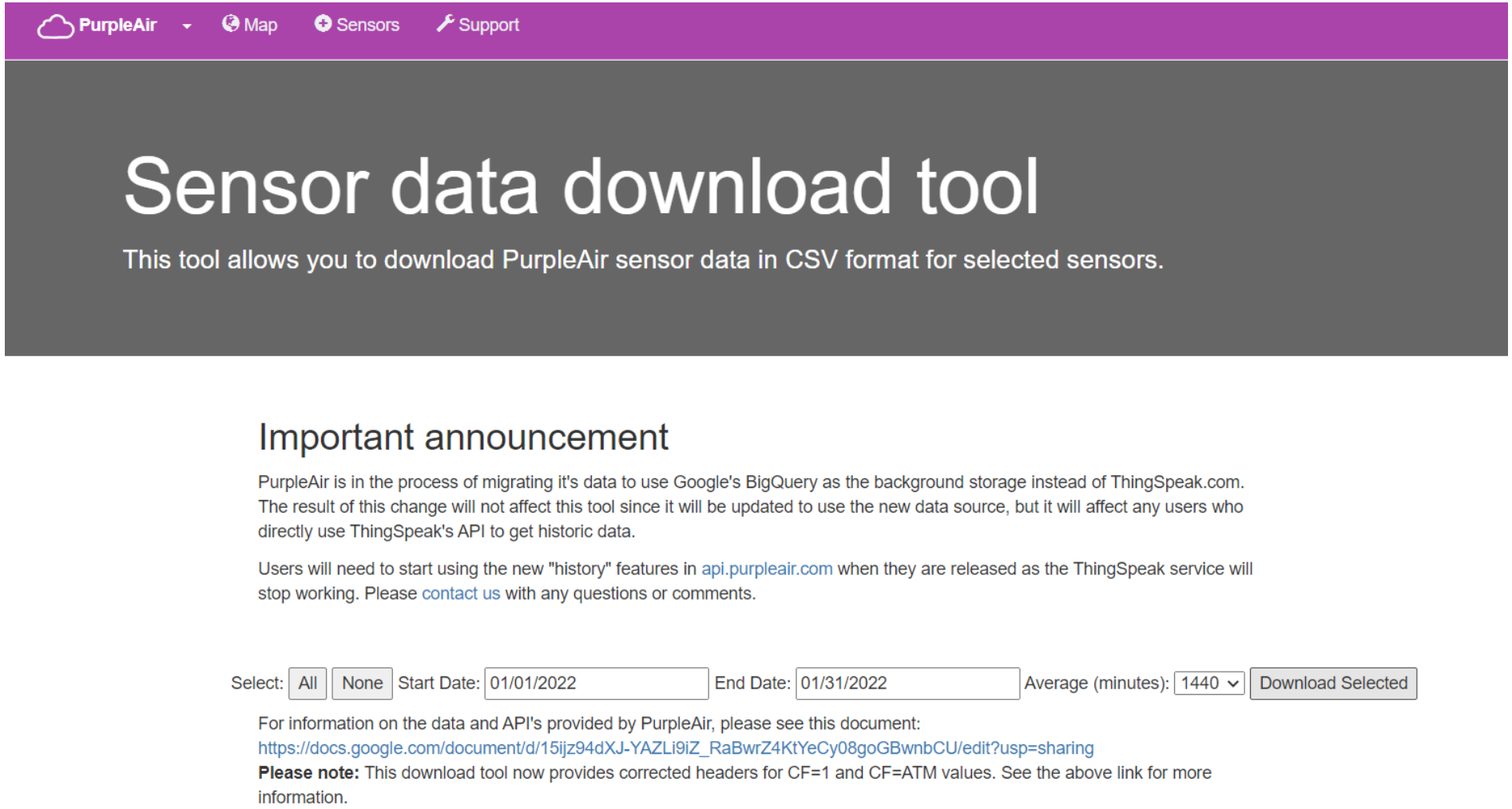




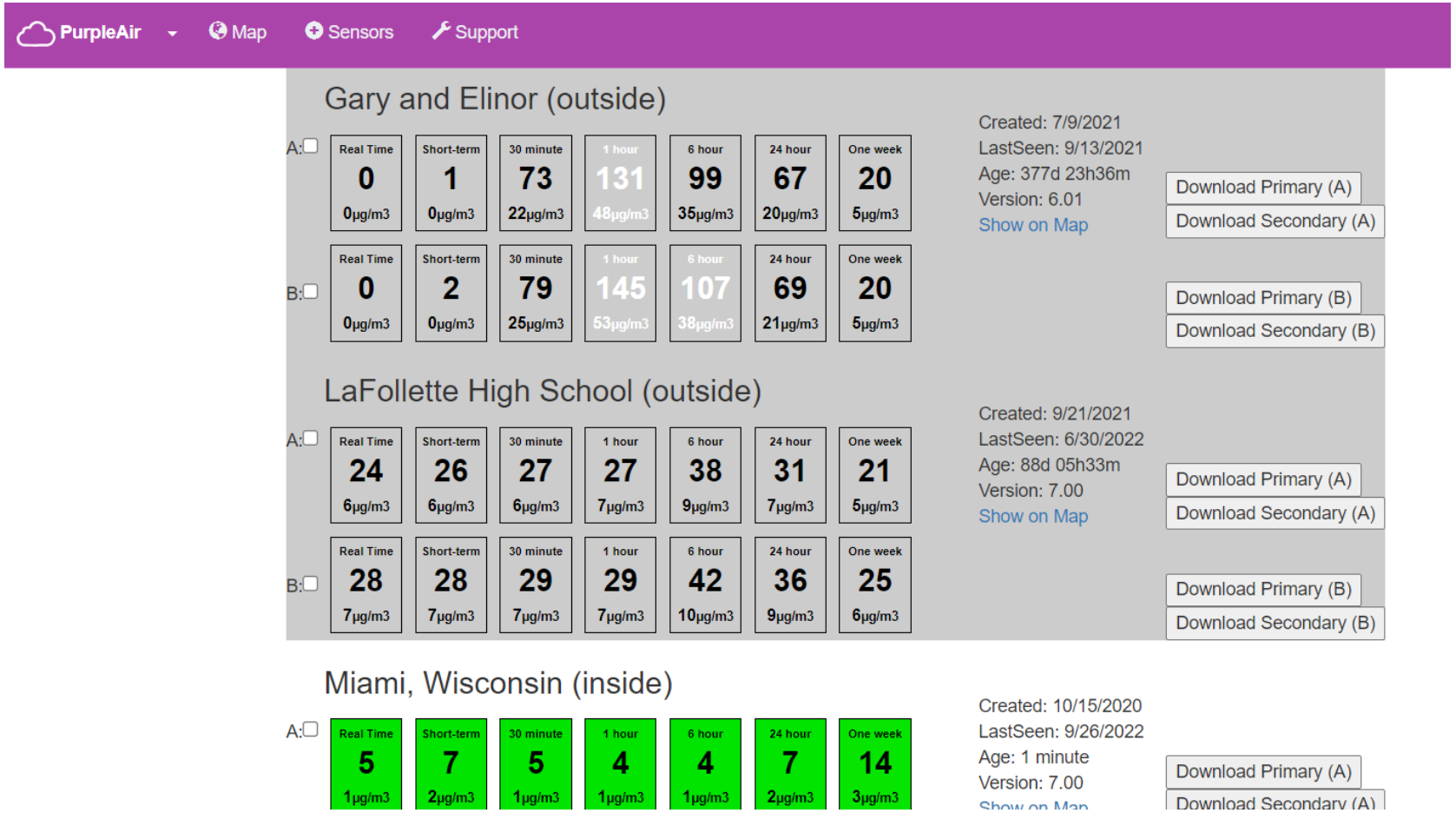
Slide 5: After clicking on the downward arrow in the white box, you will see the Sensor Data Download Tool



Slide 6: Choose **begin and end dates** (January 1 to 31, 2022) and **Average 1440** minutes (24 hours)



Slide 7: Pick sensor next to wood burner “Gary and Elinor (outside) Click Download Primary (A)



Slide 8: PurpleAir data can be saved as Excel or CSV

CSV Opening: Flinor and Gary B (undefined) (43.080776 -89.313634) Secondary 1440 minute averag

	A	B	C	D	E	F	G	H	I	J
1	created_at	>=0.3um/c	>=0.5um/c	>1.0um/dl	>=2.5um/c	>=5.0um/c	>=10.0um/	PM1.0_AT	PM10_ATM_ug/m3	
2	2022-01-01	2296.39	659.92	159.98	16.3	3.39	1.91	15.39	31.18	
3	2022-01-02	691.54	192.58	30.98	2.38	0.58	0.35	4.1	6.96	
4	2022-01-03	2064.39	580.14	110.66	8.55	2.03	1.2	14.97	25.28	
5	2022-01-04	2952.8	842.08	184.03	16.14	3.5	1.98	19.35	35.74	
6	2022-01-05	1891.01	541.96	122.35	10.55	2.07	1.14	11.37	21.94	
7	2022-01-06	307.84	85.42	14.67	1.46	0.38	0.23	0.93	2.53	
8	2022-01-07	899.13	247.32	39.82	3.4	0.9	0.56	5.87	9.86	
9	2022-01-08	3539.55	1002.68	213.07	20.36	4.63	2.69	23.14	43.1	
10	2022-01-09	2177.1	625.04	150.78	15.24	3.17	1.83	14.14	28.91	
11	2022-01-10	486.59	136.92	29.13	3.09	0.82	0.51	2.57	5.89	
12	2022-01-11	1477.23	420.41	100.65	10.67	2.73	1.64	9.9	20.66	
13	2022-01-12	2158.58	609.43	123.55	11.61	2.74	1.61	11.91	21.39	
14	2022-01-13	5051.08	1436.14	296.15	22.61	3.57	1.82	27.28	50.88	
15	2022-01-14	1800.11	514.31	111.04	9.4	1.69	0.9	9.52	18.75	
16	2022-01-15	632.1	177.93	32.74	2.89	0.72	0.44	3.38	6.57	
17	2022-01-16	2734.85	776.47	165.18	13.67	2.93	1.72	19.75	35.28	
18	2022-01-17	1916.83	546.48	118.47	9.82	2.12	1.21	12.95	23.59	
19	2022-01-18	2082.04	595.79	135.04	11.36	2.19	1.21	12.72	23.84	
20	2022-01-19	1419.86	403.43	82.99	6.39	1.25	0.7	8.46	15.22	
21	2022-01-20	455.86	128.41	25.8	2.53	0.64	0.4	2.25	5.06	
22	2022-01-21	1943.63	544.42	108.23	9.46	2.28	1.37	14.41	25.51	
23	2022-01-22	1892.17	533.99	107.91	9.7	2.38	1.39	12.8	22.73	
24	2022-01-23	695.72	196.35	38.95	3.7	0.96	0.58	3.96	7.77	
25	2022-01-24	1334.28	376.3	77.44	7.3	1.8	1.08	8.99	16.83	
26	2022-01-25	727.48	203.21	35.3	2.84	0.72	0.44	4.65	8.08	

Slide 9: Wisconsin DNR Official: I was asked to address your question regarding which column of data to use with the Wisconsin Purple Air correction equation. The column to use is PM2.5_ATM_ug/m3 value. Please be aware that the WI equation was developed using 24-hour average PM2.5 values derived from 1-hr averages which in turn were calculated from the raw data. Also please note that the Purple Air correction equation used for EPA's fire and smoke map is different from the WDNR's Wisconsin correction. The EPA's fire and smoke correction is a national equation based on data from around the US while the WDNR's correction is Wisconsin-specific equation developed using data from Wisconsin only.

	A	B	C	D	E	F	G	H	I	J	K
1	created_at	>=0.3um/dl	>=0.5um/c	>1.0um/dl	>=2.5um/c	>=5.0um/c	>=10.0um/	PM1.0_AT	PM10_ATM_ug/m3		
2	2022-01-01 00:00:00 UTC	2296.39	659.92	159.98	16.3	3.39	1.91	15.39	31.18		
3	2022-01-02 00:00:00 UTC	691.54	192.58	30.98	2.38	0.58	0.35	4.1	6.96		
4	2022-01-03 00:00:00 UTC	2064.39	580.14	110.66	8.55	2.03	1.2	14.97	25.28		
5	2022-01-04 00:00:00 UTC	2952.8	842.08	184.03	16.14	3.5	1.98	19.35	35.74		
6	2022-01-05 00:00:00 UTC	1891.01	541.96	122.35	10.55	2.07	1.14	11.37	21.94		
7	2022-01-06 00:00:00 UTC	307.84	85.42	14.67	1.46	0.38	0.23	0.93	2.53		
8	2022-01-07 00:00:00 UTC	899.13	247.32	39.82	3.4	0.9	0.56	5.87	9.86		
9	2022-01-08 00:00:00 UTC	3539.55	1002.68	213.07	20.36	4.63	2.69	23.14	43.1		
10	2022-01-09 00:00:00 UTC	2177.1	625.04	150.78	15.24	3.17	1.83	14.14	28.91		
11	2022-01-10 00:00:00 UTC	486.59	136.92	29.13	3.09	0.82	0.51	2.57	5.89		
12	2022-01-11 00:00:00 UTC	1477.23	420.41	100.65	10.67	2.73	1.64	9.9	20.66		
13	2022-01-12 00:00:00 UTC	2158.58	609.43	123.55	11.61	2.74	1.61	11.91	21.39		
14	2022-01-13 00:00:00 UTC	5051.08	1436.14	296.15	22.61	3.57	1.82	27.28	50.88		
15	2022-01-14 00:00:00 UTC	1800.11	514.31	111.04	9.4	1.69	0.9	9.52	18.75		
16	2022-01-15 00:00:00 UTC	632.1	177.93	32.74	2.89	0.72	0.44	3.38	6.57		
17	2022-01-16 00:00:00 UTC	2734.85	776.47	165.18	13.67	2.93	1.72	19.75	35.28		
18	2022-01-17 00:00:00 UTC	1916.83	546.48	118.47	9.82	2.12	1.21	12.95	23.59		
19	2022-01-18 00:00:00 UTC	2082.04	595.79	135.04	11.36	2.19	1.21	12.72	23.84		
20	2022-01-19 00:00:00 UTC	1419.86	403.43	82.99	6.39	1.25	0.7	8.46	15.22		
21	2022-01-20 00:00:00 UTC	455.86	128.41	25.8	2.53	0.64	0.4	2.25	5.06		
22	2022-01-21 00:00:00 UTC	1943.63	544.42	108.23	9.46	2.28	1.37	14.41	25.51		
23	2022-01-22 00:00:00 UTC	1892.17	533.99	107.91	9.7	2.38	1.39	12.8	22.73		
24	2022-01-23 00:00:00 UTC	695.72	196.35	38.95	3.7	0.96	0.58	3.96	7.77		
25	2022-01-24 00:00:00 UTC	1334.28	376.3	77.44	7.3	1.8	1.08	8.99	16.83		

Slide 10: Wisconsin DNR Official: The Wisconsin PurpleAir correction factor is: Pac = PA * 0.5140 +1.8304 PAc is the corrected value for that day. PA is the daily PurpleAir particulate concentration. For further details on the PurpleAir comparison study and correction factors see the Wisconsin DNR PurpleAir Study Summary. Air Management worked with EPA and shared our local correction factor with them. They took it and embedded the algorithm into the fire and smoke map. So if your PurpleAir is set to public the fire and smoke map data is more accurate than the PurpleAir Website. That can be found here: https://fire.airnow.gov/ If your data is in excel the correction factor can be applied using excel functions. If you need help with that you can reach out to Pam Foy Gilmore, the Quality Assurance Coordinator - Pamela.FoyGilmore@wisconsin.gov

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	created_at	>=0.3um/dl	>=0.5um/c	>1.0um/dl	>=2.5um/c	>=5.0um/c	>=10.0um/	PM1.0_AT	PM10_ATM_ug/m3		Pac = PA * 0.5140 +1.8304		
2	2022-01-01 00:00:00 UTC	2296.39	659.92	159.98	16.3	3.39	1.91	15.39	31.18		17.86		
3	2022-01-02 00:00:00 UTC	691.54	192.58	30.98	2.38	0.58	0.35	4.1	6.96		5.41		
4	2022-01-03 00:00:00 UTC	2064.39	580.14	110.66	8.55	2.03	1.2	14.97	25.28		14.82		
5	2022-01-04 00:00:00 UTC	2952.8	842.08	184.03	16.14	3.5	1.98	19.35	35.74		20.20		
6	2022-01-05 00:00:00 UTC	1891.01	541.96	122.35	10.55	2.07	1.14	11.37	21.94		13.11		
7	2022-01-06 00:00:00 UTC	307.84	85.42	14.67	1.46	0.38	0.23	0.93	2.53		3.13		
8	2022-01-07 00:00:00 UTC	899.13	247.32	39.82	3.4	0.9	0.56	5.87	9.86		6.90		
9	2022-01-08 00:00:00 UTC	3539.55	1002.68	213.07	20.36	4.63	2.69	23.14	43.1		23.98		
10	2022-01-09 00:00:00 UTC	2177.1	625.04	150.78	15.24	3.17	1.83	14.14	28.91		16.69		
11	2022-01-10 00:00:00 UTC	486.59	136.92	29.13	3.09	0.82	0.51	2.57	5.89		4.86		
12	2022-01-11 00:00:00 UTC	1477.23	420.41	100.65	10.67	2.73	1.64	9.9	20.66		12.45		
13	2022-01-12 00:00:00 UTC	2158.58	609.43	123.55	11.61	2.74	1.61	11.91	21.39		12.82		
14	2022-01-13 00:00:00 UTC	5051.08	1436.14	296.15	22.61	3.57	1.82	27.28	50.88		27.98		
15	2022-01-14 00:00:00 UTC	1800.11	514.31	111.04	9.4	1.69	0.9	9.52	18.75		11.47		
16	2022-01-15 00:00:00 UTC	632.1	177.93	32.74	2.89	0.72	0.44	3.38	6.57		5.21		
17	2022-01-16 00:00:00 UTC	2734.85	776.47	165.18	13.67	2.93	1.72	19.75	35.28		19.96		
18	2022-01-17 00:00:00 UTC	1916.83	546.48	118.47	9.82	2.12	1.21	12.95	23.59		13.96		
19	2022-01-18 00:00:00 UTC	2082.04	595.79	135.04	11.36	2.19	1.21	12.72	23.84		14.08		
20	2022-01-19 00:00:00 UTC	1419.86	403.43	82.99	6.39	1.25	0.7	8.46	15.22		9.65		
21	2022-01-20 00:00:00 UTC	455.86	128.41	25.8	2.53	0.64	0.4	2.25	5.06		4.43		
22	2022-01-21 00:00:00 UTC	1943.63	544.42	108.23	9.46	2.28	1.37	14.41	25.51		14.94		
23	2022-01-22 00:00:00 UTC	1892.17	533.99	107.91	9.7	2.38	1.39	12.8	22.73		13.51		
24	2022-01-23 00:00:00 UTC	695.72	196.35	38.95	3.7	0.96	0.58	3.96	7.77		5.82		
25	2022-01-24 00:00:00 UTC	1334.28	376.3	77.44	7.3	1.8	1.08	8.99	16.83		10.48		
26	2022-01-25 00:00:00 UTC	727.48	203.21	35.3	2.84	0.72	0.44	4.65	8.08		5.98		

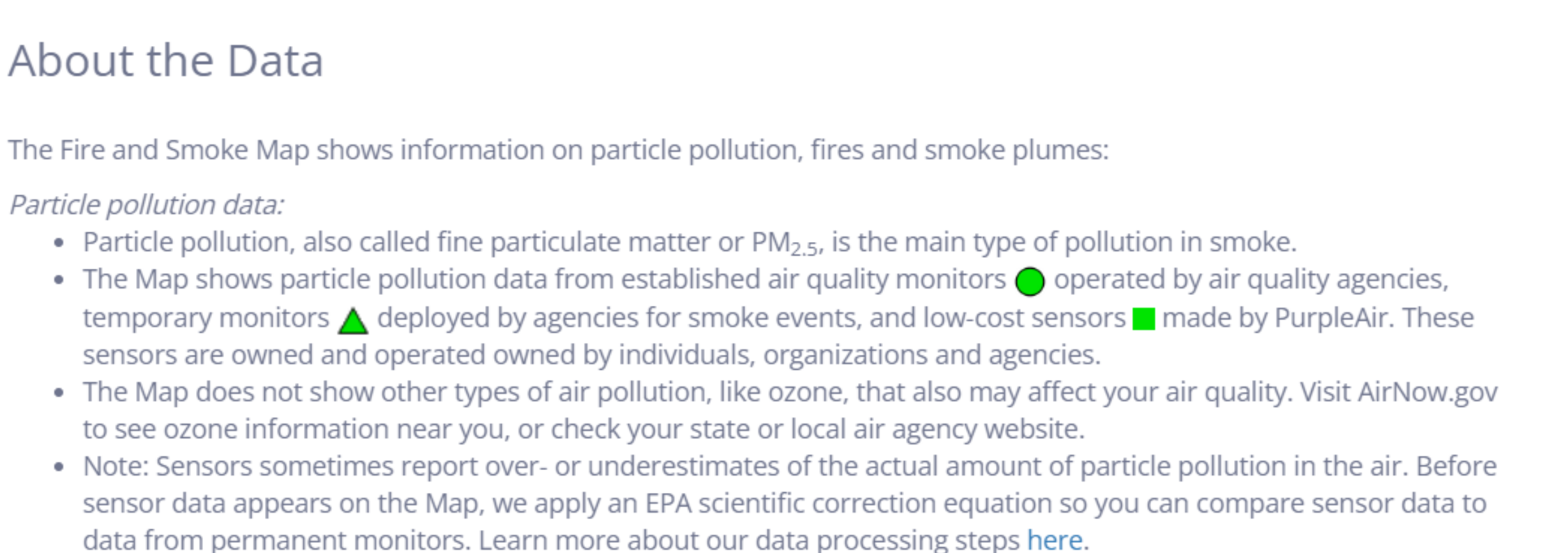
Slide 11: January 1-25, 2022 PurpleAir Monitor showing **PM 2.5 over** 5, 8 and 12 ug/m3, from neighboring wood burning neighbor's smoke entering yard.

	A	I	J	K	L	M	N	O
1	created_at	PM10_ATM_ug/m3		Pac = PA * 0.5140 +1.8304		>12 ug/m3	>8 ug/m3	>5 ug/m3
2	2022-01-01 00:00:00 UTC	31.18		17.86		17.86	17.85692	17.85692
3	2022-01-02 00:00:00 UTC	6.96		5.41		5.40784	5.40784	5.40784
4	2022-01-03 00:00:00 UTC	25.28		14.82		14.82432	14.82432	14.82432
5	2022-01-04 00:00:00 UTC	35.74		20.20		20.20076	20.20076	20.20076
6	2022-01-05 00:00:00 UTC	21.94		13.11		13.10756	13.10756	13.10756
7	2022-01-06 00:00:00 UTC	2.53		3.13		3.13082	3.13082	3.13082
8	2022-01-07 00:00:00 UTC	9.86		6.90		6.89844	6.89844	6.89844
9	2022-01-08 00:00:00 UTC	43.1		23.98		23.9838	23.9838	23.9838
10	2022-01-09 00:00:00 UTC	28.91		16.69		16.69014	16.69014	16.69014
11	2022-01-10 00:00:00 UTC	5.89		4.86		4.85786	4.85786	4.85786
12	2022-01-11 00:00:00 UTC	20.66		12.45		12.44964	12.44964	12.44964
13	2022-01-12 00:00:00 UTC	21.39		12.82		12.82486	12.82486	12.82486
14	2022-01-13 00:00:00 UTC	50.88		27.98		27.98272	27.98272	27.98272
15	2022-01-14 00:00:00 UTC	18.75		11.47		11.4679	11.4679	11.4679
16	2022-01-15 00:00:00 UTC	6.57		5.21		5.20738	5.20738	5.20738
17	2022-01-16 00:00:00 UTC	35.28		19.96		19.96432	19.96432	19.96432
18	2022-01-17 00:00:00 UTC	23.59		13.96		13.95566	13.95566	13.95566
19	2022-01-18 00:00:00 UTC	23.84		14.08		14.08416	14.08416	14.08416
20	2022-01-19 00:00:00 UTC	15.22		9.65		9.65348	9.65348	9.65348
21	2022-01-20 00:00:00 UTC	5.06		4.43		4.43124	4.43124	4.43124
22	2022-01-21 00:00:00 UTC	25.51		14.94		14.94254	14.94254	14.94254
23	2022-01-22 00:00:00 UTC	22.73		13.51		13.51362	13.51362	13.51362
24	2022-01-23 00:00:00 UTC	7.77		5.82		5.82418	5.82418	5.82418
25	2022-01-24 00:00:00 UTC	16.83		10.48		10.48102	10.48102	10.48102
26	2022-01-25 00:00:00 UTC	8.08		5.98		5.98352	5.98352	5.98352

Elinor and Gary B (undefined) (

Slide 12: Compare PurpleAir Legend Colors and AirNow (AQI) Legend Colors corresponding to levels of pollution. They are the same.

Slide 13: If a local ordinance is passed to use fenceline monitoring of polluting wood stoves, a local government official could either use the correlation formula to correlate PurpleAir data with EPA data, or could use the color chart on the Airnow map to see if the PM level is above W H O standard of 5 micrograms per meter cubed or above the (expected after November 2022) U S standard of 8 micrograms per meter cubed. The EPA PM 2.5 “safe” standard is now 12 or below but is expected to be lowered to 8 after public comment in Fall 2022. PurpleAir monitors are the squares on AirNow maps.



About the Data

The Fire and Smoke Map shows information on particle pollution, fires and smoke plumes:

Particle pollution data:

- Particle pollution, also called fine particulate matter or $PM_{2.5}$, is the main type of pollution in smoke.
- The Map shows particle pollution data from established air quality monitors ● operated by air quality agencies, temporary monitors ▲ deployed by agencies for smoke events, and low-cost sensors ■ made by PurpleAir. These sensors are owned and operated owned by individuals, organizations and agencies.
- The Map does not show other types of air pollution, like ozone, that also may affect your air quality. Visit AirNow.gov to see ozone information near you, or check your state or local air agency website.
- Note: Sensors sometimes report over- or underestimates of the actual amount of particle pollution in the air. Before sensor data appears on the Map, we apply an EPA scientific correction equation so you can compare sensor data to data from permanent monitors. Learn more about our data processing steps here.