

AIR QUALITY MONITORING

Part 4 – Getting and viewing the data



Community Action to Promote Healthy Environments (CAPHE)

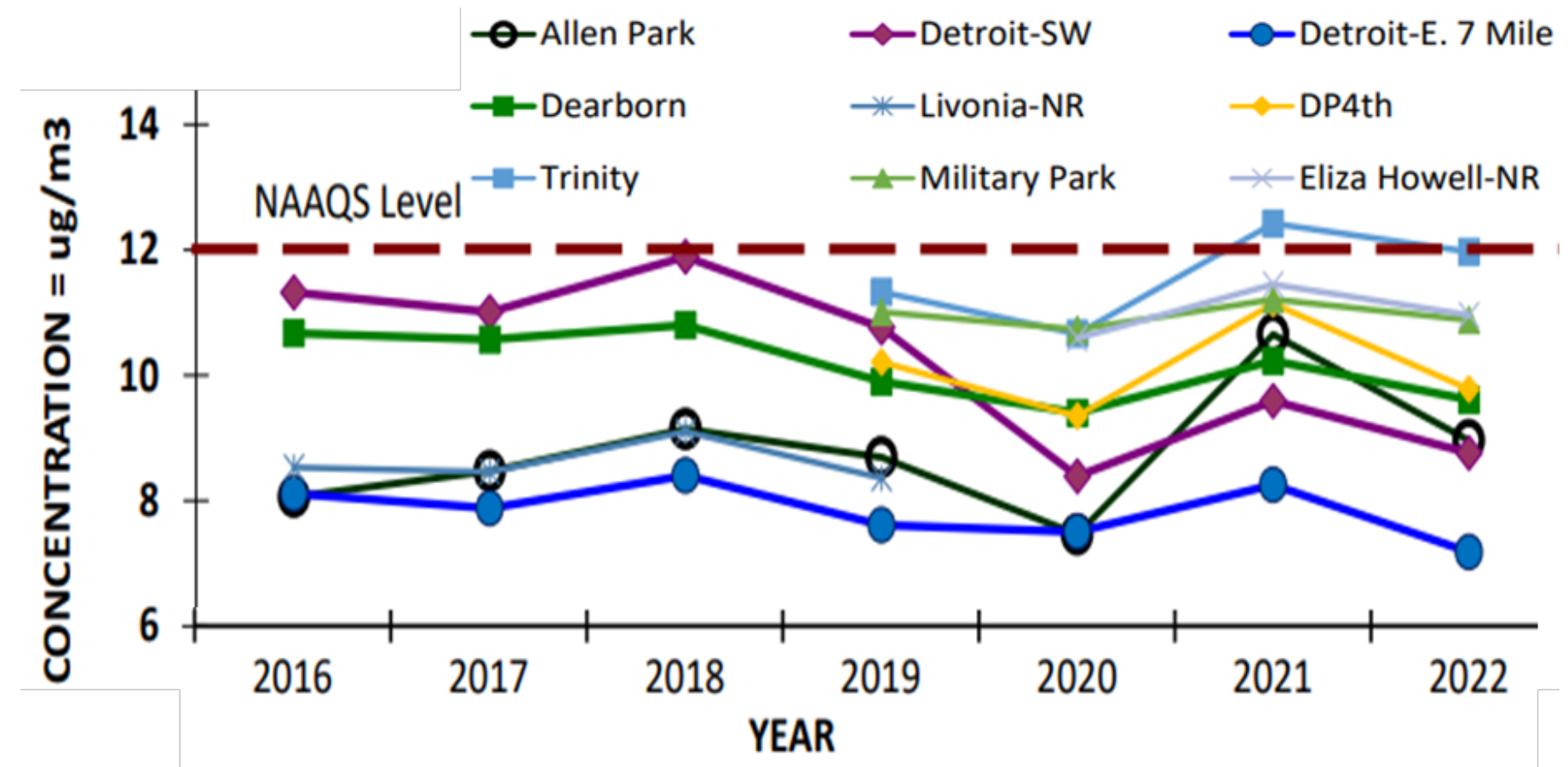
Stuart Batterman (stuartb@umich.edu)

Funded by NIEHS Grant # RO1ES022616 and the Fred A and Barbara M. Erb Family Foundation with additional support from NIEHS Grant # P30ES017885 and NIEHS Grant #R25 ES033042



Understanding and using the data

- ▶ Long-term trends – concentration plots, tile plots
- ▶ Short-term trends – day of week, hour of day
- ▶ Wind roses
- ▶ Pollution roses
- ▶ Next steps
 - ▶ Completed analyses
 - ▶ Acting on air quality data



Annual Average PM_{2.5} concentrations in SE Michigan
From Michigan EGLE: Air Quality Monitoring Report 2022

Air quality trends and data visualization

Trends are key to understanding exposure, dose and health effects

- Short “acute” exposure
- Prolonged “chronic exposure

Trends needed for regulatory compliance, forecasting, tracking

- Standards expressed with specific averaging times, e.g., PM_{2.5} has 24-hr and annual average.
- Multiyear analyses often required

EPA has interactive visualization tools for air quality monitoring data at:

<https://www.epa.gov/outdoor-air-quality-data>



Air Data: Air Quality Data Collected at Outdoor Monitors Across the US

Download Data

- [Pre-generated Data Files](#)
- [Download Daily Data](#)
- [Download Raw Data \(API\)](#)

Monitor Locations

- [Interactive Map of Air Quality Monitors](#)

About Air Data

- [Basic Information](#)
- [Frequent Questions](#)
- [Subscribe to RSS feed](#)

Data Viz Tools

- [Daily Air Quality Tracker](#)
- [Tile Plot - Multiyear](#)
- [Tile Plot - Single Year](#)
- [AQI Plot](#)
- [Concentration Plot](#)
- [Concentration Map](#)
- [Ozone Exceedances](#)

Summary Reports

- [Air Quality Index Report](#)
- [Air Quality Statistics Report](#)
- [Monitor Values Report](#)
- [Monitor Values Report - Hazardous Air Pollutants](#)
- [Air Quality Index Daily Values Report](#)

Technical Reports

- [PM2.5 Continuous Monitor Comparability Assessments](#)
- [PM10 Continuous Monitor Comparability Assessments](#)
- [Single Point Precision and Bias Report](#)
- [Additional Air Monitoring Assessments](#)

Concentration Plots – long term trends and the easiest way to get data

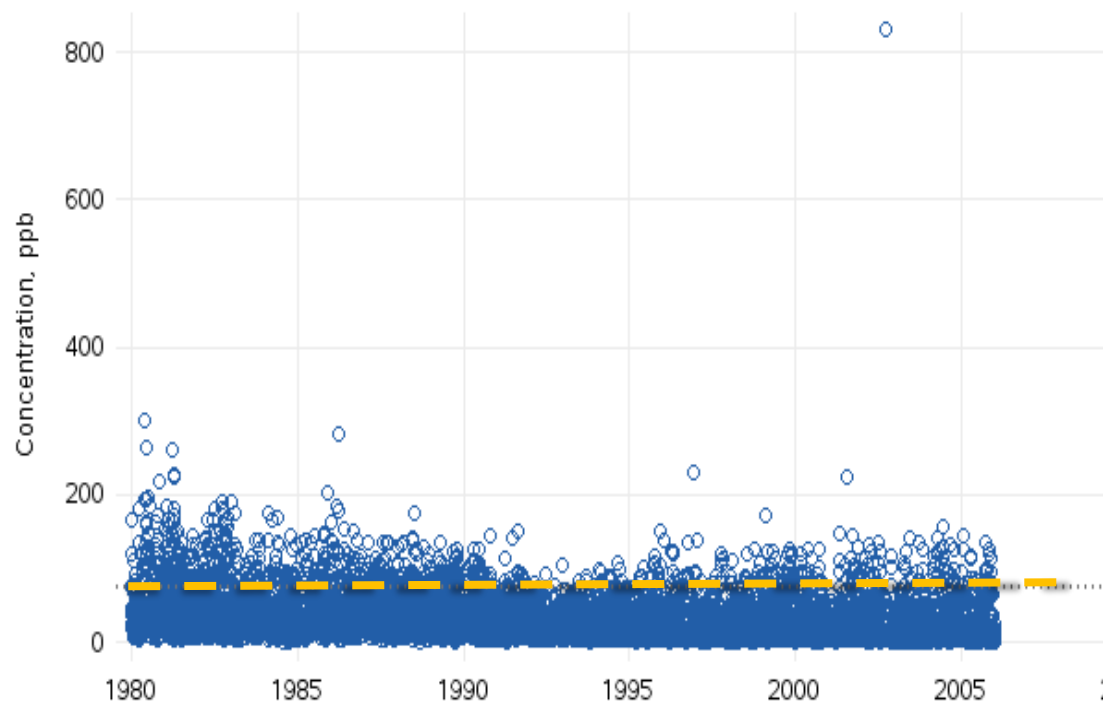
SO₂ – Daily 1 hour maximum compared to NAAQS of 75 ppb

Ozone – Daily 1 hour maximum compared to NAAQS of 70 ppb

P2.5 – Daily 24 mean compared to NAAQS of 35 ug/m³

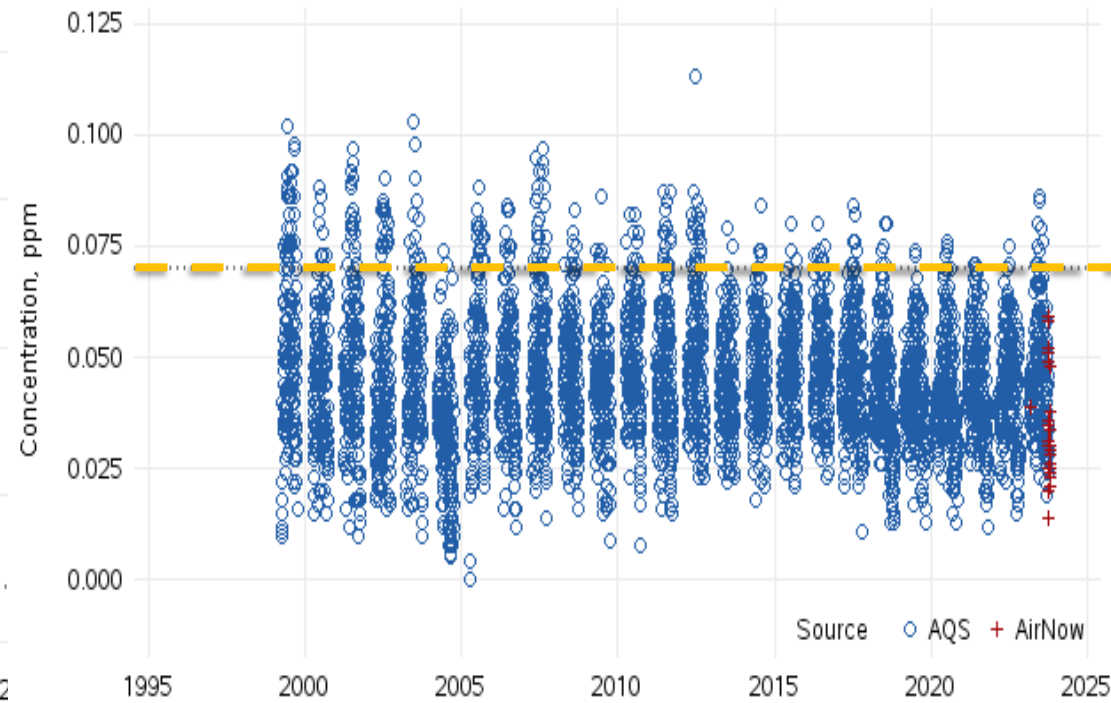
Daily Max 1-hour SO₂ Concentrations from 01/01/80 to 12/31/05

Parameter: Sulfur dioxide (Applicable standard is 75 ppb)
CBSA: Detroit-Warren-Dearborn, MI
County: Wayne
State: Michigan
AQS Site ID: 261630015, poc 1
Local Site Name: Southwestern H.S.



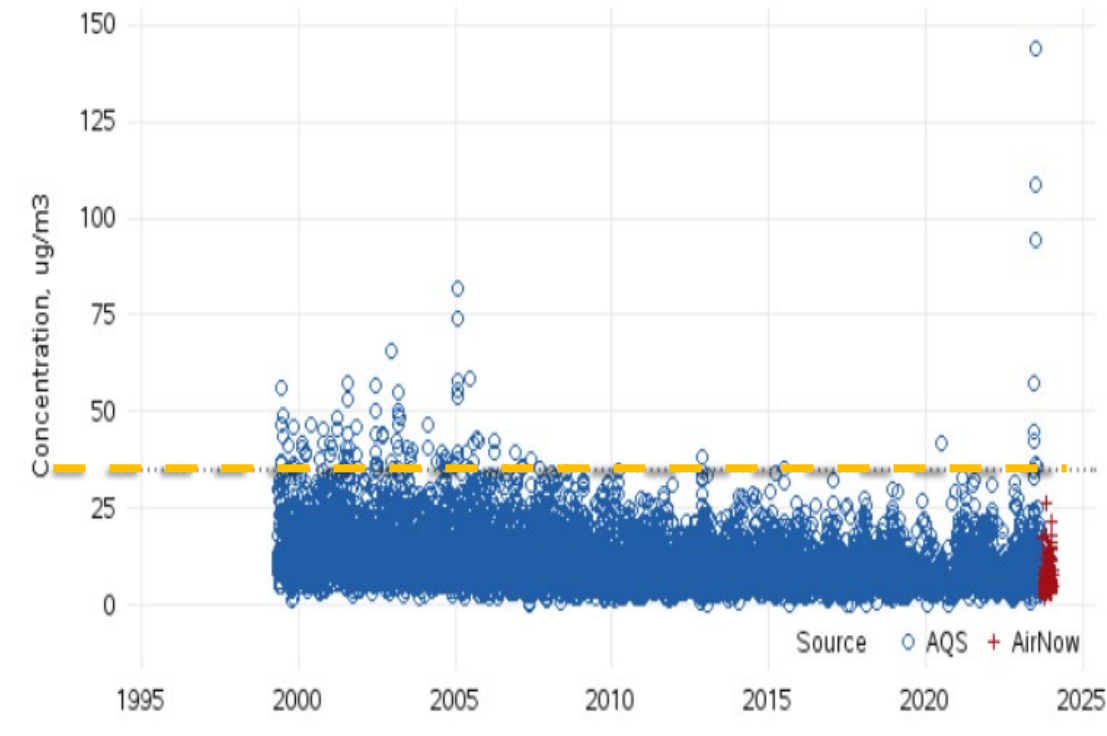
Daily Max 8-hour Ozone Concentrations from 01/01/99 to 12/31/24

Parameter: Ozone (Applicable standard is .070 ppm)
CBSA: Detroit-Warren-Dearborn, MI
County: Wayne
State: Michigan
AQS Site ID: 261630019, poc 2
Local Site Name: East 7 Mile



Daily Mean PM_{2.5} Concentrations from 01/01/99 to 12/31/24

Parameter: PM_{2.5} - Local Conditions (Applicable standard is 35 ug/m³)
CBSA: Detroit-Warren-Dearborn, MI
County: Wayne
State: Michigan
AQS Site ID: 261630001, poc 1
Local Site Name: Allen Park



Source: U.S. EPA AirData <<https://www.epa.gov/air-data>>

Source: U.S. EPA AirData <<https://www.epa.gov/air-data>>

Source: U.S. EPA AirData <<https://www.epa.gov/air-data>>

Plots limited to 25 years. Must enter dates prior to selecting sites.

Concentration Plots – easiest way to get data

Try it! 😊

Goto <https://www.epa.gov/outdoor-air-quality-data>
Select **Concentration Plot**

Select **Pollutant** PM2.5
Select **Period** 2000-2024
Select **County** Wayne
Select **All Sites or Site** 261630001
This is Allen Park with longest record
Select **Plot Data** and then scroll down

Data Viz Tools

- [Daily Air Quality Tracker](#)
- [Tile Plot - Multiyear](#)
- [Tile Plot - Single Year](#)
- [AQI Plot](#)
- **[Concentration Plot](#)**
- [Concentration Map](#)
- [Ozone Exceedances](#)

Air Data - Concentration Plot

This tool displays daily air quality summary statistics for the criteria pollutants by monitor. You can plot all monitors in a city or county, or you can select a specific monitor.

1. Pollutant

2. Period from to (maximum 25 years)

3. Geographic Area

-- or --

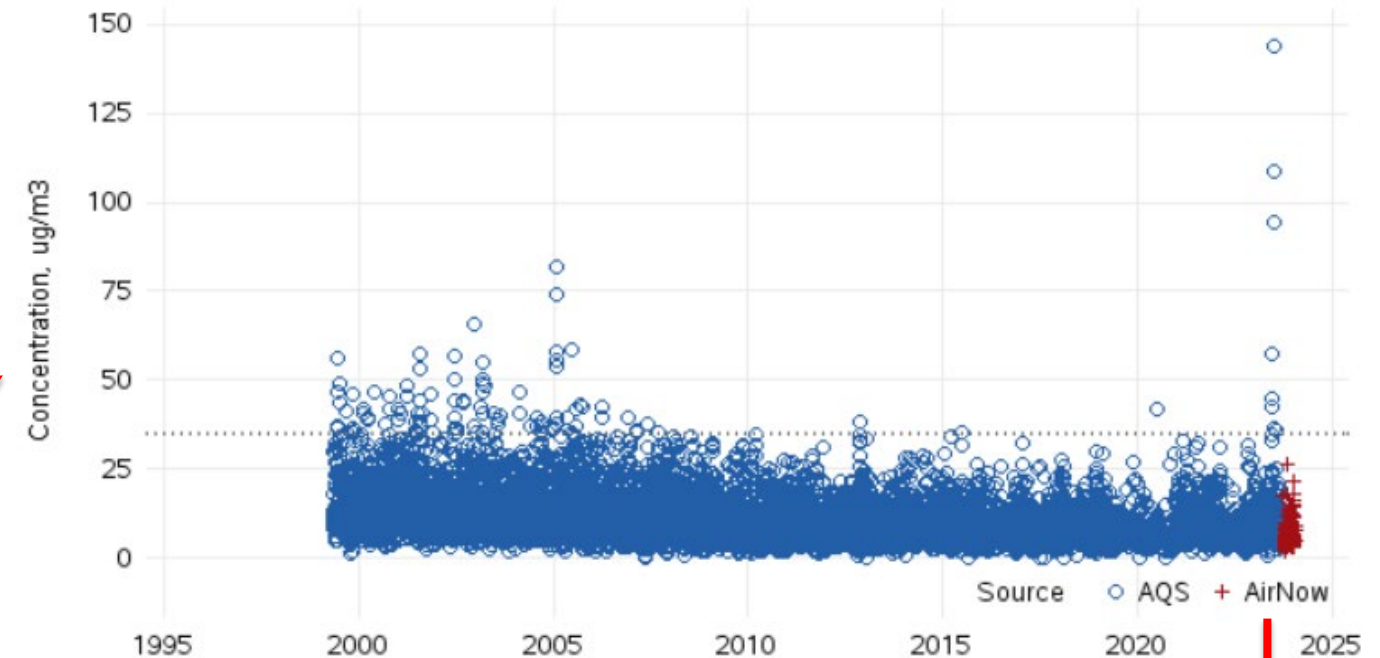
4. Monitor Site

Use of AirNow Data

This plot provides ozone, PM_{2.5}, and PM₁₀ data from [AirNow](#) for recent days that are not available from AQS. AQS data, as it becomes available, replaces any AirNow data. The AirNow data are not fully verified and validated through the quality assurance procedures monitoring organizations use to officially submit and certify data on the EPA

Daily Mean PM2.5 Concentrations from 01/01/99 to 12/31/24

Parameter: PM2.5 - Local Conditions (Applicable standard is 35 ug/m3)
CBSA: Detroit-Warren-Dearborn, MI
County: Wayne
State: Michigan
AQS Site ID: 261630001, poc 1
Local Site Name: Allen Park



Source: U.S. EPA AirData <<https://www.epa.gov/air-data>>

Get the Data The following data link is active for the next 10 minutes, after which you must resubmit your query. [Download CSV \(spreadsheet\)](#)

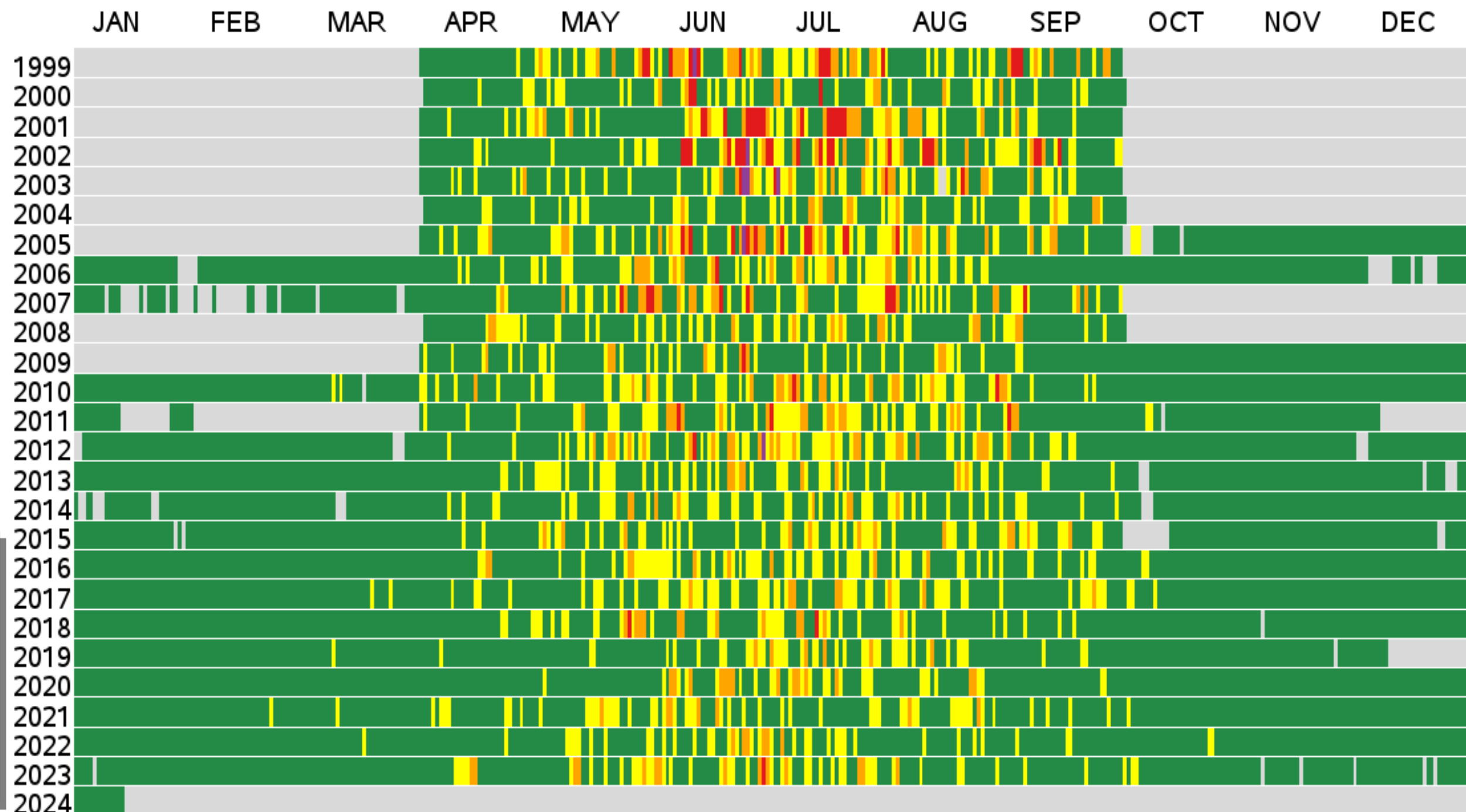
	Date	Source	Site ID	POC	Daily Mean PM2.5 Concentration	UNITS	DAILY_AQI_VALUE	Site Name	DAILY_OBS_COUNT	PERCENT_COMPLETE	AQS_PARAMETER_CODE	AQS_PARAMETER_DESC	CBSA_CODE
1													
2	1/28/2004	AQS	261630001	1	8.9	ug/m3 LC	37	Allen Park	1	100	88502	PM2.5 AQI & Spec	19820
3	1/31/2004	AQS	261630001	1	19.4	ug/m3 LC	66	Allen Park	1	100	88502	PM2.5 AQI & Spec	19820
4	2/3/2004	AQS	261630001	1	14.3	ug/m3 LC	56	Allen Park	1	100	88502	PM2.5 AQI & Spec	19820
5	2/6/2004	AQS	261630001	1	15.2	ug/m3 LC	58	Allen Park	1	100	88502	PM2.5 AQI & Spec	19820

Multiyear Tile Plot – easiest way to interpret standards and AQI

Plots daily AQI for a place and time period.

- Each “tile” represents one day of the year
- Color-coded based on the highest daily AQI value at monitor - or among all monitors in the geographic area
- Shows annual trend (more green is better)
- Shows seasonal trends (summer high)

Ozone Daily AQI Values, 1999 to 2024
Detroit-Warren-Dearborn, MI



Multiyear Tile Plot – try it for PM2.5

Try it! 😊

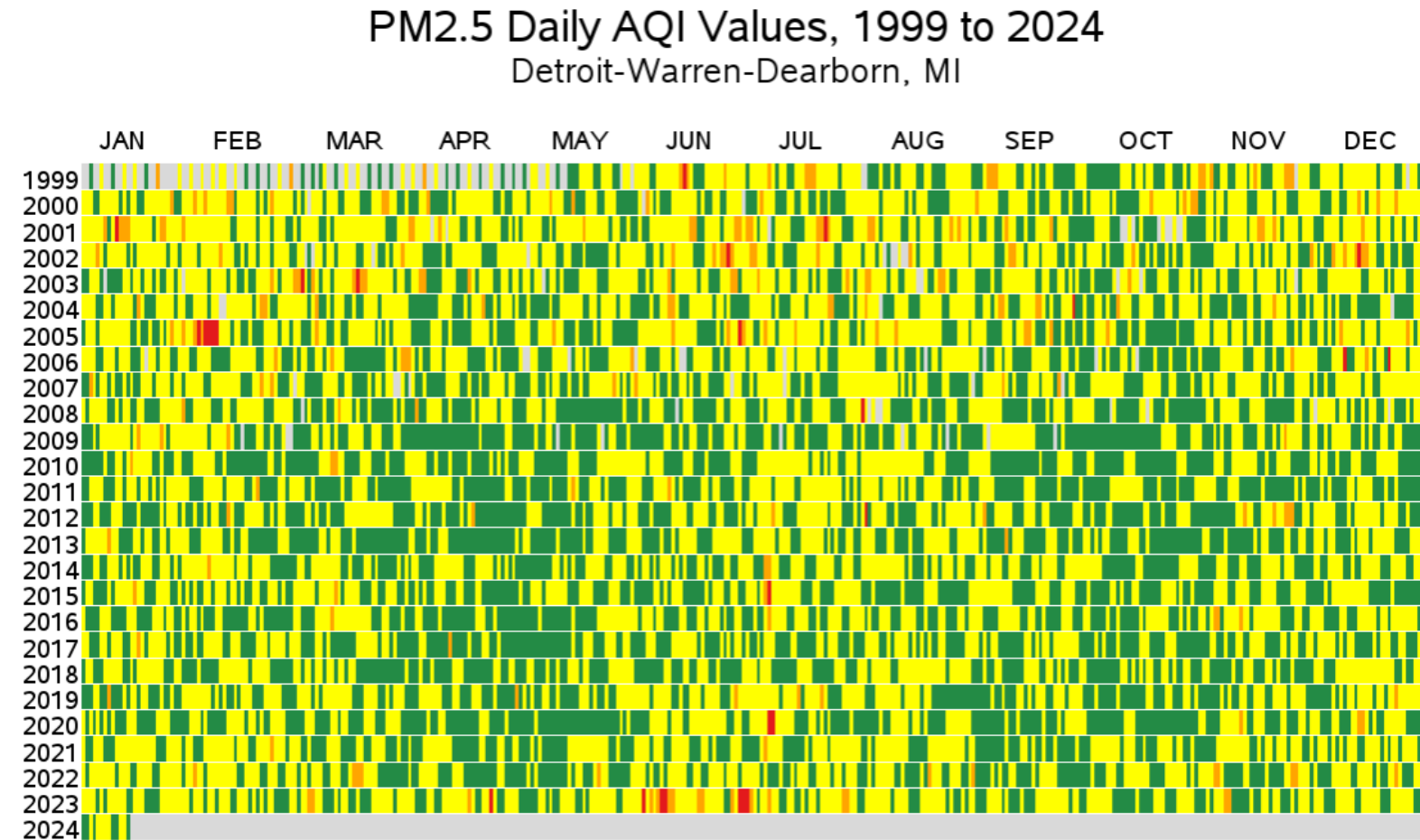
Goto <https://www.epa.gov/outdoor-air-quality-data>
Select **Concentration Plot**

- Select **Pollutant** PM2.5
- Select **Period** 2000-2024
- Select **County** Wayne
- Select **All Sites**
- Select **Plot Data**

Air Data + Multiyear Tile Plot

Plot daily AQI values for a specific location and time period. Each “tile” represents a color-coded based on the highest daily AQI value at the selected monitor - or among geographic area if "All Sites (Highest Daily AQI)" is selected.

- Pollutant
- Period from to (Maximum 25 years / Query time: 15 years ~ 30 se)
- Geographic Area
- or --
- Monitor Site



Data Viz Tools

- [Daily Air Quality Tracker](#)
- [Tile Plot - Multiyear](#)
- [Tile Plot - Single Year](#)
- [AQI Plot](#)
- [Concentration Plot](#)
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- [Ozone Exceedances](#)

Get the Data The following data link is active for the next 10 minutes, after which you must resubmit your query. [Download CSV \(spreadsheet\)](#)

	A	B	C	D	E	F	G	H	I	J	K	L	M
	Date	Source	Site ID	POC	Daily Mean PM2.5 Concentration	UNITS	DAILY_AQI_VALUE	Site Name	DAILY_OBS_COUNT	PERCENT_COMPLETE	AQS_PARAMETER_CODE	AQS_PARAMETER_DESC	CBSA_CODE
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2	1/28/2004	AQS	261630001	1	8.9	ug/m3 LC	37	Allen Park	1	100	88502	PM2.5 AQI & Spec	19820
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DetroitAir – <https://detroitair.umich.edu/>

CAPHE portal with goals:

1. Collect and include data from regulatory monitoring and multiple sensor networks
 - ▶ AirNow (EGLE, EPA) - PM, CO, SO₂, NO₂, **BC**
 - ▶ Purple Air - PM
 - ▶ Clarity - PM, some NO₂, O₃
 - ▶ DST - PM, **BC**, SO₂, NO₂
 - ▶ TSI - PM, NO₂, CO
2. Display and download the data with easy access
3. Help interpret air quality monitoring data

Website being developed by students at the University of Michigan - **(beta version)**



Yashoditya (Yash) Watal



Ella Zhang



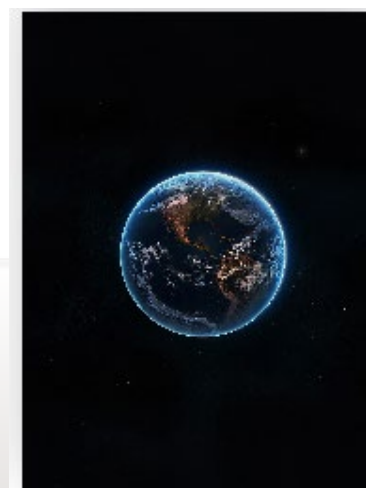
Amelia Francisco



Kristine McLaughlin



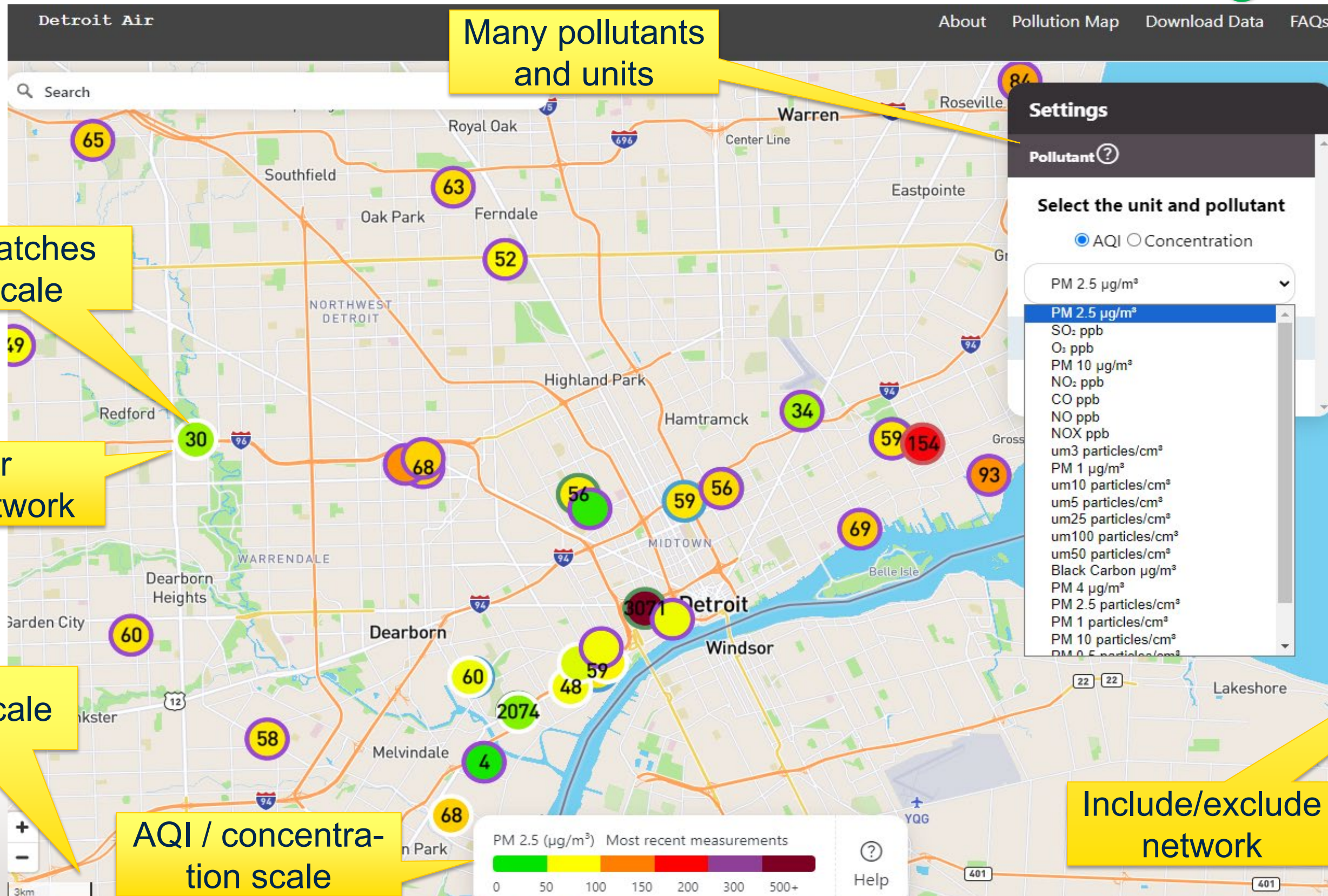
Olaf Dsouza



Jenny Xu

DetroitAir – <https://detroitair.umich.edu/>

Try it! 😊



Many pollutants and units

Help

Color matches AQI or scale

Edge color shows network

Physical scale

AQI / concentration scale

Settings

Pollutant ?

Select the unit and pollutant

AQI Concentration

PM 2.5 µg/m³

- PM 2.5 µg/m³
- SO₂ ppb
- O₃ ppb
- PM 10 µg/m³
- NO₂ ppb
- CO ppb
- NO ppb
- NOX ppb
- um3 particles/cm³
- PM 1 µg/m³
- um10 particles/cm³
- um5 particles/cm³
- um25 particles/cm³
- um100 particles/cm³
- um50 particles/cm³
- Black Carbon µg/m³
- PM 4 µg/m³
- PM 2.5 particles/cm³
- PM 1 particles/cm³
- PM 10 particles/cm³
- PM 0.5 particles/cm³

Settings

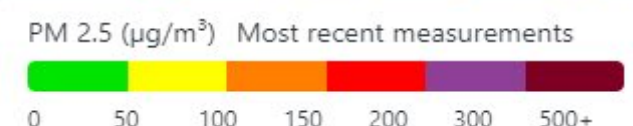
Pollutant ?

Filters ?

- Exclude inactive monitors
- EPA monitor locations
- PurpleAir locations
- DST locations
- Clarity locations
- TSI locations

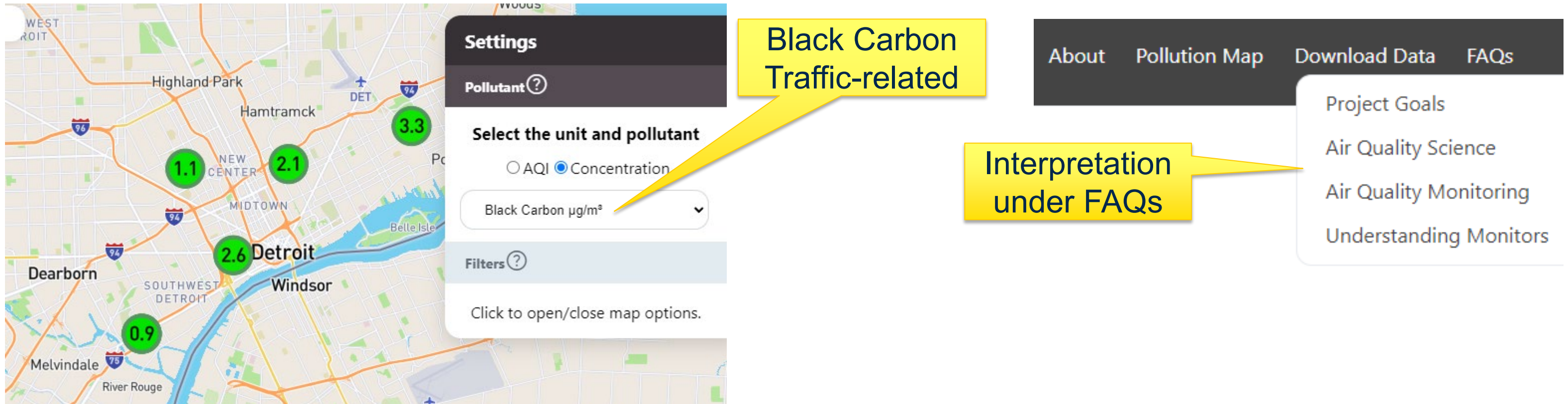
Click to open/close map options.

Include/exclude network



Help

DetroitAir – <https://detroitair.umich.edu/>

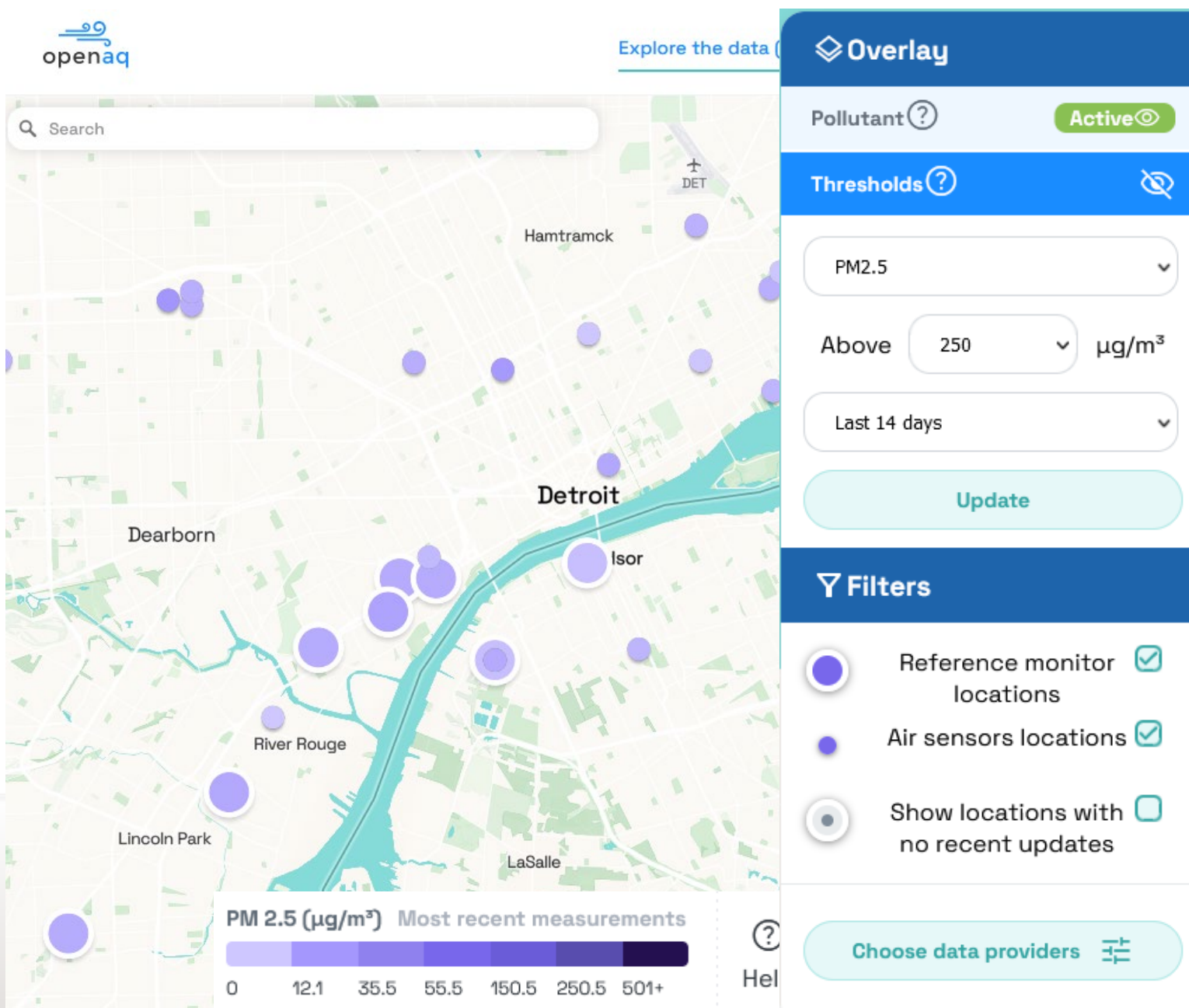


Plan to include information to help interpret air quality data

- sources
- meteorology
- short- and long-term trends
- pollution roses

Short-term trends using OpenAQ.org

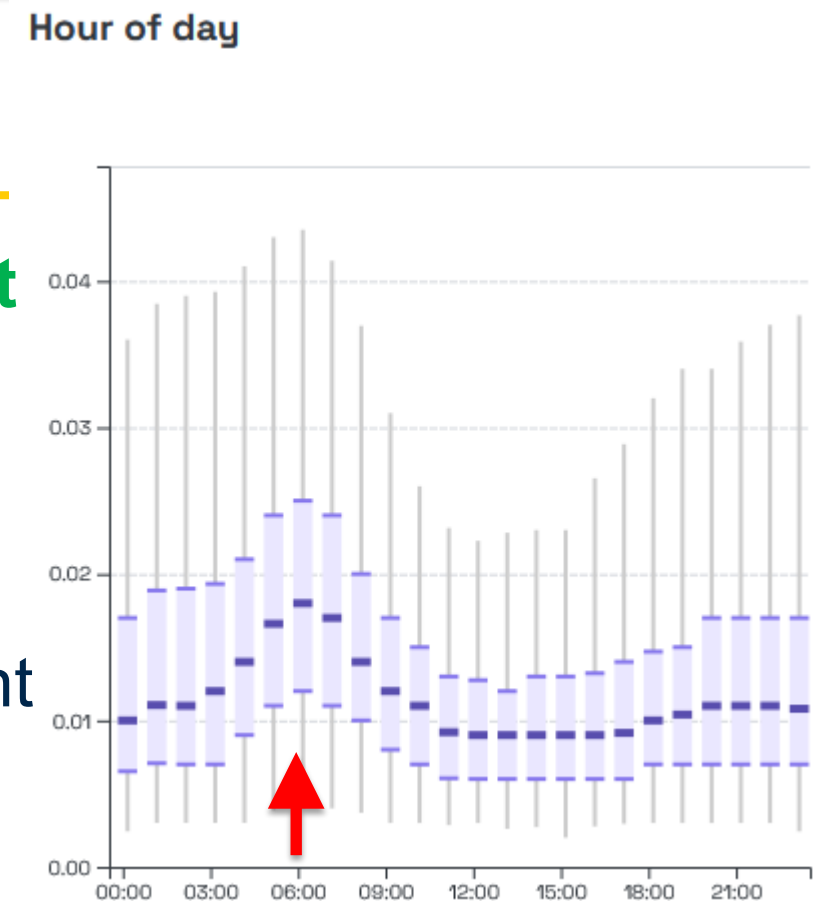
OpenAQ is an open access, non-profit organization
 Combines several networks (AirNow, PurpleAir)
 Trend analysis + data downloads



NO₂ at DP4 SW Detroit

Hour of day analysis

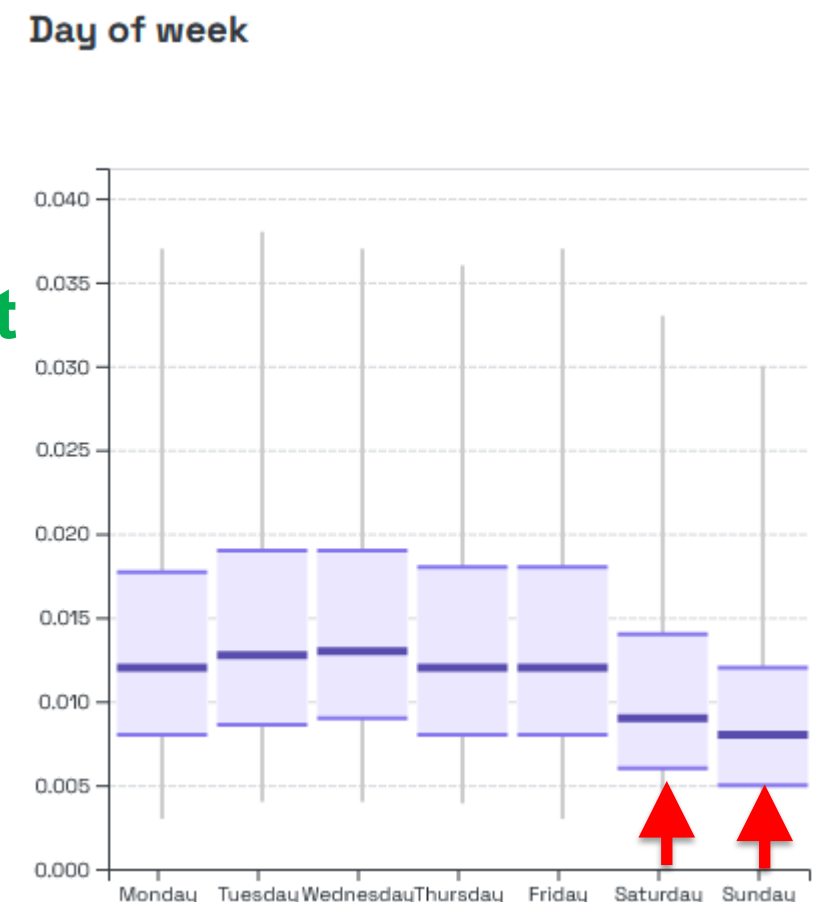
- Median and ranges
- Traffic-related pollutant
- Morning peak due to traffic emissions and meteorological effects



NO₂ at DP4 SW Detroit

Day of week analysis

- Median and ranges
- Traffic and industry
- Weekday/weekend

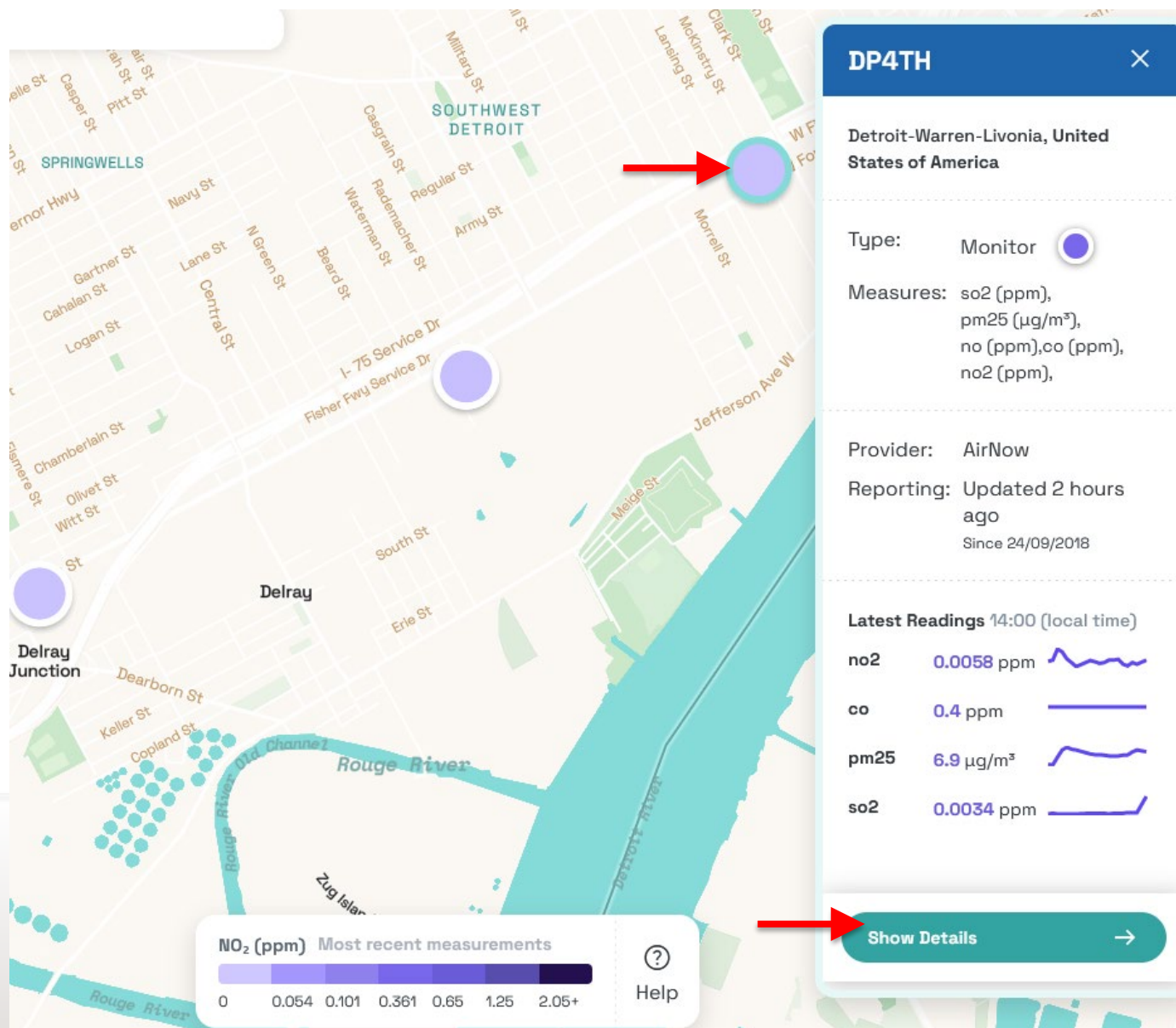


Short-term trends using OpenAQ.org

Try it! 😊

Goto <https://openaq.org/>
Select [Explore the data \(Beta\)](#)
Zoom to area or site of interest
Select **pollutant** NO2

Select **Show Details**
Can get detailed map (LOCATION)
→ **Scroll down** for figures (update)
Can download data



CHARACTERISTICS

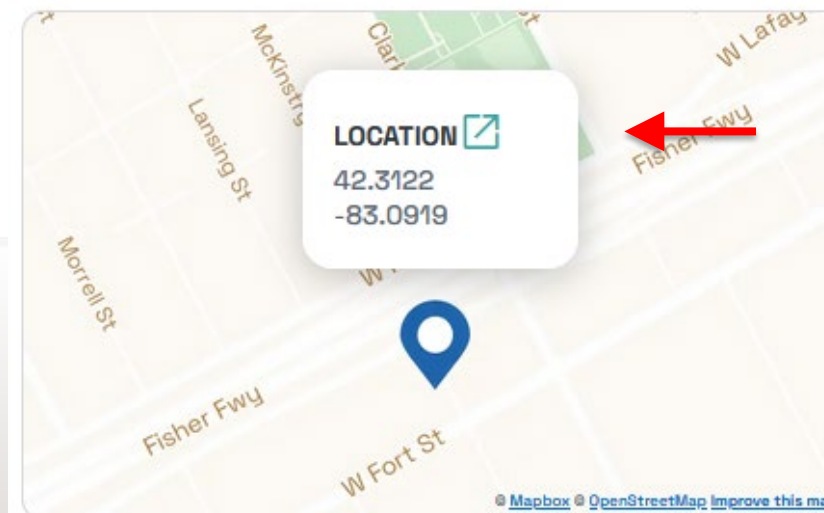
Type Monitor
Stationary

Measures SO₂ (ppm), PM2.5 (µg/m³), NO (ppm), CO (ppm), NO₂ (ppm)

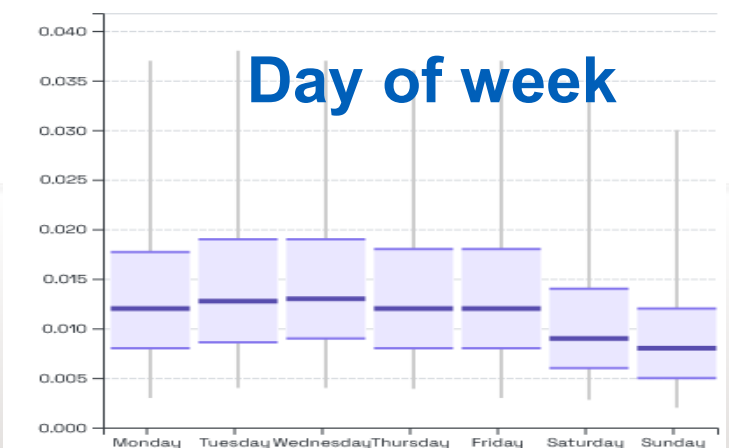
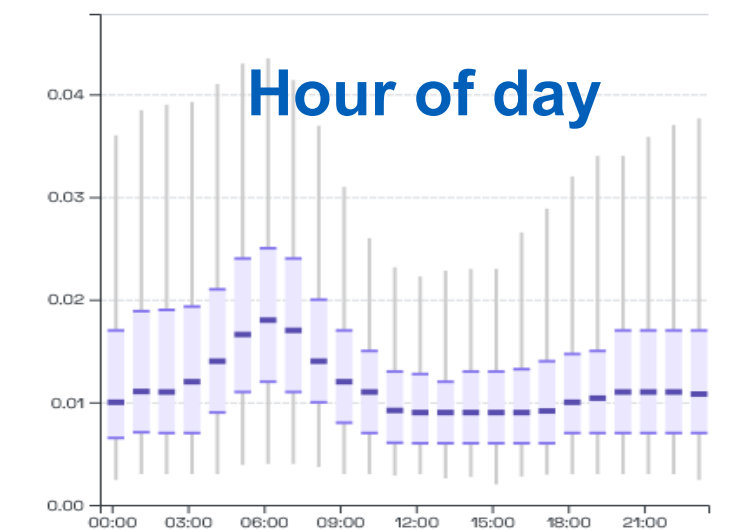
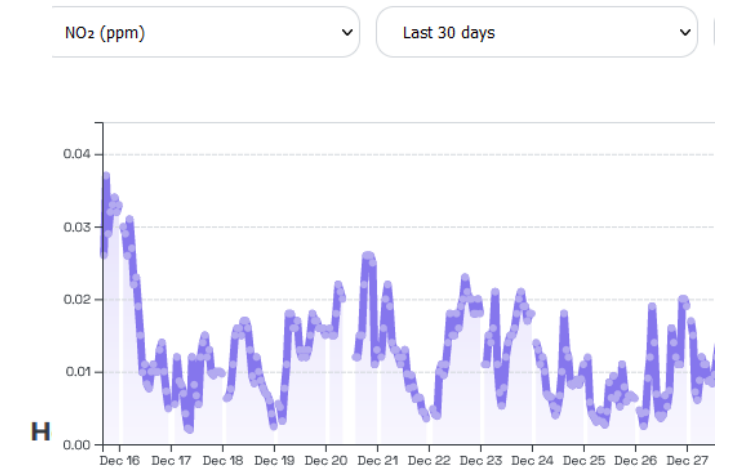
Name DP4TH

Reporting Updated 2 hours ago
Since 24/09/2018

Provider AirNow



Latest readings

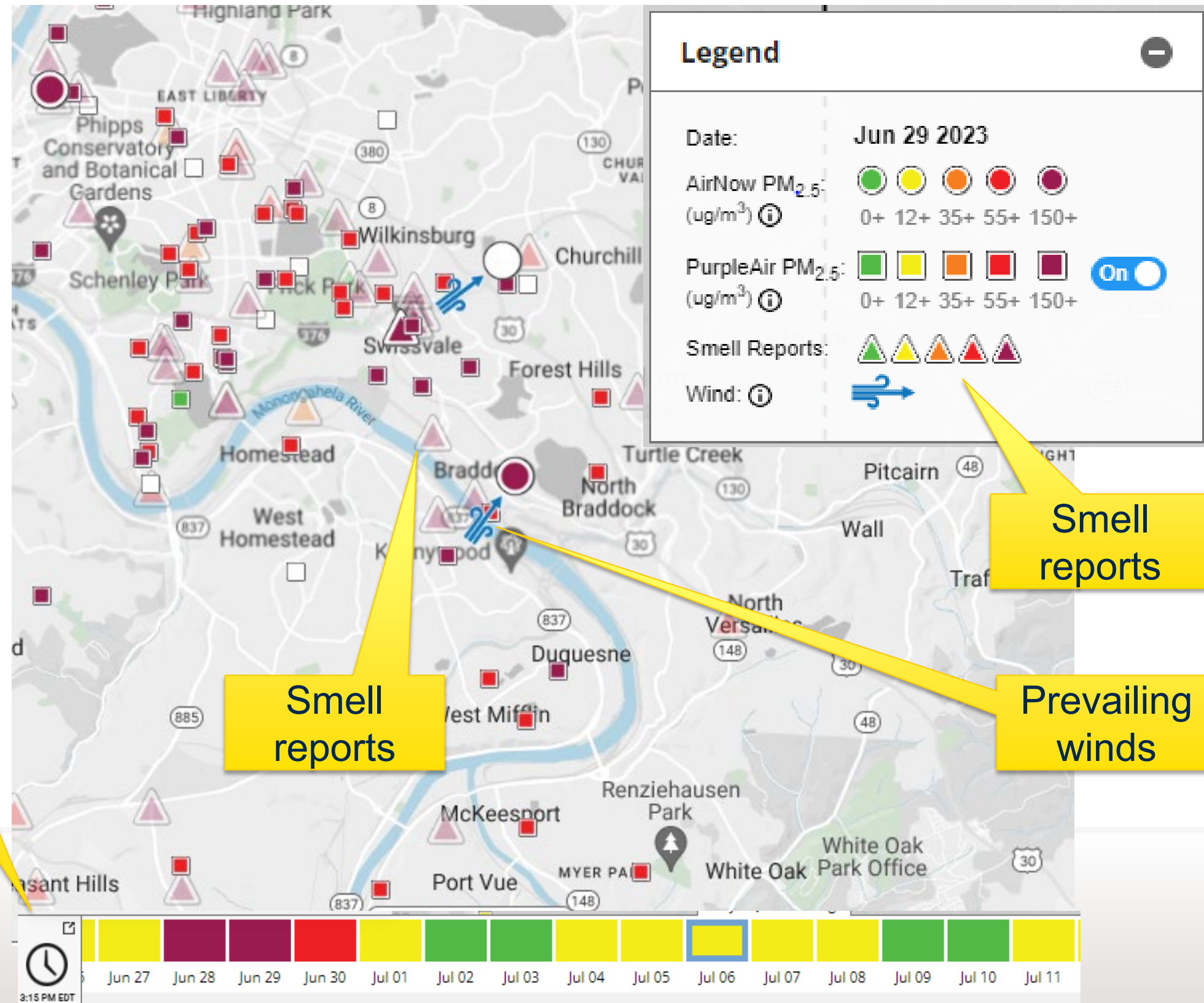


<https://globalcleanair.org/air-tracker/map/>



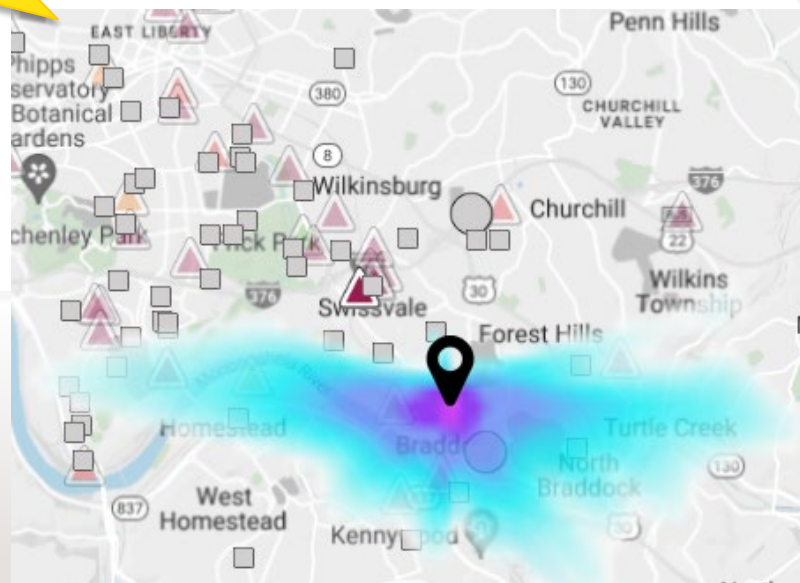
EDF site that incorporates:

- PM_{2.5} from AirNow and PurpleAir
- Meteorology and source data
- Odor reports
- Shows “pollution path” and potential source area
- Shows current and historical data
- Limited to Pittsburgh, Houston, Salt Lake City, Sacramento



Heat map showing source area for given dates

Choose Date and time



Smell reports

Smell reports

Prevailing winds