Know Your Air Network

Educator's Guide

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Why is air monitoring important?

Local air monitoring is essential for understanding how air pollution impacts neighborhoods at the local level. When monitors are spaced out at the county level, we cannot see how pollutants may be affecting certain neighborhoods within a county. Studies show that the burden of air pollution exposure more often falls on neighborhoods populated by lower income people of color. On this page you will learn about air quality monitoring, pollutants to pay attention to, and how to work with real-time air quality data provided by Clarity Movement.

Part one: What's polluting our air?

The Clean Air Act requires the EPA to set National Air Quality Standards for six common air pollutants known as Criteria Pollutants. Particulate matter is of the most studied and easily measured pollutants.

PARTICULATE MATTER (PM)

The sum of all solid and liquid inorganic compounds suspended in air, many hazardous.

Sources: wildfires, dust, industrial processes, combustion engines, and more.

Health effects associated with PM 2.5 exposure

How are these pollutants regulated?

All six of the criteria pollutants

Part two: Working with the data

The monitors we have deployed, provided by Clarity Movement, are solar powered and upload via cellular signal, so even in an extreme weather event or power outage, they are still collecting data!

As for accessing the data, there are two ways to go about it:

BASIC

ADVANCED

Basic

For students unfamiliar with statistical analysis and wanting to use photos of the data to support their capstone research.

Use the Know Your Air Network page to explore air quality at schools within the Los Angeles Unified School District and across the world. Our "How-To" video introduces our network, shows how to explore air quality at local schools using OpenMap, and how to use the AirVisual app to get alerts and health information based on the air quality from your local monitor.

Click image to play our "How-To" Video, additional info can also be found on Clarity's OpenMap video tutorial

Examples of potential research questions for students:

How do air quality trends change depending on the topography (forms and features of the land) of a place?
Reference 3-5 places around the world to show the role that topography plays in air quality.

How does a particular time of year affect air quality trends?
Pick two places at two different times of year, and see how they change.

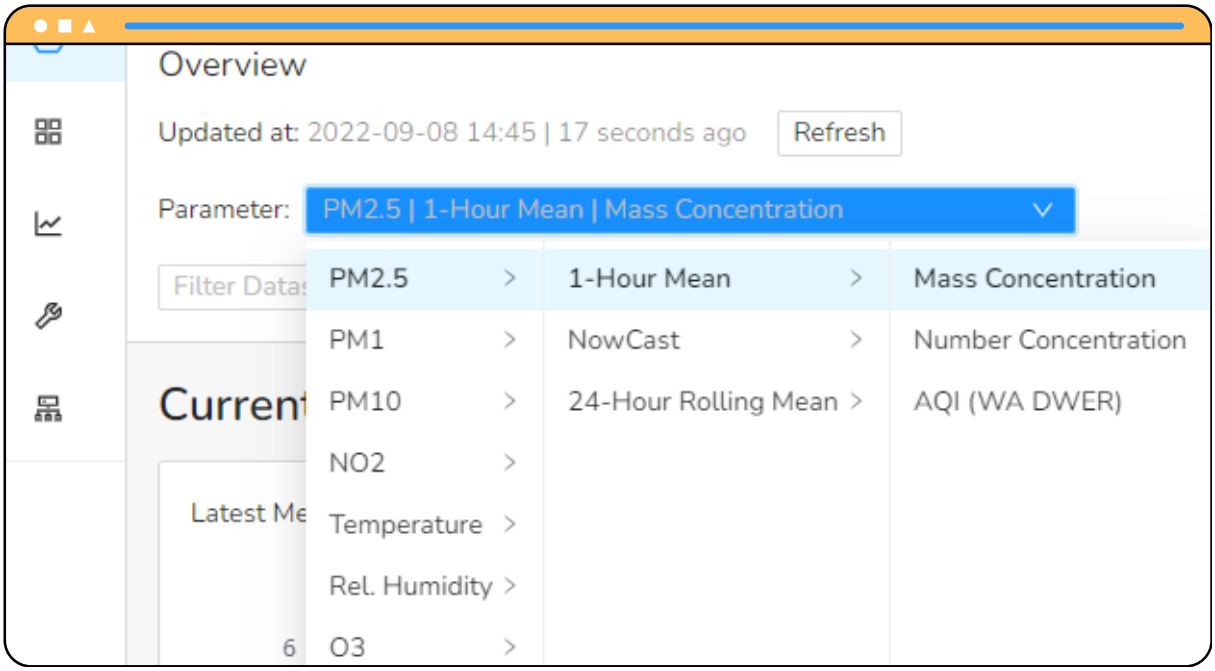
How does the political and/or cultural landscape of a place affect their air?
Choose 2-4 different locations around the world and compare their air quality in relation to their political/socio-cultural landscape.

Advanced

This section is best for students familiar with statistical analysis. Note: this section uses the Clarity Dashboard, which requires special log-in credentials to access.

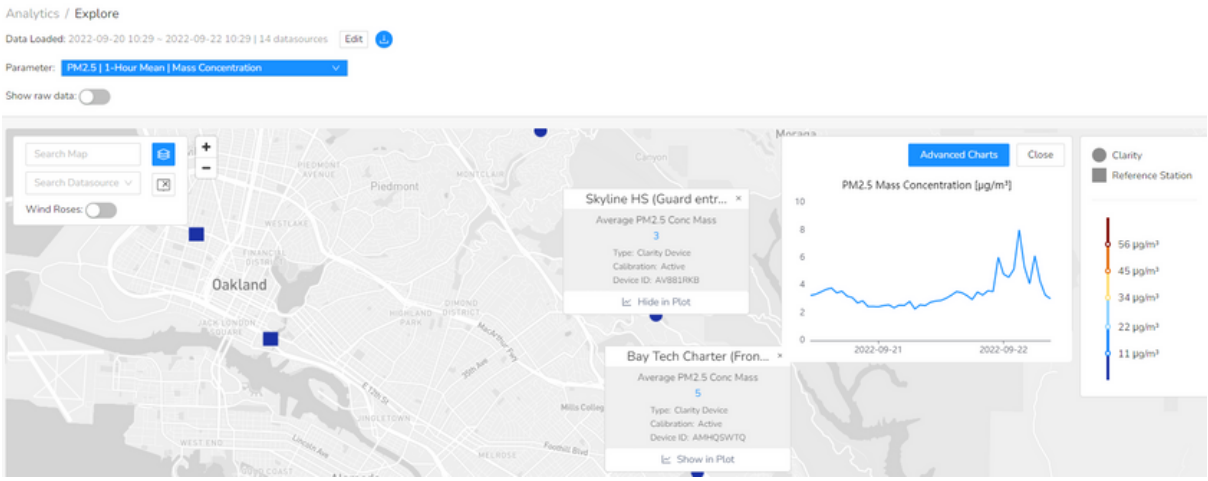
1. Choose your parameters (what measurements to select).

PM 2.5 is the most commonly studied and easily measurable pollutant, so the recommended parameter is PM 2.5 + 1 hour mean + mass concentration.



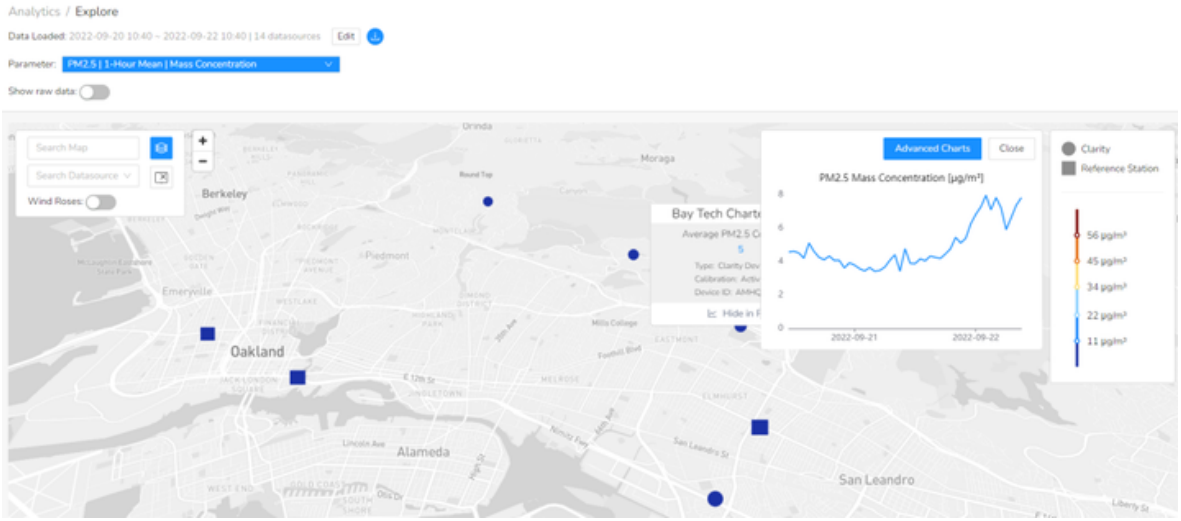
2. Under the **Analytics** tab on the left, you can use **Explore** to view the different monitors on the map. The squares and circles represent the **clarity monitors (circles)** and the **reference monitors (squares).**

Hover over which monitor you want to view and select **show in plot.** You can also select multiple monitors to view in the same graph- repeat the process to do so.



The squares on the map are non-clarity monitors used as reference sites. If you include both kinds of devices in your analysis, be sure to indicate which monitors' data you are referencing.

3. After selecting **show in plot** you can then view **advanced charts** to see the different ways to visualize the data.



The squares on the map are non-clarity monitors used as reference sites. If you include both kinds of devices in your analysis, be sure to indicate which monitors' data you are referencing.

Understanding Air Quality

The Air Quality Index (AQI) is a color-coded system for reporting air quality and its associated health impacts. High AQI values indicate increased levels of air pollution which pose greater health risks. AQI is based on 6 criteria pollutants: **PM2.5**, **PM10**, ground-level ozone, carbon monoxide, sulfur dioxide, and nitrogen dioxide.

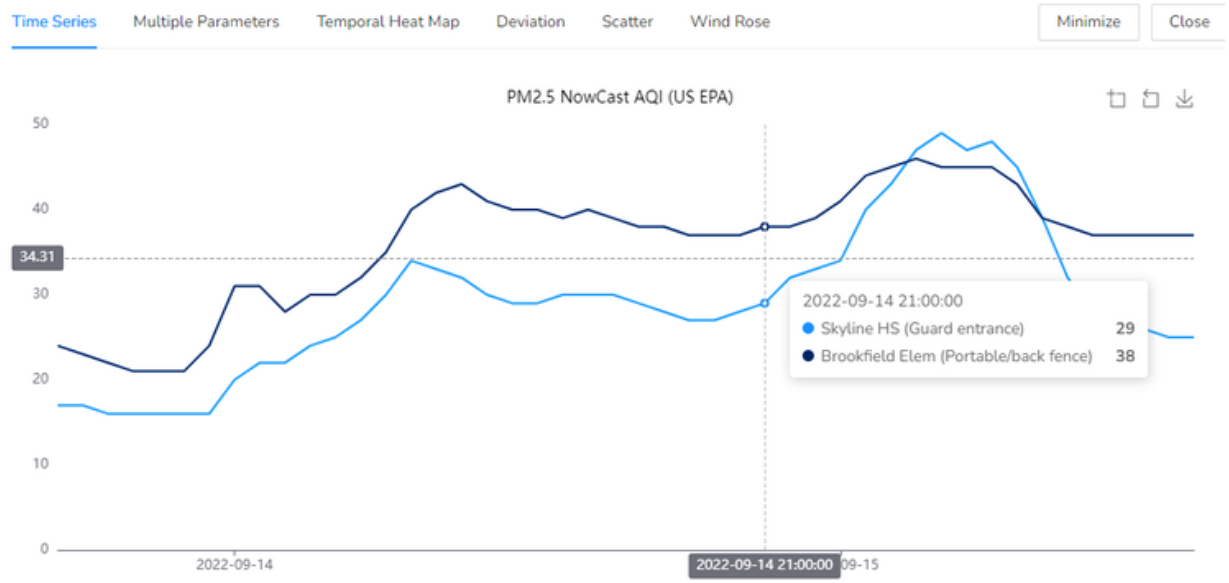
AirVisual App Icon	AQI Color	AQI Value Range	Air Pollution Level	Air Quality Description, Health Impacts, & Recommendations
	Green	0 to 50	Good	Air quality is "**Good**." Air pollution poses little or no health risk.
	Yellow	51 – 100	Moderate	Air quality is acceptable with "**Moderate**" air pollution. Sensitive Groups may experience irritations.
	Orange	101 – 150	Unhealthy for Sensitive Groups	Air Quality is "**Unhealthy for Sensitive Groups**" & they should limit outdoor activity. The general public is less likely to be affected.
	Red	151 – 200	Unhealthy	Air Quality is **"Unhealthy"** for Everyone, & **"Harmful"** for Sensitive Groups. Everyone should limit outdoor activity.
	Purple	201 – 300	Very Unhealthy	Air Quality is **"Very Unhealthy"** for Everyone. Health Alert: everyone is at risk of health effects. Prolonged or strenuous outdoor activity should be avoided.
	Maroon	> 301	Hazardous	Air Quality is **"Hazardous"** for Everyone. Health Warning of emergency conditions. Everyone is at serious risks of respiratory effects & should remain indoors.

What do these graphs tell us?

TIME SERIES:

X-axis is time and the Y-axis is the Air Quality Index (AQI).

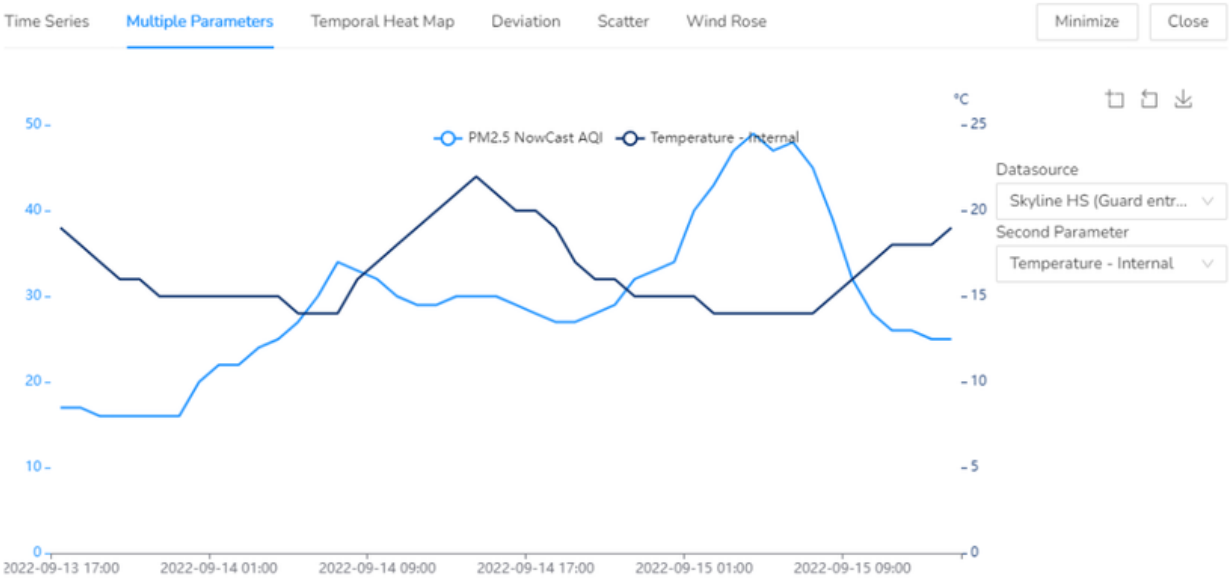
Research question: Pick a significant date or time of day and assess the air quality across two or more monitors. How are they alike and how are they different?



MULTIPLE PARAMETERS

X-axis is time (data and hour), and the Y-axis has two different measurements, comparing temperature in celcius on the right, to AQI on the left.

Research question: How does heat collect in different areas of the East Bay, in relation to the air quality? Are there other factors that may affect how the heat and poor air quality relate to one another within a specific location?

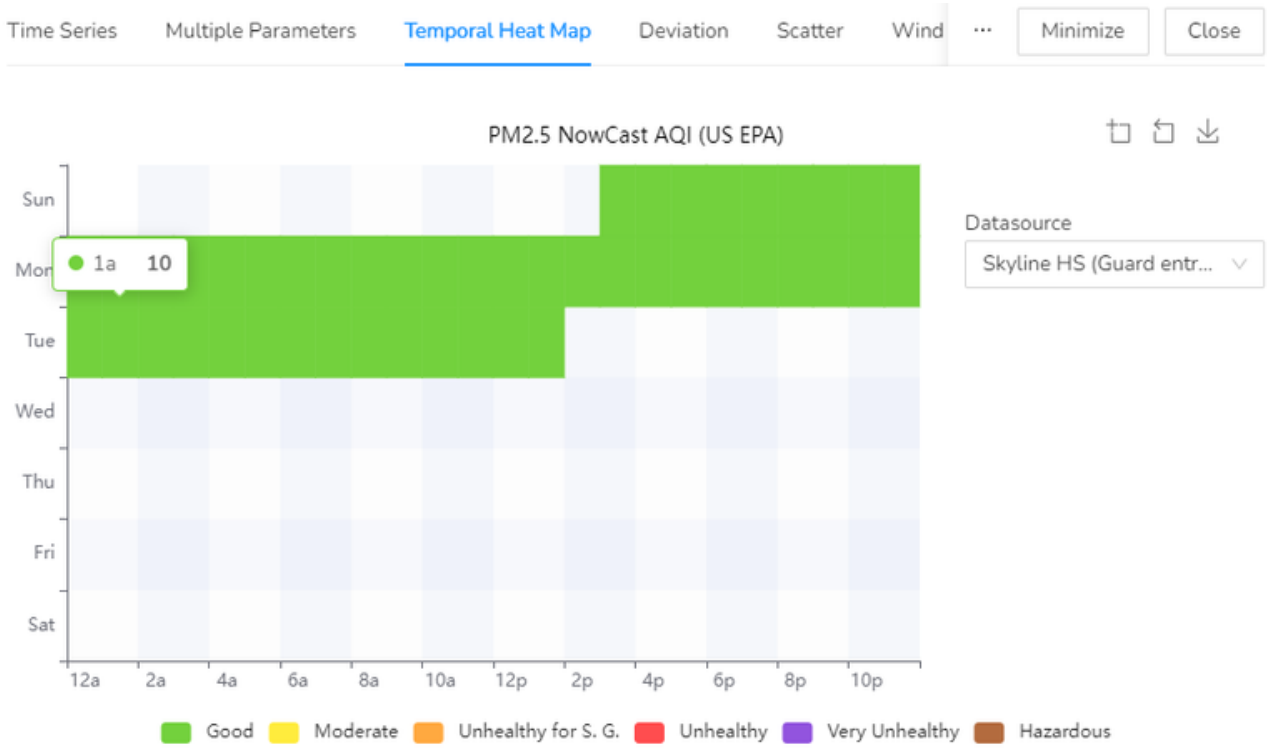


What do these graphs tell us?

TEMPORAL HEAT MAP

X-axis is time (hour), and the Y-axis is day of the week. The color blocks indicate how the air quality shifts across the different categories of air quality from good to hazardous, symbolized with colors.

Research question: During a wildfire event, what are the major differences we see in air quality over the course of a week, comparing two different neighborhoods and the factors that may affect those differences? You may need to reference other data if there has not been a recent local wildfire event.

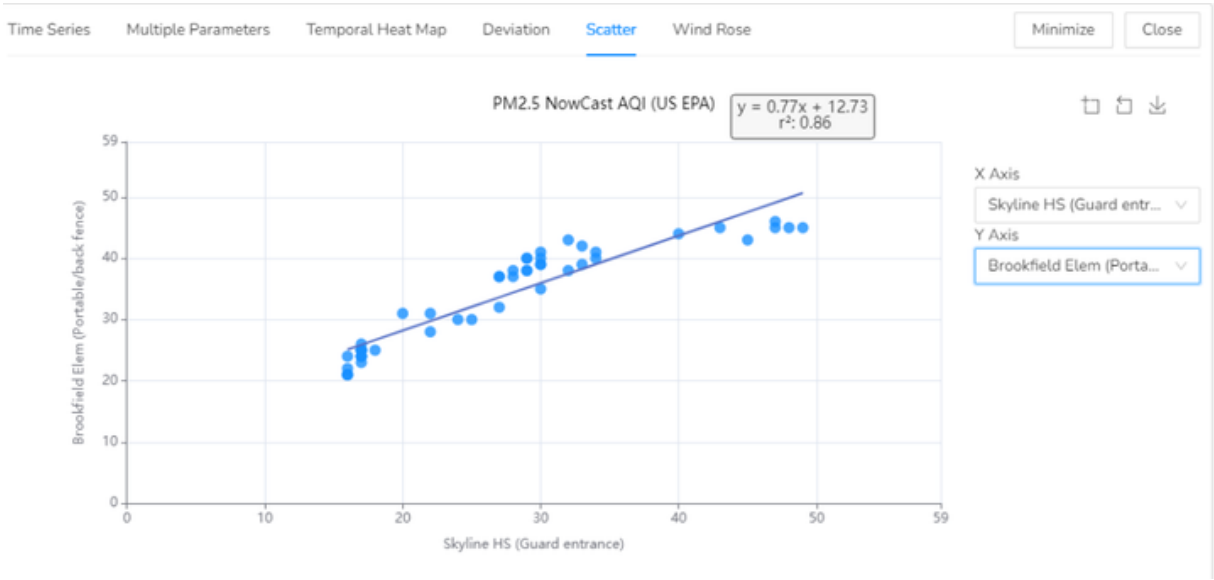


What do these graphs tell us?

SCATTER

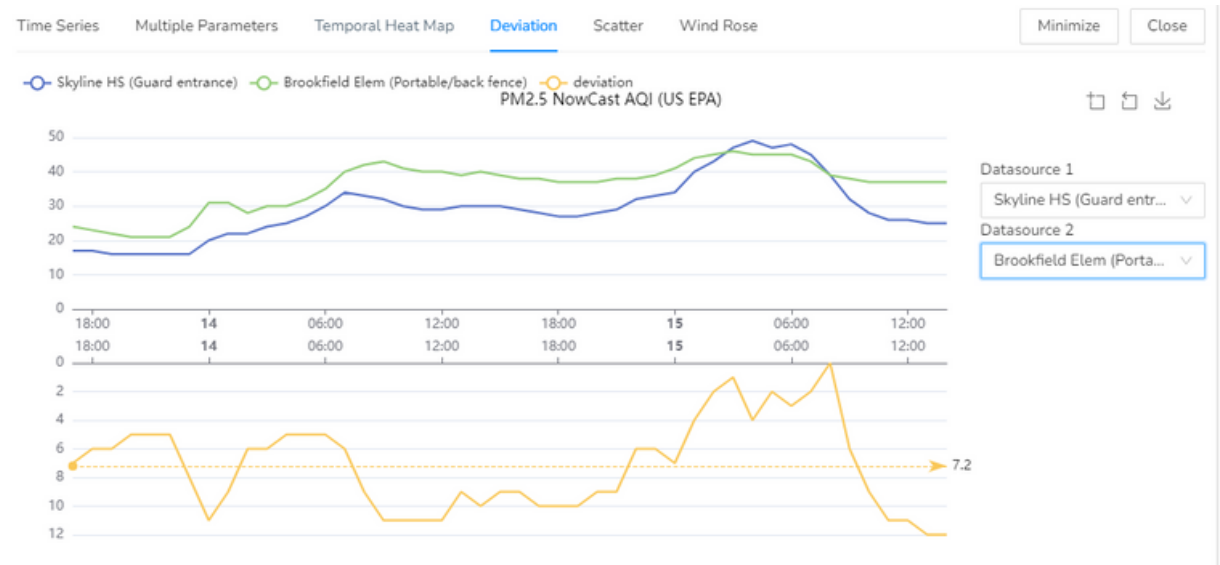
For this graph, be sure to choose two different monitor locations to plot. Select one for the x axis, and one of the y axis. This will compare how much the two locations differ in air quality from one another over.

Research question: What two monitors are most similar to each other and what two are most different? What might explain these similarities and differences?



DEVIATION

This graph is best used with data from more than one monitor. On the x axis is time in hours, and on the y axis is AQI, but below is a range from 0-1 which will indicate on the graph, to what extent (by %) is the air quality shifting over the course of a day.



How to View the Data	**Know Your Air Network** Website	**AirVisual** App	**Clarity** Dashboard
View the Air Quality Index (AQI)	✓	✓	✓
See data at a glance	✓	✓	✓
See data for different time periods (hourly, daily, monthly, etc)	✓	✓	✓
Basic Plotting features	✓	✓	✓
See data from monitors around the world	✓	✓	
Sign up for push alerts for the school nearest you		✓	
Health recommendations based on the Air Quality		✓	
Download LAUSD network data for analysis			✓
Advanced plotting features of LAUSD data			✓
Compare data to reference monitors			✓

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- **Know Your Air Network**: https://achieve.lausd.net/knowyourairnetwork
- **Clarity**: https://www.clarity.io/
- **Coalition for Clean Air**: https://www.ccair.org/
- **Sequoia Foundation**: https://scholairproject.org/air-monitoring-tutorial/