# YAQA/BackpAQ Data Analysis With AQView Workbook

Analyzing and interpreting your BackpAQ data using AQView

AQView is a powerful data analysis tool that lets you explore your BackpAQ data, create graphs and charts, identify air pollution sources, and most importantly take action!

AQView Community Air Quality Map

All BackpAQ users are automatically entitled to use the AQView Community Air Quality portal. Simply point your web browser to http://www.backpaqlabs.com/aqview to get started. This is the main window you'll see:
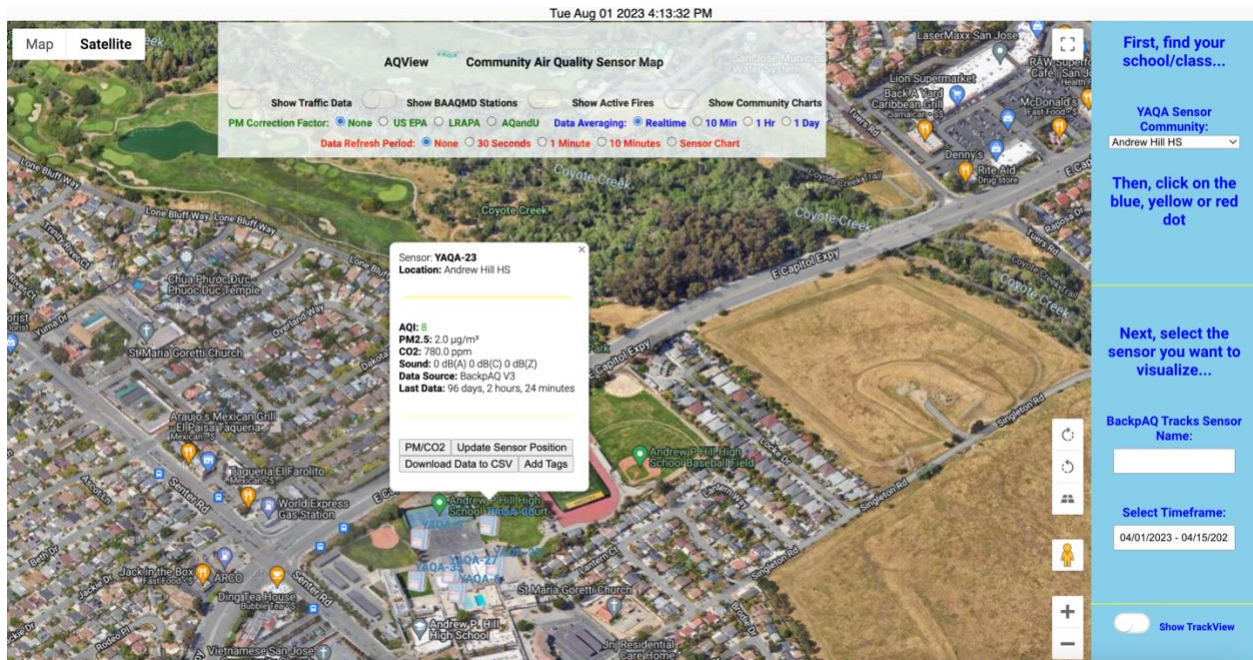
The main page is the Map itself, centered and zoomed-in on the middle area of your project sensors, and where you'll probably spend the most time and receive the biggest value. These maps are highly interactive: click around on the various tabs, options, and markers to see more detailed data.

In the image above you'll notice a number of colorful icons: BackpAQ sensor icons ;

and yellow and blue sensor clusters which represent a number of sensors. Other types of sensors are represented by their icons:

- Purple Air (fixed sensor)

- Met (or metrological sensor) (fixed sensor)

- Vaisala (fixed sensor)

These icons represent active sensors located at these positions on the map. A single sensor means there is one sensor at that location; the color clusters represent multiple sensors – click on one and it will expand into multiple sensor locations. Here's an example:
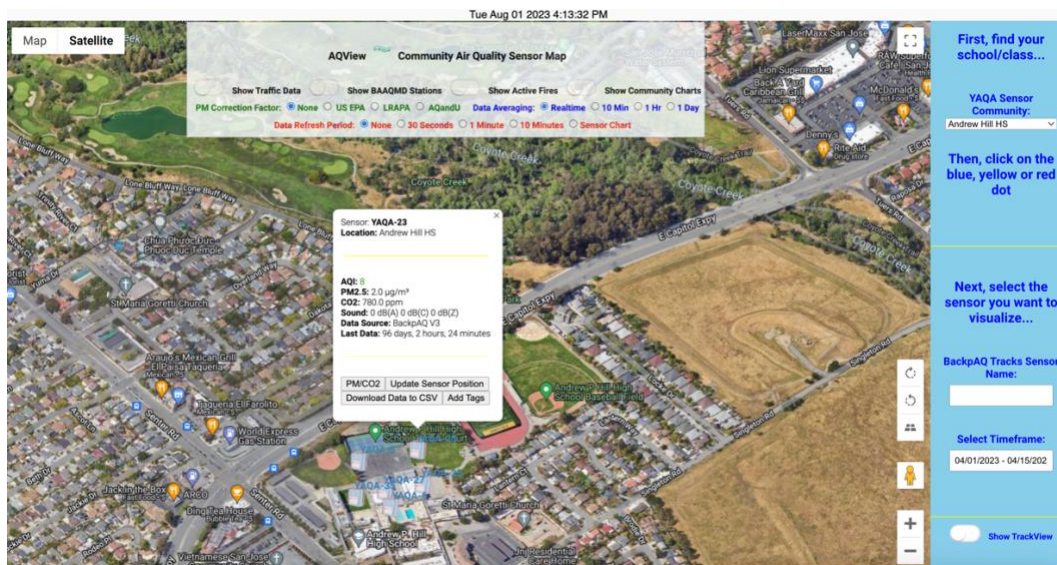
There are several additional functions we can utilize to better understand the data we have collected.

How to View Your BackpAQ Sensor Data
## How to View PM2.5 and CO2 Data

In general, AQview organizes data in *layers,* with each layer individually selectable. To view data that has been collected by your BackpAQ sensors, follow the two steps below. **It's as easy as ① ② ③ (refer to the circled numbers on the AQView screen.)**

🔵 Step 1

First, using the "YAQA Sensor Community" menu, select your school (or class if more than one teacher at your school.) You should see a blue, yellow or red dot (as described above) representing the. Sensors being used by your students. Click on this dot and you'll see the sensors displayed in approximate positions around your campus.

2️⃣ Step 2

To see *your* sensor data live on the map, click on your BackpAQ (or other) sensor (example: YAQA-11) and you'll see a popup window appear with the current sensor readings. Note that it may not be positioned where you are actually located because it may not have been updated with your current GPS location. You can re-click this periodically to see the current reading refresh.
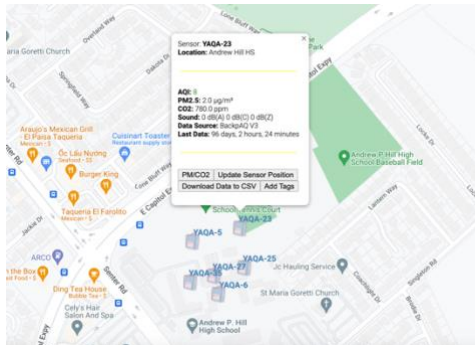
If you click on the button an interactive chart will appear

below the window, like this one:

This chart shows all PM2.5 and CO2 measurements recorded during the time shown as *date* and *time*. You can click on any point in the chart and the actual measurements from that time will appear as in the above image.

A couple of things to point out here…the chart is *actually two charts* which are "synced", meaning that as you scroll one the other scrolls along in sync, with all measurement points aligned. The top chart shows PM2.5 **in µg/m₃**, with the US EPA color scale in the background. The bottom chart shows CO2 in ppm, which was from an onboard CO2 sensor in the BackpAQ. (Note: Not all sensors will have CO2 measurement capability, for example Purple Air which is PM-only.)

There is also a handy Zoom capability which allows you to vary the time period for the data on the chart, eg, realtime, 30 mins, 1 hour, 1 month, etc.

Finally, you can easily export all of the data for this sensor by simply clicking the "Download Data to CSV" button. This is handy when you want to further explore your data using Excel or other statistical tool which uses CSV as file input. Note that this will download *ALL* the data for the sensor, using **UTC** time. If you just want the PM and CO2 measurements in *local time*, it's better to click on the "hamburger" icon in the upper right corner and select "Download CSV". ***Note that you can also view the graph in full screen mode or download JPEG or PDF images of your graph for use in reports or sharing with classmates.***
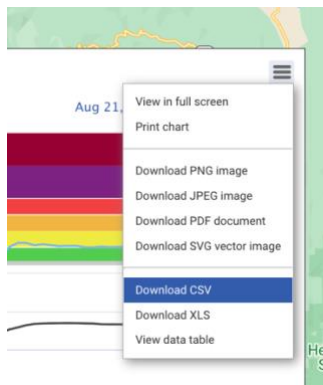

Finally, if you are working with a metrological sensor, you can view the Met graph which will show "Wind Barbs" representing wind speeds (in m/s) at specific times and dates on the Y-axis, with wind direction shown on the same time scale in the barbs below the graph.
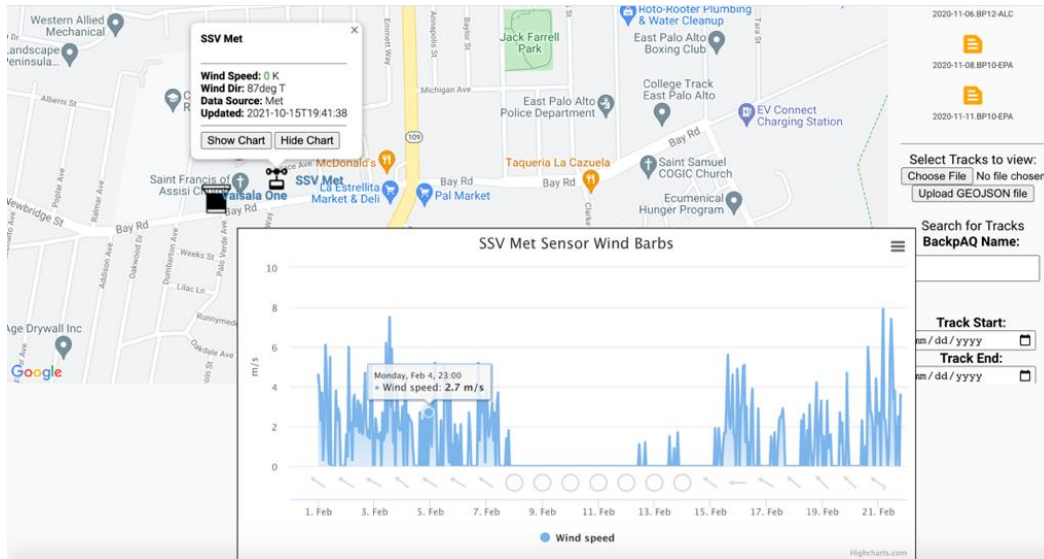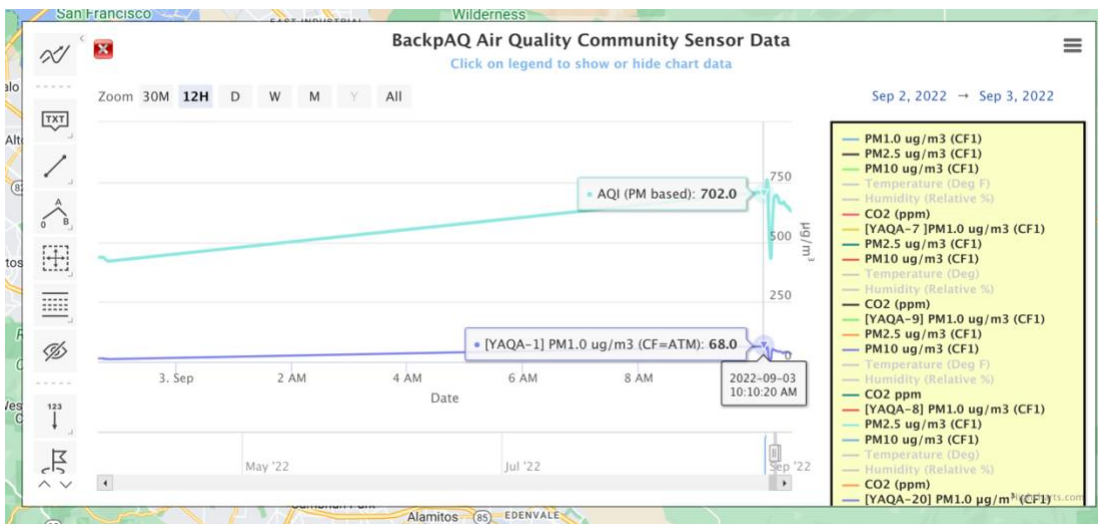
Community Chart

Community Chart offers a powerful way to examine all your BackpAQ sensor data along with data from your classmates or even other schools in the community (of course, they can "see" your data as well!)

You can click over to "**Show Community Charts**" on the front panel menu
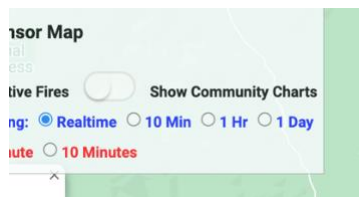

and you'll see this mega-chart appear:

This powerful chart will display all of the BackpAQ (or other) devices participating in your study or class. To better focus on *your* BackpAQ data, click "Hide Chart Data" and then re-select only the data pertaining to your device, for example, "BP1-DUB", in the yellow box. Or load all of the data and see how yours compares to your classmates. Note that you can select or de-select data simply by clicking on the fields in the yellow box. Have fun!

Oh, and one more feature…you can download the data for sharing or further analysis by clicking the "hamburger" icon in the upper right corner of the chart. There are options for downloading PDFs, JPEGs, CSV and other formats.
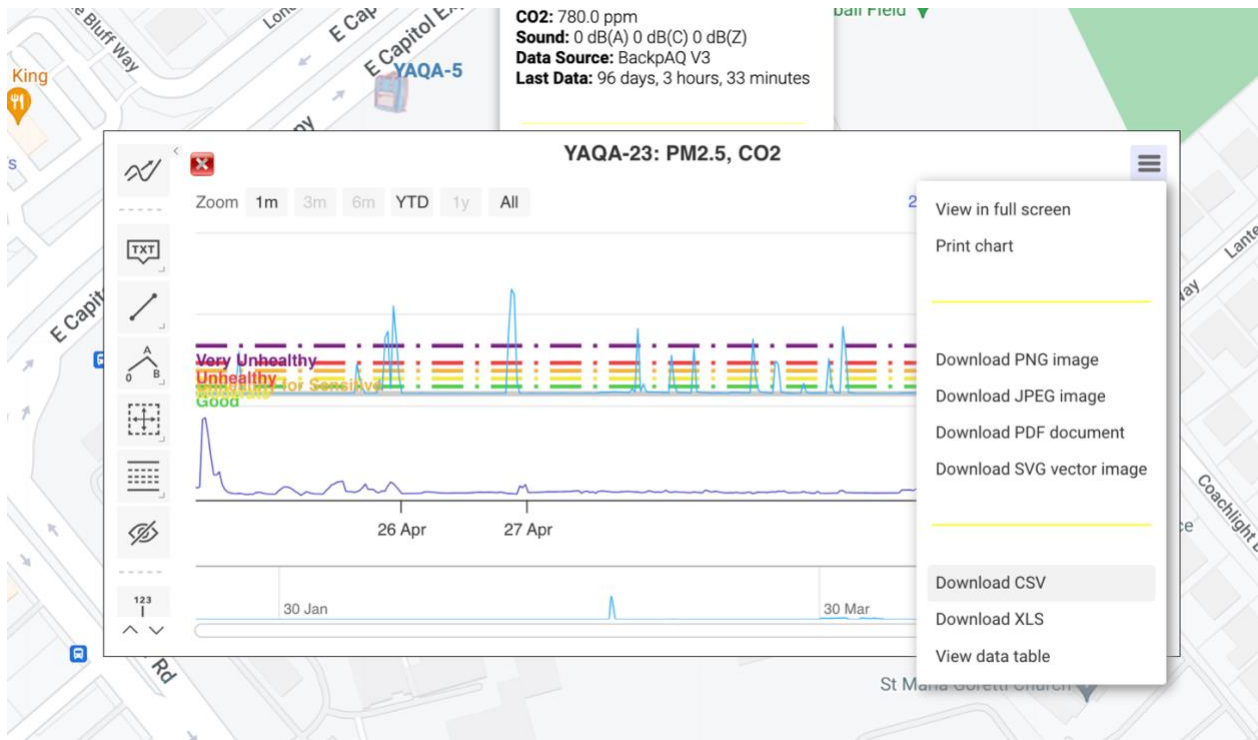
Viewing and Replaying BackpAQ Mobile Exploration Data

A Brief Intro

Since BackpAQ is aimed at *mobile* air quality monitoring, the most useful data is probably the data that is collected and stored in time-sequence form, as you walk around. This is one of the reasons we chose ThingSpeak to store and manage the data, as it's primarily a time-sequence data store. But we've also come up with some data visualizations that should help you interpret your data using the same *temporal* cues and visual representations that were there when you first collected the data.
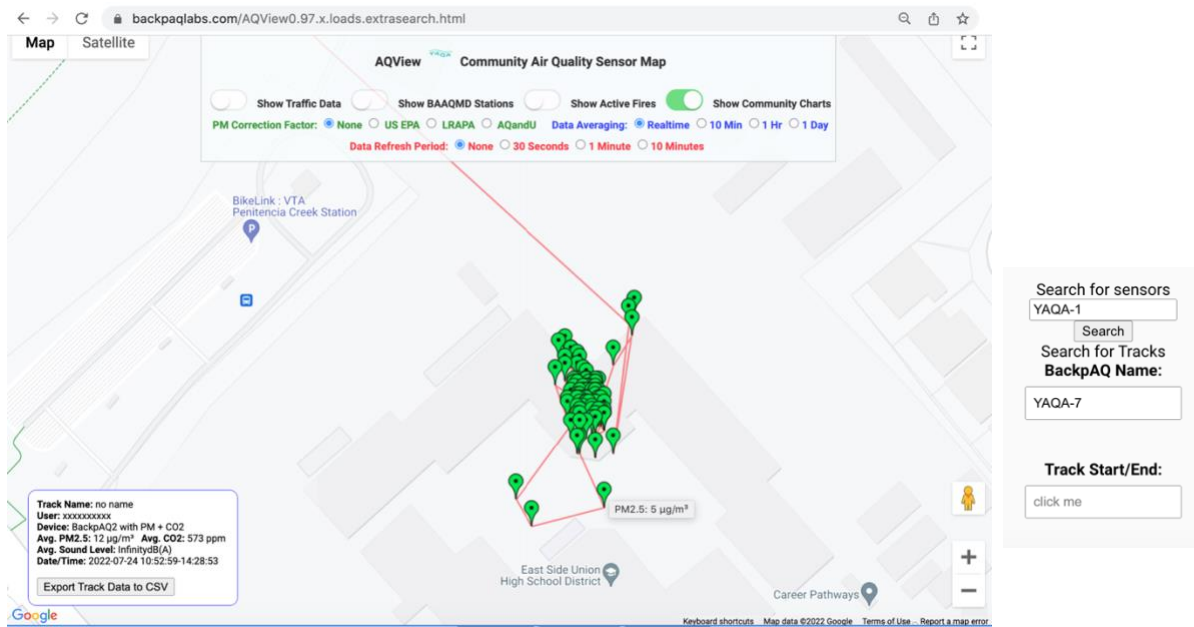
How to see your Tracks on the map

3 Step 3

This is easy and quick: just enter your BackpAQ device name (eg, "BP8-EPA") in the **"Search for Tracks"** box to the right of the map and click in the **"Track Start/End"** box to launch the calendar data picker. Then, select start and end dates.

Once you have selected your timeframe, you'll see this screen:

You can click on any marker to see the PM2.5 values at that point. Additionally, the red lines which connect the markers indicate the path taken.

A new feature allows you to draw a polygon around any set of markers to calculate the average PM2.5 and CO2 values with the polygon.
To use, click this symbol in the upper right-hand side of the screen. Then using drag and click, draw the segments around the area to be measured. When you complete the polygon the averages will be calculated as shown below.

BackpAQ TrackView

If you click on "Charts" on the main menu bar you can enter your tracks file name. You should then see something like this. Just enter your BackpAQ device name (eg, "BP3-EPA") and click in the start & end dates to pop up the calendar to set for the track(s) you want to view. Hint: fto view Tracks very recently recorded, you might have to enter the "next" day to include these tracks. So, if you do this…


…then you'll see this display:

Here, in the upper window, you'll see the familiar map with your track data displayed. But a new chart now sits below this, with a time-sequenced representation of your journey that's liked to the map above. The x-axis shows the time of day, and the y-axis represents the PM2.5 value (in ug/m3) at that time. The background colors represent the EPA AQI color index scale. You can **click on the marker** in either window and see the corresponding location or time sequence. This should help greatly in providing important *context* to your data analysis.

Other Data Layers

There are additional data layers you can access through AQView, including

- **Traffic Data**   Data from Google showing realtime traffic on local roads
- **US EPA / BAAQMD**   Data from US EPA AirNow API showing current measurements from local official air quality monitors
- **Active Fires** Data from InciWeb API showing all active fires
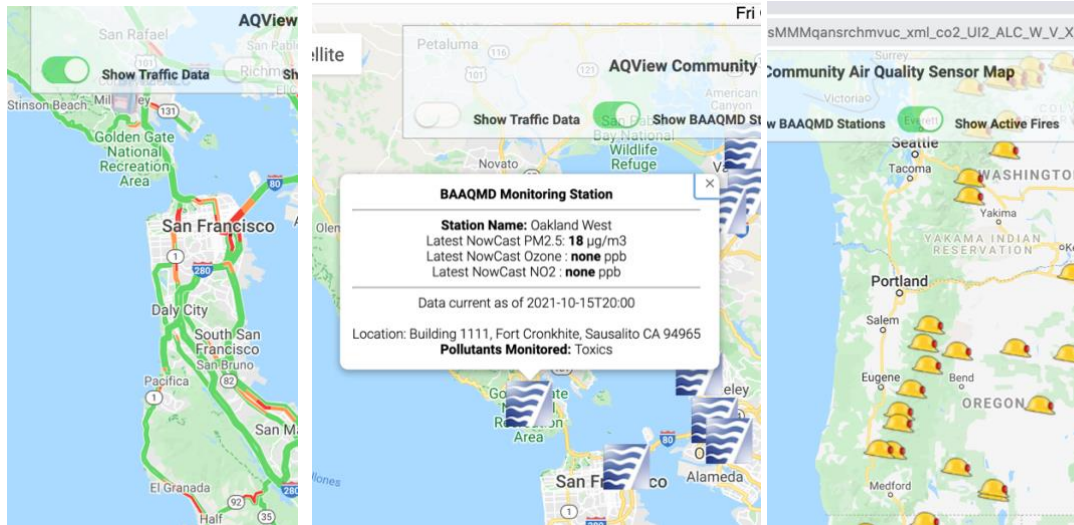
This data is useful when comparing your personal sensor to official regulatory monitors, when analyzing your data and looking to see what mobile or stationary sources might be influencing what you are seeing.