

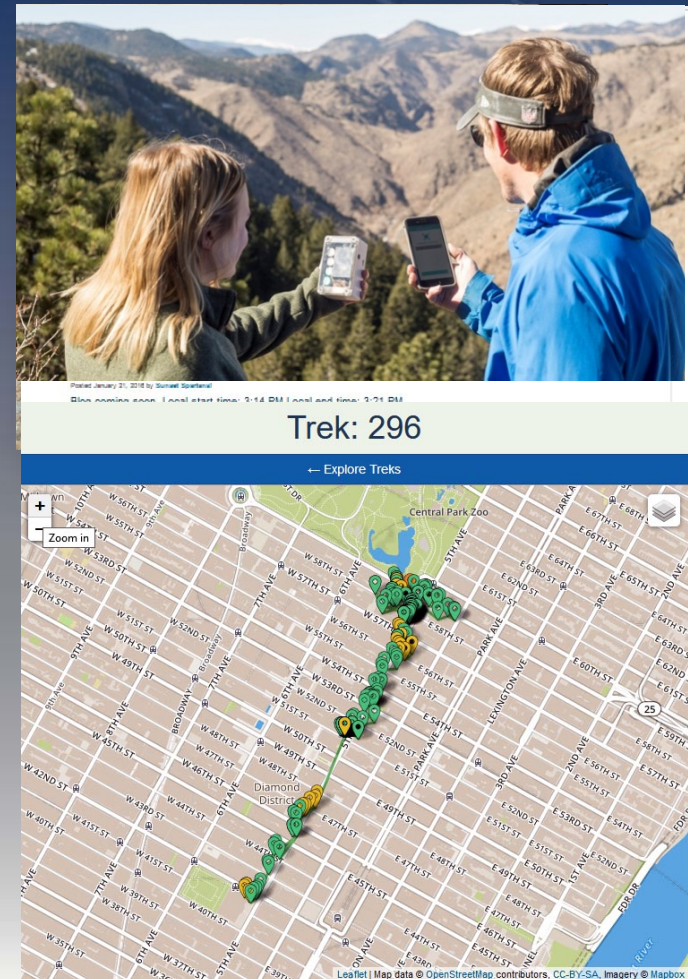


# **AQTreks: Students Learning About Air Pollution Through Measurement and Data Sharing**

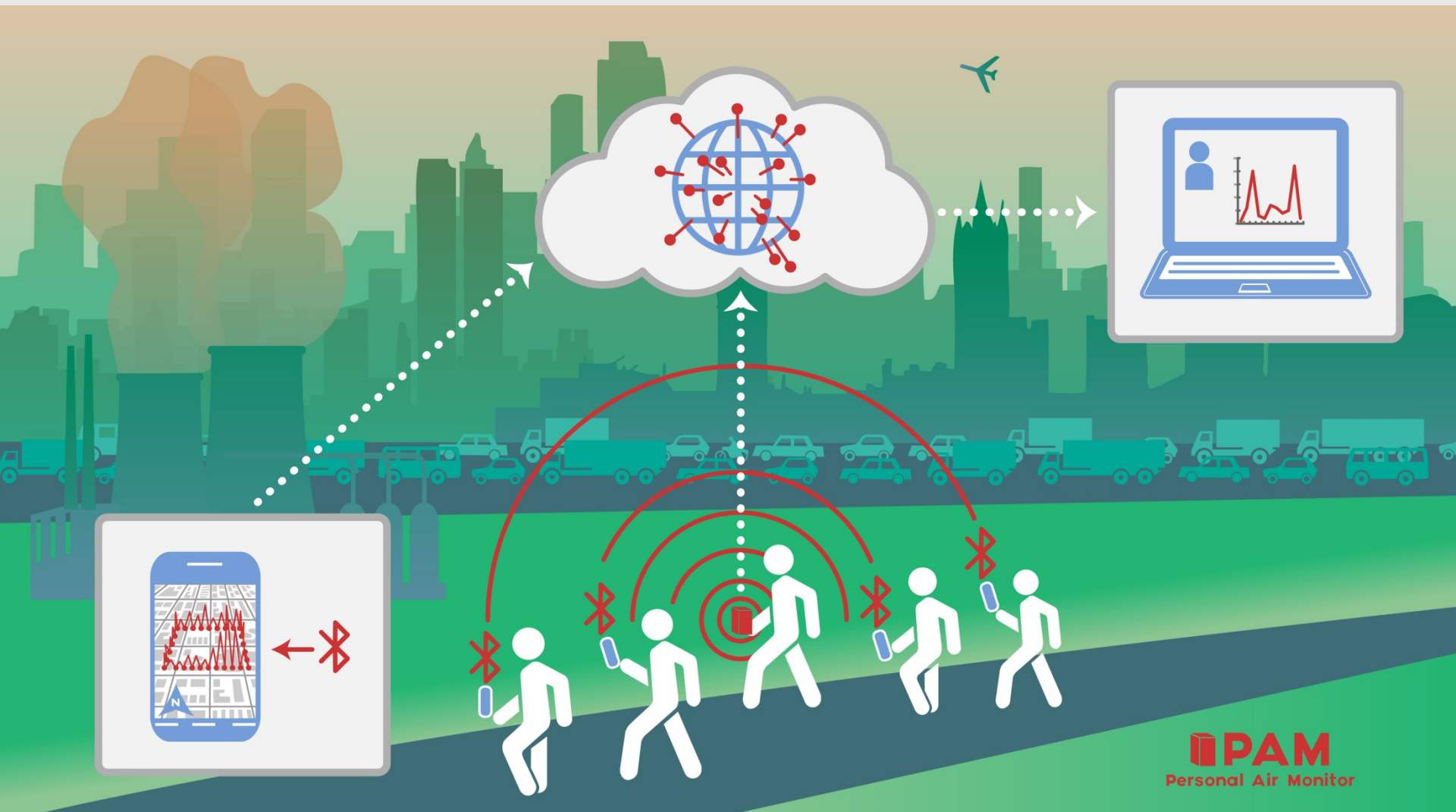
John Birks, Jessica Hatz, Jessa Ellenburg, Craig Williford and Drew Meyers

# The Development of AQTreks

- 2009: GO3 Project (O<sub>3</sub>)
- 2014: NIEHS SBIR Phase I “GO3 Treks” (BC and O<sub>3</sub>)
- Connect instruments to computer and see data on Google Earth
- Students test hypotheses about where high and low concentrations of different pollutants will be found
- Over 500 Treks made at more than 100 schools
- 2017: NIEHS SBIR Phase II “AQTreks” with the PAM and AQTreks App, 900 Treks uploaded to date



# AQTreks



# Personal Air Monitor™ (PAM™)



Sensor	Air Pollutant
4 Alphasense (electrochemical)	CO, NO, NO <sub>2</sub> , NO <sub>2</sub> +O <sub>3</sub> , SO <sub>2</sub>
1 SGX (HMOS)	NO <sub>2</sub>
2 Alphasense (HMOS)	CO, VOCs
ELT S-300 (NDIR)	CO <sub>2</sub>
Plantower PMS1300 OPC	PM <sub>1.0</sub> , PM <sub>2.5</sub> , PM <sub>10</sub>
1 User Developed	
T, P, RH	

## First Implementation of Treks Measures:

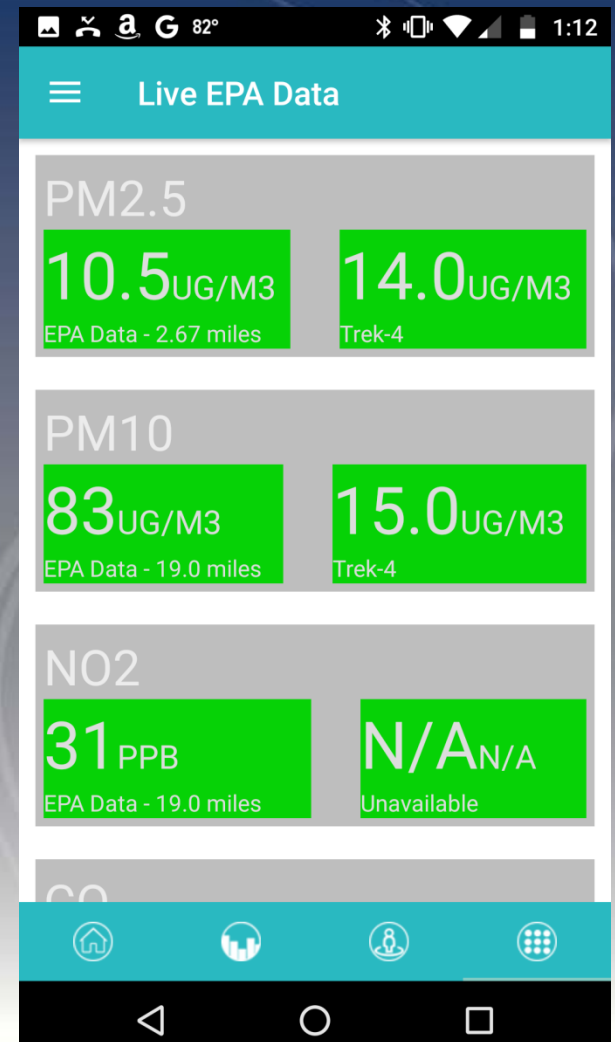
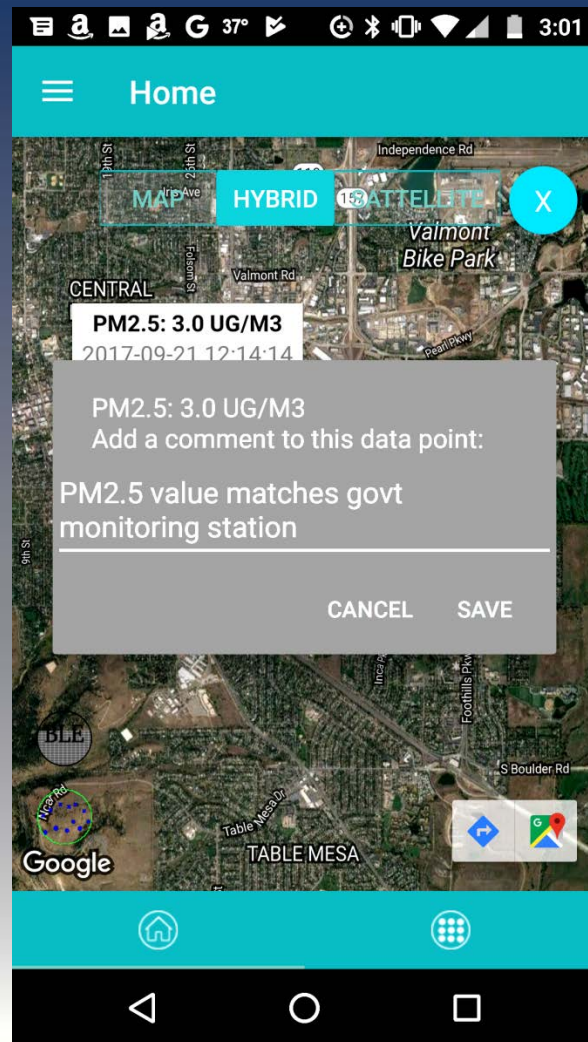
CO<sub>2</sub>, CO, PM<sub>1</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>

T, P, RH

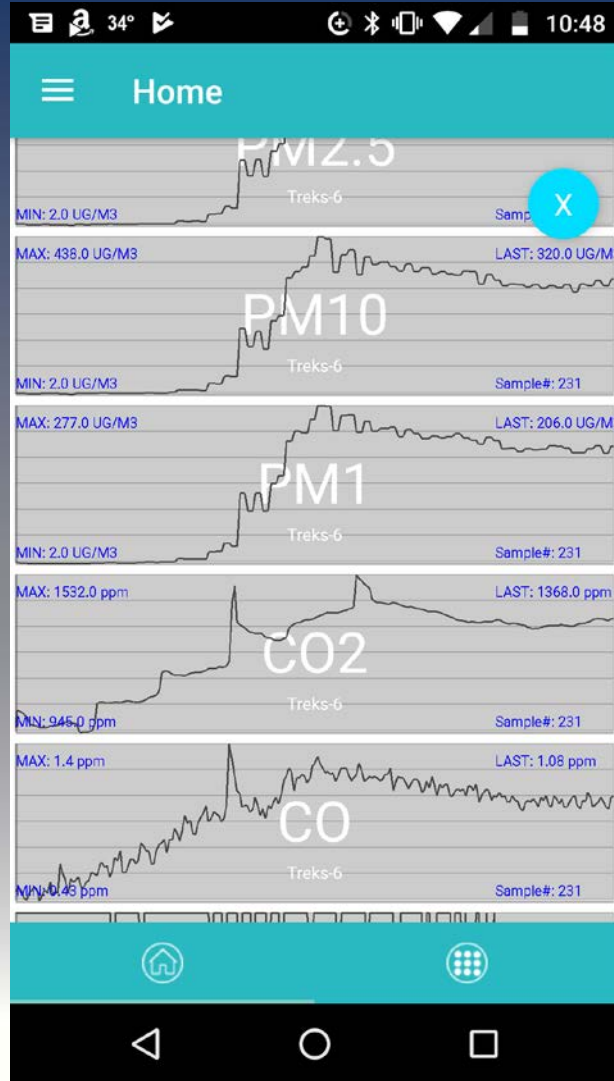
# How It Works

- Rentals Only – Three Weeks at \$330
- Shipped in Pelican Case with Prepaid Return Shipping Label
- Calibration of Sensors Between Shipments
- Includes
  - ✓ Instructions
  - ✓ Activities
  - ✓ Online Curriculum

# AQTreks App



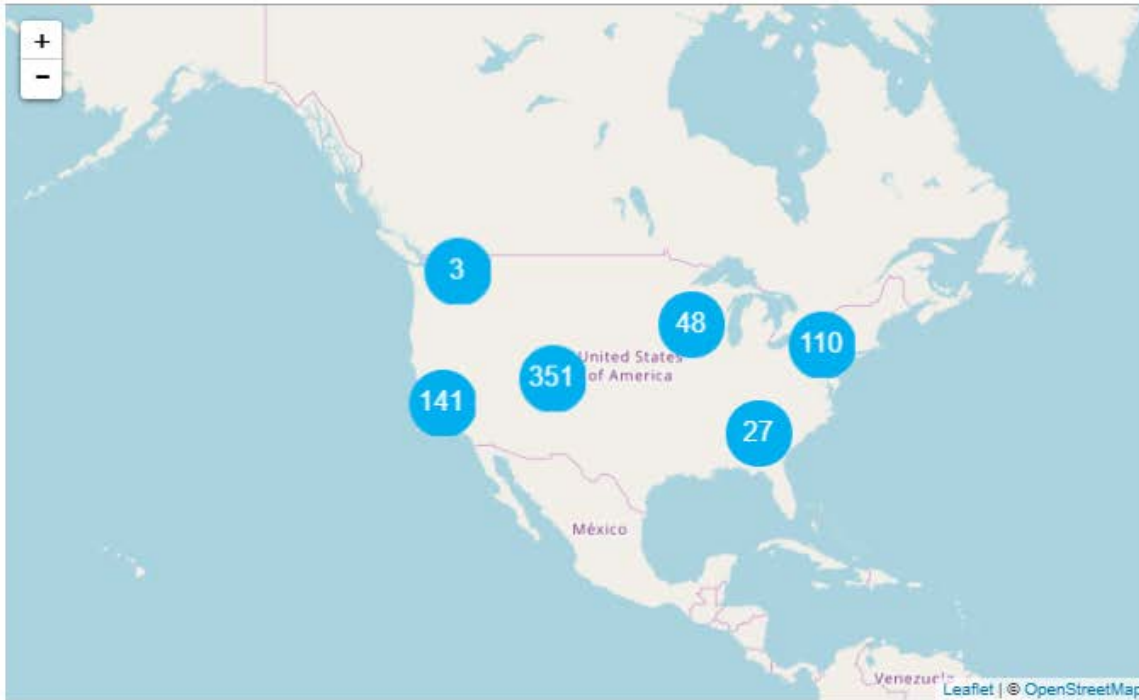
# App Graph: Indoor Cooking Example



Species	Range
PM <sub>2.5</sub>	2 → 391 μg/m <sup>3</sup>
PM <sub>10</sub>	2 → 438 μg/m <sup>3</sup>
PM <sub>1</sub>	2 → 277 μg/m <sup>3</sup>
CO <sub>2</sub>	945 → 1,532 ppm
CO	0.43 → 1.4 ppm

# AQTreks Website

## Explore Treks



## Search for treks

Here's an interactive map indicating where some of the recent treks have taken place. Click on one to see its data, or use the tools below to search for a trek.

## Search by trek number

Trek Number



# User Data

[Trek Data](#)[Rent PAM](#)[About](#)[PAM](#)[Downloads](#)[Curriculum](#)[Contributors](#)

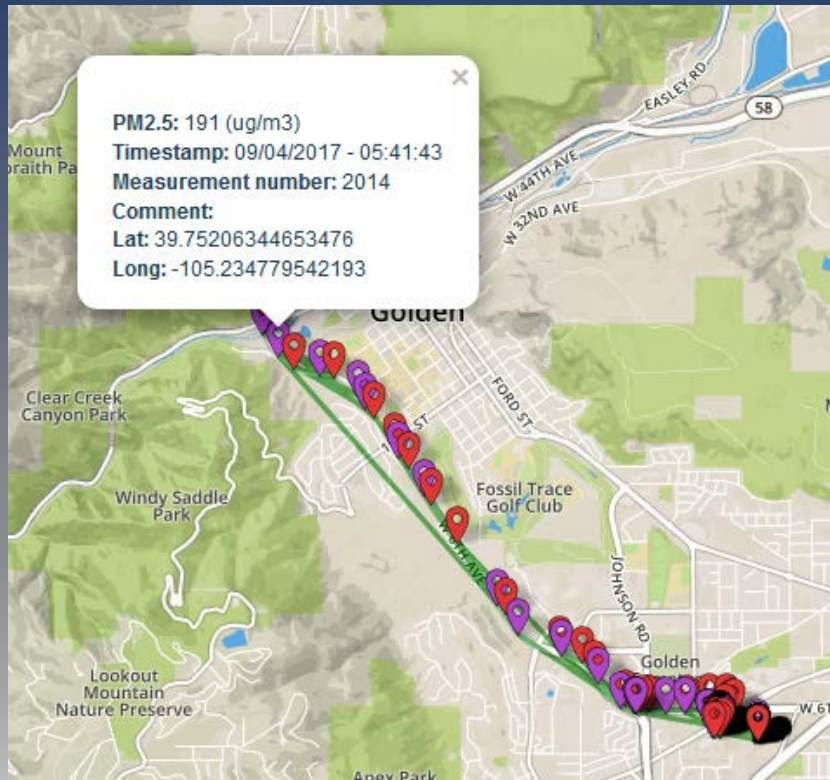
**Welcome jessae@aqtreks.com**

[Logout](#)

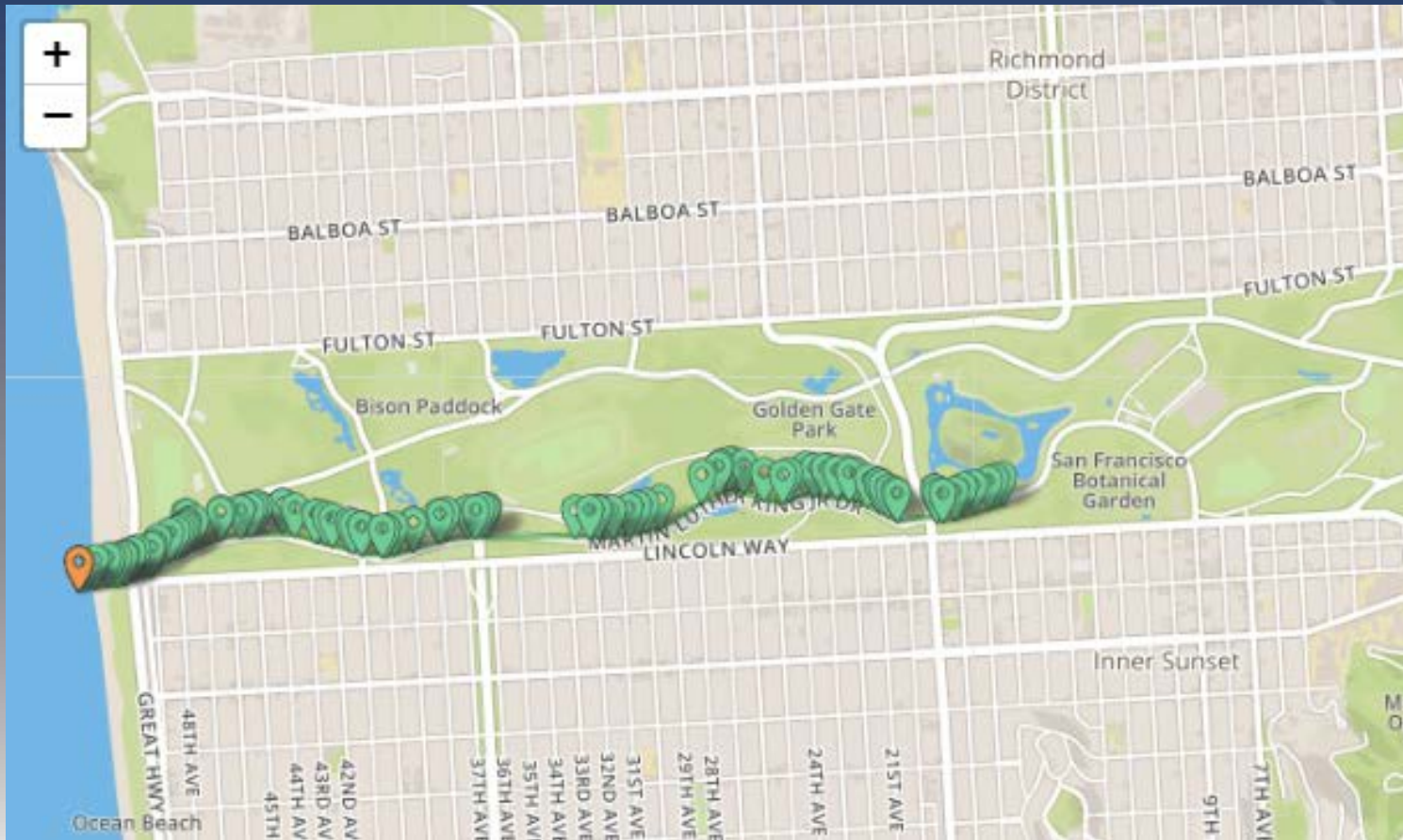
Check out one of your treks:

Trek 253 2017-08-30 15:02:22	→	Trek 255 2017-08-31 13:58:40	→
Trek 275 2017-09-08 16:29:37	→	Trek 284 2017-09-09 08:25:40	→
Trek 285 2017-09-09 09:08:02	→	Trek 288 2017-09-10 09:09:32	→
Trek 289 2017-09-10 09:50:13	→	Trek 290 2017-09-10 10:36:43	→
Trek 357 2017-09-21 12:04:10	→	Trek 359 2017-09-21 13:17:01	→
Trek 361 2017-09-21 14:04:37	→	Trek 537 2017-10-04 17:40:22	→
Trek 631 2017-11-01 10:59:23	→		

# Smoky Day in Golden, CO

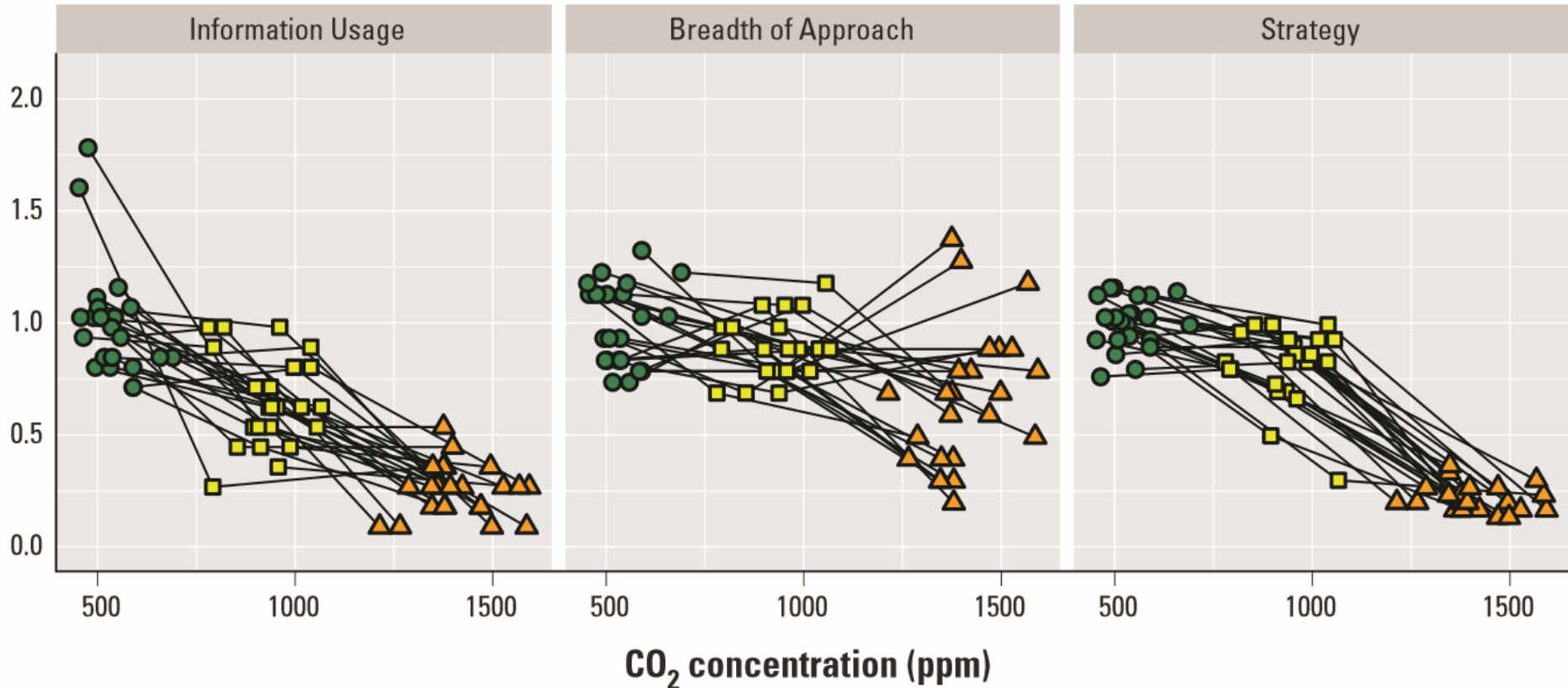


# Golden Gate Park Trek – High PM2.5 on the Pier!



# CO<sub>2</sub> in Classrooms

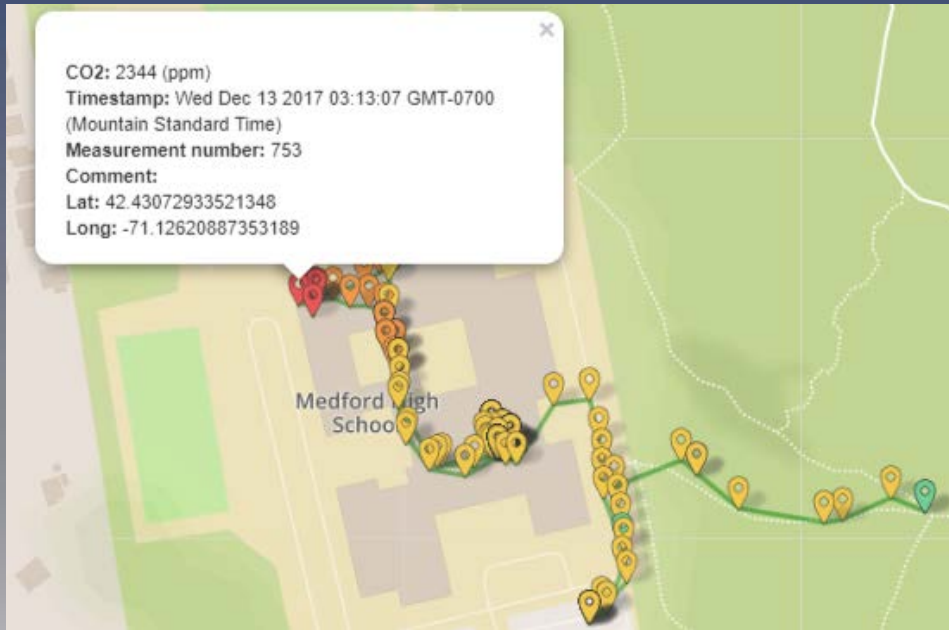
## CO<sub>2</sub> Affects Cognitive Function Scores



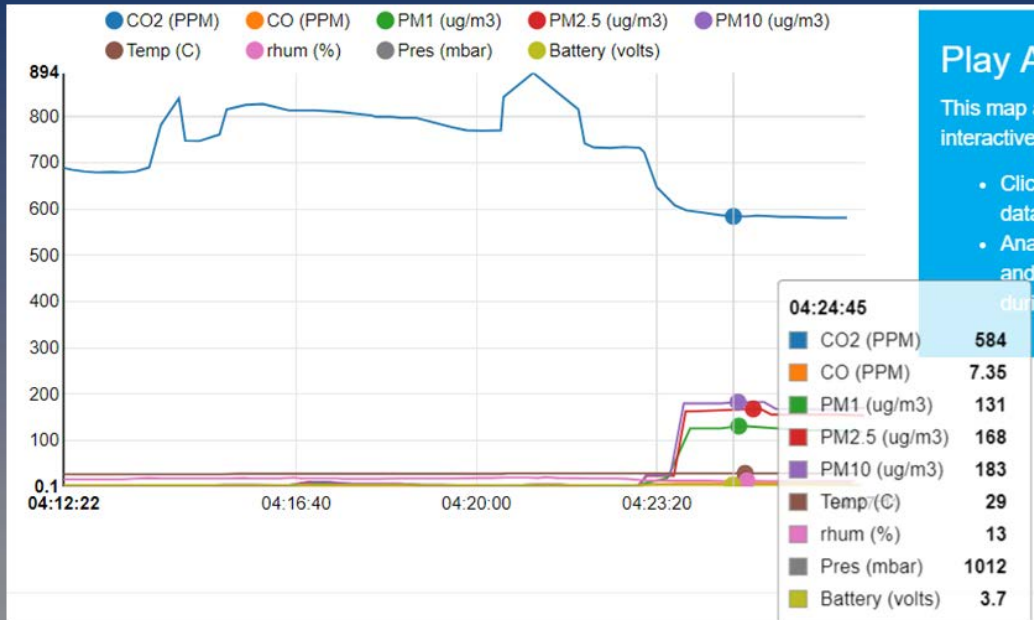
J.G. Allen, P. MacNaughton, U. Satish, S. Santanam, J. Vallarino and J.D. Spengler (2016) Environmental Health Perspectives 124, 805-812.

“In surveys of elementary school classrooms in California and Texas, *average CO<sub>2</sub> concentrations were above 1,000 ppm*, a substantial proportion exceeded 2,000 ppm, and in 21% of Texas classrooms peak CO<sub>2</sub> concentration exceeded 3,000 ppm.”

# CO<sub>2</sub> Measurements at MA High School



# CO and PM Measurements at MA High School



Play A

This map a  
interactive.

- Click  
data
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durin



# Navajo School – Shonto Prep, AZ



“These gadgets are so cool. I’ve never seen anything like them.”

“What this taught me inspired my to learn more about air. I want to go to college and maybe get a job related to this topic.”

“Thank you for letting us borrow the AQTreks and for teaching us about what is in the air. Now I know that carbon monoxide is a poison in the air and can harm our bodies.



# Thank you!



Project funded by NIEHS/NIH Phase 1 & 2 SBIR Grants

[AQTreks](https://www.youtube.com/watch?v=...) Promo Video on YouTube  
[www.aqtreds.com](http://www.aqtreds.com)

**2B** Technologies