

# Using Low-Cost, Community-Based Sensors to Study Cyanobacterial Blooms and Air Quality

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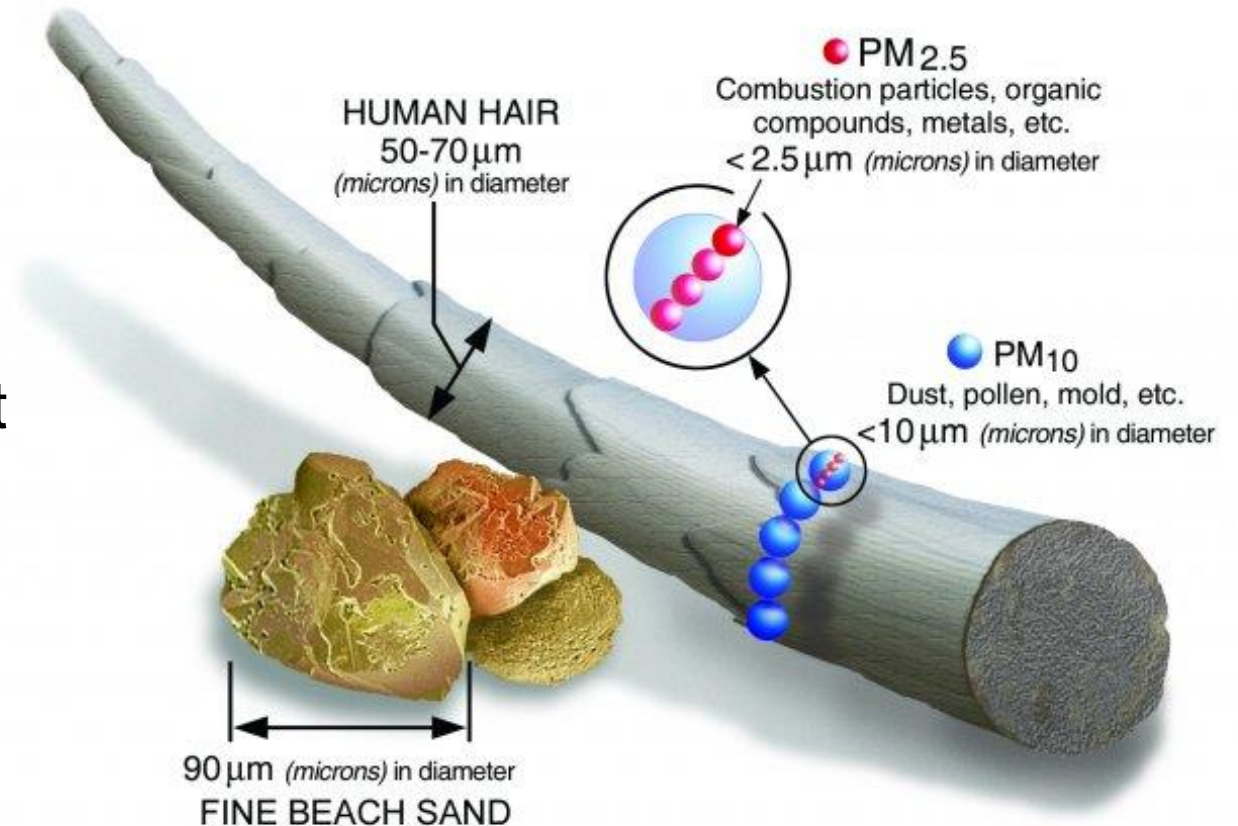


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Look here for plain language summaries for each slide.

# Compounds produced by CyanoHABs are aerosolized.

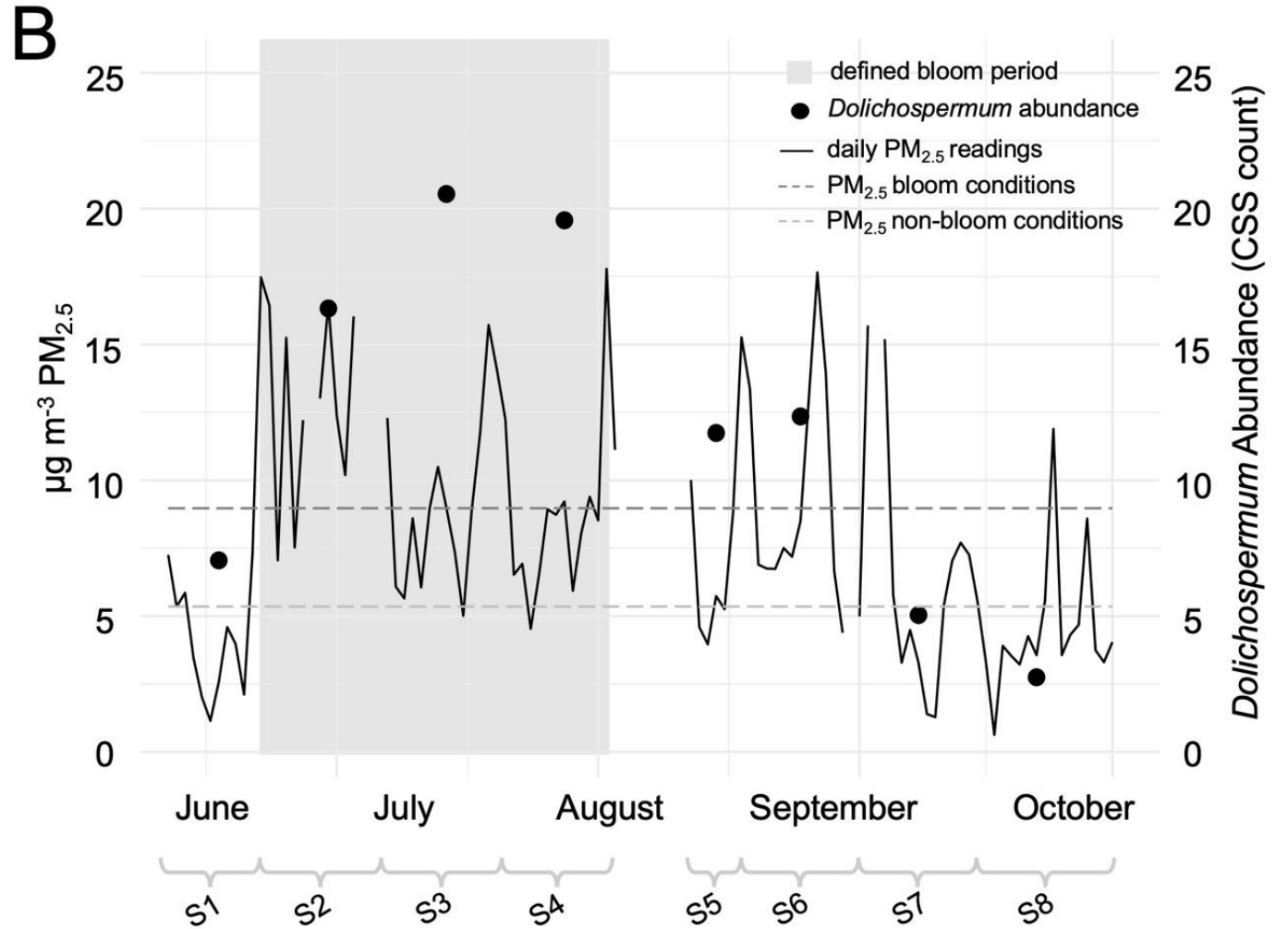
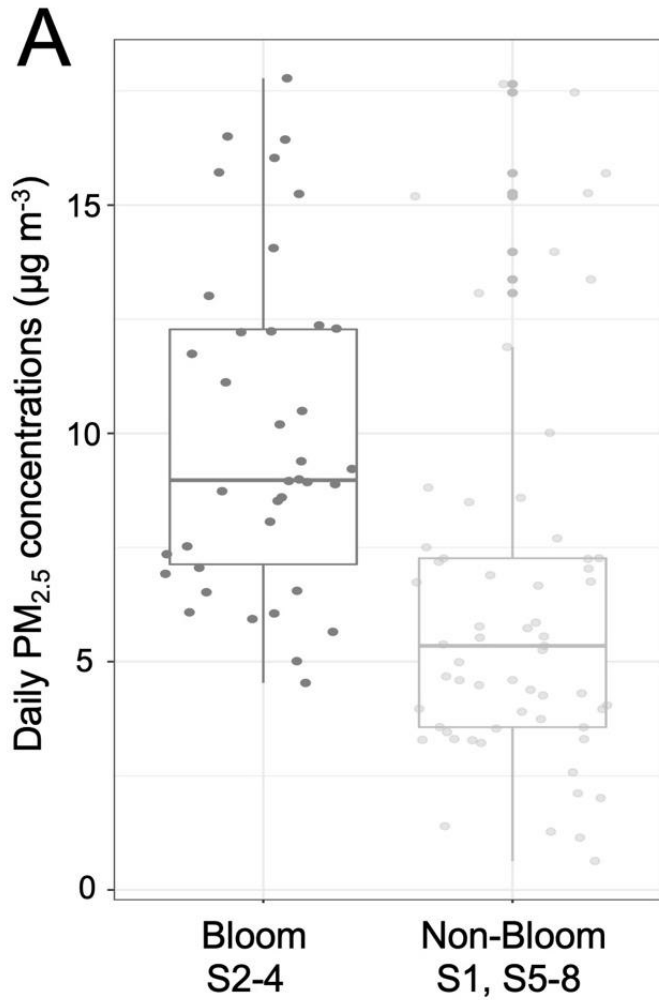
- Microcystins, anatoxins, nodularins, and lipopolysaccharides derived from CyanoHABs have been measured in aerosol.<sup>1-4</sup>
- Respiratory irritation is the most common side effect reported following HAB exposure.<sup>5</sup>
- PM<sub>2.5</sub> is one of the six criteria pollutants regulated by the US EPA.



Source: US EPA

Toxins produced by blue green algae can go airborne, and airborne particles are unhealthy to inhale.

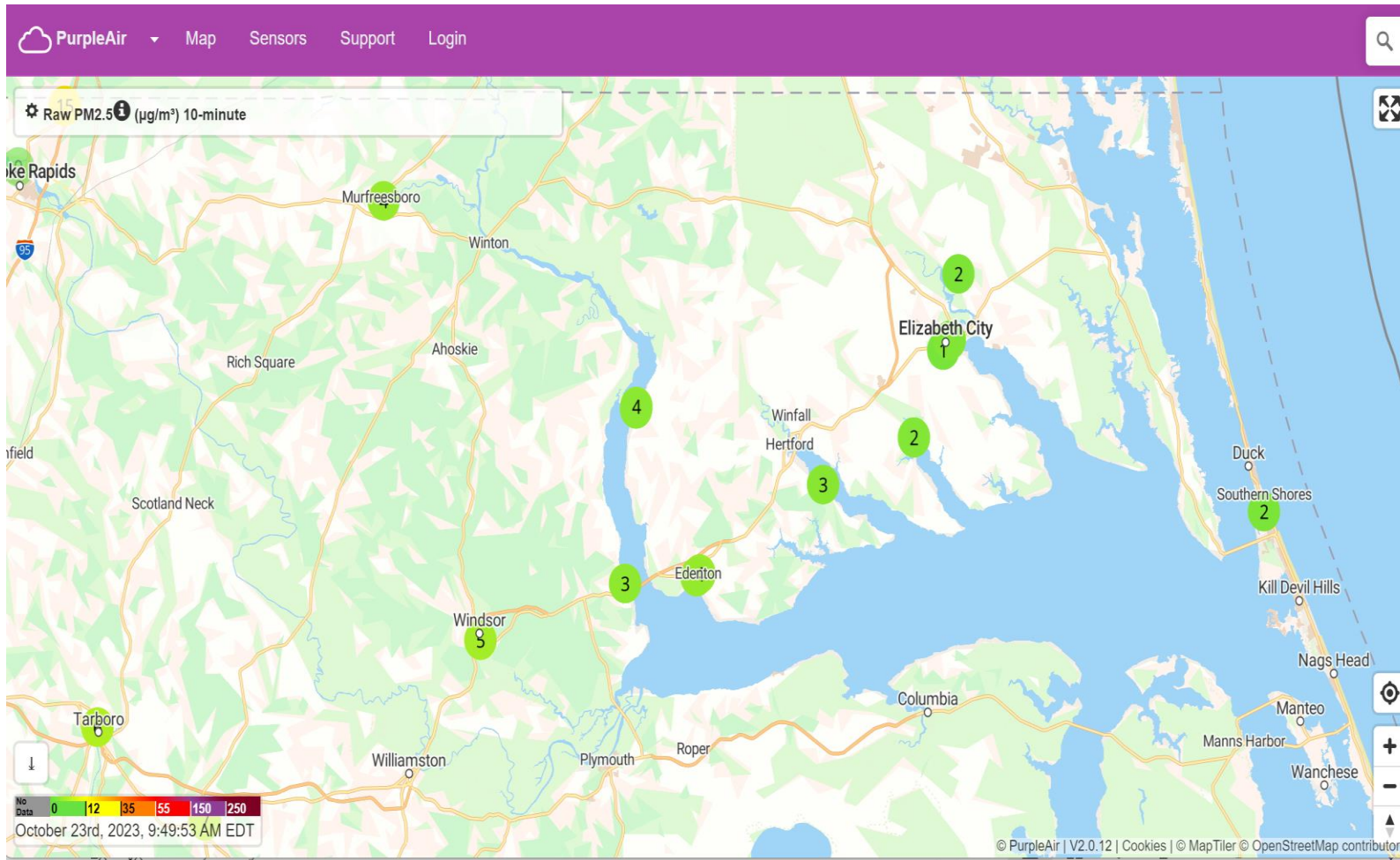
# PM<sub>2.5</sub> mass concentration increased during the 2020 bloom.



Plaas et al., *STOTEN* 2022

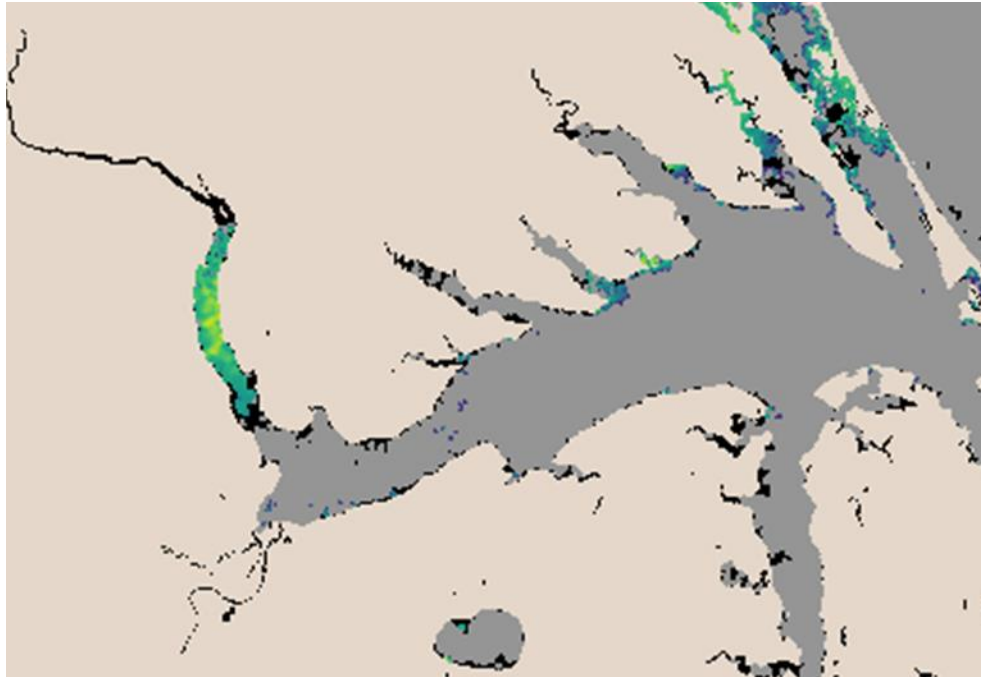
Airborne particles were more concentrated during the blue green algae bloom.

# PurpleAir sensors measure real-time PM<sub>2.5</sub> concentrations.



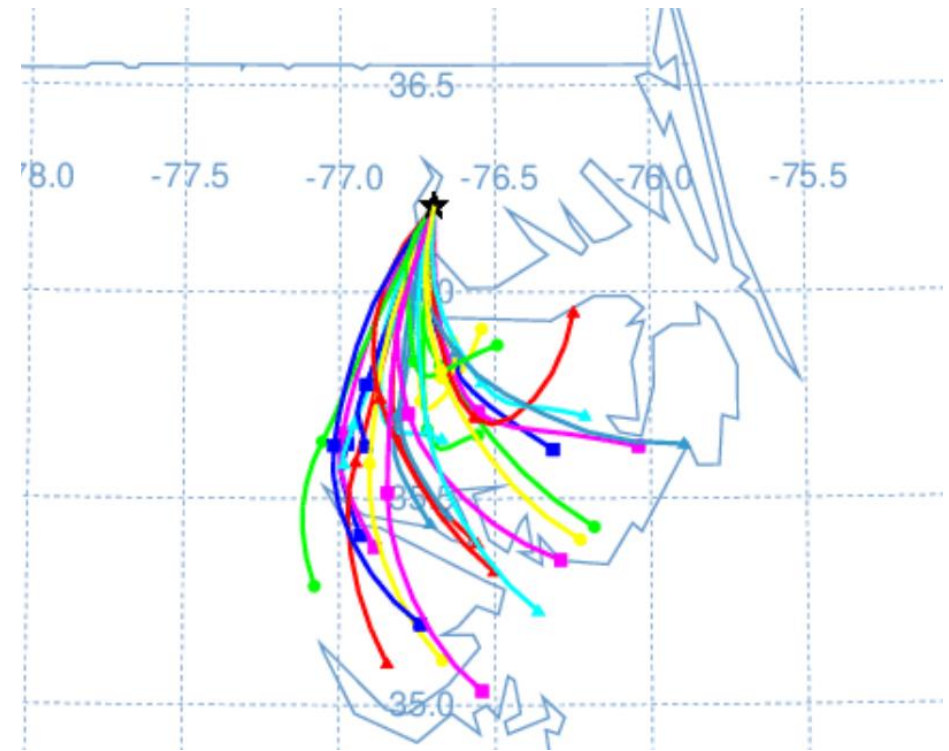
PurpleAir sensors provide real-time air quality measurements that are publicly available.

# PM<sub>2.5</sub> concentrations will be examined as a function of cyanobacterial blooms.



Source: NASA OCEAN COLOR, July 12, 2023

Chlorophyll a concentrations as a proxy for cyanobacterial biomass

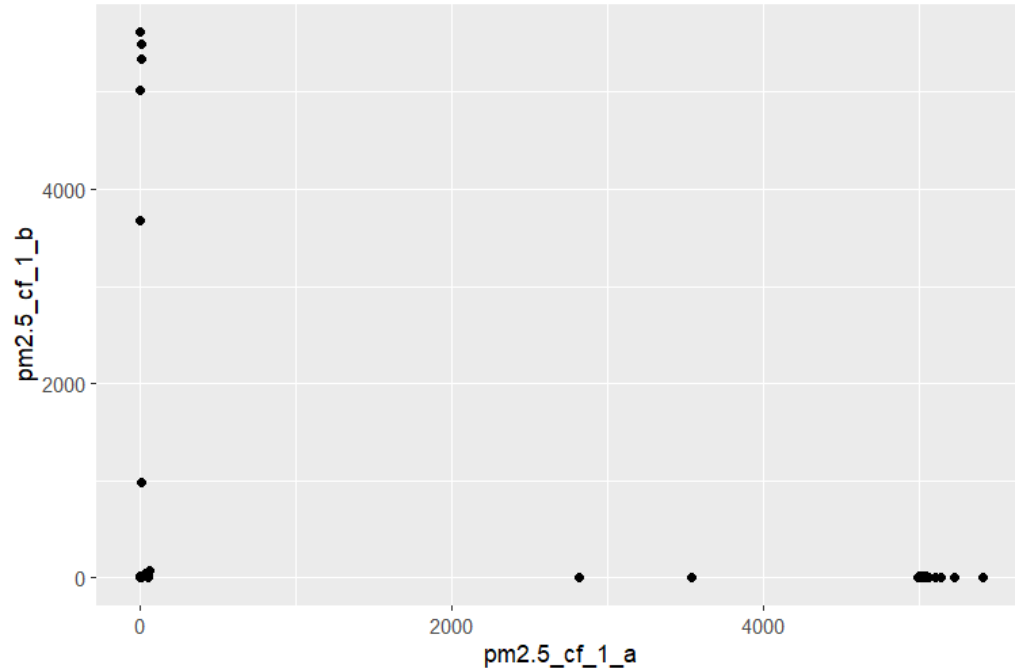


Source: NOAA HYSPLIT Trajectory Model, Oct 23, 2023

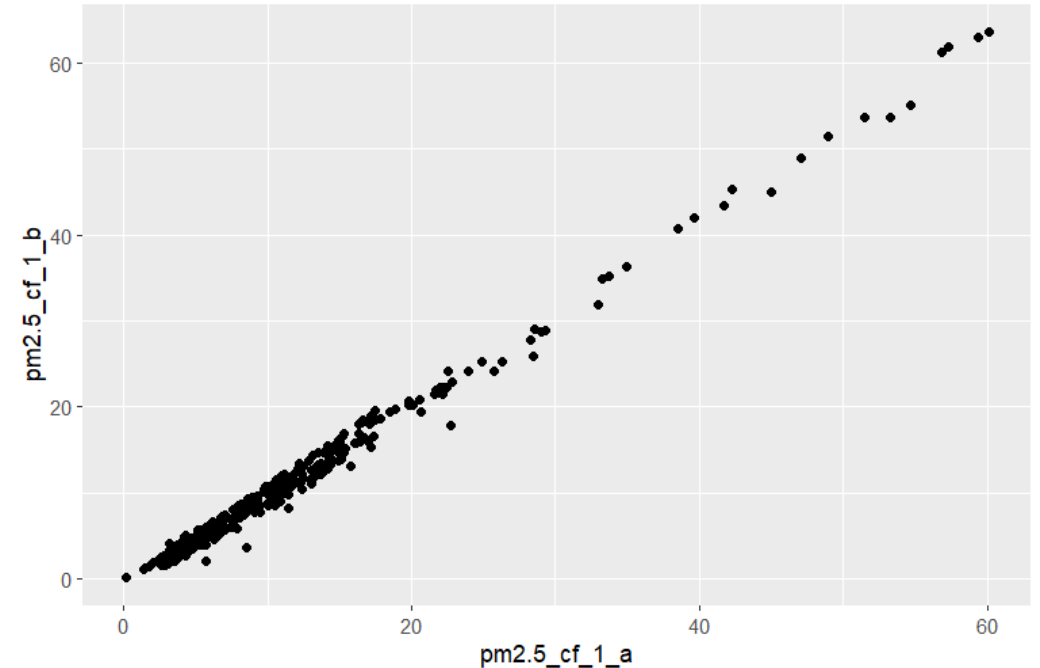
Air mass movement showing potential waterborne sources of aerosol

Using a statistical model, we will examine blooms in association with PM<sub>2.5</sub> concentrations.

# PM data is currently being cleaned and adjusted (work by MPH student Rachael Cogbill).



Channel comparison for Arrowhead Beach sensor **pre-cleaning**



Channel comparison for Arrowhead Beach sensor **post-cleaning**

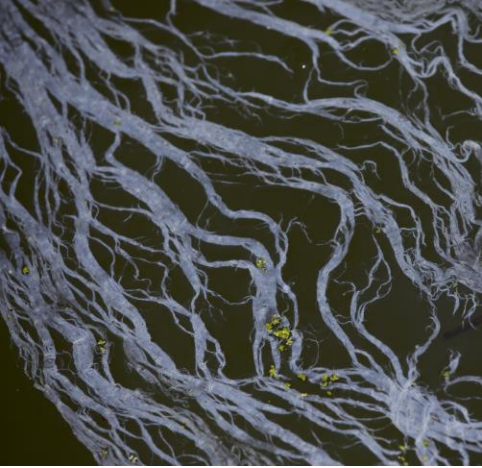
The purpleair data requires quality checks prior to its use in the statistical model.

A vertical strip on the left side of the slide shows a microscopic view of plant cells, likely from a leaf, with green chloroplasts and cell walls visible.

# The air quality data has many applications.

- 2023 Canada wildfires were detected by our network.
- Discussions are ongoing with Lisa Satterwhite and the ALS network.
- Wood pellet plants / agricultural emissions

There are numerous potential sources of particulate matter that our sensors detect, which is both a limitation and benefit of our network.



**Questions?**

