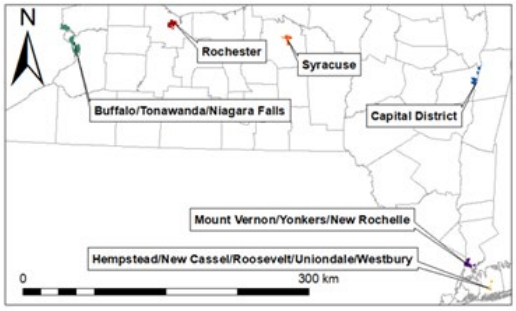
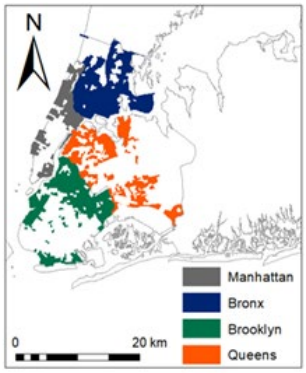
AIR SENSORS

Community Air Monitoring Initiative 2022-2023

NEW YORK STATE | Department of Environmental Conservation

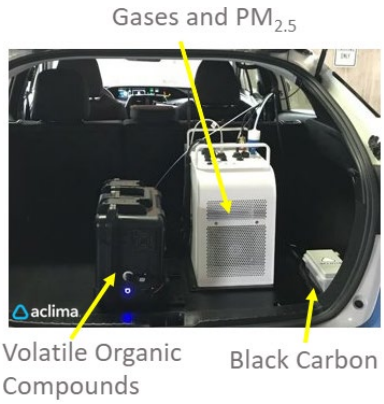
In accordance with New York State's Climate Leadership and Community Protection Act, the New York State Department of Environmental Conservation (DEC) is undertaking community air quality monitoring in 10 Disadvantaged Communities (see maps to the right). These areas were identified as the Disadvantaged Communities with the highest air pollution burdens. New York State is working with Aclima, Inc., to screen for local sources of air pollution street-by-street in these communities for one year.





Aclima's mobile fleet of air sensor-equipped, low-emissions vehicles are driven on public roads in the study areas at least 20 times across seasons, different days of the week, and different times of the day, over the course of the year. The goal of this screening effort is to collect block-level air pollution data to help identify sources contributing to disproportionate air pollution burdens and develop strategies to reduce air pollution within these communities, including greenhouse gas emissions contributing to climate change.

What Air Pollutants are Measured with Sensors?



Air pollution is a mixture of gases and particles. $PM_{2.5}$ is fine particulate matter (or particulate matter 2.5 microns in size and smaller) and mostly comes from combustion sources such as the burning of fossil fuels to heat buildings, generate electricity, and run motor vehicles. $PM_{2.5}$ is also released from industrial processes, commercial cooking, and burning wood. Black carbon, often called soot, is a part of $PM_{2.5}$ and contributes to climate change. Gases like nitric oxide, nitrogen dioxide, carbon monoxide, and carbon dioxide, a greenhouse gas altering our climate, are released from motor vehicles. Some of these gases may also be released during the burning of fossil fuels to heat buildings. Methane, a potent greenhouse gas, is released from landfills, sewage treatment facilities, and natural gas leaks, among other sources. Ethane measurements are used to help determine the source of methane. Volatile organic compounds, or VOCs, are gases released from industrial sources, paints, adhesives, solvents, fuels like gasoline, and consumer goods. The pollutant ozone is produced when VOCs and gases from motor vehicle exhaust react with sunlight. The monitoring may be able to detect specific VOCs such as benzene, toluene, ethylene benzene, and xylene to help further identify sources.

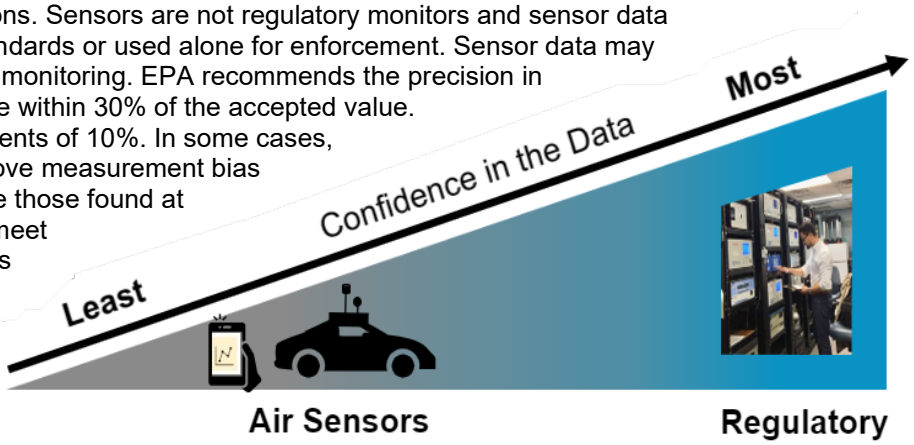
Sensor Data

The U.S. Environmental Protection Agency (EPA) developed the Air Sensor Toolbox and Enhanced Air Sensor Guidebook, to help communities understand how to use air sensors and interpret the data they collect. EPA identified non-regulatory supplemental and informational monitoring as the best use of air sensors. Examples of sensor applications include citizen science, education, fixed outdoor and indoor monitoring, and mobile monitoring. This community air monitoring initiative is using mobile monitoring as a screening tool to evaluate wider areas for sources of air pollution.

The Enhanced Air Sensor Guidebook

EPA has recommended minimum performance metrics like precision and bias for air sensors. Precision is how close repeated sensor measurements are to each other. Bias refers to measurement error and is a measure of how close the sensors are to the true value. The combination of the two provides a measure of confidence in the overall results. The sensor's ability to collect useful results can be affected by temperature, humidity, other pollutants, and variable environmental conditions. Over time, some sensors may undergo a gradual decrease in accuracy (also called drift)

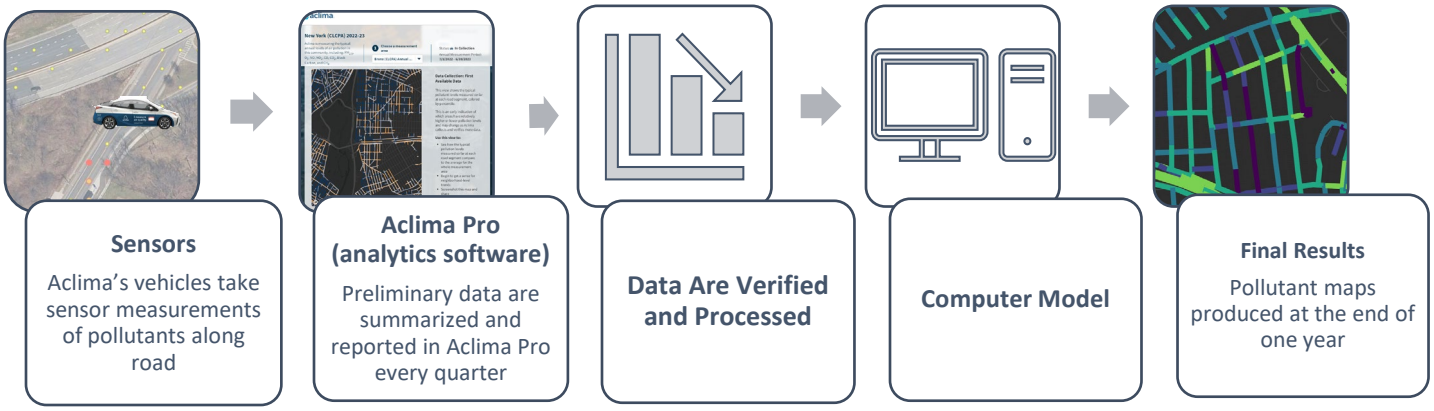
and require routine checks and data corrections. Sensors are not regulatory monitors and sensor data cannot be compared to federal air quality standards or used alone for enforcement. Sensor data may be used to complement stationary regulatory monitoring. EPA recommends the precision in sensor measurements for $PM_{2.5}$ and ozone be within 30% of the accepted value. Regulatory monitors have precision requirements of 10%. In some cases, sensor data are periodically adjusted to improve measurement bias by comparison to high-quality instruments like those found at DEC's stationary air monitoring sites, which meet rigorous performance and accuracy standards set by the EPA. The figure above compares regulatory monitors that produce data with the most confidence with sensors typically used for non-regulatory applications.



Using Sensor Data

Aclima provides preliminary data to DEC every day through their analytics software, Aclima Pro. These data may change as new data are collected and reviewed for sensor malfunctions and accuracy changes over time. DEC examines these data to look for areas of concern and evaluates high pollutant levels or peaks. As Aclima collects more data, DEC reexamines areas of concern to see if peaks are still occurring and looks for new areas with peaks. Staff are also investigating what sources may be contributing to these peaks.

At the end of the full year of collection, Aclima will validate all the preliminary data. The verified data are then used in models to produce maps of annual concentration estimates for each pollutant by road segment. These maps will be available to the public on an interactive website. All information including community input, mobile monitoring data, and other air monitoring and emissions data will be used to inform New York State's pollutant reduction strategies that will help improve air quality and reduce emissions that contribute to climate change.



⚠ Preliminary data may be different from final results

NEW YORK STATE | Department of Environmental Conservation

Public Engagement

Your help and information about your community is critical for the success of this initiative. DEC is holding regular public meetings to provide updates on this program. DEC is also working with local partners to develop community advisory committees (CAC) in each of the 10 communities. Email your air quality concerns and interest to participate in the CAC to CLCPA.CAM@dec.ny.gov or call 518-402-8402. Information and updates will be posted on the NYS DEC Community Air Monitoring website at https://www.dec.ny.gov/chemical/125320.html.

CONTACT INFORMATION

Division of Air Resources
New York State Department of Environmental Conservation
625 Broadway, Albany, NY 12233
P: (518) 402-8402| CLCPA.CAM@dec.ny.gov
www.dec.ny.gov