EPA's Air Sensor Toolbox for Citizen Scientists:
A Resource for Community Air Quality Monitoring and Mapping

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Abstract

There exists a strong desire by the general public to collect environmental data of importance to their family or community. This desire is driven by a wide variety of goals including concerns citizens have about known or perceived local pollution sources. Low-cost air pollution sensors and monitors have recently been introduced into the public domain, giving residents the opportunity to collect environmental data for their own use and presenting new opportunities for citizen science activities. This poster discusses challenges and opportunities associated with citizen science and how emerging technologies can support citizen science activities. In addition, the poster introduces the Air Sensor Citizen Science Toolbox. We also introduce the Community Air Monitoring Training that will share tools to conduct citizen science projects using Next Generation Air Monitoring (NGAM) technology and to educate interested groups and individuals on best practices for successful air monitoring projects..

Citizen Science: Challenges & Opportunities

Citizen Scientists are collecting environmental data measurements for a variety of interests, including individual health, community exposures, research, and technology. The emergence of more reliable lower cost air pollution monitors presents tremendous opportunities to improve public health through citizen science. However, most citizens do not have the technical training to operate environmental monitors. Also, most of the lower cost environmental monitors have not been evaluated for their performance characteristics. Finally, individuals and citizens may need help with interpretation of data from a health perspective.

A Typical Low Cost Monitor:
- Inexpensive ($100 to $5000) to purchase
- Highly portable and easy to operate (often mobile)
- Requires little or no training to start collecting data
- Inexpensive to operate (replace or recharge batteries)
- Lifetime of service not expected to exceed 1-2 years

AirCasting App and Monitor–
Carbon Monoxide/Nitrogen Dioxide

CairClip–
Ozone/Nitrogen Dioxide Monitor

Air Sensor Toolbox

The Air Sensor Toolbox for Citizen Scientists provides guidance and instructions to citizens to allow them to effectively collect, analyze, interpret, and communicate air quality data. This includes a list of devices with known performance characteristics, sampling methodologies, generalized calibration/validation approaches, measurement method suggestions, and data interpretation guidelines. The ultimate goal of the Toolbox is environmental awareness of local pollution levels through citizen-based environmental monitoring.

Air Sensor
Citizen Science Toolbox
EPA
Measure·Learn·Share

The Air Sensor Toolbox provides:
1. Guidance on how to identify pollutants of interest, appropriate sensors
2. Easily understandable operating procedures for highly portable sensor units
3. Quality assurance guidelines
4. Guidance and deployment recommendations based on pollutants and sources
5. Basic ideas for data analysis, interpretation, and communication
6. Citizen Science Funding Resource Guide
7. Fact sheets, news articles and blogs
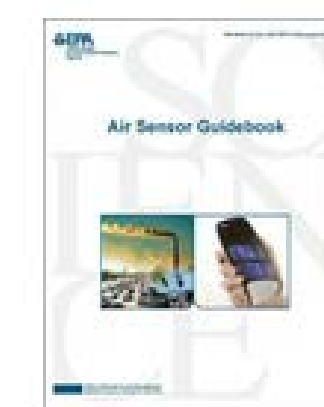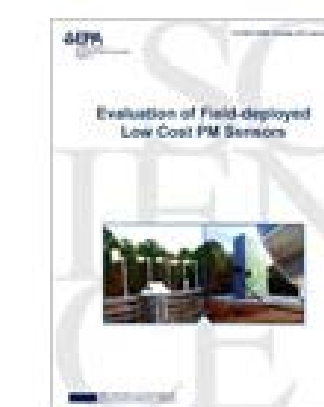
Air Sensor Guidebook

CSAM Operating Procedures

Mobile Sensors & Applications for Air Pollutants

Citizen Science Air Monitor (CSAM): Quality Assurance Guidelines

Evaluation of Field–deployed Low Cost PM Sensors

Air Sensor Toolbox Website:
http://www.epa.gov/heasd/airsensortoolbox/

Community Air Monitoring Training:
A Glimpse into EPA's Air Sensor Toolbox

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EPA United States Environmental Protection Agency

Thursday July 9th, 2015; 8:30am to 4:30pm
at EPA's Facility in Research Triangle Park, NC

Goal: EPA will host a training workshop to share tools used to conduct citizen science projects involving Next Generation Air Monitoring (NGAM) technology and to educate interested groups and individuals on best practices for successful air monitoring projects.

Learning Objectives: Participants will learn about air quality basics, air pollution monitoring, how to start a citizen science program, citizen science study design, how to obtain funding, what to look for in a sensor, sensor applications and performance goals, how to collect useful data using sensors, data management and quality, maintaining sensors, interpreting and communicating data, and lessons learned from past community air monitoring projects.

Target Audience: Invited community action groups, nonprofit organizations, Tribal offices. 30-50 in-person, 500 via webinar. Will be videotaped for wider distribution.

Presentation Topics
(30 min each)

- Air quality basics, air pollution monitoring, sensor technology, performance goals
- How to start a citizen science program/obtain funding
- Citizen science study design
- Data measurement, management, quality, uncertainty
- Quality Assurance
- Short term measurements and air quality messaging, regulatory requirements for data

Breakout Sessions
(attendees rotate, 20 min each)

- C-FERST/ T-FERST demonstration
- RETIGO demonstration
- Citizen Science Air Monitoring Success Story: Tonawanda, New York
- General advice on how to plan a study
- Facilitated discussion on individual experiences, inquiries, lessons learned
- Community and government/ academic partnerships
- Citizen science study design- Case studies from 13 years in citizen science

Hosted by EPA's Air, Climate, and Energy Research Program, Office of Air Quality Planning and Standards and Regional offices.

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