

Environmental Information



EN2015

Advances in Monitoring Technology: Opportunities and Challenges

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Supporting the Business of Environmental Protection

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<http://www.exchangenetwork.net/en2015>

ABSTRACT

Monitoring technology is advancing rapidly. It is becoming significantly cheaper and easier to use while also improving in quality. These factors are leading to short term challenges for EPA and State programs. However, these challenges are likely to be more than offset by the promise of better environmental data leading to improved environmental protection.

What are we going to cover?

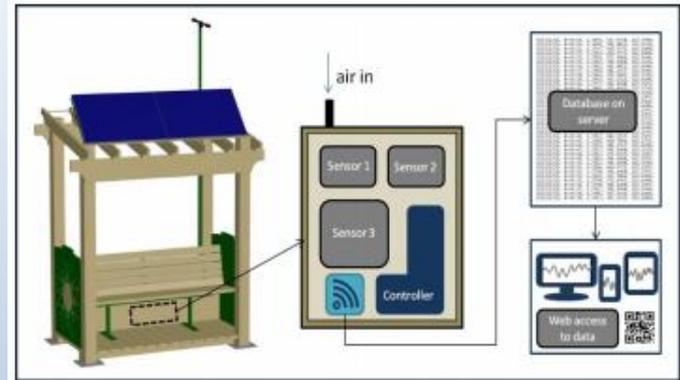
- What is Advanced Monitoring?
- What opportunities do the advances present?
- What are the challenges and how are EPA and the States trying to address them?

Promise of Advanced Monitoring: Making the invisible visible.

- Reduce pollution through:
 1. More effective regulatory monitoring
 2. Better information for sources to prevent, reduce, treat, or public to avoid
 3. Public accountability drive improved performance
 4. More effective permits, inspections, and enforcement actions
 5. Real-time information is powerful

What is Advanced Monitoring?

1. Not yet widespread in a sector or program;
2. Monitors real time (or near), often without lab lag times;
3. Less expensive, easier to use, or more mobile;
4. Data quality more complete or easier to interpret for a specific need; and/or
5. Existing technology used in new way to provide better info on pollutants, pollution sources, or environmental conditions.



Air-monitoring system incorporated into a park bench.



Advanced Monitoring Technologies

- Real-time monitoring – knowing about pollution as it's happening
- Facility feedback loops – preventing pollution before it happens
- Fenceline monitoring
- Community monitoring
- Remote sensing



Monitoring buoy in Charles River collects and transmits data

New Technologies Will Revolutionize Environmental Monitoring

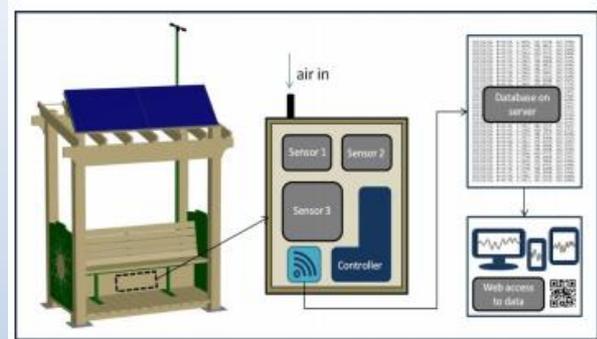
Current Technology

- Expensive
- Big footprint to house
- May require expertise to use
- May require lab analysis
- Delays for QA
- Requires power drop
- Collected by government, industry, researchers

New Technology

- Low cost
- Small footprint
- Easy-to-use
- Real time
- Less or no gov't QA before release
- Mobile
- Collected by communities and individuals w/ less QA?

Environmental Monitoring is Changing



Air-monitoring system incorporated into a park bench.



Advanced Monitoring

Making the invisible visible



Off-site assessment with *GMAP-REQ*

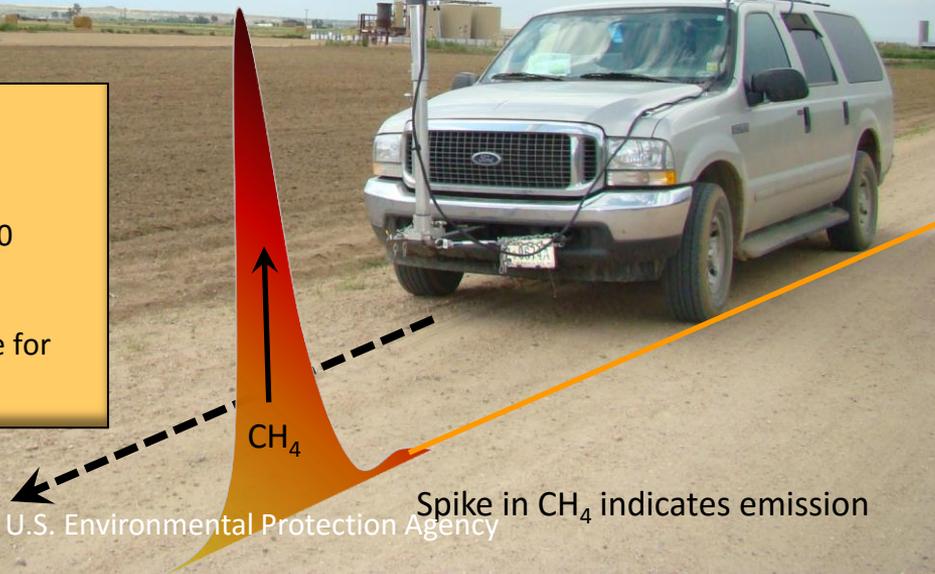
(Geospatial Measurement of Air Pollution – Remote Emissions Quantification)

wind direction



- Drive-by Mapping
- Position vehicle in the plume
- Acquire CH₄ and wind data for 20 minutes
- Pull a 30 second canister sample for VOC information

driving path



Spike in CH₄ indicates emission

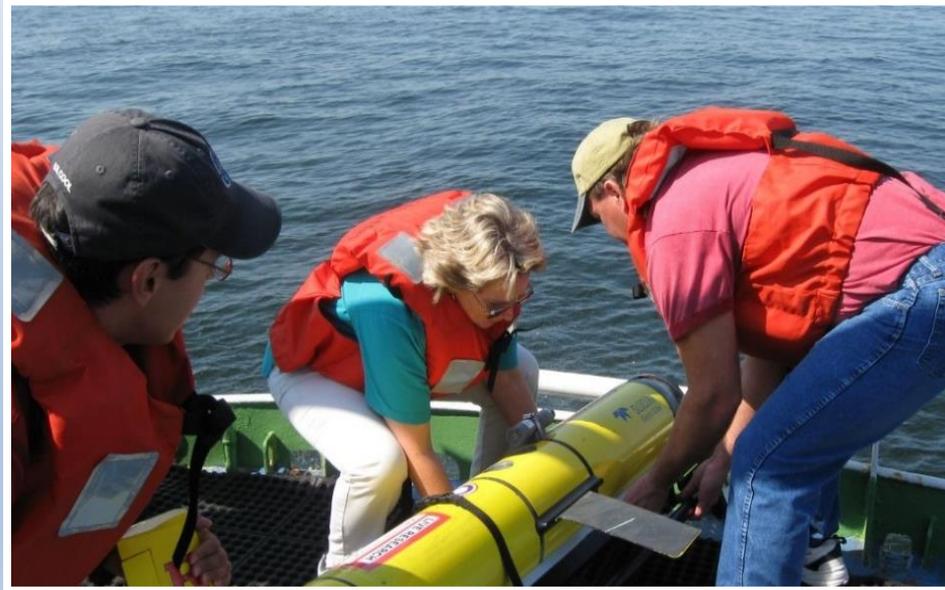
Democratization of Environmental Monitoring



https://dl.dropboxusercontent.com/u/29720355/AirBeam_Kickstarter_Video.mp4

Advanced Monitoring

Monitoring water quality in New Jersey coastal waters



Real-Time Monitoring for Cyanobacteria in the Charles River, MA



Current and Future Uses of Advanced Monitoring Data

Current Uses

- Targeting, research, or reconnaissance by government, academia, NGOs
- Persuading regulated sources that there is a problem
- Empowering communities and individuals with more information
- Educating students and communities about their environment
- Including in enforcement settlements

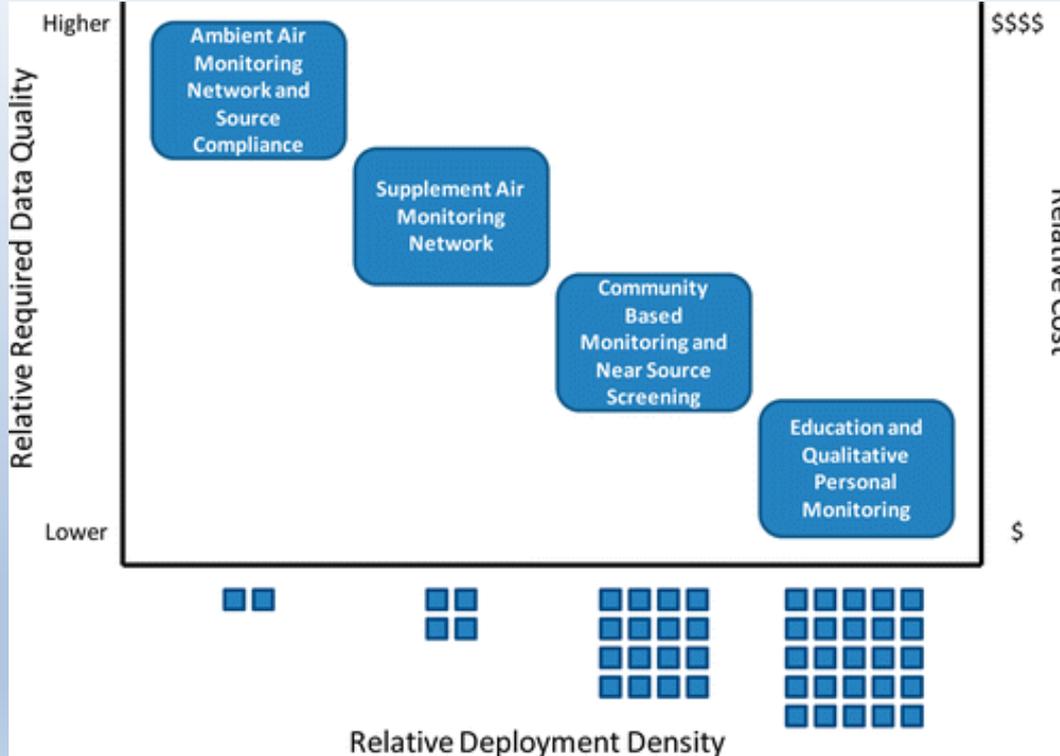
Possible Future Uses

- Publically sharing on government websites
- Substituting or supplementing for approved regulatory monitoring
- Including in our new and modified rules and permits

Policy Program Challenges

- Many of these questions will be addressed by the E-Enterprise Advanced Monitoring Path Forward Team:
 - Impact on identification of air non-attainment areas and impaired waters?
 - What new equipment and protocols should be used by government inspectors and industry monitoring?
 - How could/should our rules and permits adapt or change?
 - Recognizing that quality of the data that does not meet official regulatory purposes may still be valuable for other purposes
 - For example, regulatory compliance vs. targeting
 - See chart from ORD/OAR/OECA Article

Advanced Monitoring Future in Air



Policy Program Challenges - continued

- Democratization of monitoring may mean more data but with less QA or unknown QA.
 - Should government promote sensor standards for developers?
 - Should government promote or develop training?
 - Responding to citizen concerns and questions
 - Will low cost sensors have sufficient quality for intended purposes?
False positives and false negatives?
 - Interpreting short-term monitoring, e.g., what does it mean to have a 20-second exposure that exceeds an 8-hour average?
 - Large and crowdsourced data sets

EPA Working to Prepare for Advanced Monitoring

- EPA Air Sensors Evaluation Report
- EPA/State Monitoring and Assessment Partnership
- Air Sensors Citizen Science Toolbox
- ORD grant to fund research on communities use of sensors
- Interagency Nutrient Sensor Challenge
- E-Enterprise Advanced Monitoring Path Forward Team

Village Greens

- Durham, NC
- Oklahoma
- Connecticut
- Philadelphia, PA
- Washington, DC
- Kansas

Infrared Cameras

- R1 - New Hampshire
- R2 - New York, New Jersey
- R3 - West Virginia
- R4 - Kentucky
- R5 - Michigan, Hamilton County, OH
- R6 - New Mexico, Louisiana
- R8 - North Dakota
- R10 - NW Clean Air Agency/Puget Sound Clean Air Agency, WA

Related Upcoming EN2015 Presentations

- 10:30: Future of Water Management: Open Water Data Initiative
- 11:20: Future of Air Management: Air Quality and Community Use of Data
 - Village Green Air Monitoring Benches, Philadelphia Experience
 - Short-Term Measurements and Air Quality Messaging

Questions?