Advanced Monitoring: States and EPA Moving Forward via E-Enterprise

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ACWA Annual Meeting

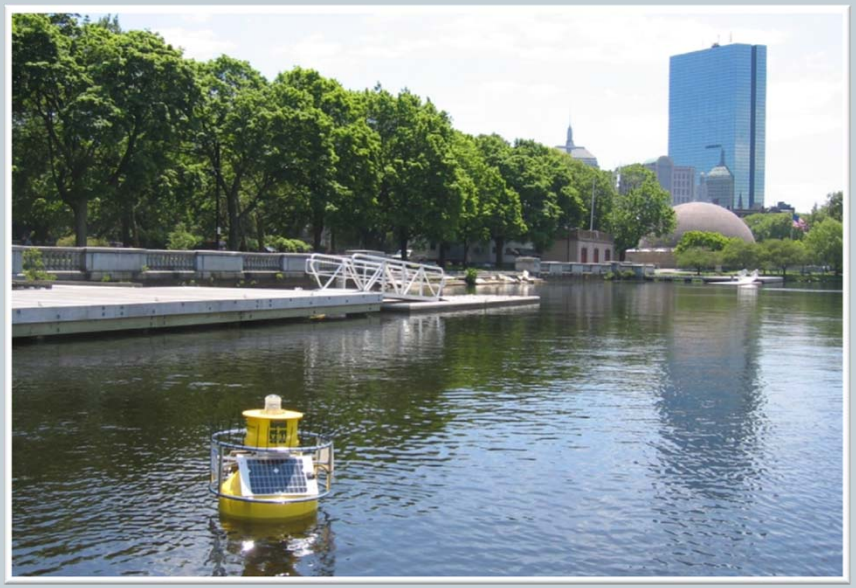
Bellevue, WA

David Hindin, EPA (OECA)

Promise of Advanced Monitoring: **Making the invisible visible**

- Reduce pollution by improved:

1. Ability of sources to prevent, reduce, treat pollution (before becomes violation).
2. Ability of gov to assess environmental quality and target resources to significant problems.
3. Avoid hotspots.
4. Public engagement in doing the monitoring
5. Transparency
6. Permits and inspections



Paradigm and Game Changer
Will Revolutionize Environmental Monitoring

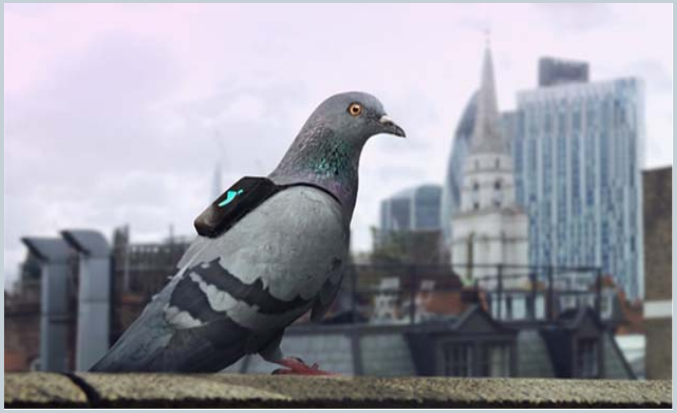
Current Technology

- Expensive
- Often snapshot
- May require expertise to use
- Often delays for lab analysis
- Established QA protocols
- Collected by gov, industry, researchers
- Data stored and explained on gov websites

New Technology

- Low cost
- Often continuous
- Perhaps easy-to-use
- Real-time w/o lab analysis
- QA protocol gaps
- Collected by communities and individuals
- Data shared and accessed on non-gov sites

Which monitor should EPA, states or citizens use for PM2.5?



Illustrative Water Advanced Monitoring

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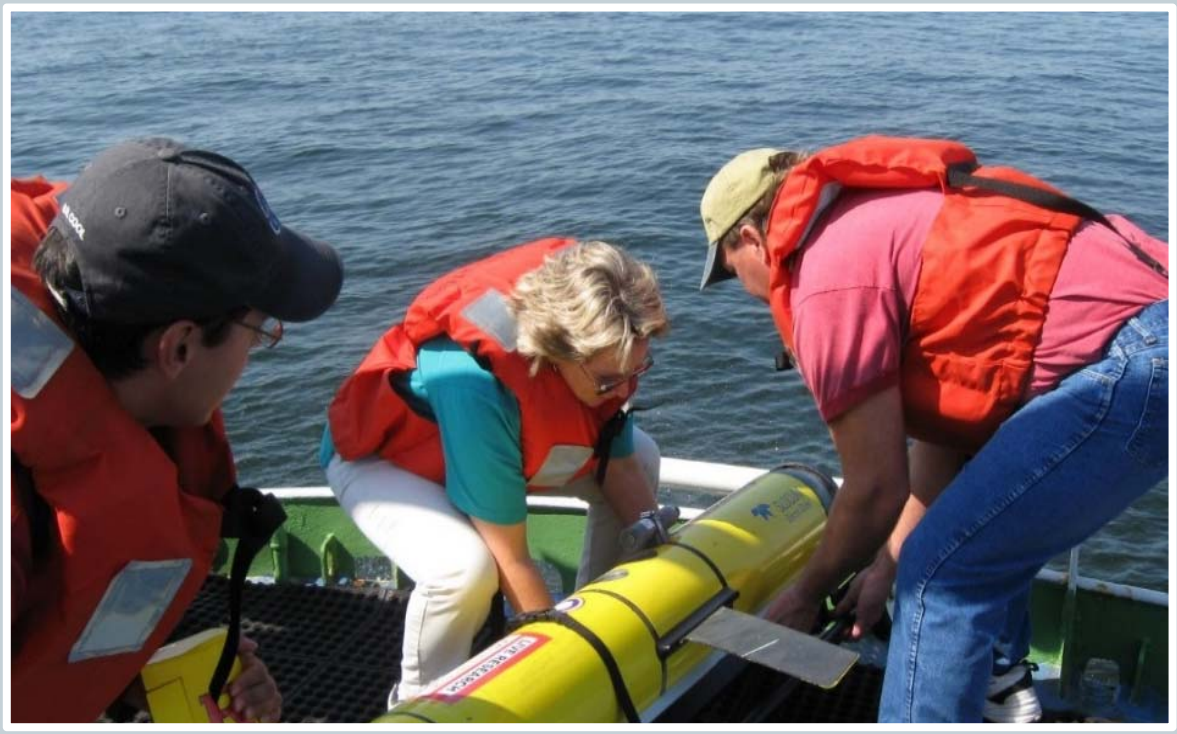
- Rutgers University with EPA Region 2 and NJ DEP
  - Ocean glider



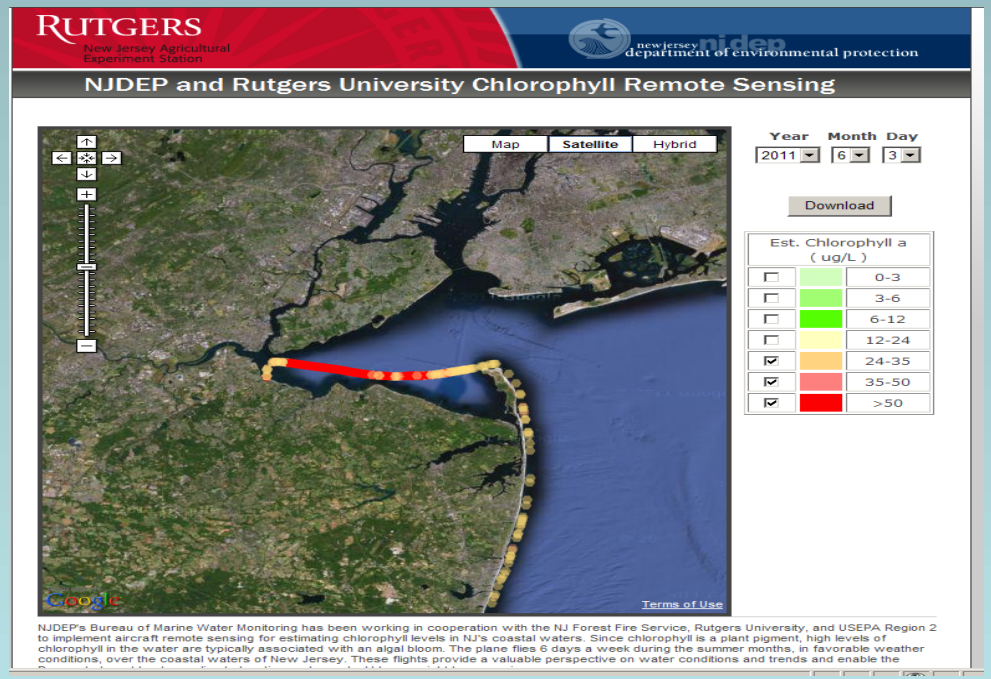
Slocum Glider Application in Coastal NJ Waters

- Joint effort - NJDEP, Rutgers U. & USEPA Region 2
- Deploys for up to 1 month at a time
- Can be rerouted in middle of deployment to targeted areas
- Collects continuous data - DO, temperature, salinity, & chlorophyll a to understand conditions that may cause algal blooms & low DO
- Helps determine depths of algal blooms
- If bloom in deeper offshore waters, can target sampling to ID phytoplankton & determine if capable of producing toxins before bloom pushed to shore

Algal Bloom Remote Sensing in NJ Coastal Waters

- Joint effort – NJDEP, Rutgers U. and USEPA Region 2
- Aircraft remote sensing for chlorophyll a
- Sensor mounted on NJDEP plane used for summer coastal surveillance flights
- Daily remote sensing data available on website - njbeaches.org

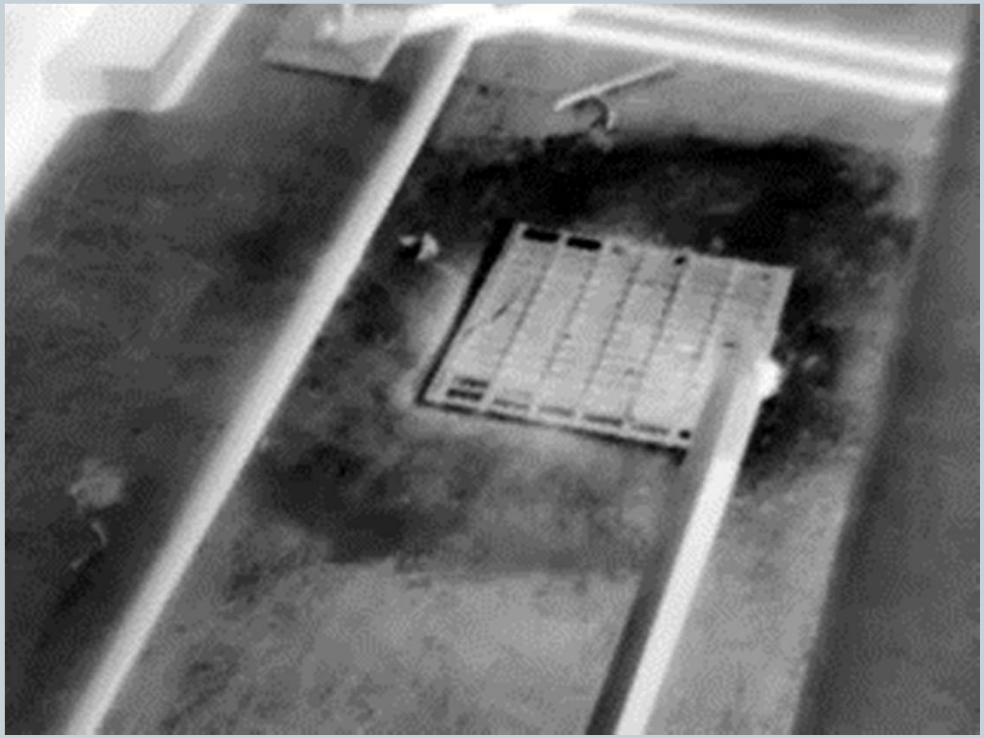
Algal Bloom Response (6/3/2011) – Chlorophyll Remote Sensing



What Information from Glider & Remote Sensing Allows NJ to Do Better

- Quicker response to algal blooms
- Identify target areas for phytoplankton species identification
- Monitor status, intensity and location of algal blooms
- Alert officials and public of potential for water discoloration or possible human health impacts in coastal waters
- Explain and document causes of fish kills

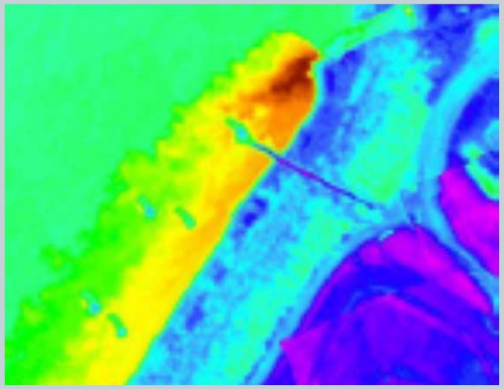
Proven Air Advanced Monitoring Tool
Now used for **Water**



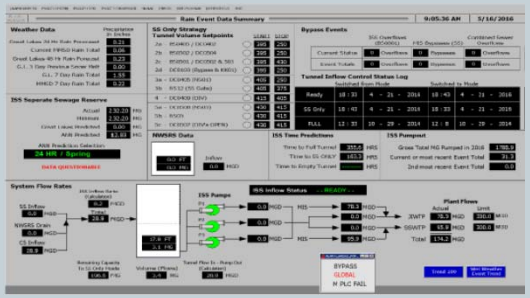
VOCs evaporating from a storm drain grate at a bulk gasoline distribution terminal

State/local uses for advanced monitoring

- Infrared aerial photography
  - Finds problems faster
  - Saves money



- CSO operations and transparency



EPA is testing water advanced monitoring

ZAPS LiquID

PhyloChip

S::CAN Spectro::lyser

The Challenges

1. Pace of tech change exceeds EPA/State ability to identify, understand or evaluate appropriate use.

   - Public and our staff ask about appropriate use of technology and we do not have capacity to answer.

   - Public will identify “problems” and we will not know if their data is credible.

2. Limited EPA ORD and SCAQMD testing reveals manufacturer claims not always confirmed

4. Large multi-$B industry but most purchasers of technology (agencies or citizens) are not able to judge performance (whether $200 or $20,000)

The Challenges – continued 2

5. Interpreting short term data when our standards are often longer term averages
6. Extract useful information from larger datasets with (potentially) lower quality individual measurements
7. Adjust to likelihood that government won't be primary repository of monitoring data.
8. Agency "gold standard" methods approval takes time and addresses only those appropriate for regulatory use

EPA and States Respond

- March 2015 state EPA E-Enterprise Leadership Council accepted our proposal to create an EPA-State team to prepare us for opportunities and challenges.
- Team chaired by David Hindin (EPA OECA) and first Dick Pedersen (Oregon) and now Ben Grumbles (Maryland)
  - States: OR, OK, NH, CA, CO, CA-SCAQMD, OH
  - EPA: OECA, ORD, OAR, OW, OEI, R1, R2
- Team identified five priority recommendations for action.
- April 2016 E-Enterprise Leadership Council enthusiastically approved moving forward.

RECOMMENDATION ONE: Options and Feasibility Analysis for an Independent Third Party Certification Program

- Consensus top recommendation is feasibility options analysis for **independent, non-governmental third party voluntary program to certify technology performance**
  - Probably focused on technologies not designed for formal regulatory uses.
  - Include preliminary development of technology evaluation protocols and performance standards linked to specific uses
- We may need to initiate creation, but long term operation and funding would likely be non-governmental
- Study existing independent technology certification programs in the US and Europe (e.g., such as UL and LEED
- Options may range from leveraging existing programs, creating a new program or partnering.

RECOMMENDATION TWO: Establish EPA/State Technology Screening and User Support Network

- Form network of EPA/state scientists and engineers to:
  - Scan new technology
  - Review available data to screen whether a new technology appears to be sound for piloting
  - Share information across EPA and states
- Main focus is on air and water equipment for our use
- Given resource constraints, field or laboratory testing would be limited.
- Does not substitute for approval as an EPA standard/reference method.

RECOMMENDATION THREE: Develop tools and guidance on interpretation of data from emerging sensors

- Instantaneous results from advanced monitors can be misunderstood, especially when compared with standards based on long-term averaging.
- To ensure that data is used properly, agencies should develop guidance on data interpretation.
- Agencies will also need to create visualization tools (e.g. interactive maps, websites, mobile applications)

RECOMMENDATION FOUR: Create data standards

- Data is being collected in inconsistent formats and qualities. IT Data standards are needed to allow numerous and diverse entities to distribute, share and integrate the data.
- Can merge with ongoing work on standards in the private sector
- Classic E-Enterprise Exchange Network work

RECOMMENDATION FIVE: Lean technology evaluation processes

- Monitoring methods for regulatory, permitting, and compliance purposes must be approved by EPA.
- To ensure that these processes operate as efficiently as possible, they should go through the Lean process.
- This effort should be coordinated with the ECOS EPA-State Leaning Team; states as well as technology developers should participate
- There are five EPA monitoring approval programs. Perhaps Lean each, but phase.

Dual Goals

- Accelerate adoption by environmental agencies
  - Technology scanning and screening state EPA network to help us understand which equipment might meet our needs.
  - Leaning approval processes will speed up adoption of “gold standard” technology for regulatory use
- Strengthen quality and impact of citizen science
  - Third-party process for certifying sensors will help ensure only high quality tools are used
  - Guidance on data interpretation will minimize confusion, maximize value of privately-collected data
  - Data exchange standards will make data from all sources interchangeable, enhance value of external data collection

Next Steps

- EPA-State Steering Committee will oversee implementation of the recommendations, provide direction and input to teams
  - Chaired by David Hindin (EPA OECA) and Ben Grumbles, MD
  - Also conducting related tasks, such as a survey of current advanced monitoring projects and pilots among states and EPA (ECOS will gather information on states via media associations)
- Teams will implement recommendations 1 to 4. State participants have been recruited via ECOS, and teams have begun meeting
- ECOS has reached out to the media associations for water and air—if you want to participate, contact ECOS
- Supporting documents:
  - Advanced Monitoring Technology: Critical Next Steps for EPA and States. A Report to the E-Enterprise Leadership Council
  - Advanced Monitoring: **Proposed Plan** for Implementation of EELC-Approved Recommendations.

Steering Committee Membership

David Hindin, EPA (co-chair)
Sec. Ben Grumbles, Maryland (co-chair)
Chet Wayland, EPA Office of Air and Radiation
Dan Costa, EPA Office of Research and Development
Jeff Lape, EPA Office of Water
Robin Thottungal, EPA Office of Environmental Information
Scott Gordon, EPA Region 4
Tad Aburn, Maryland
Brian Boling, Oregon
Andrea Keatley, Kentucky
David Neils, New Hampshire
Lance Phillips, Oklahoma
Gordon Pierce, Colorado
Gary Rose, Connecticut
Laki Tisopulos, South Coast (CA) Air Quality Management District

Team Membership

Team 1: Third-party certification (Led by EPA Office of Research and Development)

Alan Vette, ORD management lead

Joel Creswell, ORD staff lead

State participants: Laki Tisopulos, South Coast (CA) Air Quality Management District; Brian Boling, Oregon; David Manis, Texas

Team 2: Scan, screen and user support (led by EPA Office of Enforcement and Compliance Assurance)

David Hindin, OECA management lead

George Wyeth, OECA staff lead

State participants: Andrea Keatley, Kentucky; Michael Beaulac, Michigan; Nathan Hoppens, Texas

Team 3: Data interpretation (led by EPA Office of Air and Radiation)

OAR management lead: Chet Wayland

OAR staff lead: Kristen Benedict

State participants: Tad Aburn and Lee Curry, Maryland; Eric Brown, Colorado; Ted Diers, New Hampshire; Lindsey Jones, Texas; Cara Keslar, Wyoming;

Team 4: Data Quality Standards (Co-led by EPA Office of Air and Radiation, Office of Environmental Information, Office of Water)

Robin Thottungal, OEI (management lead)

Dwane Young, OW (staff lead)

State participants: Gordon Pierce, Colorado