AIRNOW

September 9, 2014

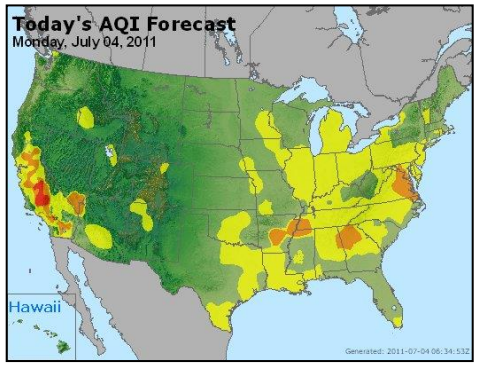
Air Quality Forecaster Focus Group Workshop

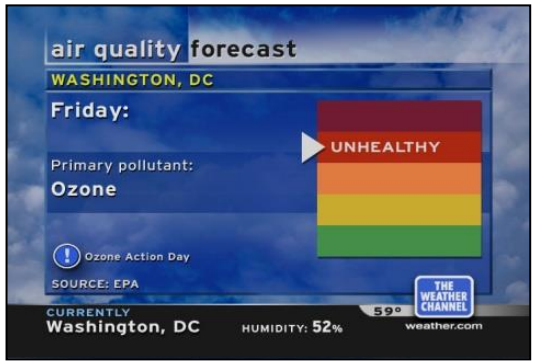
Overview

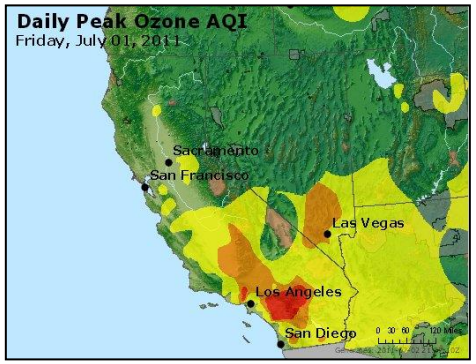
- Modern AIRNow has two major components
  - AIRNow (domestic)
    - Airnow.gov, EnviroFlash, iPhone app, etc.
  - AIRNow-I (international)
    - Expansion to other countries
    - Interest from Group on Earth Observations (GEO) and Eye on Earth (EoE)
- Future Directions
- AIRNow Satellite Data Processor
- Small Sensors
- Forecast Submittal System Update
- NOAA data transfer

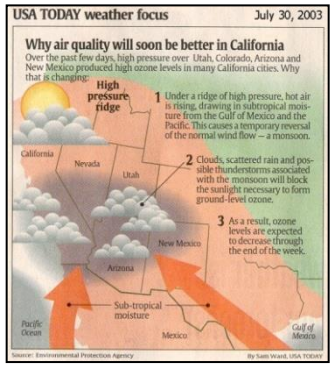
Status

- **Year Round 24/7 coverage/delivers real-time data (ozone & particles) for 50 States, 6 Canadian Provinces and 24 U.S. National Parks**
- **Next-day AQI forecasts for over 400 cities (summer) and over 300 cities (year-round)**
- **Successful iPhone and Android apps**
- **State-of-the-science information about air pollution health effects for the public, media and stakeholders**
- **Public/Private partnerships with The Weather Channel, USA Today, CNN, weather service providers, NOAA National Weather Service**

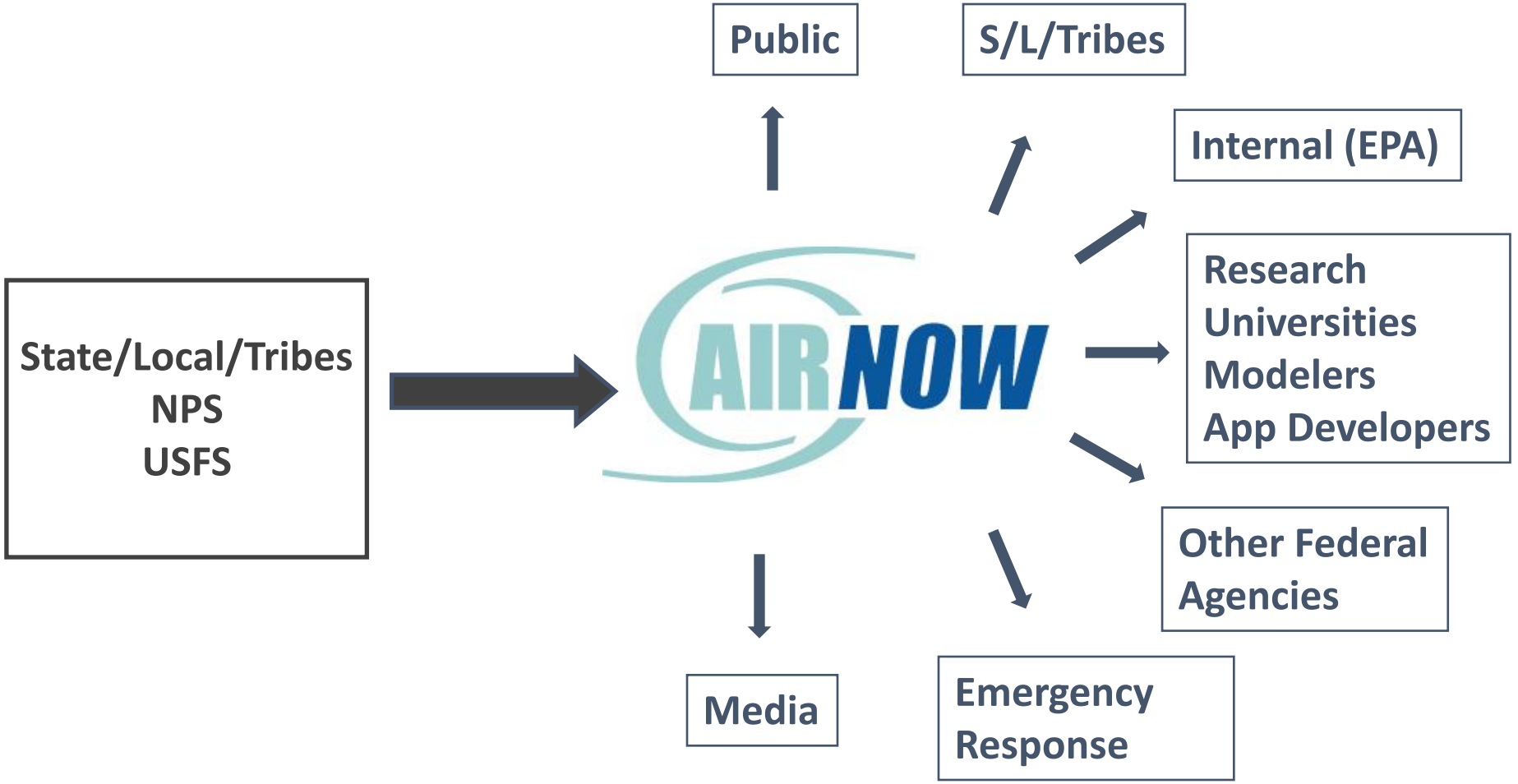








AIRNow System



AirNow Outputs

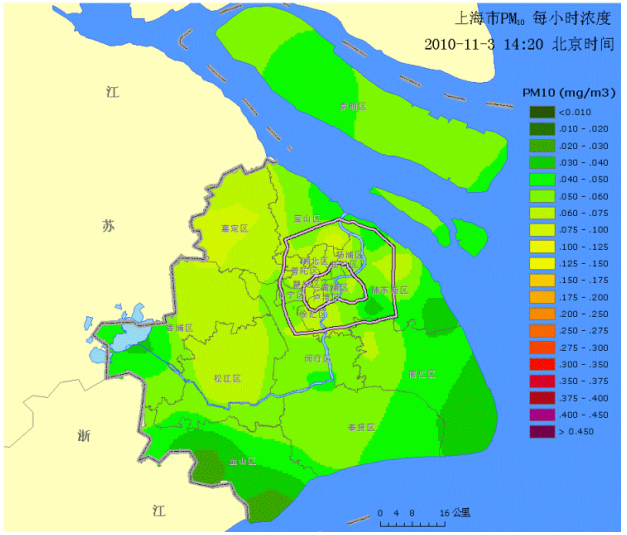
- Public
  - Website: 4.8 million views/yr
  - iPhone App: 100+ installed/wk; 25,000 installed total
- State/local/tribal agencies
  - 280,000 EnviroFlash subscribers
  - 210 million people in areas that have AQI forecasts
- Media
  - Estimate 3.7 million viewers of AirNow information – USA Today, Weather Channel
- Emergency response
  - Public and states used AirNow to convey info about BP, Katrina, and wildfires
- Internal
  - AQAD's Ozone Watch, OEI's My Environment, AQS Data Mart
- Others
  - Epi studies, researchers, other federal agencies

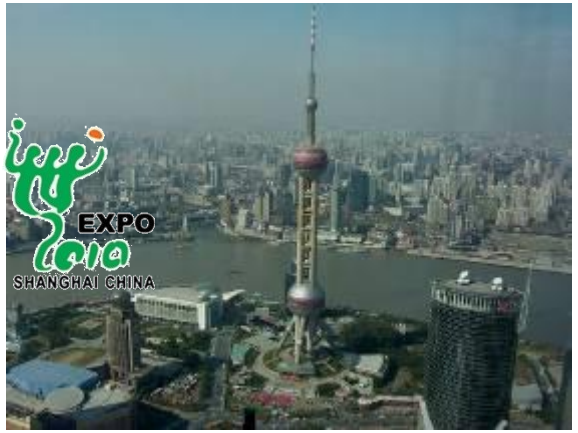
"Several parents I know have discussed with me the importance to them of code orange days and how they are used to limit their child's outdoor activity in daycare in order to reduce their exposure to unhealthy levels of ozone and pm." (Erica Snyder, New Jersey Dept. of Environmental Protection)

"The information on the [AIRNow.gov] web site has helped by having another tool to get information out and help start a new program for air quality (school flag)." "We would like the students and teachers to check out the material on AIRNow." (Jim Carey, Klamath County)

AIRNow-International Update

- $1.5M state-of-the-art system, funded by EPA GEO (ORD)
- Successful pilot launched at 2010 World Expo in Shanghai
- Leveraged development funding - running same software in US data center
- Expanding rapidly
  - China's Zhejiang and Jiangsu provinces
  - Brazil
  - Mexico
- Strong international interest
  - Turkey, Kuwait, UAE, Indonesia, Taiwan

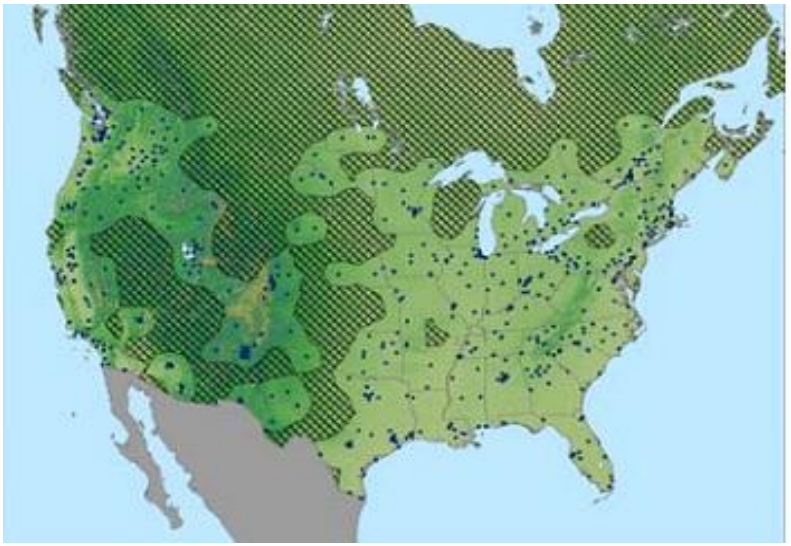




Future Directions – game changers

- **Citizen Monitoring**
  - **Low cost sensors are becoming very common**
  - **Community groups are making measurements of their environment**
  - **ORD has a "sensor workgroup" and has held several workshops here in RTP**
  - **Can we continue to ignore "crowd sourced" data?**
- **NASA Research Opportunities in Space and Earth Sciences (ROSES)**
  - **$1.5M over three years to integrate NASA satellite data into AIRNow for improved AQ reporting**
  - **AirNow Satellite Data Processor (ASDP): Solid, functioning prototype is "fusing" space-based data with ground observations**

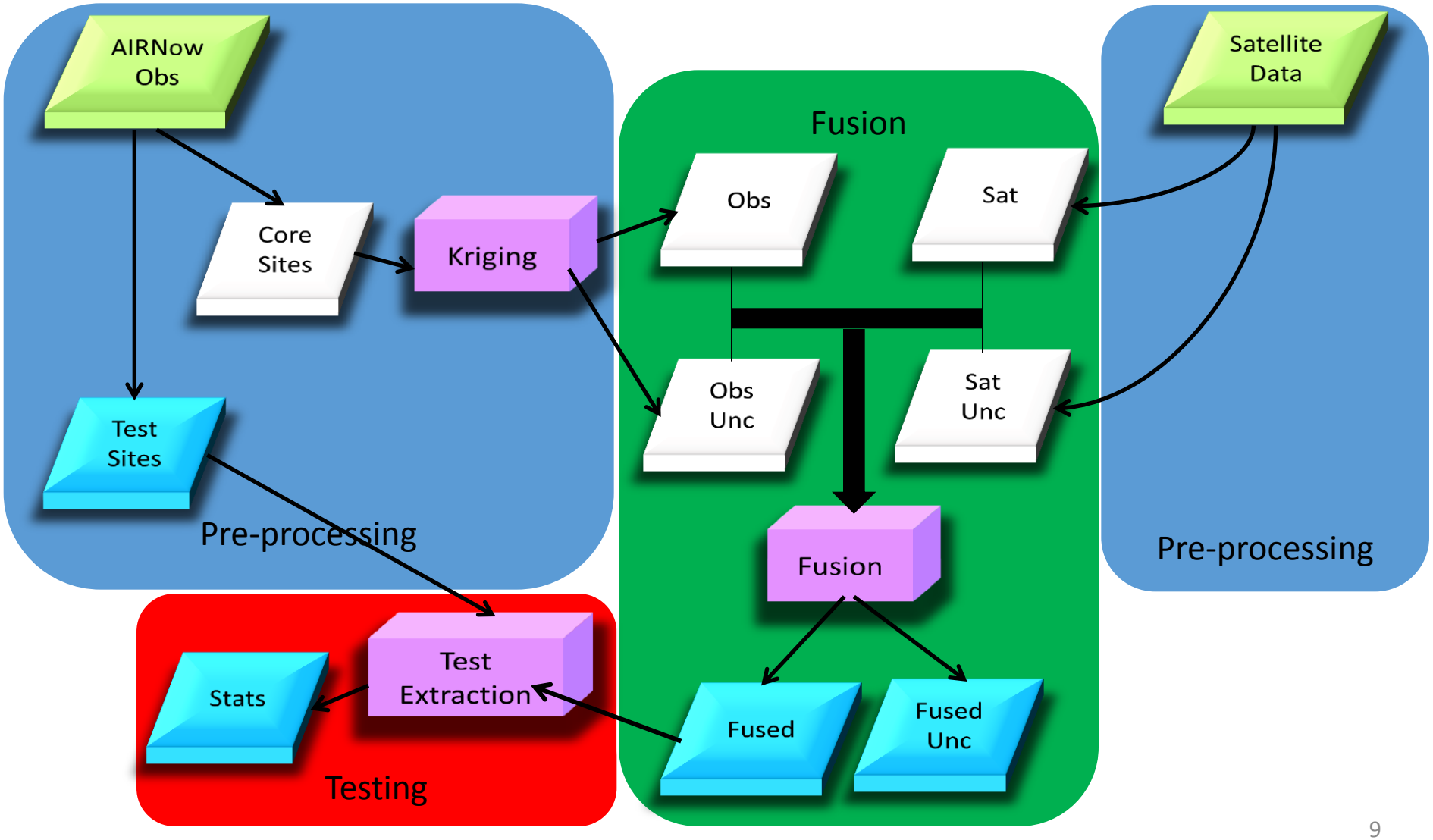
Big Picture: Project Objectives



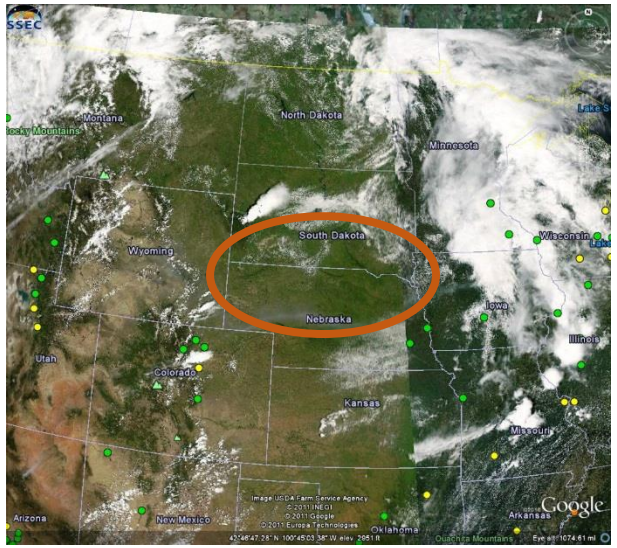
Without satellite data, contouring would not be possible in the hatched areas.

- Improve operational air quality maps currently in AIRNow and make them available 24 hrs a day every day
- Provide satellite data products in AIRNow-Tech
  - Initially PM2.5, but limited only by available satellite instruments
- Improve tools for air quality forecasting

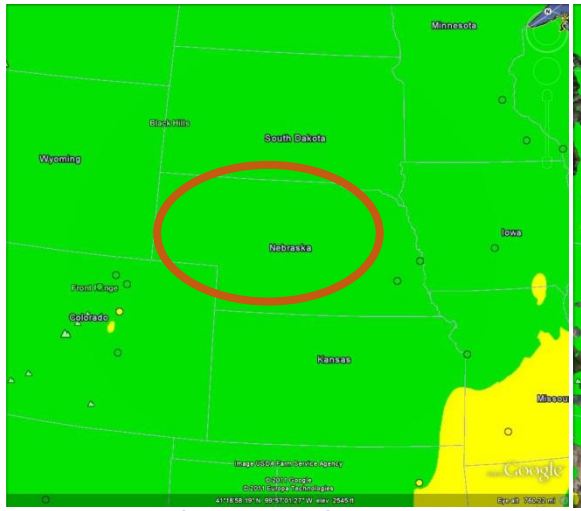
ASDP Overview



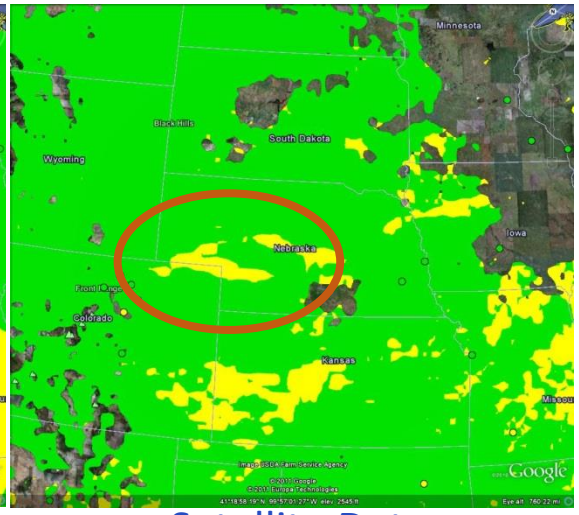
Preliminary Results: Smoke and No Monitors (Kansas)



MODIS & AIRNow Observations

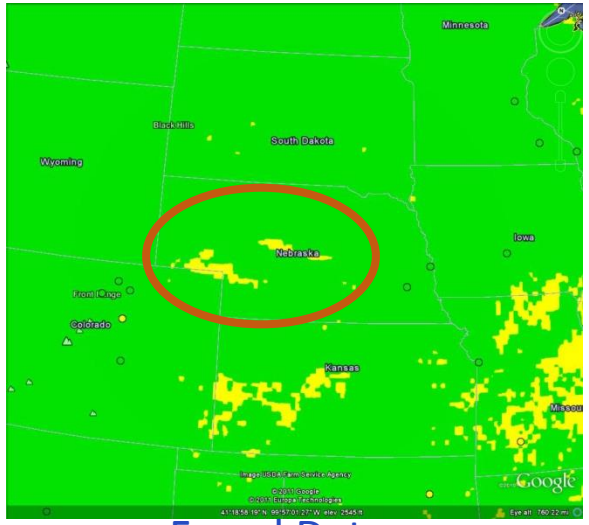


Observed Data



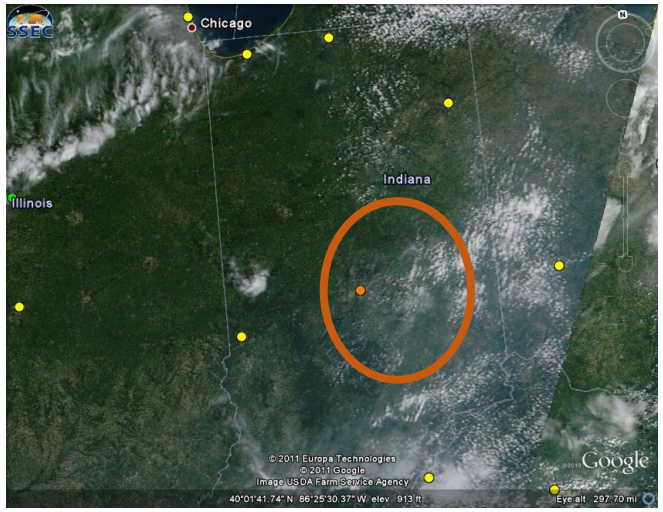
Satellite Data

- Smoke in Nebraska (MODIS and AOD)
- No Monitors
- ASDP adds information (Moderate)



Fused Data

Preliminary Results: Isolated Unhealthy for Sensitive Groups



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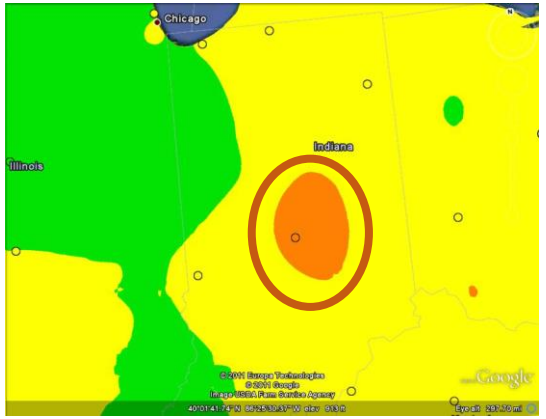

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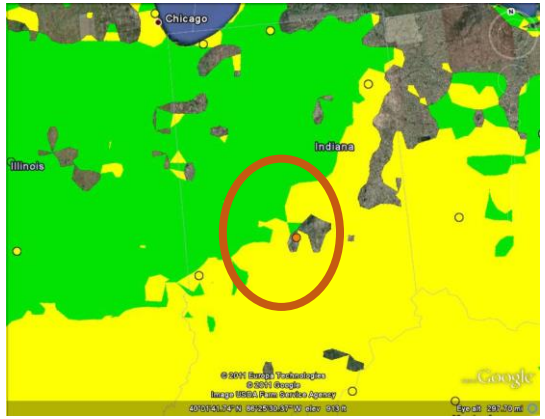
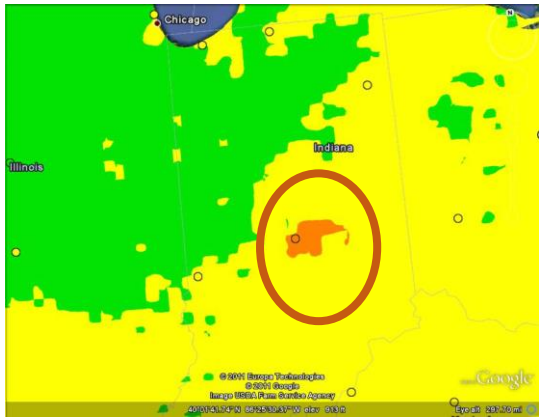


Satellite Data

- High AOD (smoke?) in central Indiana
- Large USG area due to interpolation
- ASDP constrains the monitor influences

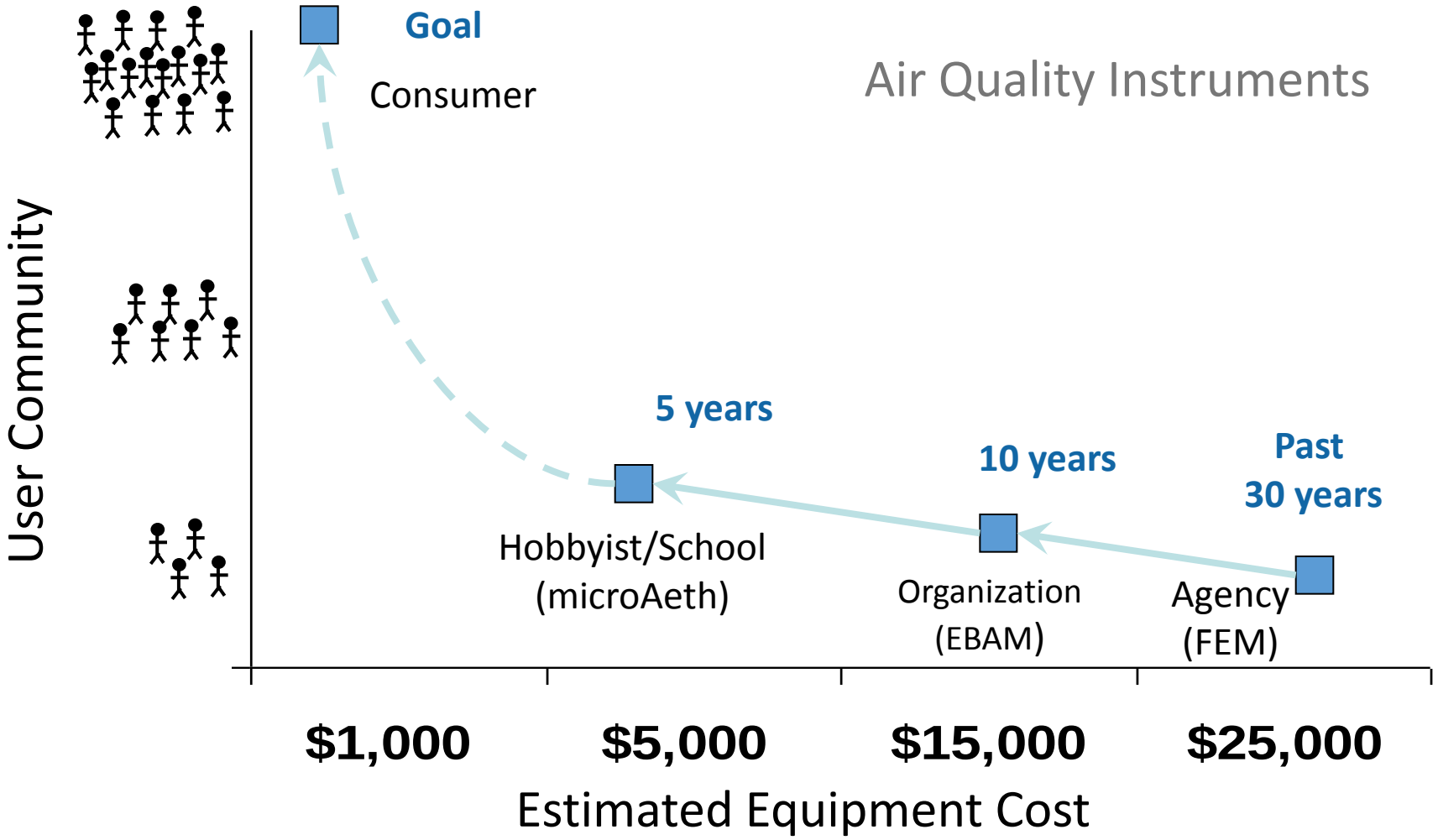


Fused Data

Small Sensors

- **Global Ozone Initiative (GO3)**
- **ORD initiatives**
  - **Next Generation Air Monitoring (NGAM)**
  - **Village Green**
- **Other potential citizen science applications**

Instruments versus Cost



EBAM = Environmental beta attenuation monitor; FEM = Federal Equivalent Method; Aeth = Aethalometer

Global Ozone Initiative

- **Schools buy a $600 kit to monitor ozone**
- **Worked with STI to allow that data to flow into a separate AirNow database**
- **STI has done analysis showing the GO3 data compares well with standard ozone instruments**

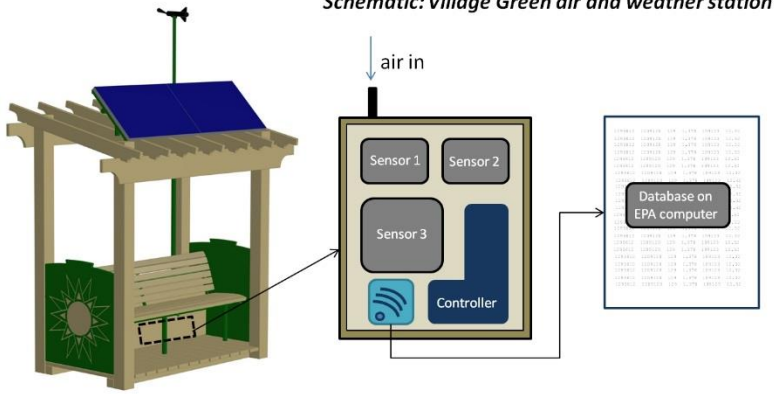
US EPA ORD Initiatives

- **Next Generation Air Monitoring (NGAM)**
  - **Workshops bring together sensor designers, state, local, tribal agencies, and EPA**
  - **Taking stock of the technology and its impact**
  - **Some work being done to move AirNow closer to being able to accept sub-hourly data**
  - **AirNow also being considered as a source of FRM and FEM data for small sensor evaluation**

AirCasting App

AirCasting Air Monitor

US EPA ORD Initiatives



Schematic: Village Green air and weather station

- **Village Green**
  - **A self-contained monitoring bench was installed at a public library in RTP**
  - **Delivers small sensor data to a server at EPA for display to the public**
  - **Talks underway to incorporate this dataflow in AirNowTech**
    - **Replication of the VG benches will be easier**
    - **Data will be more easily available to AirNow stakeholders**

Other potential applications

- **Environmental education**
  - **Small sensors are a great way to teach**
- **Granularity**
  - **Small sensors can provide data in many more locations than traditional monitors**
- **Field studies**

Potential Uses ASDP Data

- Exceptional events
  - May be the only data available in remote areas
  - Additional datapoints to add to monitoring data
- Monitor siting
  - Satellite data could inform locations for new monitors or assess siting of existing monitors
- Model Evaluation
  - Gridded, national dataset may be useful in evaluating models
- Air quality assessments
  - Satellite data may discover issues in areas where there are no monitors
  - More data, of known quality, is generally good
- Data is flowing…we can start thinking about these NOW

Forecast Submittal System Update

- No Changes this year

NOAA data transfer system

- **Updating this year to use Web services from Airnow tech.**

US Forestry Service Emergency Monitors

- USFS data flowing into AirNow
- They are delivering real-time data for all USFS currently deployed emergency monitors.
- AIRSIS data flowing into AirNow
- New Smoke Wildfire page

Thanks

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