Air Quality Monitoring Modes

Mode: Mobile
Making measurements while in motion

Air quality data from Google / Aclima

Example application: Maps to analyze and interpret hot spots

Features:
- Quickly screen for air pollutants over a broad spatial area
- Multiple passes can reveal areas having high pollutant impacts
- Results help direct resources and additional monitoring efforts

Limitations:
- Air quality information at a given place at a given time
- Many passes required to build confidence in results
- Vast amounts of data requiring complicated analysis
- Build out of unit may be costly

Mode: Saturation
Sensor network
(As long as maintained)

Key
● - Sensor Node
(Note: This is just a simulation, not an existing sensor network)

Features:
- Stationary measurements with high time resolution
- Good spatial coverage with dense networks
- Easy to use and deploy

Limitations:
- Limited pollutants (no air toxics)
- Requires significant resources for upkeep
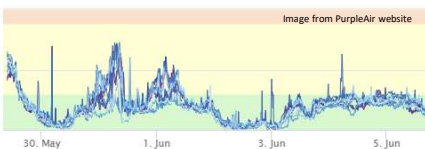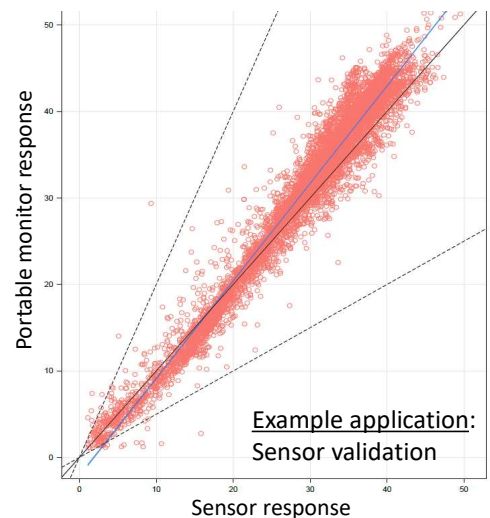- Lower and more uncertain data quality

Example application: Current air quality at high spatial resolution

Image from PurpleAir website

Image from PurpleAir website

Mode: Portable
Stationary for short periods
(hours/days)

Image from https://www.nrdc.org/stories/petcoke-problem-where-store-risky-tar-sands-refining-product

Features:
- Portable instrumentation with minimal site preparation
- Source identification measurements
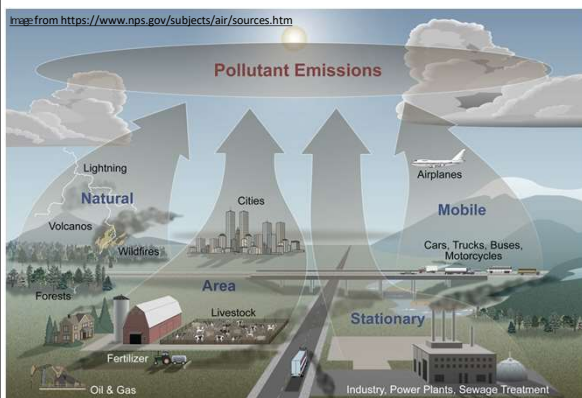- Co-location and validation of instruments
- Medium to high data quality

Limitations:
- Short time periods only
- May need access to power
- Instruments limited to those that are relatively easy to transport and deploy

Example application: Sensor validation

(x-axis) Sensor response
(y-axis) Portable monitor response

Mode: Short-term
Stationary for moderate periods (weeks to months)

Photo from https://www.syft.com/industries/fenceline-monitoring/

Image from https://www.nps.gov/subjects/air/sources.htm

Features:
- Possible to move
- Short-term trends of pollutants (daily, weekend/weekday)
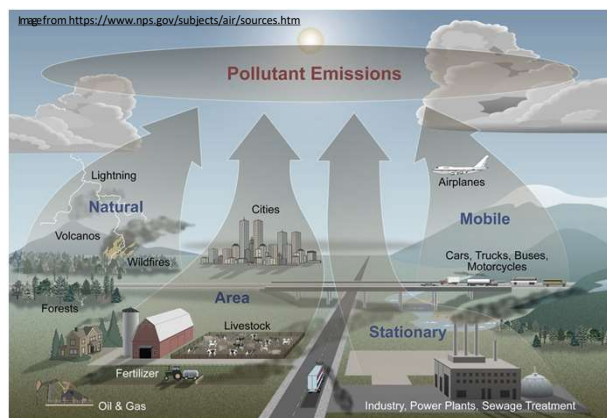- Can employ a wide range of instruments yielding many pollutants
- High data quality
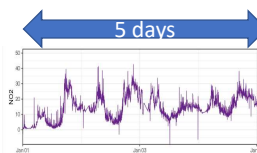
Limitations:
- Moving may be difficult depending on size
- Siting challenges, including reliable power, security
- Low spatial coverage
- Build out of unit may be costly

5 days

Example application: Source attribution

Mode: Long-term
Stationary for long periods (one year or more)

Image from https://www.nps.gov/subjects/air/sources.htm

Features:
- Long term trends of pollutants (monthly, seasonal)
- Can employ a wide range of instruments yielding many pollutants
- High data quality
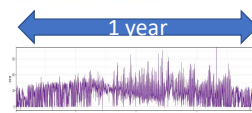
Limitations:
- Moving not as easy
- Siting challenges, including reliable power, security, rent
- Stationary, so no spatial coverage
- Build out of unit may be costly

1 year

Example application: Regional air quality