AQ Ground Monitoring Landscape

Slides at: https://tinyurl.com/gwrt2019
For PM10, PM2.5, O3, NO3, SO2, CO, BC:
>10396 stations
>2300 cities
>70 countries

WHO 2018 OAP (annual avg, PM2.5+PM10):
>10000 stations
- 4300 cities
- 108 countries
What does the Daily Planetary “Heartbeat” of Air Pollution Look Like?

Max Manning, an undergraduate in Randall Martin’s group at Dalhousie University, published a paper addressing **this basic question** by using open data accessed from the OpenAQ platform.

Manning et al., ES&T Letters (2018)
• Annual averages created from gov’t ground monitoring data, collected over the same period of time as one another (90% threshold of temporal coverage)

• Similar annual averages could be created from near-real time (15 min to hourly) data for O3, NO2, SO2, CO, PM10

• All near real-time gov’t data are harmonized and open on openaq.org

• Tools for annual + daily averages: Open-source, on github.com/openaq, openaq-quality-checks, running SQL queries, code found in openaq-averages (on Athena),

Data accessed from openaq.org
Exploring 2018 Daily Avg Data in Cities

(Daily-average color-scales are only comparable between days in a given city; not across cities)

Data accessed from openaq.org
Where are data publicly available? (In some form)

- Low-hanging fruit: improving data access in dark green and light green places
- But how to fill in gray areas?

- Countries with AQ open data of some sort (often not be shared robustly, however)
- Countries likely monitoring but not on the OpenAQ platform (due to data-sharing issues or data are not shared)
- Countries’ AQ data status unknown (to us)
Examples of open air quality data barriers

Technical
- Isn’t a website ‘open’?
- Know-How not “in-house”

Social
- Data misusage
- Negative press
- Political sensitivities
- Cultural norms

Financial
- Threatens existing funding models
- Requires (some) funding

Potential low-hanging (and inexpensive) fruit:
Incentivizing (e.g. funding) countries that collect data and face technical barriers to share it more openly.
What about all of the other continent-sized data gaps?

- 1893-1919: 1689 Public “Carnegie” libraries built in US
- Call for towns to apply for central repo of building funds, submitted plan for long-term community support
- Created expectation in communities to have libraries
- "Just by giving local communities those grants for constructing buildings, he generated a desire among others to do the same thing."

What about a Carnegie-like program for ref-grade PM2.5 monitors (gov’ts, universities?) to fill in data gaps?
THANK-YOU!

Thanks to the OpenAQ Community and our Partners:

Slides at: https://tinyurl.com/gwrt2019

Contact: openaq.org | christa@openaq.org | @open_aq
## Comparison with WHO Outdoor Database

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<tr>
<th>Ground Monitoring Type</th>
<th>2018 WHO Outdoor AP Database</th>
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| Quality Control | May be performed by gov’ts, but process often not specified, nor uniform across countries | May be performed by gov’ts, but process often not specified, nor uniform across countries |
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Year of PM2.5 (measured) Annual Average from 2018 WHO AAP

- 2017: 5%
- 2016: 65%
- 2015: 12%
- 2014: 17%
- 2013: 5%
- 2012: 0%
- 2011: 0%
- 2010: 0%
- 2009: 0%
- 2008: 0%
Use Case, Model Insights #1: More data from more cities unearth differences between observations and models

GEOS-CF overestimates summertime ozone compared to OpenAQ observations

Slide courtesy: Christoph Keller, NASA
Use Case, Model Insights #2: Forecasting AQ in India

Case study: agricultural fires in India

MODIS fires Nov 01, 2017

Slide courtesy: Christoph Keller, NASA