SCAQMD| Diamond Bar, CA | 27 Sep 2017

OpenAQ: Fighting Air Inequality through Open Data and Community

OpenAQ's goal is to foster an ecosystem of diverse sectors and geographies using open air quality data and connecting with each other to fight air pollution better.

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Slides: tinyurl.com/SCAQMD17

First Principles that Drive OpenAQ

- Air pollution is one of the *globe's biggest killers*.

Change = Political Will + A Plan

***Both* require community + data**

3 Global AQ Data Gaps:

1. Geography Gap(s)
2. Accessibility Gap
3. The So What Gap

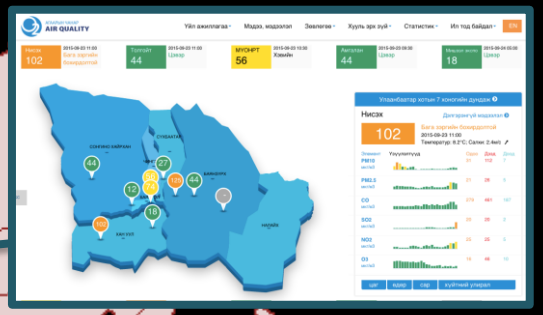
1. Geography Gap

Countries where near real-time gov't AQ is available *in some form**

*That we know of. Know of others? Say so!

2. Accessibility Gap

Click on the city name for more detailed information. printable summary	FORECAST		CURRENT AQI
	Wed Sep 23	Thu Sep 24	
Metropolitan Washington	33	38	44



Gobernación ICAP-MP10

Calidad de Aire las ultimas 24 horas:

Estación	MP 10	MP 2,5	SO_2	CO	O_3	NO_2
Gobernación		-		-	-	-
Escuela E-10						
Bomberos	-		-	-	-	-
Gendarmería			-	-	-	-

Presione sobre los botones para visualizar los niveles para los últimos tres días de cada estación-contaminante.

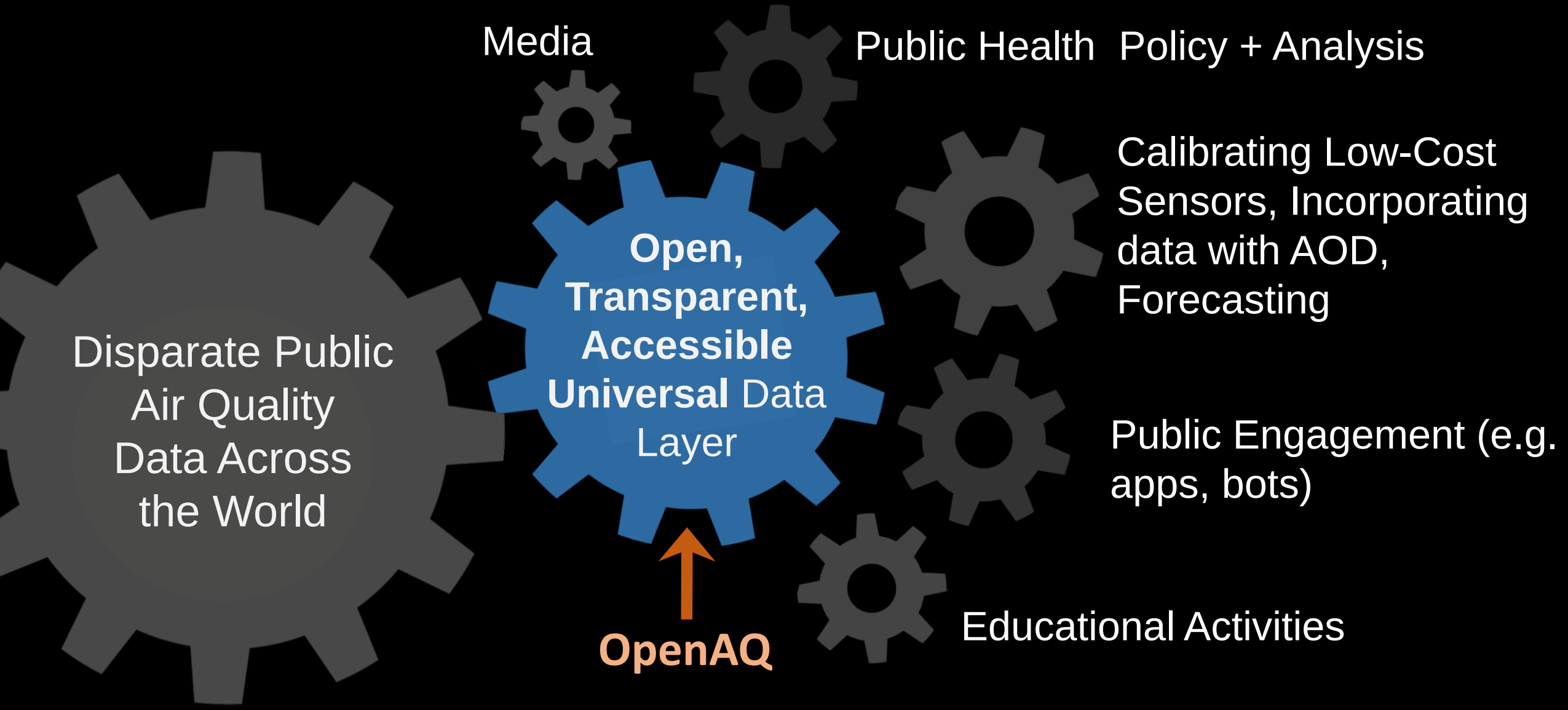
Central Scotland

Latest measured levels

Monitoring site	Running 8 Hour mean Ozone (μgm^{-3})	Hourly mean Nitrogen dioxide (μgm^{-3})	Max 15 min mean Sulphur dioxide (μgm^{-3})	Running 24 Hour mean $PM_{2.5}$ Particles (μgm^{-3})	Running 24 Hour mean PM_{10} Particles (μgm^{-3})	Last updated
Auchencorth Moss Timeseries Graph	45 (2 Low)	n/m	n/m	0 (1 Low)	6 (1 Low)	23/09/2015 21:00:00
Bush Estate Timeseries Graph	51 (2 Low)	3 (1 Low)	n/m	n/m	n/m	23/09/2015 21:00:00
Dumbarton Roadside Timeseries Graph	n/m	4 (1 Low)	n/m	n/m	n/m	23/09/2015 21:00:00
Edinburgh St Leonards Timeseries Graph	29 (1 Low)	15 (1 Low)	6 (1 Low)	6 (1 Low)	6 (1 Low)	23/09/2015 21:00:00
Glasgow Great Western Road Timeseries Graph	n/m	19 (1 Low)	n/m	n/m	n/m	23/09/2015 21:00:00

Pollutants		Ozone O3	Ozone O3	Nitrogen dioxide NO2	Visibility NEPH	Carbon monoxide CO	Sulfur dioxide SO2	Particles PM10	Particles PM2.5
Averaging Periods		1-hour average	rolling 4-hour average	1-hour average	1-hour average	rolling 8-hour average	1-hour average	rolling 24-hour average	rolling 24-hour average
Sydney East	Randwick	2.9	2.3	0.4	0.09		0.1	13.7	
	Rozelle	2.9	2.2	0.4	0.03	0.2	0.0	10.4	2.6
	Lindfield	3.0	2.4	0.2	0.06		0.0	10.3	
	Chullora	3.0	2.4	0.5	0.06	0.2	0.0	12.8	4.5
	Earlwood	2.8	2.3	0.3	0.06			10.3	3.7
Sydney North-west	Richmond	2.7	2.5	0.2	0.06		0.0	8.9	3.6
	St Marys	3.0	2.8	0.0	0.04			9.1	
	Vineyard	3.1	2.8	0.1	0.06		-0.1	10.5	
	Prospect	2.8	2.4	0.3	0.10	0.0	0.0	12.0	6.2
Sydney South-west	Bargo	2.9	2.8	0.0	0.04		0.0	7.2	
	Bringelly	2.9	2.8	0.1	0.06		0.0	9.6	
	Camden	3.0	2.9	0.0	0.05	0.0		7.0	2.6
	Campbelltown West	2.8	2.7	0.1	0.07	0.2	0.0	11.7	
	Liverpool	2.9	2.5	0.3	0.04	0.0		10.3	3.6
	Oakdale	2.9	2.7	0.0	0.04			6.4	
Illawarra	Wollongong	2.7	2.6	0.4	0.06	0.1	0.0	12.6	4.4
	Kembla Grange	2.6	2.6	0.2	0.05			8.8	3.2
	Albion Park Sth	2.8	2.8	0.0	0.04		0.0	8.7	2.4
Lower Hunter	Wallsend				0.08			9.0	4.1

Bridging the Accessibility Gap



openaq

Programmatic, transparent access to **historical** + **NRT** station AQ data in a **universal format**:

- PM_{10}, $PM_{2.5}$, BC, O_3, CO, NO_2, SO_2
- Primarily gov't sources
- **>100 million** total measurements, ~**250,000+** added daily
- **7800+** monitored stations in **61** countries
- Data accessible via API, csv files, user-customized files via openaq.org

openaq

Grassroots Effort

Open S

Repositories

Pinned reposito

openaq-api

OpenAQ Platform

JavaScript

openaq-data

A description of th
OpenAQ platform.

4

Open_AQ
@Open_AQ

Thanks to @dolugen, Tuzla, Bosnia AQ
now on OpenAQ! No more recording t
data by hand.

UR AGO
nd Herzegovina
17/05/02
M2.5, SO2
lanski
View More

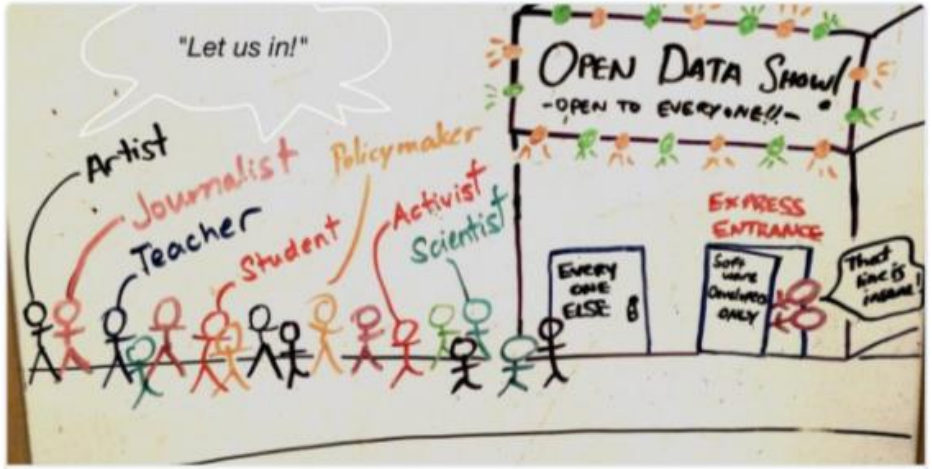
UPDATED AN HOUR AGO
Bukinje
in Tuzla, Bosnia and Herzegovina
Collection Start: 2017/05/02
Measurements: 90
Values: CO, NO2, O3, PM2.5, SO2
Source: Bosnia_Tuzlanski
Download
View More

New! Tuzla, BiH data on OpenAQ courtesy a Mongolian Communit
A few months ago, before the Sarajevo OpenAQ Workshop, we visited
People told us that they recording by hand real-time air…
medium.com

RETWEETS 2
LIKES 6

Open_AQ
@Open_AQ

1. Community Members in India and Kosovo improved RSS feeds for real-time US EPA air quality data



Four Ways OpenAQ Community Members are Improving Access to Governme…
Governments invest a lot of effort, money and staff in measuring air quality data at thousands of stations across the world. One of our…
medium.com

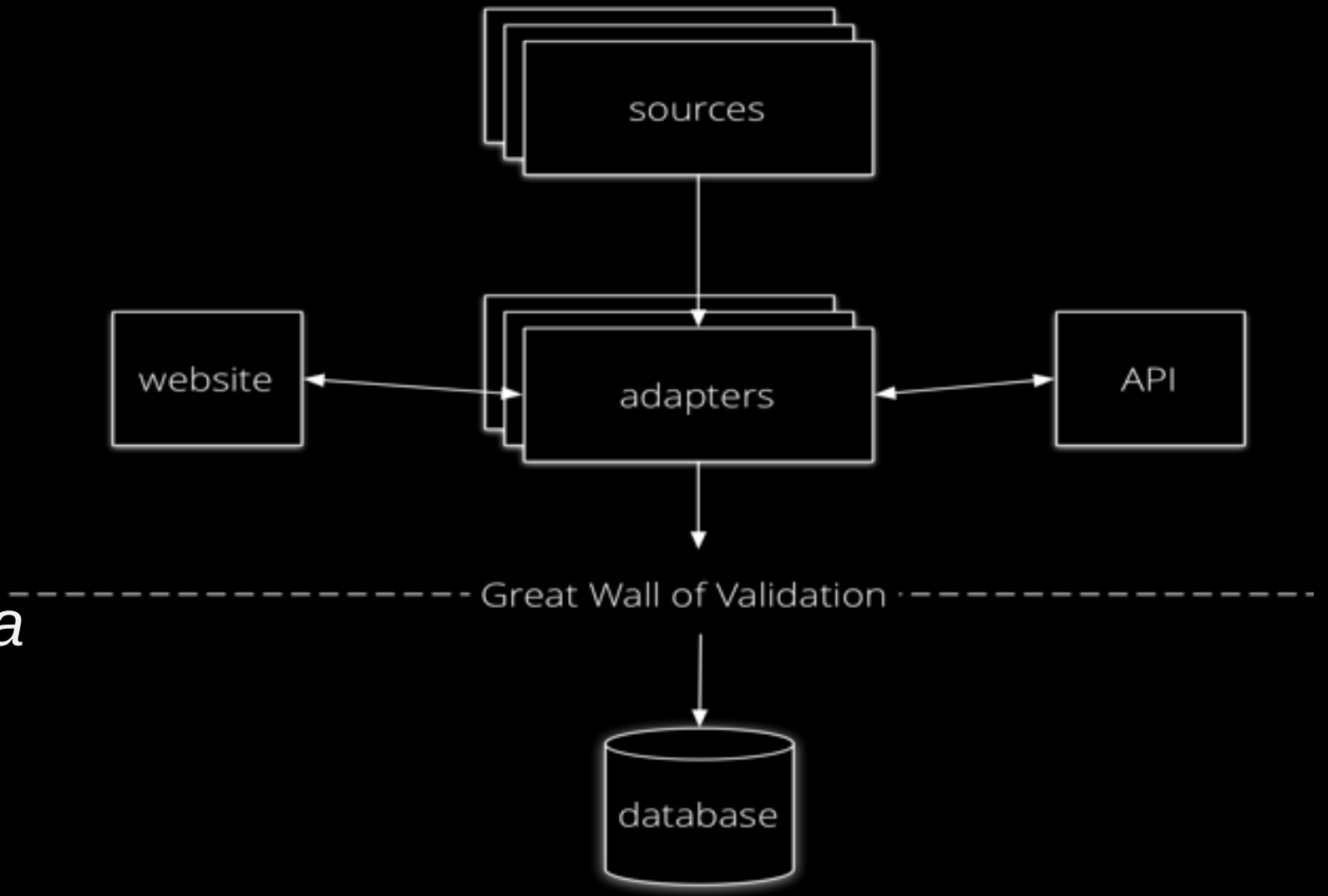
ontributed
a via
kholm!
Sweden are now
ntribution, lhufnagel!

Yay, Swedish data!

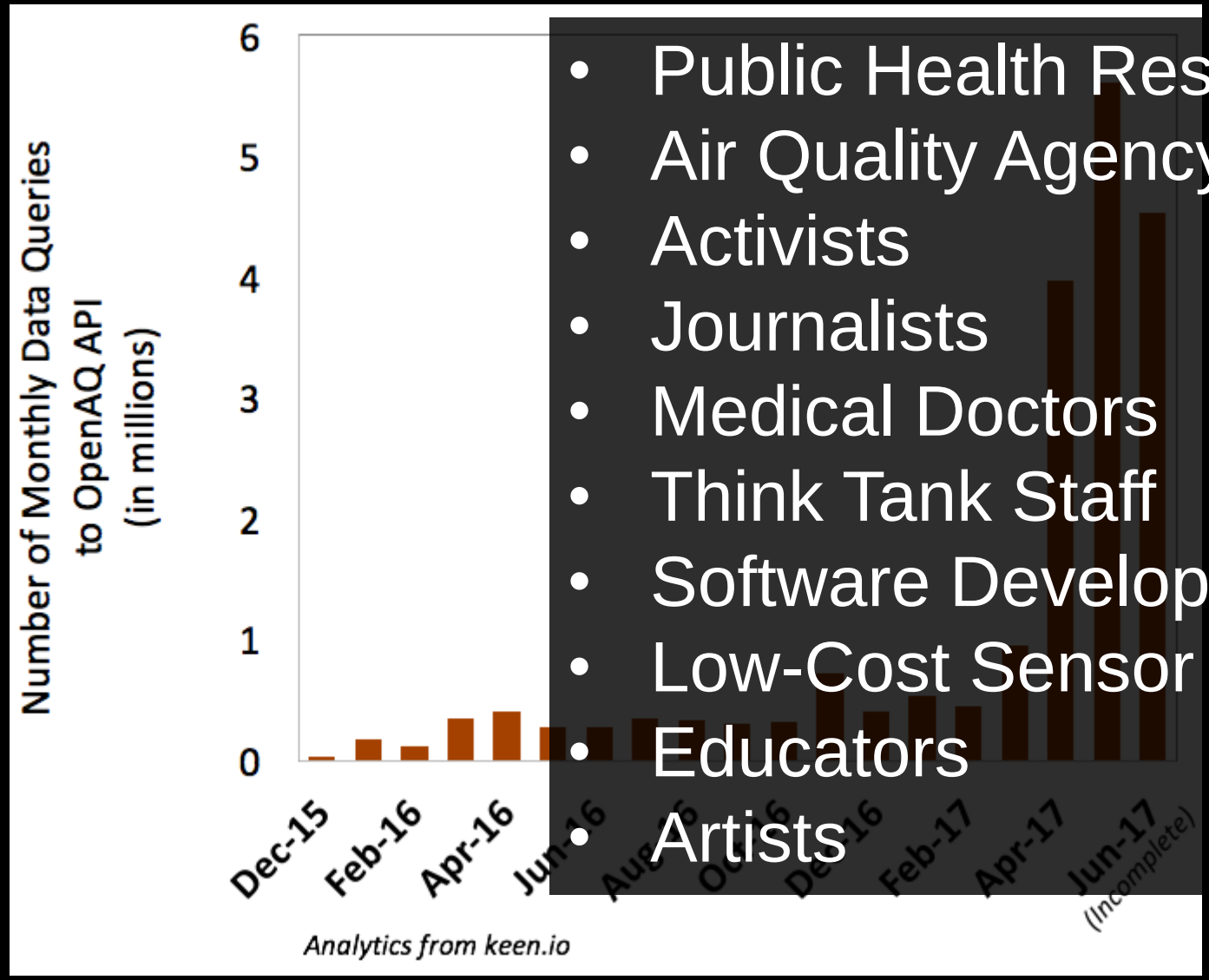
Air Quality | Air Pollution | Open Data | Open Source

OpenAQ Fetch

- Adapters reach out for new data every 10 minutes
- Validation is technical, not a *data quality* judgement



3. The So What Gap

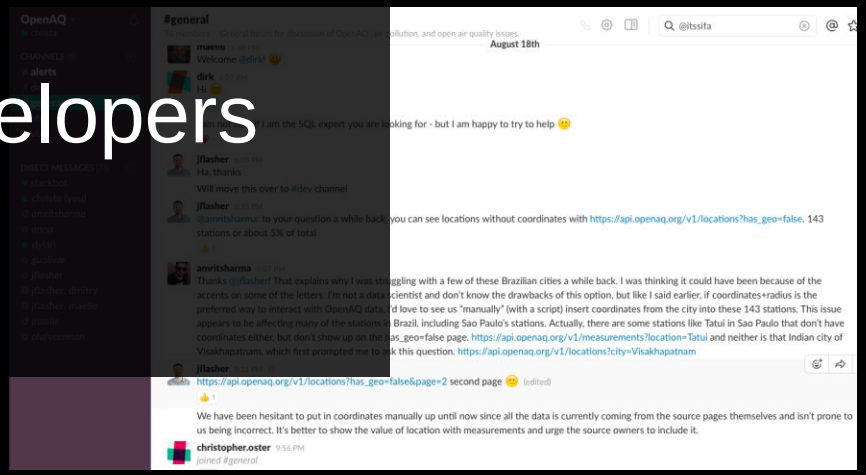


- Public Health Researchers
- Air Quality Agency Staff
- Activists
- Journalists
- Medical Doctors
- Think Tank Staff
- Software Developers
- Low-Cost Sensor Developers
- Educators
- Artists

In-Person, via Workshops

Delhi OpenAQ, Nov 2016

Virtually, on Slack:



3. The So What Gap

URBAN emissions .info

UrbanEm

SPARTAN

SPARTAN, th
Matter Netw
data availabl
on OpenAQ.

Learn More

Firemap: A Dynamic Data-Driven Predictive Wildfire Modeling and Visualization Environment

Daniel Crawl[1], Jessica Block[2], Kai Lin[1], Ilkay Altintas[1]

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https://doi.org/10.1016/j.procs.2017.05.174 Get rights and content

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Abstract

Wildfires are destructive fires over the wildland that can wipe out large areas of vegetation and infrastructure. Such fires are hard to control and manage as they can change directions almost instantly, driven by changing environmental conditions. Effective response to such events requires the ability to monitor and predict the behavior of the fire as fast as they change. The WIFIRE project builds an end-to-end cyberinfrastructure for real-time and data-driven simulation, prediction, and visualization of wildfire behavior. One goal of WIFIRE is to provide the tools to predict a more accurate rate of a spreading wildfire. To this end, WIFIRE has developed interfaces for ingesting and visualizing high-density sensor networks to improve fire and weather predictions, and has created a data model for wildfire resources including sensed and archived data, sensors, satellites, cameras, modeling tools, workflows, and social information including Twitter feeds for wildfire research and response. This paper presents WIFIRE's Firemap web platform to make these geospatial data and products accessible. Through a web browser, Firemap enables geospatial information visualization and a unified access to geospatial workflows using Kepler. Using GIS capabilities combined with scalable big data integration and processing, Firemap enables simple execution of the model with options for running ensembles by taking the information uncertainty into account. The results are easily viewable, sharable, repeatable, and can be animated as a time series.

ropenaq

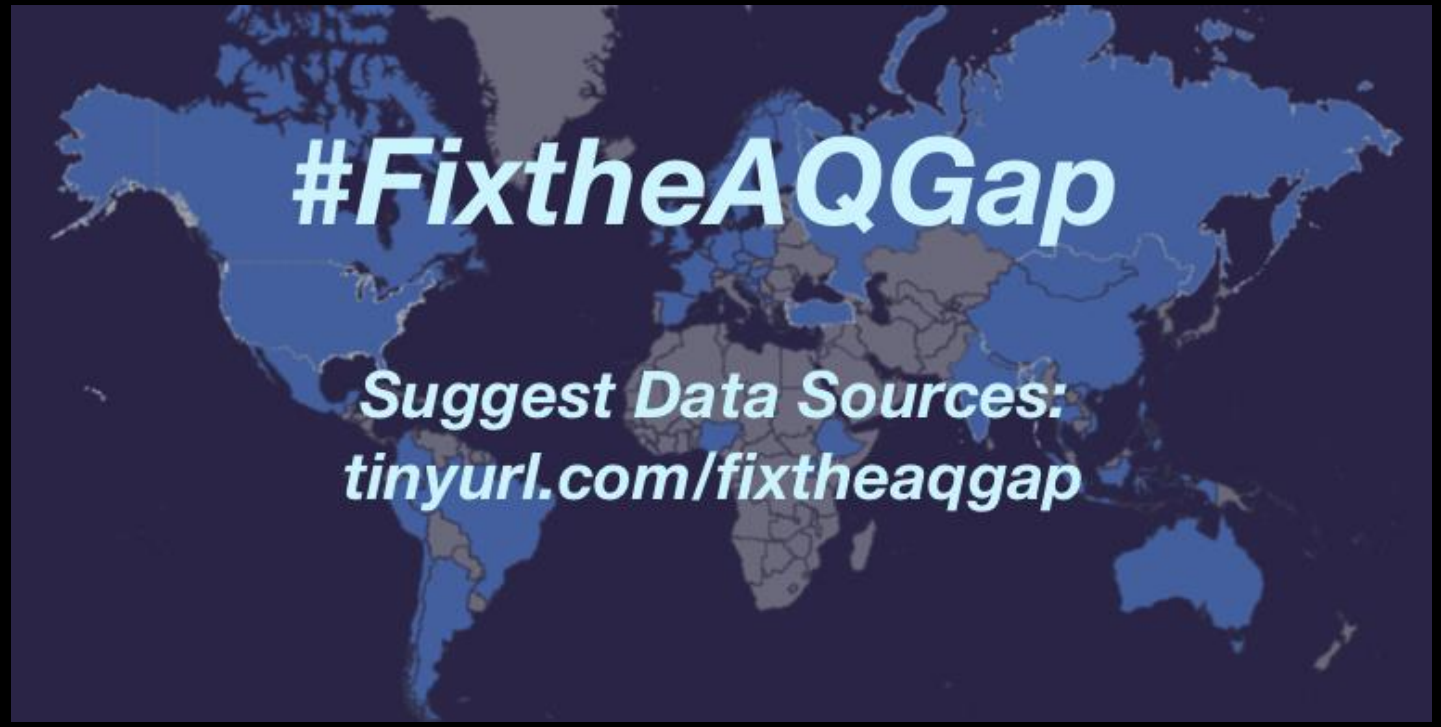
Maëlle Salmon of Barcelona, Spain created a package to make accessing the OpenAQ API easier in R. It can be used to easily make

Putting a magnifying glass on air pollution

An article in the UB Post by Oyungerel Munkhbat of Ulaanbaatar, Mongolia featured graphics generated by Maëlle Salmon via ropenaq, which accessed data from OpenAQ.

Learn More

Expanding Our Platform



WORLD RESOURCES INSTITUTE

development SEED

- More gov't data sources – working directly with gov'ts
- More meta data
- New data types
- More workshops
- Incentivizing open data

Collaboration Points

Our goal is to foster an ecosystem of diverse sectors and geographies using open air quality data and connecting with each other to fight air pollution better.

- Data, open-source work, workshops
- Connections with low-cost sensor work
- Connecting communities
- Collaborating on incentivizing open data projects

thankyou

Slides: tinyurl.com/SCAQMD17

- **You, for your attention! (What ways can we collaborate?)**
- **Our organizational partners and sponsors**

- **The entire OpenAQ Community!**

Contact us: openaq.org | christa@openaq.org | @open_aq