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OpenAQ: Harmonizing Billions of Air Quality Measurements into an Open and FAIR Database

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OpenAQ is the largest open-source, open-access repository of air quality data in the world, integrating and hosting over 50 billion measurements from air monitors and sensors at more than 59,000 ground-level locations across 153 countries. The OpenAQ platform supports data on a variety of pollutants in different temporal frequencies. The platform is a one-stop solution for accessing air quality data in a consistent and harmonized format, thereby facilitating findability, accessibility, interoperability and reusability. OpenAQ utilizes modern cloud computing architectures and open-source data tools to maintain a highly scalable data pipeline, which can be resource- and computationally intensive, thus requiring thoughtful and efficient data management and engineering practices. Being an open-source platform that is grounded in community, OpenAQ strives to be transparent, responsible, user-focused, sustainable and technologically-driven.

OpenAQ supports innovation and collaboration in the air quality space by:

- Ingesting and sharing data on an open, low-bandwidth platform to ensure data is broadly accessible
- Providing tools to help interpret the data and create visualizations for users with varied technical skills
- Providing a user guide and trainings on how to use the OpenAQ platform for community-level pilot purposes and beyond
- Catalyzing specific analyses through intentional outreach to a broad community of data stakeholders

OpenAQ has been widely used for research, informing nearly 300 scientific and data-oriented publications/proceedings. OpenAQ trainings and workshops around the world have resulted in community statements demanding increased coverage and frequency of air quality monitoring, the donation of air quality monitoring equipment to local communities, and adoption of APIs to make open-source city data available. As one example, our work with the Clean Air Catalyst supports pilots to clean the air in Jakarta (Indonesia), Indore (India) and Nairobi (Kenya). As another example, our Community Ambassador program trains emerging air quality leaders in low- and middle-income countries to utilize open data to spur community action to fight air pollution.

Our poster describes how OpenAQ ingests and harmonizes heterogeneous air quality data at scale and how we conduct outreach to increase impactful usage of the hosted data.