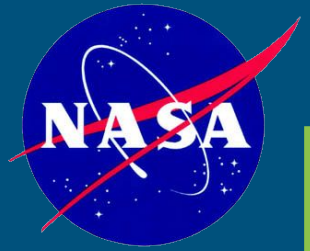


Predicting What We Breathe

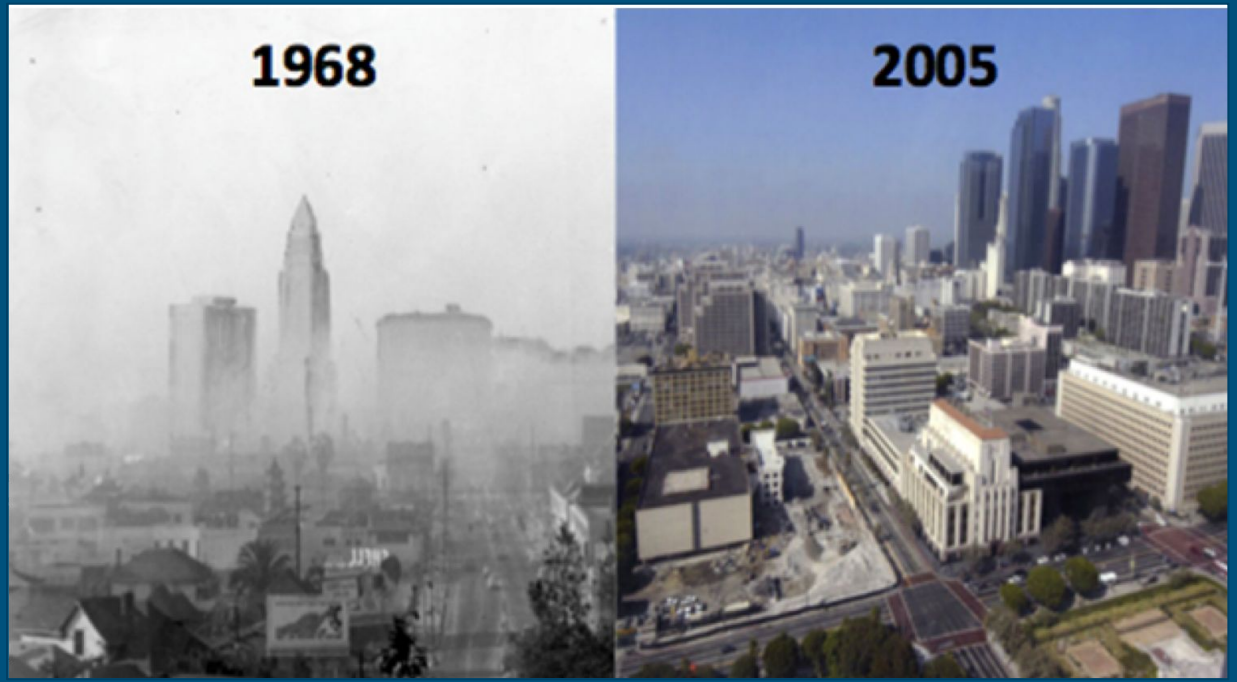
Using Machine Learning to Understand Urban Air Quality

Jeanne Holm, Dawn Comer, Irene Burga, Aaron Gross @ City of Los Angeles

Dr. Mohammad Pourhomayoun @ Cal State LA

airquality@lacity.org

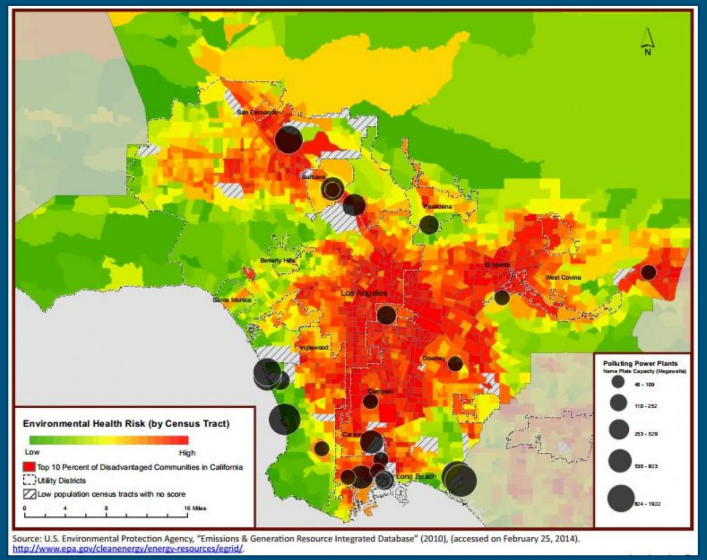
Increase our ability to measure, understand, and act to improve air quality in L.A.



- NASA competitively awarded grants to use new tech (machine learning) with NASA data to solve a large problem
- The City was awarded an Advanced Information Systems Technology grant for Predicting What We Breathe

Current State of Air Quality Data

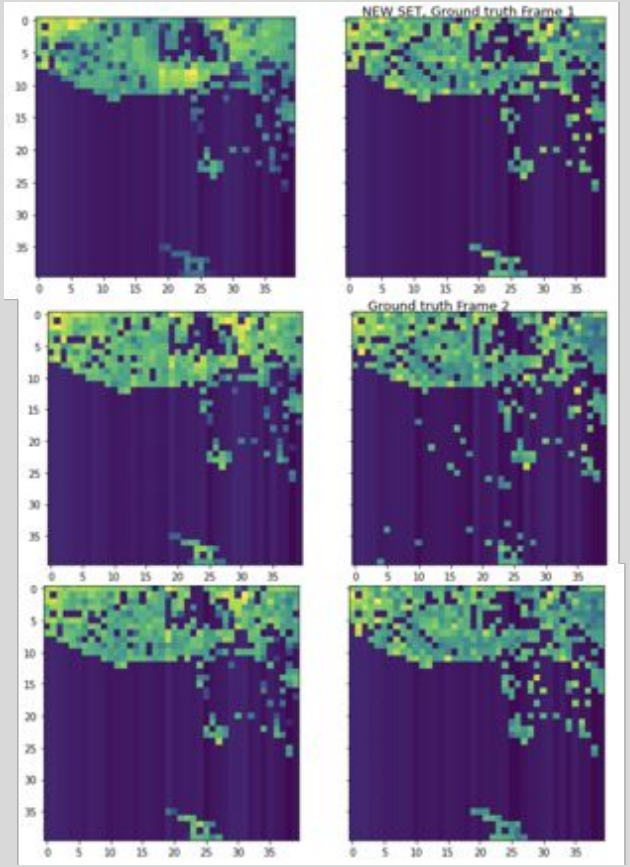
- Most maps today use either satellite data OR ground sensors, but not both
- These approaches lack
  - City-to-city collaboration on effective AQ control strategies
  - Accurate predictive capabilities
  - Urban scale information



Steps to Data-Driven Decisions

- Identify and map all the regional air quality sensors
- Help City departments organize and manage that data
- Create a map of all air quality data in L.A. and look for gaps
- Identify environmental justice priorities
- Identify locations to fill in the gaps and deploy new sensors
- Work with the L.A. Public Library to distribute citizen science small sensors in specific areas
- Identify similarly polluted air quality sister cities to understand effective solutions

Sample Prediction of NO_2 Based on Satellite Images and Meteorological Data



Frame 1 Prediction: 2nd day in the future prediction of Nitrogen Dioxide air pollution in Los Angeles County from previous 10 days of data

Frame 2 Prediction: 4th day in the future prediction of Nitrogen Dioxide air pollution in Los Angeles County from previous 10 days of data

Frame 3 Prediction: 6th day in the future prediction of Nitrogen Dioxide air pollution in Los Angeles County from previous 10 days of data

Benefits for NASA

Apply machine learning techniques to large, disparate datasets

- Identify and integrate local data (health, polluters, traffic, roads, ports) from smart city and internet of things sensors
- Integrate data standards with previous, current, and upcoming (MAIA) missions
- Federate satellite data and data from ground sensors and align resolution and periodicity
- Drive the use and application of NASA and space data for cities

Benefits for the City

Improve city planning, health outcomes, and enforcement
managing dynamic changes in the environment and ecosystem

- Create visualizations to improve understanding
- Identify and integrate local data (health, polluters, traffic, roads, ports) from smart city and internet of things sensors
- Identify gaps in coverage and deploy sensors to cover
- Correlate to green spaces and other mitigation efforts
- Share findings via smart city air quality intervention and toolkit (C40 cities, U.N. Sustainable Development Goal Network, Climate Mayors, etc.)

Partners

- Public
  - City of Los Angeles
  - NASA
  - South Coast Air Quality Management District
- Private
  - OpenAQ
  - SmartAirLA
  - SafeCast

- Academic
  - California State University, Los Angeles
  - Data Science Federation
- Organizations
  - Mayor Garcetti leads the C40 Cities
  - Climate Mayors