



# Journalist Training

Topic: Air Quality Forecasting

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# Introduction

- Air pollution can harm people's health and damage the environment.
- Fine Particulate Matter with diameter < 2.5 microns

## What is fine particulate matter or PM2.5?

Particles measuring less than 2.5 micrometers in diameter, can penetrate deep into our lungs

Where does it come from?	How does it affect our health?
 Fossil fuel use - energy generation, transportation	 Increased risk of illness and death from lung and heart diseases
 Industrial activities	
 Household solid fuel use	 Risk of newborns being born too early or too small
 Waste burning	

STATE OF GLOBAL AIR

[www.stateofglobalair.org](http://www.stateofglobalair.org)

# What is Air Quality Forecasting

- The application of science and technology to predict the composition of the air pollution in the atmosphere for a given location and time.
- An algorithm prediction of the pollutant concentrations can be translated into air quality index.
- An **air quality index (AQI)** is an indicator developed by government agencies to communicate to the public how polluted the air currently is or how polluted it is forecast to become
- Countries and cities are given forecasts by state and local government organizations and private companies as well.

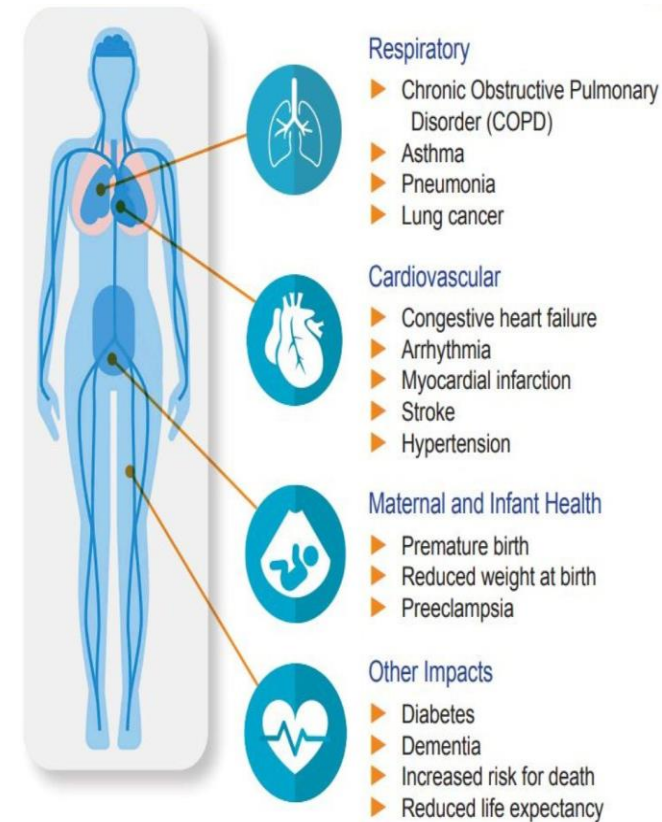


Air Quality Index (AQI) Values	Levels of Health Concern
0 to 50	Good
51-100	Moderate
101-150	Unhealthy for Sensitive Groups
151-200	Unhealthy
201-300	Very Unhealthy
301 to 500	Hazardous

Source: <https://airquality.climate.ncsu.edu/2014/08/12/an-introduction-to-air-quality-forecasting/>

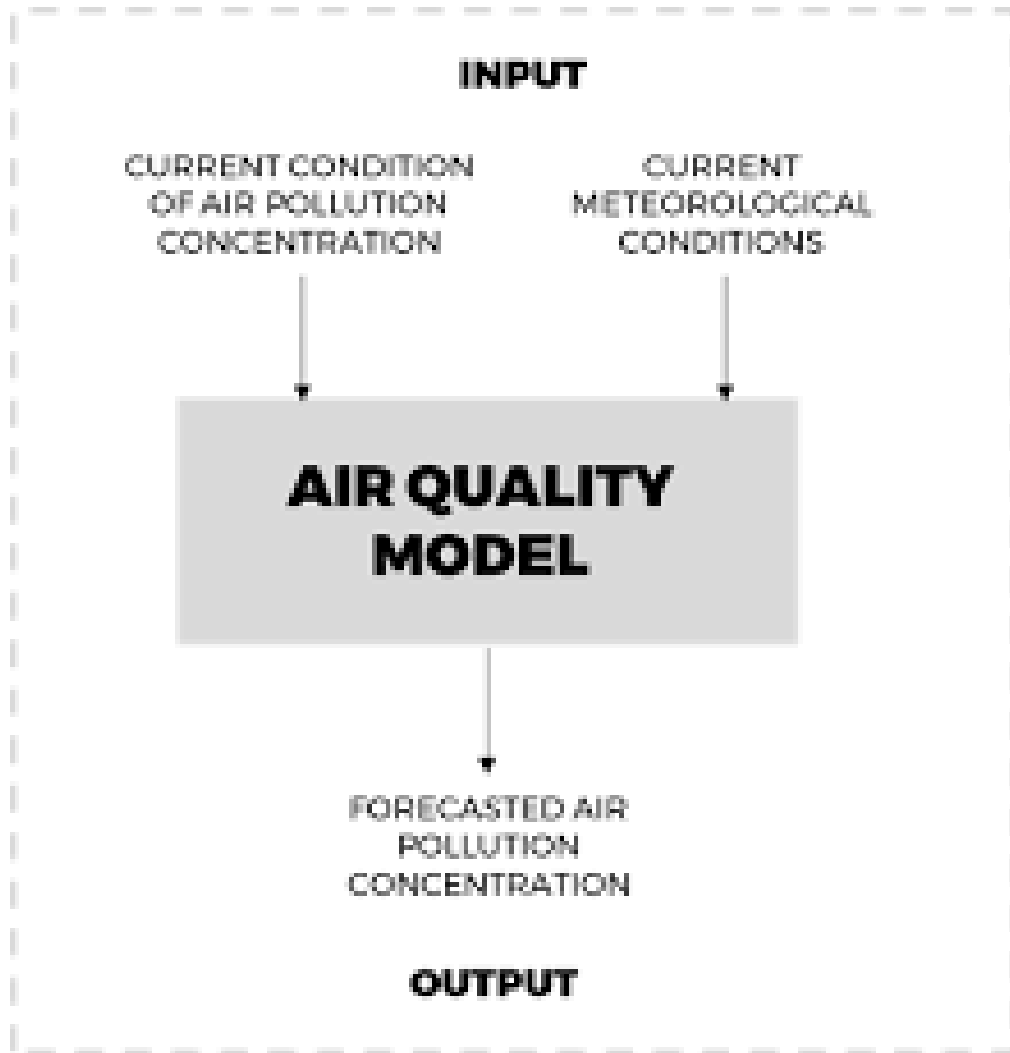
# Motivation

- Air pollution causes respiratory problems, lung diseases, and cardiovascular issues and aggravate existing health conditions.
- With the accurate method of forecasting air pollution, it becomes easier to manage and mitigate the risks of air pollution and ensure a safe level of pollutant concentration in the region.
- It also helps assess risks to the environment and the **climate** caused by poor air quality standards.
- Accurate forecasting can also lead to ease in planning day-to-day activities, avoiding locations with high alert areas, and implementing effective pollution control measures.



*Reducing and making people aware of these problems caused by air pollution becomes essential.*

# Techniques



- An input of current air quality, monitored by local stations and remote sensing.
- An input of the forecasted weather during the period of prediction, to predict any pollutant's movement.
- A model of pollutant emission. This can include traffic, industry, and pollen.
- An input of the local terrain.
- Daily or Hourly Forecast
- Most forecasts of air quality cover two to five days.

*Advanced approaches combine historical data with current in-situ data and satellite observations to provide insights, analysis, and forecasts from global to street-level air pollution*



**Advantages:** The **goal** of any technology is to help and improve the lives of people.

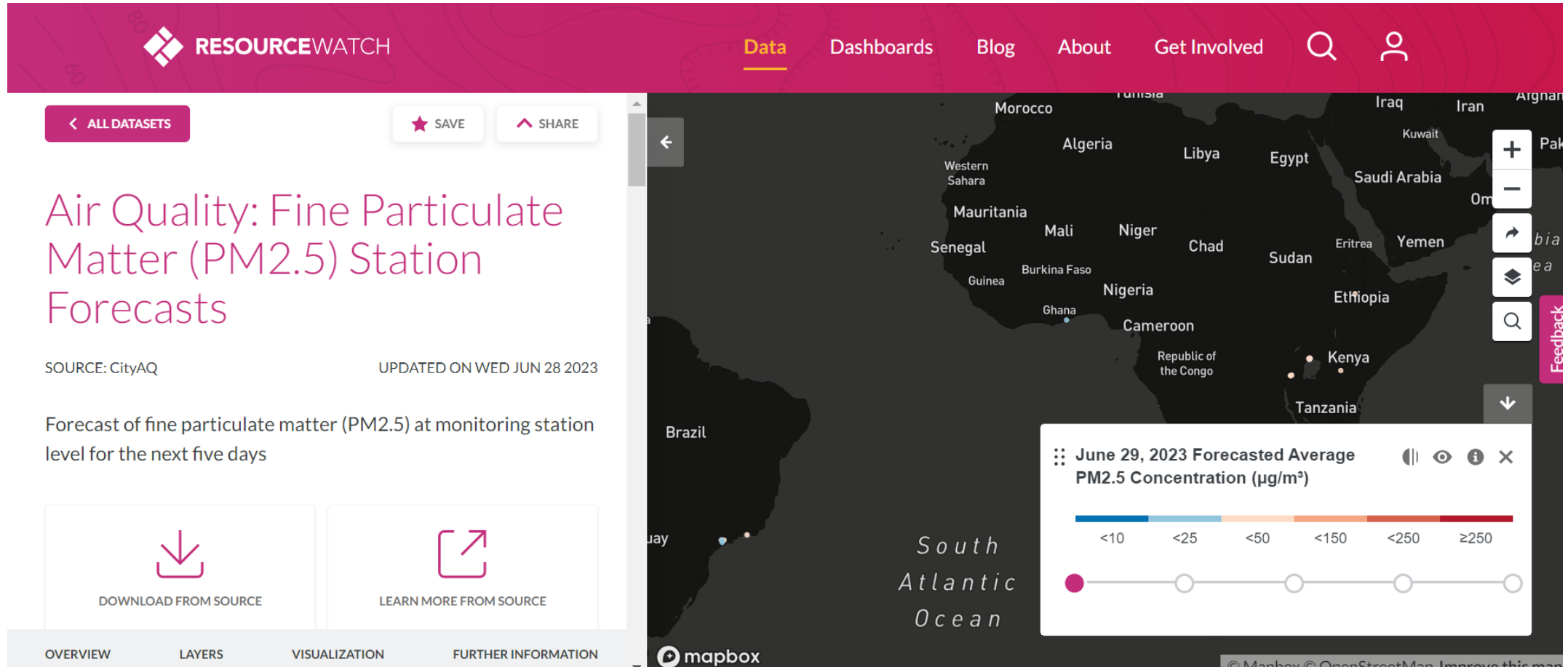
- **Health Alerts:** Many cities currently provide warnings to the public when air pollution levels exceed specified levels. The more reliable the forecast is the more effective it is.
- **Supplementing Existing Emission Control Programs:** The availability of reliable air pollution forecasts affords local environmental regulators the option of “on demand” or intermittent emission reductions on days with high episodes, thus avoiding the high cost of continuous emission control.
- **Operational planning:** Regional haze can impair and even endanger activities such as private and commercial aviation.
- **Emergency response:** The availability of reliable forecasts offers rerouting options for automobiles and air traffic to reduce the possibility of accidents, also provides early warning system for the vulnerable.



# Challenges

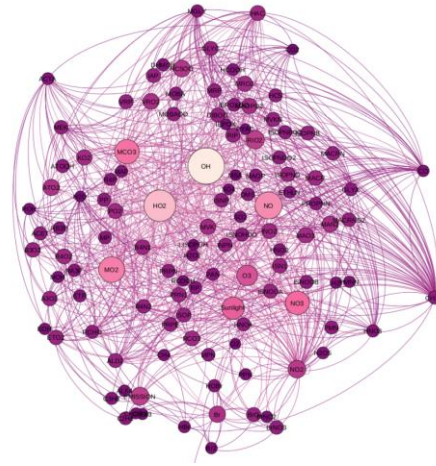
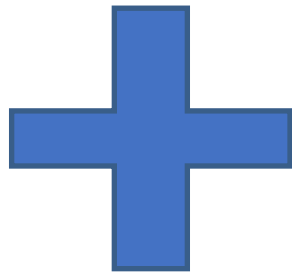
- Meteorological conditions such as [temperature inversion](#) can prevent surface air from rising, trapping pollutants near the surface, which makes accurate forecasts of such events crucial for air quality modelling.
- Urban air quality models require a very fine computational mesh, requiring the use of high-resolution mesoscale weather models.

# CanAIRY Alert

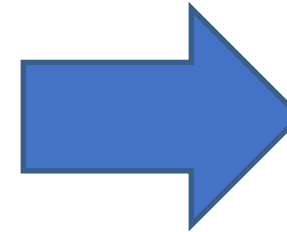




# NASA GMAO's Composition Forecast



GEOS - Chem



GEOS - CF

GEOS-CF is one of only a few global forecasting systems conducting gaseous and aerosol composition simulations in near real-time.

# The GEOS Composition Forecast

**Surface**

O3	NO2
CO	SO2
<b>PM2.5</b>	

**REGIONS**

Africa

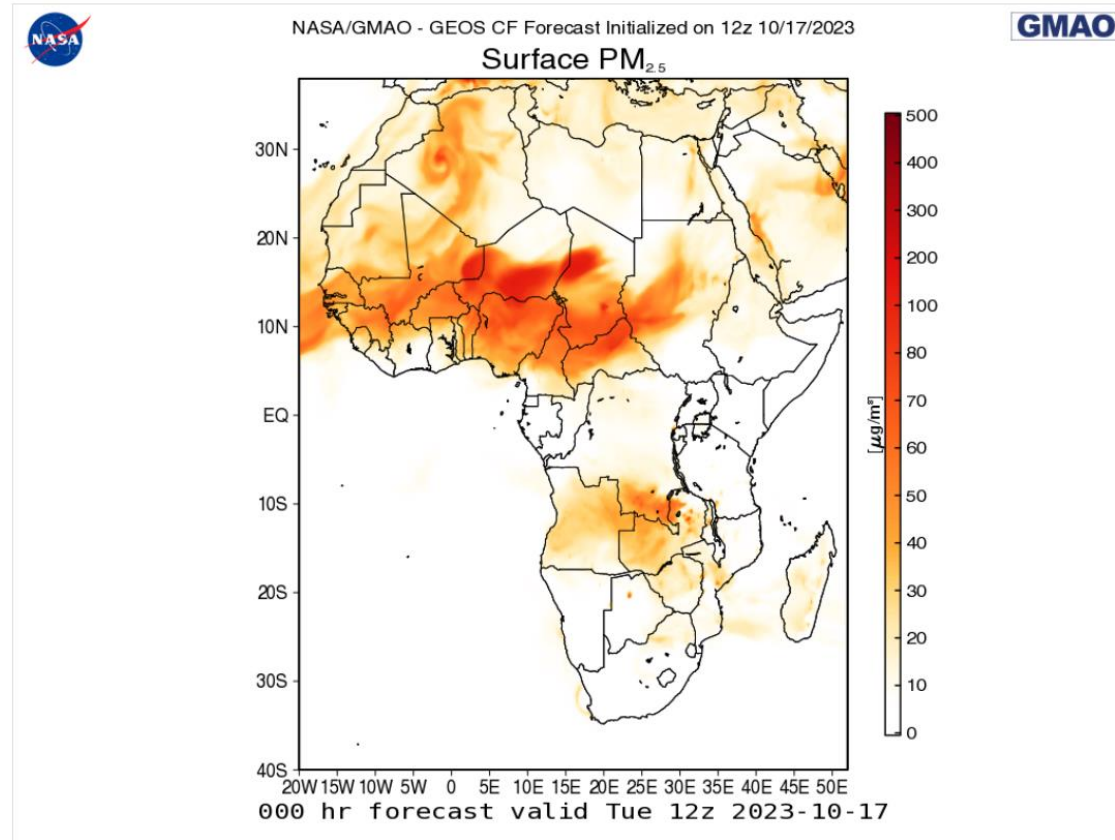
**FORECAST INITIAL TIME**

17Oct2023 12z

**FORECAST LEAD HOUR**

000h 17Oct2023 12z

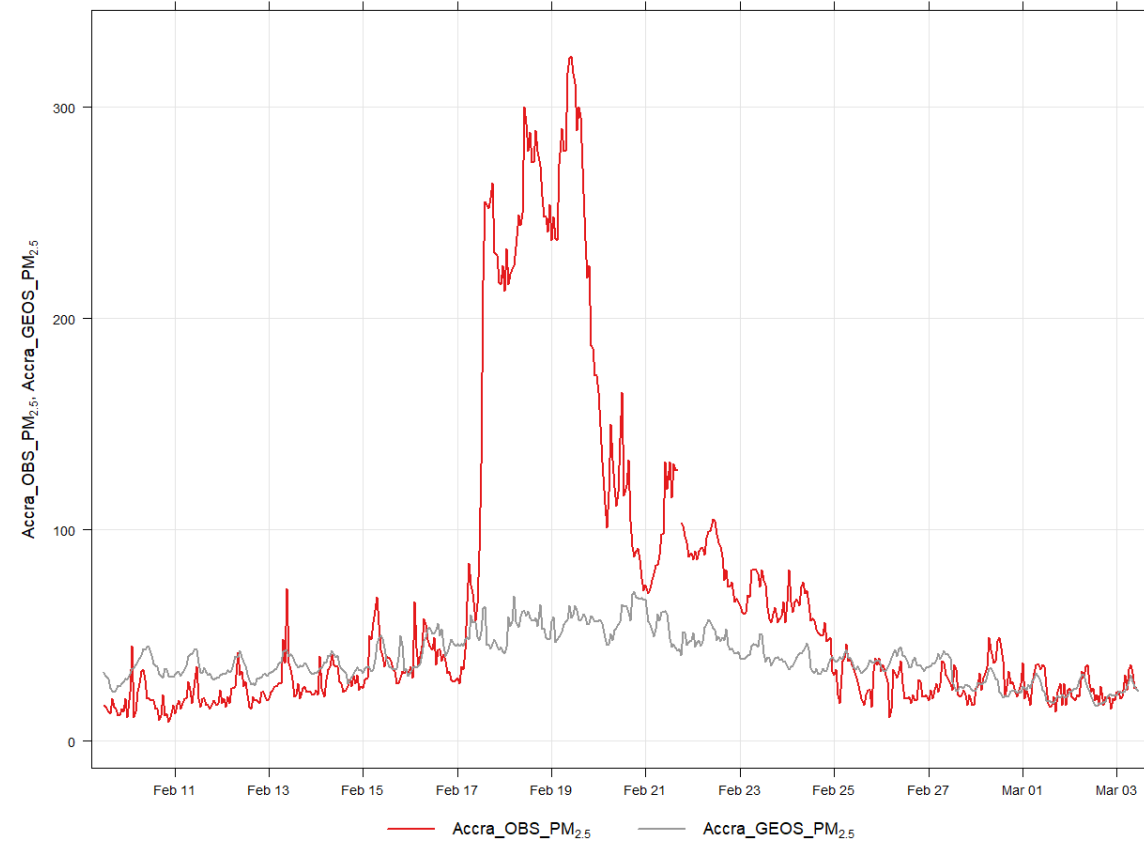
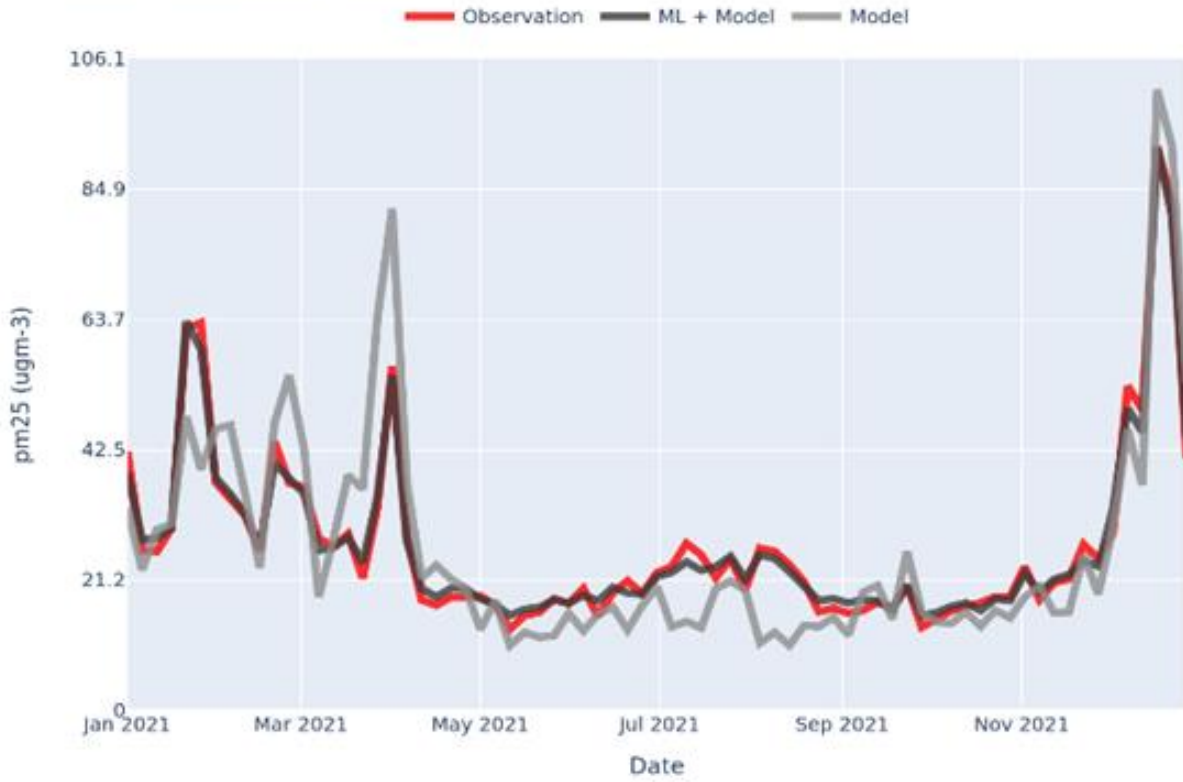
## Composition Forecast Maps



<https://fluid.nccs.nasa.gov/cf/>

# Accra

Ghana\_Accra (5.55, -0.2)



Accra



## Schools Project in Kumasi



# References

- <https://oizom.com/how-can-air-quality-forecasting-help-reduce-pollution-exposure/>
- [www.stateofglobalair.org](http://www.stateofglobalair.org)
- <https://fluid.nccs.nasa.gov/cf/>

**THANK YOU**