Project: **1257**

Project title: **Daily air quality forecasts for São Paulo**

Principal investigator: **Adrien Deroubaix**

Allocation period: **2024-07-01 to 2025-6-31**

The resources allocated for the project have been employed to forecast the air quality in São Paulo with a novel approach to increase the accuracy of the forecasts. **This approach is presented in an article submitted to Earth's Future (AGU publications)**, for which a pre-print is available (10.22541/essoar.171352084.46269313/v1). The "Plain Language Summary" of the article is:

Forecasting urban air quality is important for protecting public health, but current model forecasts are often limited by an inaccurate prescription of pollutant emissions from human activities.

We developed a new approach that improves air quality forecasts by adjusting emission prescription based on observed concentrations in urban agglomerations for key pollutants such as nitrogen oxides, sulfur dioxide, carbon monoxide, particulate matter, and volatile organic compounds.

Applying this new approach to the São Paulo metropolitan area, Brazil, we compared forecasted and observed pollutant concentrations (from 6 February to 17 April 2023). Using adjusted emission significantly improved air quality forecasts for São Paulo, especially for ozone levels after adjusting estimates of volatile organic compound emissions. However, the forecast of particulate matter concentrations remained challenging due to their links with gaseous pollutants.

Our study demonstrates the potential of using observed concentrations in urban agglomerations to improve air quality forecasts. Extending this approach to other urban agglomerations can help refine emission estimates and improve regional air quality forecasts, enabling better decision making for health protection.

These results have also been presented during the KLMAPOLIS symposium in Natal in Brazil (https://www.klimapolis.net/klimapolis-symposium-natal-2023-agenda-en) with the title ***Air quality Prediction System for the Metropolitan Region of São Paulo***, and will be in the CMAS air quality conference (https://airpollutionconference.com/).

The report is short because the request for resources is only for finalizing the article. **The simulations of air quality forecasts used for the article may need to be run again depending on the review process.**