

# My Pathway to Researching Dust Impacts on Climate and Health

Candidate, Alejandra Montejo  
2025

# My Interest in Air Quality and Environmental Challenges

- Bogotá, Colombia  
**MSc:** Environmental Engineering (2020)



- Mexico city, México  
**BSc:** Environmental Engineering (2016)



- Santiago, Chile  
**Academic exchange in Forestry Engineering** (2014)



These three Latin American cities have poor air quality.

# MSc in Environmental Engineering (2018- 2020)

## 1 Teaching and Research Assistant

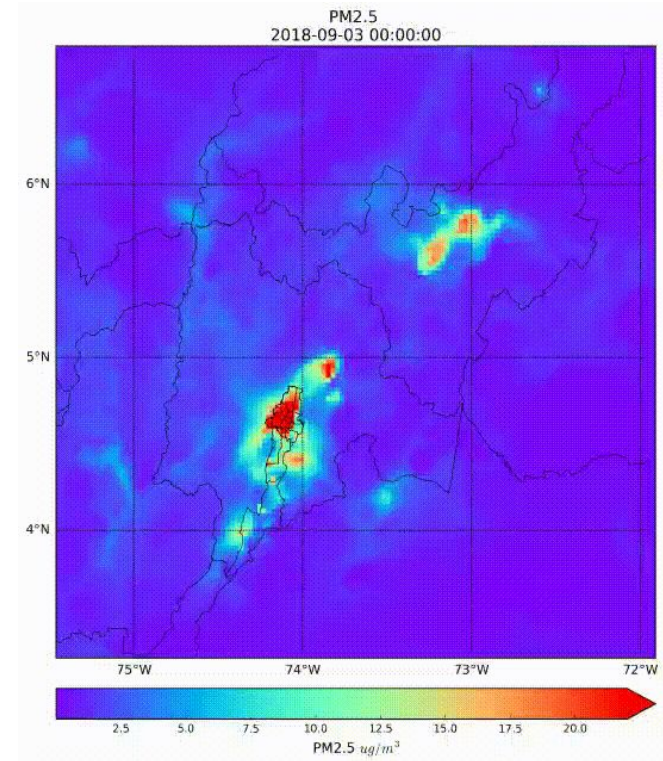
- Introduction to Environmental Engineering
- Thermodynamic



2 **Thesis:** Attribution of early deaths associated with atmospheric emissions of different economic sectors in Colombia in the year 2018

- Used WRF-Chem to evaluate sectoral contributions to air pollution in Bogotá.

**Main result:** Land transport is responsible for 329 premature deaths.



## 3 Research project: Assessing Multiple Inequalities and Air Pollution Abatement Policies

- Evaluated air pollution reduction policies using WRF-Chem.

**Main results:** Paving roads is the most effective measure to reduce air pollution.





# Toward Cleaner Transport Alternatives: Reduction in Exposure to Air Pollutants in a Mass Public Transport (2021)

**Goal:** Evaluate commuter exposure changes after fleet renewal in Bogotá's transit system.

**Main results:** PM<sub>2.5</sub> exposure reduced by 48% initially, reaching 77% after full fleet upgrade.

Environmental Science & Technology > Vol 56/Issue 11 > Article

99  
Cite Share Jump to Collapse

ANTHROPOGENIC IMPACTS ON THE ATMOSPHERE | March 25, 2022

## Toward Cleaner Transport Alternatives: Reduction in Exposure to Air Pollutants in a Mass Public Transport

Ricardo Morales Betancourt\*, Boris Galvis, Daniela Méndez-Molano, Juan Manuel Rincón-Riveros, Yader Contreras, Thalia Alejandra Montoya, Diego Roberto Rojas-Neira, and Oscar Casas



Access Through Your Institution

Other Access Options

Supporting Information (1)

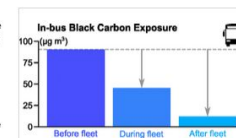
### Abstract

Commuters are often exposed to higher concentrations of air pollutants due to its proximity to mobile sources. Despite recent trends in urban transport toward zero- and low-tailpipe emission alternatives, the assessments of the impact of these transformations on commuter exposure are limited by the low frequency of such studies. In this work, we use a unique data set of personal exposure concentration measurements collected over the span of 5 years to analyze changes due to the introduction of a new fleet for Bogotá's Bus Rapid Transit System. In that system, over a thousand Euro-II and -III diesel-powered buses were replaced with Euro-VI compressed natural gas and filter-equipped Euro-V diesel buses. We measured personal exposure concentrations of equivalent black carbon (eBC), fine particulate (PM<sub>2.5</sub>), and ultra fine particles (UFP) during and after the retirement of old buses and the introduction of new ones. Observations collected prior to the fleet renewal were used as baseline and later compared to data collected over two follow-up campaigns in 2019 and 2020. Significant reductions in the concentration of PM<sub>2.5</sub> and eBC were observed during the 2019 campaign, with a 48% decrease for mean in-bus eBC (89.9 to 46.4  $\mu\text{g m}^{-3}$ ) and PM<sub>2.5</sub> (180.7 to 95.4  $\mu\text{g m}^{-3}$ ) concentrations. Further reductions were observed during the 2020 follow-up, when the fleet renovation was completed, with mean in-bus eBC decreasing to 17.7  $\mu\text{g m}^{-3}$  and PM<sub>2.5</sub> to 42.3  $\mu\text{g m}^{-3}$ . These observations imply nearly a 5-fold reduction in eBC exposure and a 4-fold decrease in PM<sub>2.5</sub>. There was a much smaller reduction of in-bus UFP concentration between 2019 and 2020, indicating a persistent presence of high particle number concentrations in the near-road environment despite the fleet renovation process. In-bus UFP concentrations ranged between 65 000 and 104 500  $\text{cm}^{-3}$  during the follow-up campaigns. The results in this work illustrate the immediate benefits of reducing personal exposure through the adoption of vehicles with more stringent emission standards.

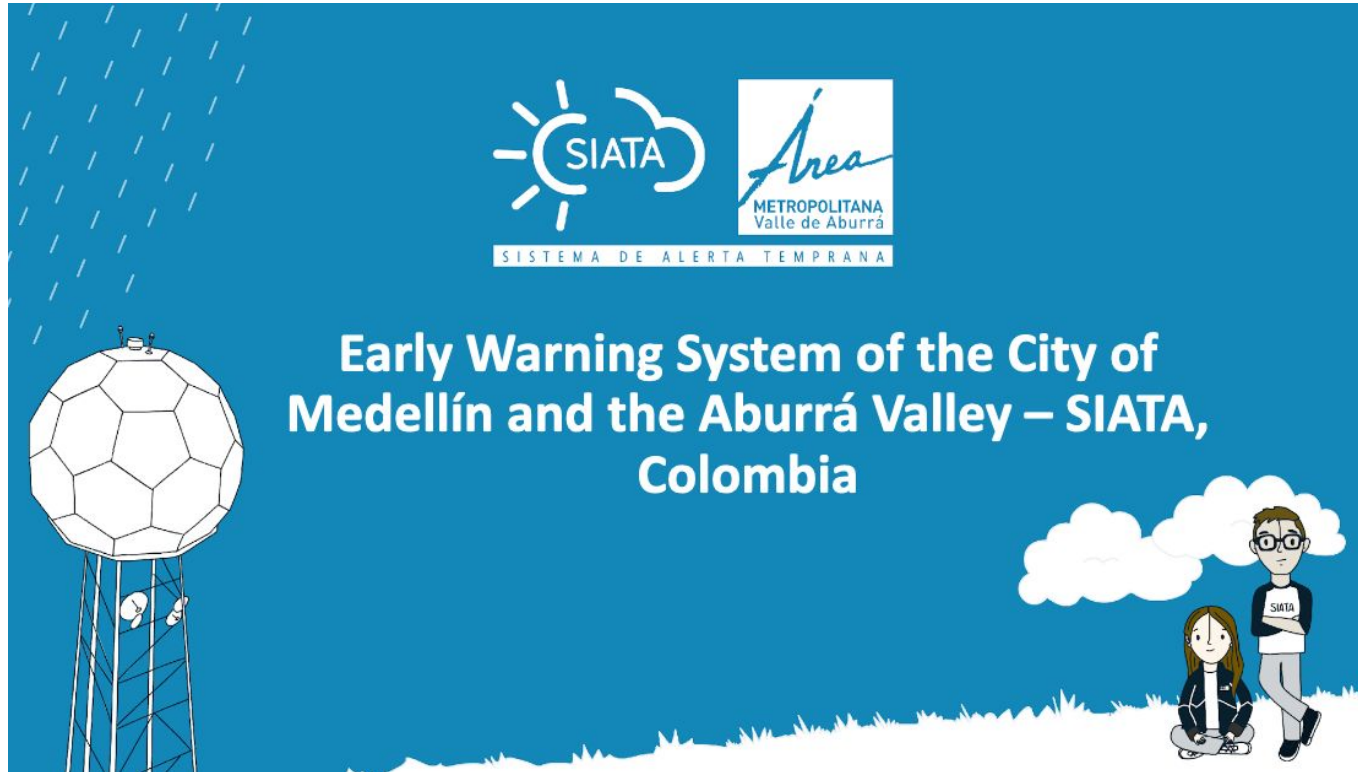
Copyright © 2022 American Chemical Society

### Keywords

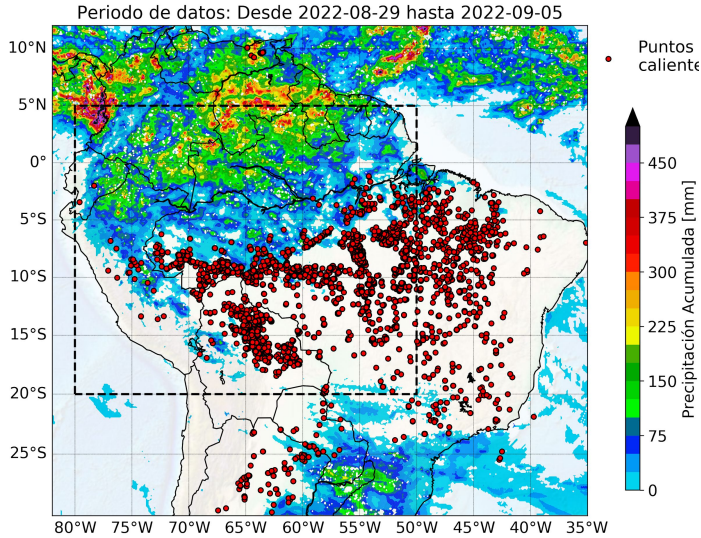
Air Pollution Reduction Traffic-Related Air Pollutants Commuter Exposure Ultrafine Particles UFP Black Carbon PM<sub>2.5</sub> Exposure



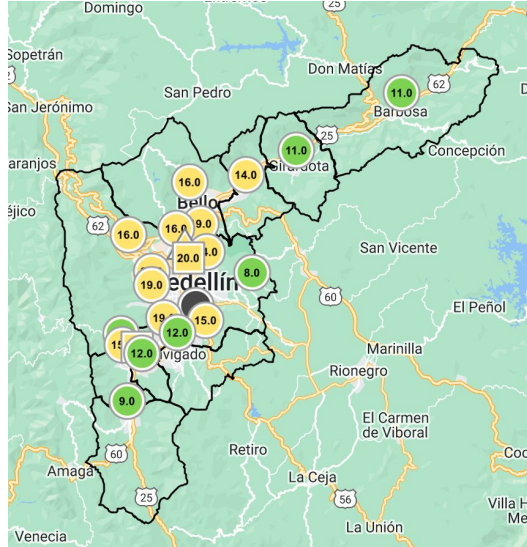
# Work Experience with SIATA (2021- Present)



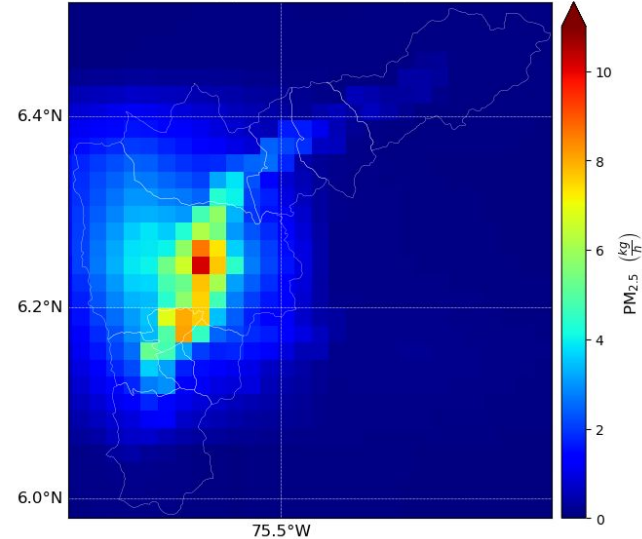
# Experience in data analysis and modelling



Tracking  
satellite data



Monitoring



WRF-CHEM



# Experience in Air Quality Research and Public Engagement

## Public Sector

### Secretary of Culture (2021-2022)

- Designed a behavioural change strategy to reduce exposure risk indoors.



### Secretary of Environment (2022- Present)

- Leader of air quality governance.

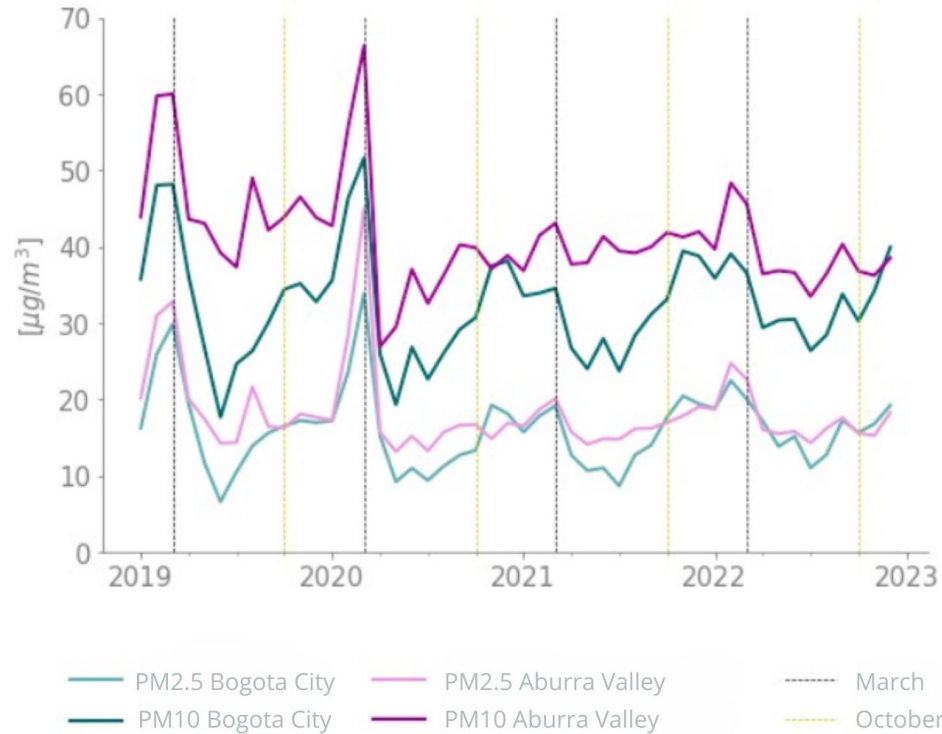
## Research Project

### Hill Consulting (2023)

- Assessed LEZ in Bogotá (ZUMA)
- Organized Colombian air quality conference (CASAP)

### Global Methane Hub (2024)

- Measurement and Data Analysis to Calculate Methane Emission Rates from Cooking Stoves



**I am motivated to continue researching the links between dust, air quality, climate and health**

# Thank you!

