Monitoring campaigns and multi-scale model coupling for high-resolution NO_2 assessment in the MABA

Summary

Nitrogen dioxide (NO_2) is a critical pollutant in urban areas like the Metropolitan Area of Buenos Aires (MABA), where observations frequently exceed WHO limits. While the roles of emissions, wind transport, atmospheric dispersion, and chemistry are generally understood individually, their relative contributions to high NO_2 concentrations near roads strongly depend on local conditions. Moreover, recent studies conducted in other large urban areas show marked concentration gradients and consequent inequities in exposure when increasing the spatial resolution of simulations around hotspots. Neither of these crucial aspects of air quality has been explored in the MABA, the third-largest megacity in Latin America. This project has two main objectives: (1) to identify the main drivers of high NO_2 concentrations at city monitoring stations and determine the most suitable modeling formulations, and (2) to collect and analyze NO_2 data from past monitoring campaigns across the MABA, and conduct a pilot campaign using passive tubes to measure horizontal gradients near a hotspot. The results will inform the design of future, more extensive monitoring campaigns and guide discussions on strategies for coupling multi-scale air quality models, laying the groundwork for a larger follow-up project. The long-term goal is to develop an integrated model that captures NO_2 spatio-temporal variations with very high spatial resolution around hotspots across the MABA, enhancing our understanding of intra-urban variability and exposure risks.