

Structural Analysis of The Planetary Boundary Layer (PBL) in The Sabana Centro Province in Cundinamarca, Colombia: An Approach To The Air Quality From A Multi-Scale Meteorological Context

Jenny Carolina Fraile Beltran

National University of Colombia, Colombia

Author list (excluding presenting author)

Abstract

Air pollution in Colombia represents a multidimensional problem that is detrimental to air quality and public health, in addition to violating the right to a healthy environment. In the country, different efforts are identified and materialized in a display of standards, policies, and management plans for air quality. However, these are insufficient due to resource limitations, the disarticulation of the State-company-academia, the poor management of information, and even, the lack of a cultural framework around atmospheric sciences and its relevance in daily life. Air quality in Colombia is a decentralized issue whose responsibility corresponds on the regional environmental authorities and is managed through the Air Quality Surveillance Systems (AQSS). To date, the coverage and scope of AQSS have progressively increased, but there are still countless difficulties and deficiencies that hinder efficient air quality management. In this research, the province of Sabana Centro in Cundinamarca is the case study considering it is a region with significant growth and development in recent years, where the AQSS is still incipient and not very functional (AQSS CAR-Cundinamarca). Given the limitations that arise from monitoring and surveillance of air quality, in the availability, accessibility, and quality of information, and the scarcity or outdated emissions inventories, this research represents a methodological approach to address the air quality from a multiscale meteorological context. The main objective is to analyze the structure of the daytime and nighttime Planetary Boundary Layer (PBL) in the study region during the high pollution episodes in January 2024 caused by wildfires in the Orinoquía (PM_{2.5}). To this end, atmospheric circulation patterns and thermal inversions are characterized, the meteorological fields of the region are simulated with WRF/GFS, vertical cross sections are made for the structural analysis of the PBL and the implications of the results in the air quality in the province.

Early Career Scientist

YES, I am an early career scientist.

IGAC Regional Working Groups

Americas Working Group