Advancing Understanding of Atmospheric Chemistry in Argentina: Insights from Satellite Remote Sensing

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Abstract

Satellite remote sensing plays a pivotal role in advancing our comprehension of atmospheric chemistry and its repercussions on climate, air quality, and environmental well-being. Long-term studies necessitate a thorough examination of various instruments and data sources, such as the Ozone Monitoring Instrument (OMI), Atmospheric Infrared Sounder (AIRS), and Modern-Era Retrospective Analysis for Research and Applications, Version 2 (MERRA-2), provided by the National Aeronautics and Space Administration (NASA). This study aims to assess the capabilities and constraints of these resources, employing time-averaged maps and focusing on Argentina as a case study. With limited existing studies on atmospheric pollutants across its expansive terrain, Argentina serves as an ideal locale for a comprehensive investigation spanning a 20-year timeframe. Analysis targets prominent chemically reactive pollutants including O_3, NO_2, SO_2, and Aerosol Optical Depths, pivotal for understanding chemical atmospheric dynamics. Our findings underscore the importance of satellite-derived data, which offer temporal coverage and resolution conducive to long-term pollutant studies, overcoming limitations associated with ground-based measurements, particularly in vast countries like Argentina. However, to effectively assess smaller study areas, a refinement in spatial resolution, ranging from 0.25° to 1° depending on the source, is imperative. Nevertheless, these satellite sources provide valuable insights into pollutant contributions from densely populated urban centres in Argentina. Furthermore, it is crucial to recognize the profound impact of atmospheric pollutants on public health and the environment. Understanding long-term trends and spatial distributions is essential for devising effective mitigation strategies to safeguard human health and ecological integrity. Hence, our study underscores the significance of employing satellite remote sensing as a methodological cornerstone in analysing the spatiotemporal evolution of chemically reactive pollutants in the atmosphere.

Early Career Scientist

YES, I am an early career scientist.

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