POLLUTANT LEVELS IN SÃO PAULO'S METROPOLITAN REGION AND THE SARS-COV-2 PANDEMIC: INTEGRATING REMOTE SENSING AND SURFACE DATA WITH ARTIFICIAL NEURAL NETWORKS APPROACHES

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Abstract

In this work, we demonstrate how the variation in vehicular traffic due to the SARS-CoV-2 pandemic and the resumption of activities affected the concentrations of some pollutants (CO, NO2, PM2.5, andvPM10) in the Metropolitan Region of São Paulo. For this purpose, we estimate the convective boundary layer (CBL) height from lidar measurements and radiosonde retrievals and calculate the ventilation coefficient, an essential parameter to evaluate the air pollutants' dispersion level. In addition, it was observed the variation of some meteorological variables (air surface temperature, humidity, and rainfall rate) to identify the occurrence of conditions that can favor pollutant dispersion. Finally, based on the time series of the pollutants previously mentioned, we created an Artificial Neural Network (ANN) to identify what will be the concentration of thesepollutants in normal conditions (no pandemic period). The results demonstrated that during the pandemic period, there was no significant change in the meteorological variables studied. However, there was a significant reduction in the concentration of pollutants whose main source is vehicular traffic (CO and NO2) and a significant increase with the resumption of activities, with the pre-pandemic level having already been reached within a few weeks. The findings here shown indicate that integrating remote sensing tools, surface data, and artificial intelligence techniques significantly enhances understanding of pollutant dynamics. Properly trained ANN algorithms offer the potential for applying this methodology in other regions.

Keywords: Remote Sensing; COVID-19; Artificial Neural Network.

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