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Multiyear observations of NO2 and SO2 vertical column measurements by PANDORA and TROPOMI in Dakar, Senegal

Nitrogen dioxide (NO2) and sulfur dioxide (SO2) are primary air pollutants and ozone and secondary aerosol precursors that are emitted by vehicles, ships, powerplants, industrial processes, and other combustion sources. There is a general lack of ground-based observational data in West African cities, which has limited our understanding of the sources, relationships with human activities, and meteorological controls over NO2 and SO2. Because of this, we installed a Pandora NO2 and SO2 spectrometer on the rooftop of the Simeon Fongang Atmosphere and Ocean Physics Laboratory (LPAOSF), located on the western corniche of Dakar, Senegal in November 2019. In this study, we analyzed two years of Pandora NO2 and SO2 total columns measurements in Dakar, Senegal and compare these data with those of TROPOMI. The spatial distribution of the total column of SO2 and NO2 measured by TROPOMI showed a strong signal over the industrial area, the port and the urban area near to the Pandora site. We found diurnal, day-of-week, and seasonal patterns, which reflect anthropogenic emissions patterns, especially from local traffic and industries. We noted also that NO2 levels generally decreased during the COVID-19 shutdown period. The same thing is observed with the SO2 total column. Results showed a good agreement between the Pandora and TROPOMI with an underestimation of Pandora by a factor of two.

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