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Long-Range Transport of Biomass Burning Aerosols over South America: A Case Study in the 2019 Amazon Rainforest Wildfires Season

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Abstract : Biomass-burning episodes are quite common in the central Amazon rainforest and represent a dominant source of aerosols during the dry season, between August and October. The increase in the occurrence of fires in 2019 in the world's largest biomes has captured the attention of the international community. In particular, a rare and extreme smoke-related event occurred in the afternoon of Monday, August 19, 2019, in the most populous city in the Western Hemisphere, the São Paulo Metropolitan Area (SPMA), located in southeastern Brazil. The sky over the SPMA suddenly blackened, with the day turning into night, as reported by several news media around the world. In order to clarify whether or not the smoke that plunged the SPMA into sudden darkness was related to wildfires in the Amazon rainforest region, a set of 48-hour simulations over South America were performed using the Weather Research and Forecasting with Chemistry (WRF-Chem) model at 20 km horizontal resolution, on a daily basis, during the period from August 16 to August 19, 2019. The model results were satisfactorily compared against satellite-based data products and in situ measurements collected from air quality monitoring sites. Although a very strong smoke transport coming from the Amazon rainforest was observed in the middle of the afternoon on August 19, its impact on air quality over the SPMA took place in upper levels far above the surface, where, conversely, low air pollutant concentrations were observed.

Keywords : Amazon rainforest, biomass burning aerosols, São Paulo metropolitan area, WRF-Chem model
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