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## Understanding the role of forest fires in urban pollution in São Paulo, Brazil

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The air quality in the Metropolitan Area of São Paulo (MASP) is influenced by local sources of pollution, mainly from vehicles and industries, but there is a concern about the role of remote sources in the concentration of particulate matter, such as biomass burning plumes, which occur mainly in the interior regions of Brazil. During the dry period (mainly between July and October), the central region of Brazil suffers from biomass burning, which releases large quantities of gases and particles into the atmosphere and not only affects nearby cities, but also regions hundreds of kilometers away, as is the case of the city of São Paulo. This study aimed to evaluate the concentration of  $PM_{10}$ ,  $PM_{2.5}$  and Aerosol Optical Depth (AOD) between 2005 and 2022, identifying seasonal variations, spatial distribution, frequency, meteorological influences, and the main sources of the aerosol, including understanding and quantifying the impact of burning events on air quality in the MASP. The surface pollutant data, meteorological data, and AOD data were provided, respectively, by: São Paulo Environmental Company (CETESB; <https://cetesb.sp.gov.br/ar/qualar/>), Institute of Astronomy, Geophysics and Atmospheric Sciences (IAG/USP; <http://www.estacao.iag.usp.br/>) and Aerosol Robotic Network (AERONET; <https://aeronet.gsfc.nasa.gov/>). The results indicate a downward trend for aerosol, since several public policies were implemented in the period, but the values are still far above the standards recommended by the World Health Organization (WHO), especially in the winter months (June-September), due to meteorological conditions. Burning events that affect the MASP (more frequent in September) contribute to the increase of particle concentrations at the surface, as well as to the increase of AOD, related to the frequency of northwest wind direction in these events and also to the number of fire spots in the country.