Brazilian wildfire pollution worsens air quality in distant cities

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Wildfires in south eastern Brazil produce airborne pollution that worsens air quality in major cities such as Sao Paulo—canceling out efforts to improve the urban environment and posing health risks to citizens, according to a new study.

The planet is frequently affected by smoke from fires caused by humans

and natural processes. Australia, California and other regions are prone to seasonal wildfires and smoke from wildfires and agricultural burns worsening air quality in places up to 2,000 km away.

Most wildfires in Brazil occur in the dry season between July and September in the areas of Amazon and Cerrado—mostly agriculture-related fires—and the Pampas. Depending on the weather, long-range transport of smoke affects the air quality of small and large cities downwind of the fire spots, including the 'megacity' of Sao Paulo.

Burning biomass produces increased quantities of low-lying ozone due, in part, to the South Atlantic subtropical high pressure system. Transported considerable distances from the fire, this pollution further contribute to poor air quality and smog in cities such as Sao Paulo.

Researchers from the University of Birmingham, the Federal University of Technology, Londrina, Brazil, and the University of Stockholm published their findings in the *Journal of Environmental Management*.

Professor Roy Harrison, from the University of Birmingham, commented: "The state of Sao Paulo has led with progressive measures to curb air pollution, such as controlling sulfur dioxide from industrial sources and enforcing standards for cleaner vehicles and fuels.

"However, present results indicate that policies targeting the reduction of biomass burning are of utmost importance to improve urban air quality, particularly in densely populated areas where high pollutant concentrations are frequently observed."

Besides affecting air quality and increasing the risk of death from respiratory causes, ozone is a short-lived climate forcer—an atmospheric compound with a warming effect but with a shorter lifetime than carbon dioxide. Reducing ozone levels has two main benefits: reducing impact

on air quality and climate.

Atmospheric emission data suggests that emissions from biomass burning make up a substantial part of the precursors for O_3 formation.

Dr. Admir Créso Targino, from the Federal University of Technology, commented: "We need enhanced governance at regional, national and international levels to combat biomass burning practices in Brazil and its neighboring countries.

Not only would the population health benefit from such a measure, but also the regional climate, as ozone and particulate matter generated by the fires are short-lived climate forcers. Such an approach would be well-aligned with the Paris Agreement that aims to limit global warming to below 2OC compared to the pre-industrial period—a critical measure in the fight against climate change."

Researchers combined in situ ozone data, measured in the states of Sao Paulo and Parana from 2014 to 2017, with information about a range of co-pollutants such as NO_x, PM2.5 and PM10 to identify sources, transport and geographical patterns in the air pollution data.

Ozone concentrations peaked in September and October—linked to biomass burning and enhanced photochemistry. Long-range transport of smoke contributed to between 23 and 41 percent of the total ozone during the pollution events.

More information: Admir Creso Targino, et al. Surface ozone climatology of South Eastern Brazil and the impact of biomass burning events, *Atmospheric Research*, 2020.

Provided by University of Birmingham