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# AE13A-05 - The role of the COVID-19 lockdown on lightning activity in the Po Valley



Monday, 12 December 2022



18:40 - 18:50



McCormick Place - S404ab (South, Level 4)

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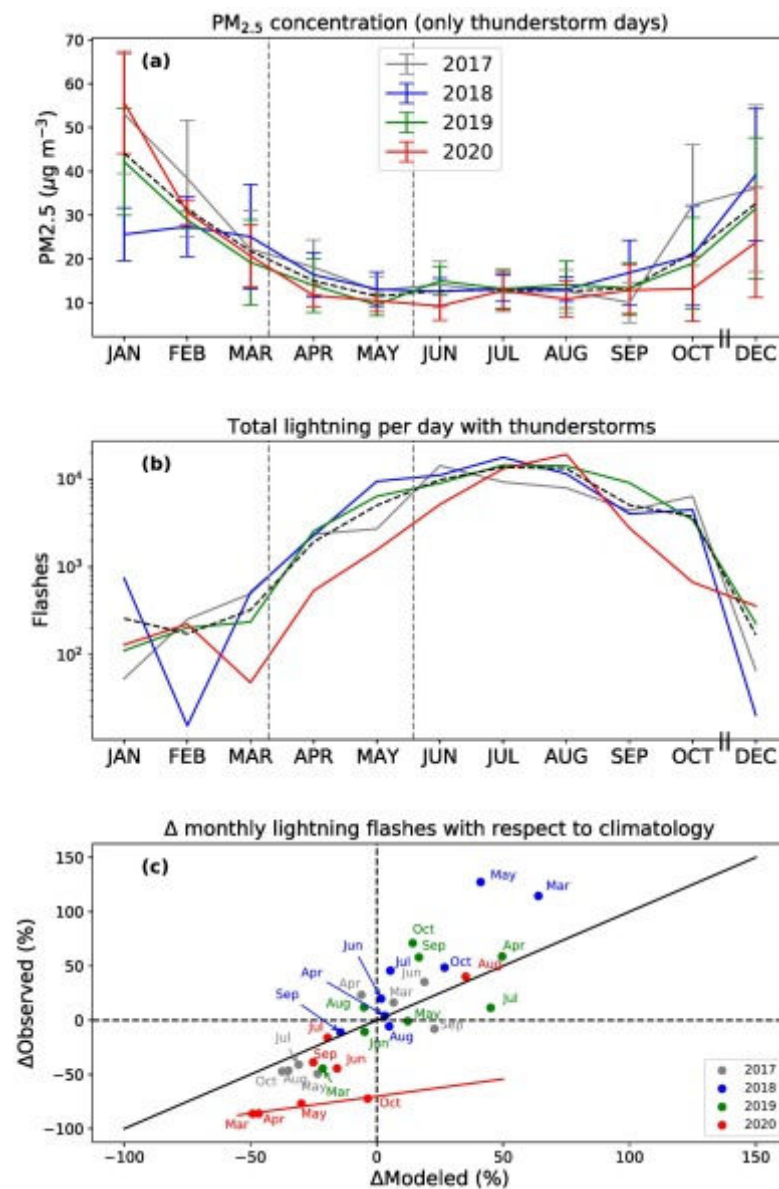
## Abstract

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Aerosols play a key role in cloud electrification processes. Aerosol particles can act as cloud condensation nuclei, contributing to the formation of cloud droplets, cloud electrification and lightning. In turn, high concentrations of aerosols can contribute to a decrease in lightning due to radiative effects. The non-linear relationship between the concentration of aerosols in thunderclouds and lightning activity reported by previous measurements show a high degree of complexity.

The COVID-19 lockdown coincided with a significant drop in the concentration of air pollutants and lightning activity over the Po Valley (Italy). This situation represented a unique opportunity to investigate the relationship between the concentration of aerosols and lightning activity. In this work, we studied the reduction in the emission of  $PM_{2.5}$  particles in the Po Valley during the COVID-19 lockdown and its influence on thunderstorm characteristics and lightning activity [1]. We used lightning parameterizations based on meteorological parameters to isolate the effect of the reduction of aerosols on lightning activity. We found that the variation in lightning during the lockdown as compared to recent years cannot be fully attributed to meteorology. In particular,  $\sim 60 \pm 10\%$  of the observed decrease in lightning activity is attributed to the unusual meteorological conditions, and  $\sim 40 \pm 10\%$  to the reduction in aerosol emissions.

[1] Pérez-Invernón, F. J., Huntrieser, H., Gordillo-Vázquez, F. J., & Soler, S. (2021). Influence of the COVID-19 lockdown on lightning activity in the Po Valley. *Atmos. Res.*, 263, 105808.



## Plain-language Summary

The COVID-19 lockdown coincided with a reduction in lightning activity and in the concentration of anthropogenic aerosols over the Po Valley. 60% of the observed decrease in lightning activity is attributed to meteorology, and about ~40% to the reduction in aerosol.

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