

EGU22-1890

<https://doi.org/10.5194/egusphere-egu22-1890>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



## Possible effect of the particulate matter (PM) pollution on the Covid-19 spread in southern Europe

Jean-Baptiste Renard<sup>1</sup>, Gilles Delaunay<sup>2</sup>, Eric Poincelet<sup>2</sup>, and Jérémy Surcin<sup>2</sup>

<sup>1</sup>LPC2E-CNRS, Orléans cedex 2, France ([jbrenard@cnrs-orleans.fr](mailto:jbrenard@cnrs-orleans.fr))

<sup>2</sup>Pollutrack, Paris, France

The time evolution of the Covid-19 death cases exhibits several distinct episodes since the start of the pandemic early in 2020. We propose an analysis of several Southern Europe regions that highlights how the beginning of each episode correlates with a strong increase in the concentrations level of pollution particulate matter smaller than 2.5  $\mu\text{m}$  (PM<sub>2.5</sub>). Following the original PM<sub>2.5</sub> spike, the evolution of the Covid-19 spread depends on the (partial) lockdowns and vaccine rates, thus the highest level of confidence in correlation can only be achieved when considering the beginning of each episode. The analysis is conducted for the 2020-2022 period at different locations: the Lombardy region (Italy), where we consider the mass concentrations measurements obtained by air quality monitoring stations ( $\mu\text{g}\cdot\text{m}^{-3}$ ), and the cities of Paris (France), Lisbon (Portugal) and Madrid (Spain) using in-situ measurements counting particles ( $\text{cm}^{-3}$ ) in the 0.5-2.5  $\mu\text{m}$  size range obtained with hundreds of mobile aerosol counters. The particle counting methodology is more suitable to evaluate the possible correlation between PM pollution and Covid-19 spread because we can better estimate the concentration of the submicronic particles compared with a mass concentration measurement methodology which would result in skewed results due to larger particles. Very fine particles of lesser than one micron go deeper inside the body and can even cross the alveolar-capillary barrier, subsequently attacking most of the organs through the bloodstream, potentially triggering a pejorative systemic inflammatory reaction. The rapidly increasing number of deaths attributed to the covid-19 starts between 2 weeks and one month after PM events that often occur in winter, which is coherent with the virus incubation time and its lethal outcome. We suggest that the pollution by the submicronic particles alters the pulmonary alveoli status and thus significantly increase the lungs susceptibility to the virus.