

Multi-Sensor Study of the Impact of Air Pollution on COVID-19

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ABSTRACT

The COVID-19 pandemic caused an unprecedented response from the countries leading to a complete or partial shutdown of human activities. More focus is being paid to mitigate and control the sources of this deadly virus. The results obtained all over the globe indicate that there is no alternative to lockdown till a suitable effective vaccine is invented. In this context, extensive observations of pollutants (PM_{1, 2.5, 10}), NO₂, SO₂, CO, O₃, VOCs), meteorological parameters, air mass back-trajectories, and complementary observations of atmospheric extinction or aerosol optical depth (AOD) and black carbon (BC) concentration have been carried out using the Air Quality Monitoring system, Multi-Spectral Solar Radiometer, Polar Nephelometer and Aethalometer at Amity University Haryana (AUH), Gurugram, India during the COVID-19 and associated lock-down period. We found an interesting relationship between air pollution (variability) and COVID-19 characteristics in terms of its detectability, spatial spread and intensity. Surprisingly, besides a substantial improvement in air quality, the results exhibited a complex relationship, indicating an increase in Corona cases with less ambient pollution. This was attributed to (i) delay in testing of patients, (ii) intermittent relaxations in lockdown period, (iii) non-observance of strict social distancing, (iv) indoor pollution scenarios and (v) local meteorology. In addition, a multi-site (rural, urban and high-altitude) study of BC measurements and the synchronous biomass burning (BB) contribution to it during the lockdown period of 15 March - 30 May 2020 has been conducted. The results indicate surprisingly low BB contribution during pre-lockdown and high BB during lockdown, revealing a clue to explain the on-going virus spread and the resultant mortality, even after continuing the lockdown. The association between the aerosol extinction and microphysical properties with the COVID-19 scenario during the above period also found to support this relation. More details of the experiments conducted, and the results obtained are presented.

Keywords: COVID-19, Ambient and indoor pollution, Infectious disease, Social distancing, Lockdown, Aerosols scattering and absorption

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