

Contrast of Aerosol Vertical Distributions over Wuhan before/during COVID-19 Lockdown

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Wuhan was the first city in the world attacked by COVID-19. City-level lockdown on January 23, 2020 was taken to prevent the spread of infection. In spite of the huge damage it caused, COVID-19 lockdown over Wuhan serves as an unprecedented chance to investigate anthropogenic contribution to regional aerosol loading. We analyzed the 532 nm polarization lidar dataset in Wuhan from 2010 to 2020 July to show the contrast of aerosol vertical distributions before/after COVID-19 lockdown. Before COVID-19, 62% of total Aerosol Optical Depth (AOD) was contributed by boundary layer (BL) aerosol. While during COVID-19 lockdown, only 31% of total AOD was contributed by BL aerosol and the mean BL AOD arrived the lowest level of 0.13 since 2010. The annual mean AOD shows an interannual decrease of -0.049 since 2010 and more than 80% of this trend was associated with BL aerosol. Overall decrease trend of total AOD during COVID-19 lockdown can be noticed, but striking decrease pattern cannot be concluded due to the enhanced loading of free troposphere aerosol in the meantime. These findings can improve our understanding of regional anthropogenic aerosol emissions and help to explain spaceborne passive remote sensing observations on COVID-19 lockdown.