

Impact of COVID-19 lock-down on aerosol characteristics over urban and rural environments in peninsular India

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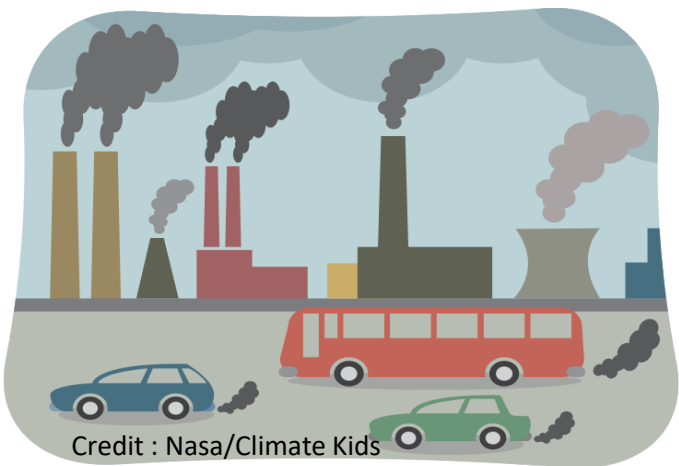
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November 23, 2022

Abstract

The COVID-19 pandemic has caused concerns globally. However, there are some positive effects because of the outbreak such as cleaner air caused due to the lock-down. The pandemic and consequent lock-down (LD) has caused significant reduction in anthropogenic activities, which provided an unprecedented opportunity to study the contribution of manmade short-lived climate forcing agents from two distinct environmental locations; Bengaluru, a mega city and rural continental region, Challakere, in southern part of peninsular India. We have used continuous and simultaneous analytical measurements of the aerosol loading and optical properties of near-surface aerosols for this purpose. The near total shutdown of rail, road, and air traffic as well as total closure of most of the business establishments and IT industry, is found to dramatically reduce black carbon (BC) aerosol abundance. Within one week of the LD, urban Bengaluru has witnessed nearly 60% reduction in BC from fossil fuel (BC_{ff}) emissions, which is almost comparable to that at a rural region like Challakere, located about 230 km northwest to Bengaluru. BC concentration at Challakere did not show any major impact because of the lock-down. On other hand, BC from biomass burning (BC_{wb}) from both the locations didn't show any conspicuous impact. Consequently, the fraction of BC_{wb} to total BC became more than double and spectral absorption coefficient increased from ~ 1.15 to ~ 1.4 . The single scattering albedo increased from its prevailing mean value of ~ 0.66 before LD to 0.74 during LD1 and then gradually decreased with more relaxations. The measurements also have shown the manner in which the environment responded to the gradual relaxation in the subsequent phases of LD leading to gradual increase in emissions. The findings re-emphasize that the emissions from fossil fuel combustion in industrial and automobile sector are the major source of absorbing aerosols over urban and semi-urban environments.

IMPACT OF COVID-19 LOCK-DOWN ON AEROSOL CHARACTERISTICS OVER URBAN AND RURAL ENVIRONMENTS IN PENINSULAR INDIA.



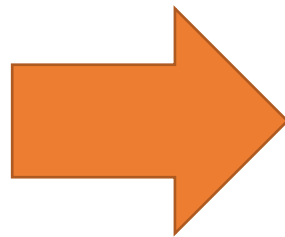
Credit : Nasa/Climate Kids

Urban

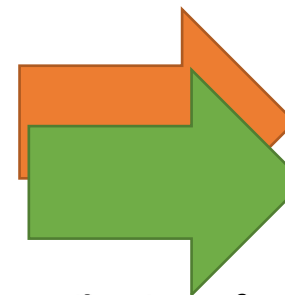
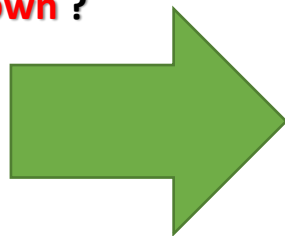


Credit : Adobe

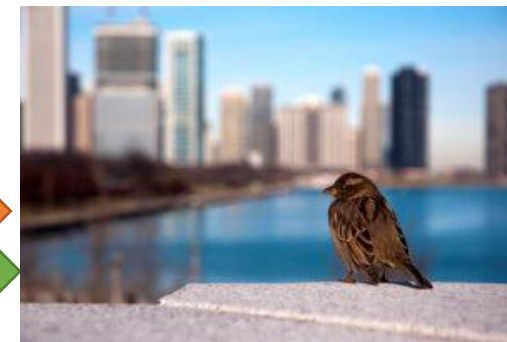
Rural



Contribution of
Black Carbon
before **Lock
Down** ?

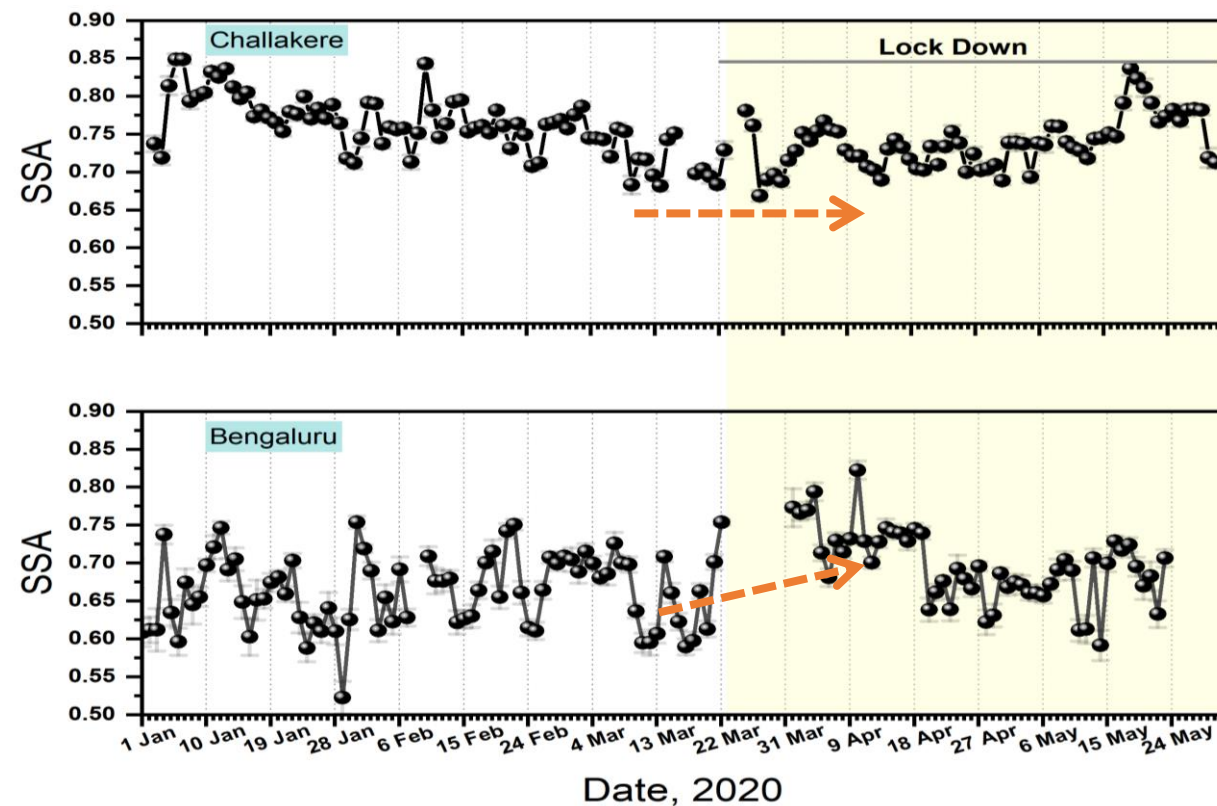
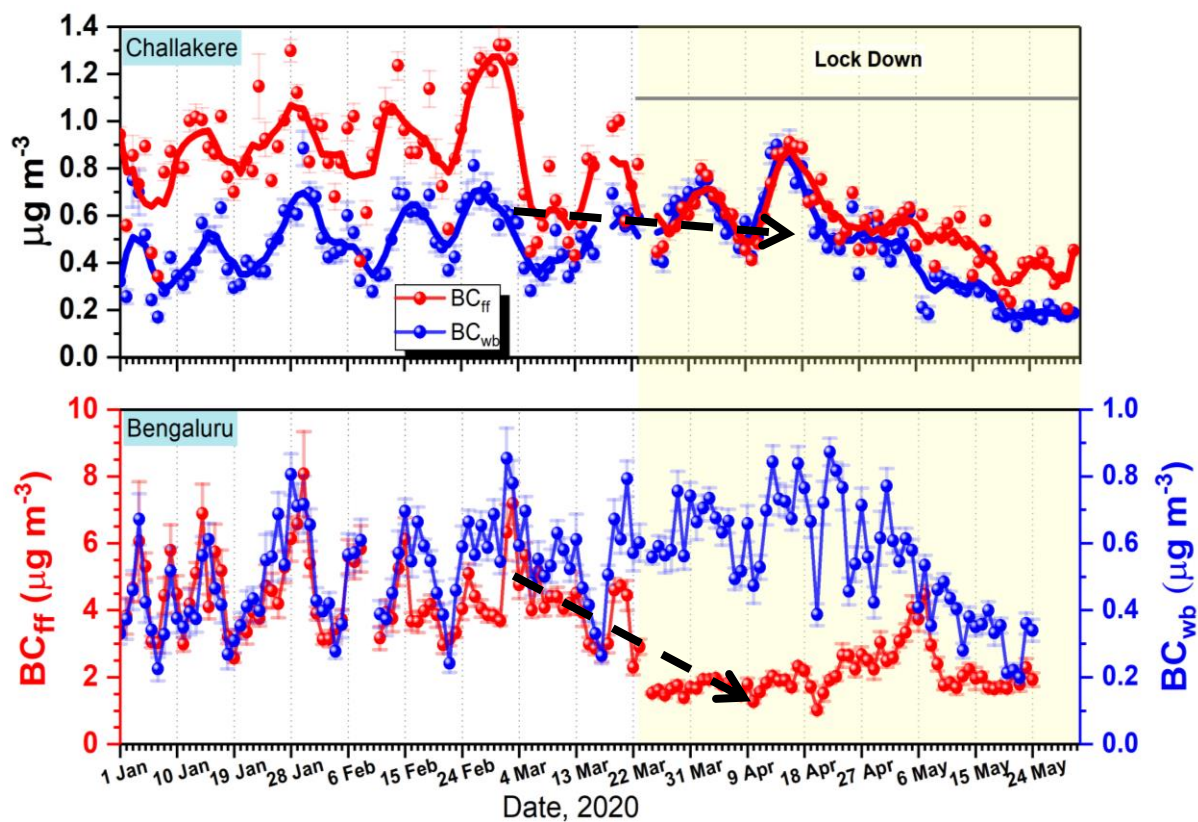


Contribution of
Black Carbon
during **Lock
Down** ?



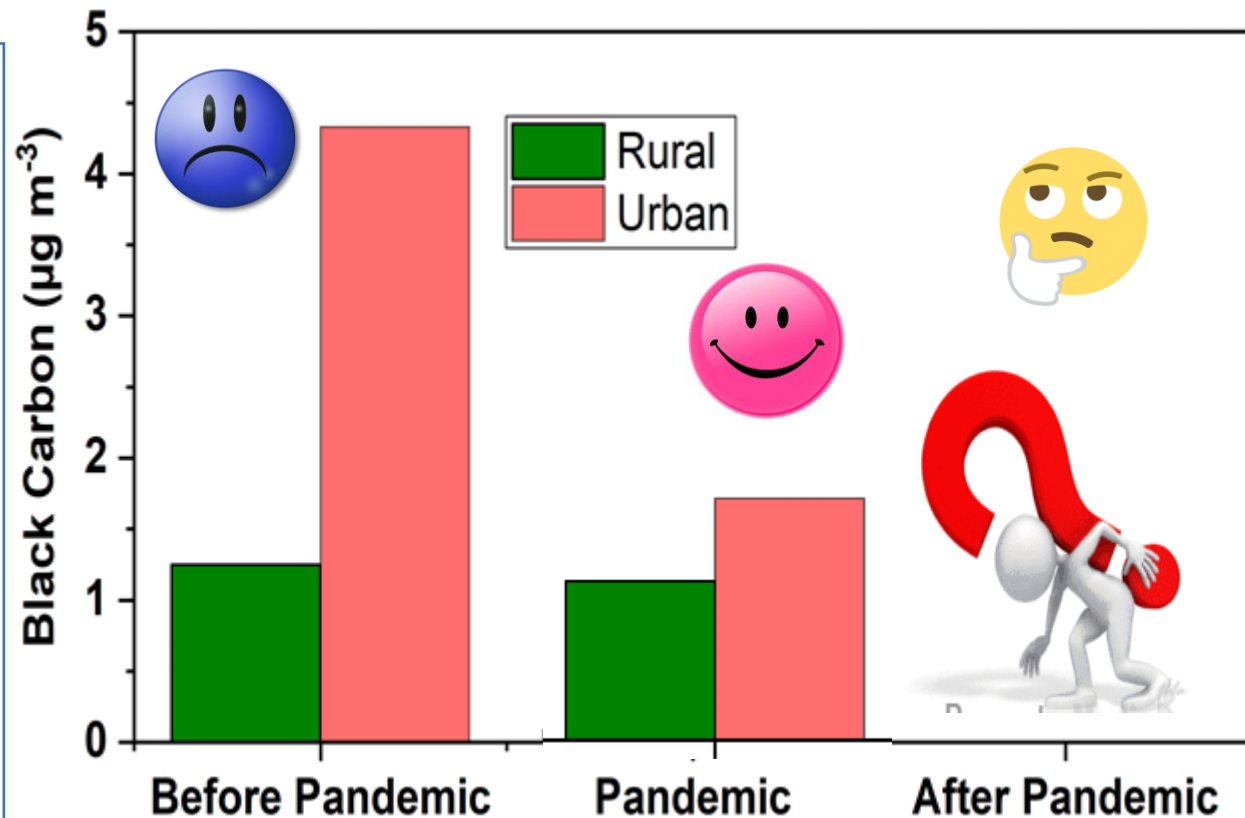
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SIGNIFICANT REDUCTION ~60% IN BLACK CARBON DUE TO FOSSIL FUELS IN URBAN REGION



RESULTS

- Before Lock Down black carbon from **Urban** region where **4 times** higher than the **Rural** region.
- During Lock Down black carbon from both the region where almost comparable.
- Single Scattering Albedo increased 20% in **Urban** as compared to **Rural** region



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