

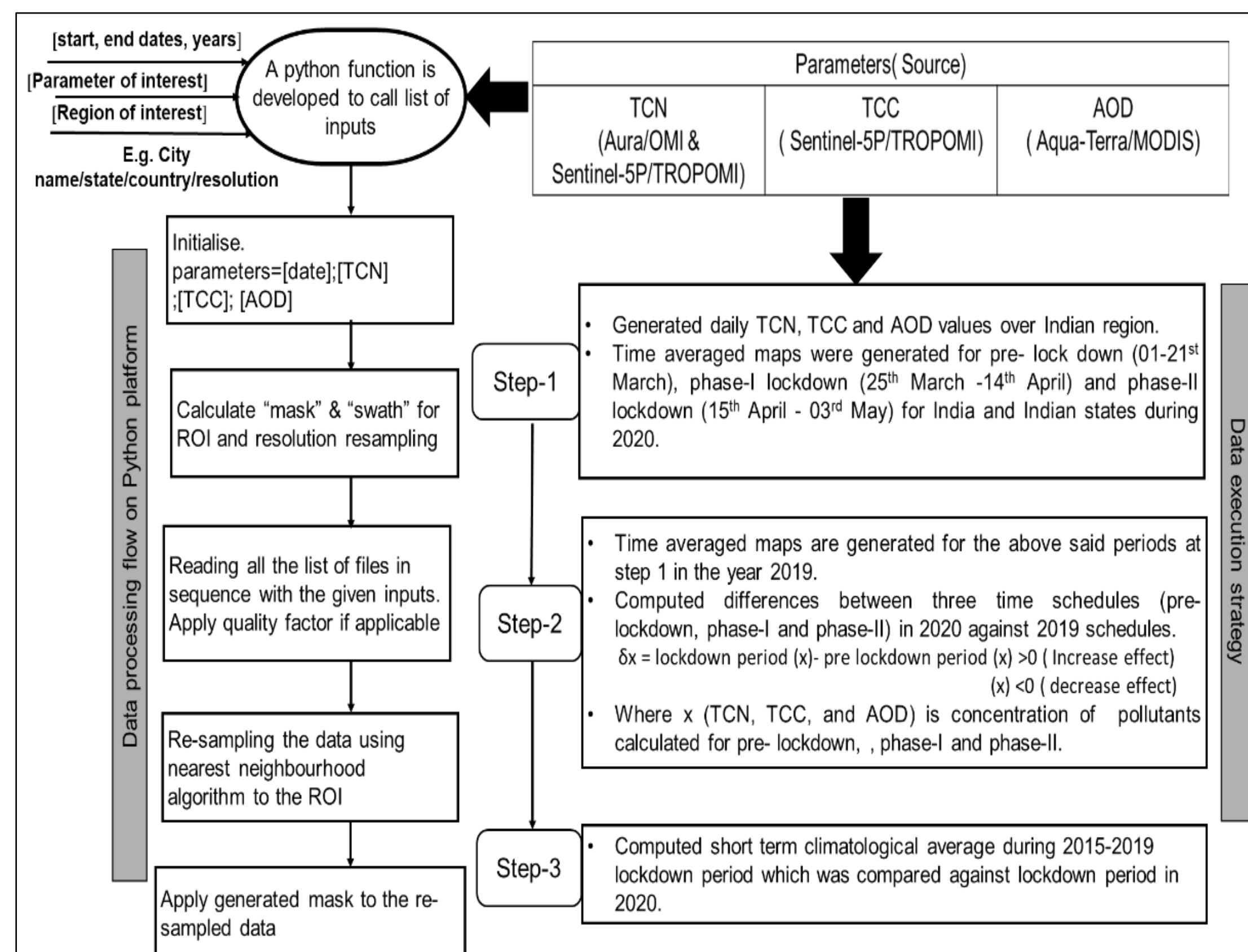


Assessment of the Impact of COVID-19 Nationwide Lockdown on Air Pollution across India

ABSTRACT

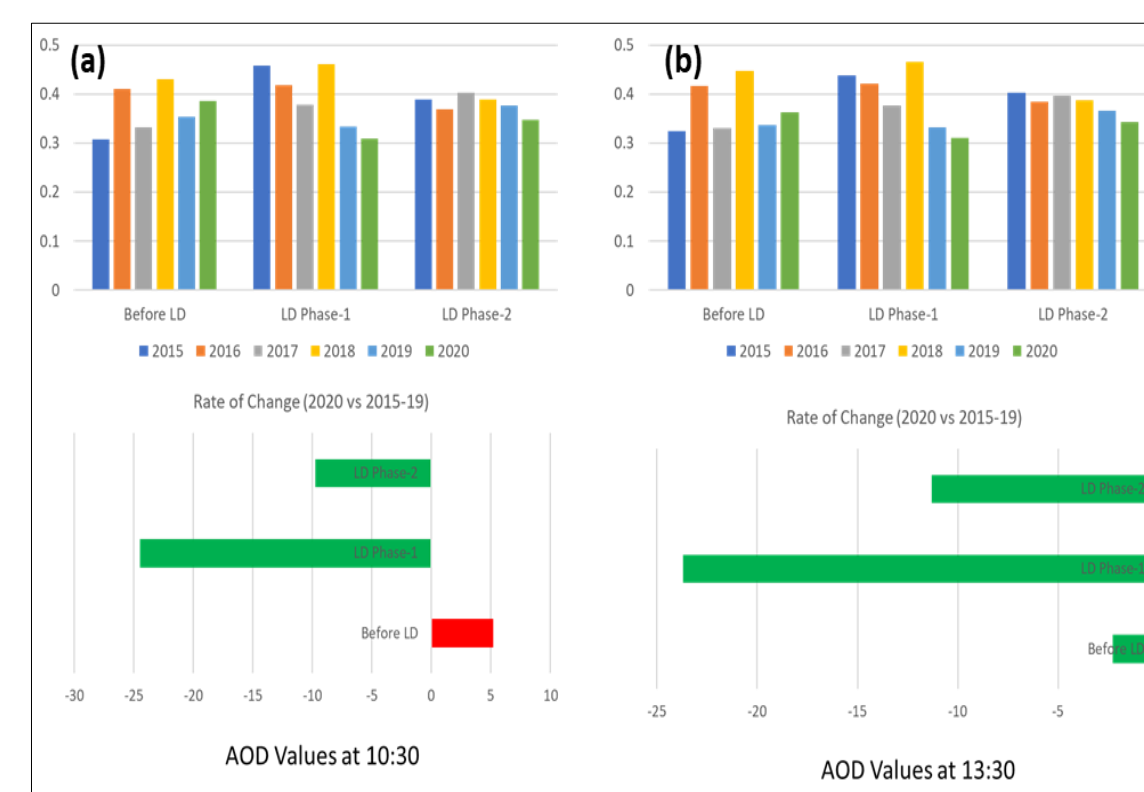
The nationwide lockdown was imposed over India from 25th March to 31st May 2020 in 4 phases to contain the spread of COVID-19. The emissions from industrial and transport sectors were halted during lockdown (LD) which resulted in a significant reduction of anthropogenic pollutants. The first two phases were strictly followed and hence are considered as total lockdown (TLD) period for this study. Satellite-based tropospheric columnar nitrogen dioxide (TCN) from the years 2015 to 2020, tropospheric columnar carbon monoxide (TCC) during 2019–2020 and aerosol optical depth (AOD550) from the years 2014 to 2020 during LD and pre-LD periods were investigated with observations from Aura/OMI, Sentinel-5P/TROPOMI, and Aqua-Terra/ MODIS satellite sensors. To quantify lockdown induced changes in TCN, TCC, and AOD550, detailed statistical analysis was performed on de-trended data using student's paired statistical t-test.

METHOD

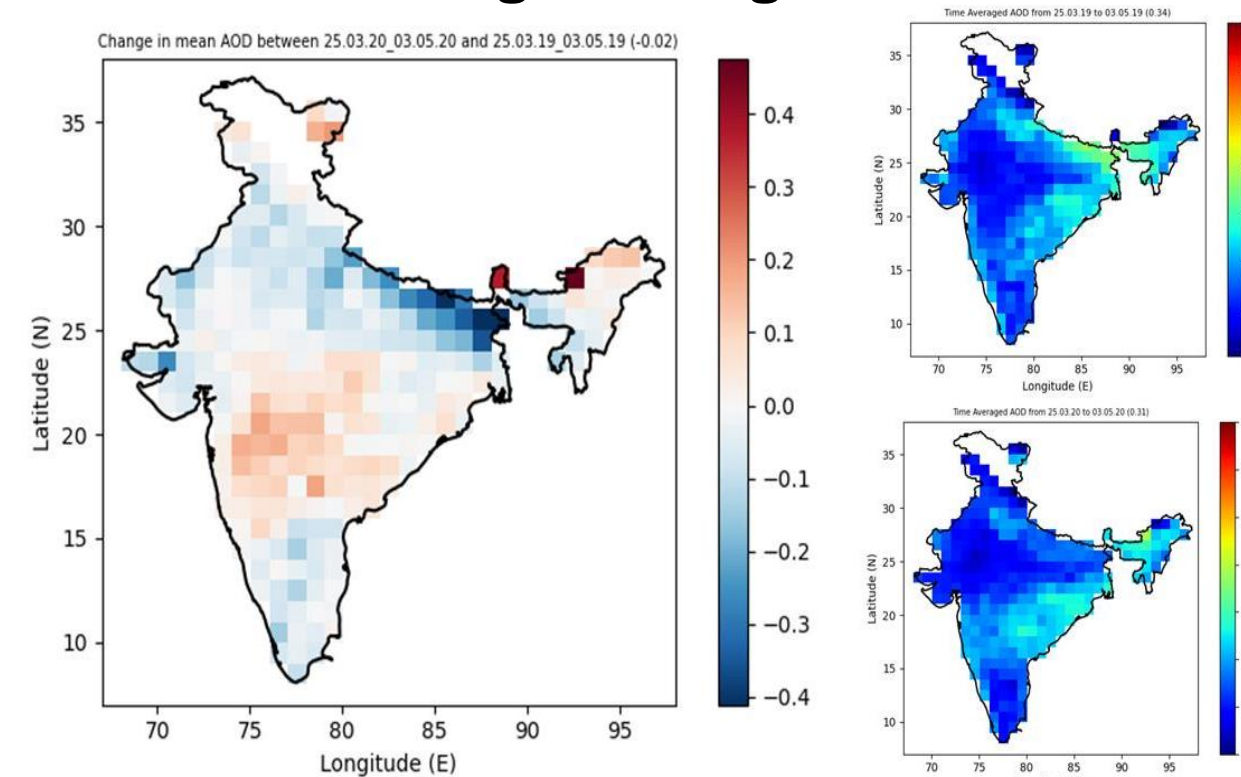


Change in AOD

AOD Mean comparison – 5 years



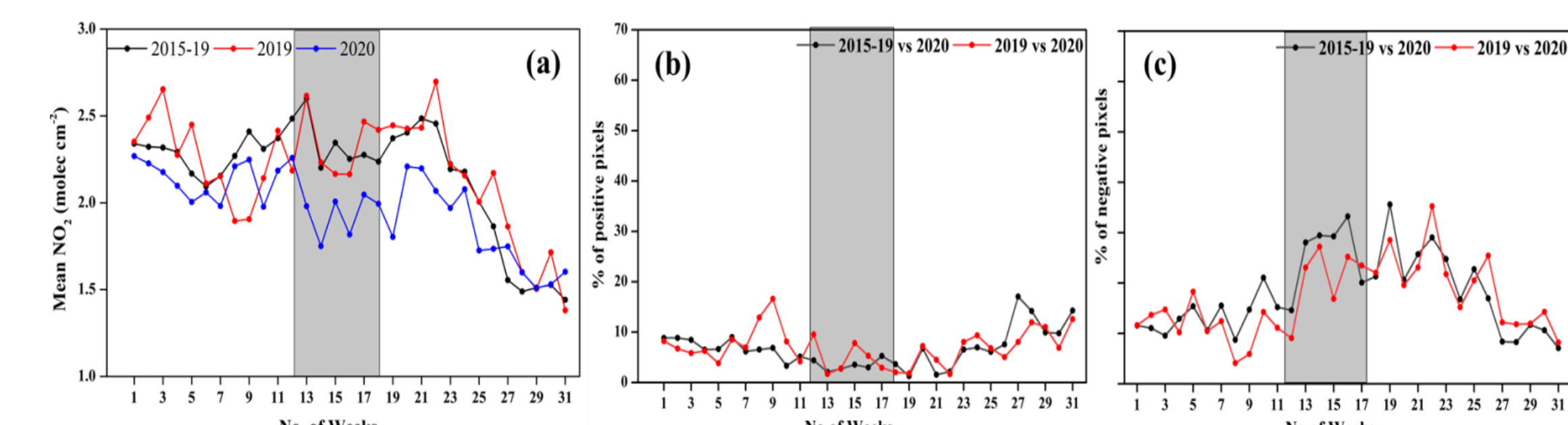
AOD Change during Lockdown



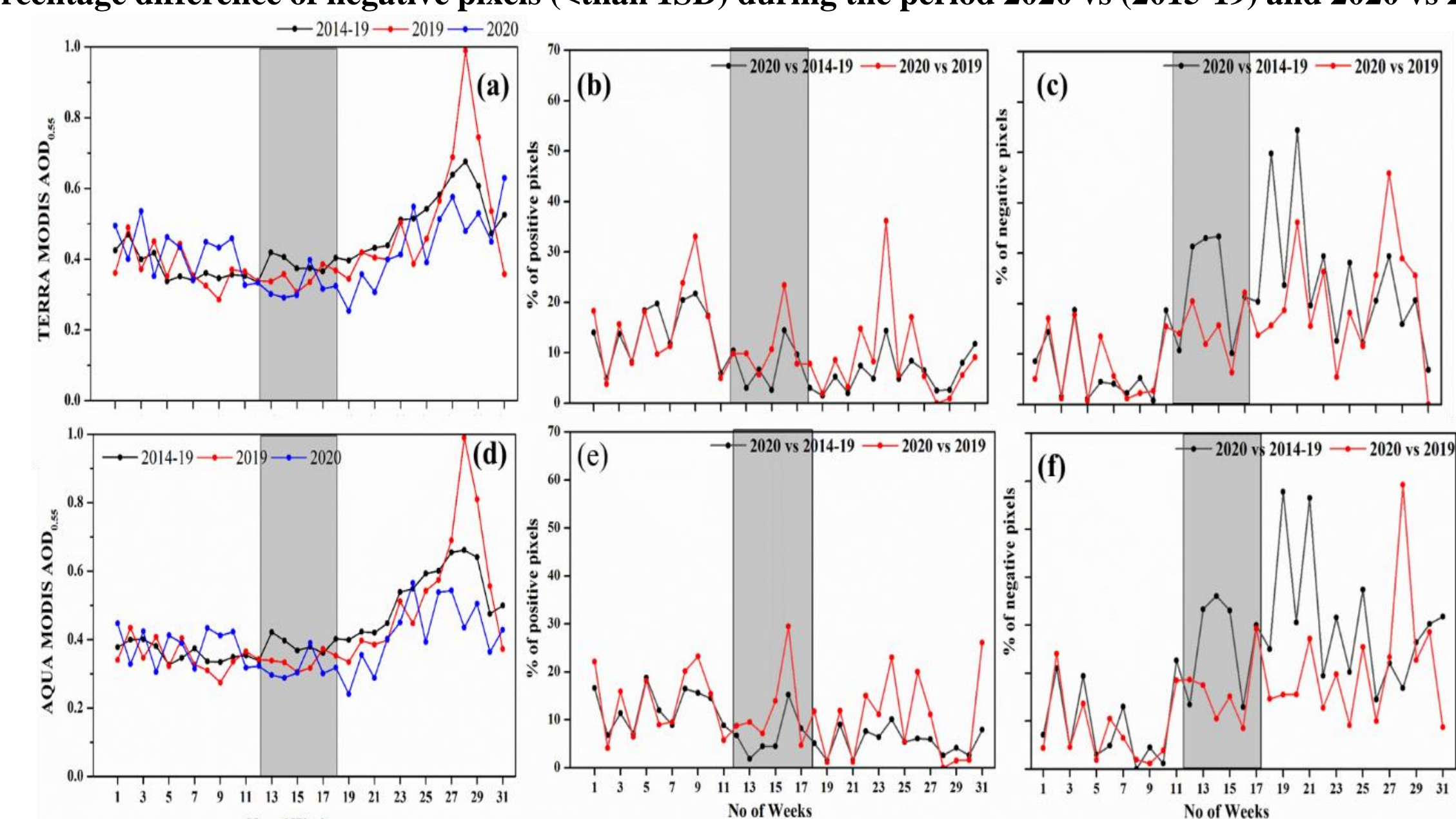
Results Summary

- **18% reduction** in TCN levels over India during lockdown phase-1
- Drastic changes in TCN levels observed over hotspots namely the eastern region and urban cities.
- **54% reduction** in TCN levels over New Delhi
- **16% reduction** in AOD is observed over India
- **28 % reduction** in AOD levels observed over the Indo-Gangetic plains (IGP) region
- **15% Increase** in AOD₅₅₀ levels are also observed over Central India.

Metrics to study the impact of lockdown



a) Mean weekly Aura/OMI measured NO₂ b) percentage difference of positive pixels (> than 1SD) c) percentage difference of negative pixels (< than 1SD) during the period 2020 vs (2015-19) and 2020 vs 2019



a) Mean weekly AOD from Terra/MODIS b) percentage difference of positive pixels (> than 1SD) c) percentage difference of negative pixels (< than 1SD) during the period 2020 vs (2014-19) and 2020 vs 2019 d) Mean weekly AOD from Aqua /MODIS e) percentage difference of positive pixels (> than 1SD) f) percentage difference of negative pixels (< than 1SD) during the period 2020 vs (2014-19) and 2020 vs 2019.