



Investigation of spatial and seasonal changes in carbon dioxide and methane over Indian subcontinent using satellite data

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Carbon dioxide (CO₂) and methane (CH₄) are most important green-house gases (GHGs) which play pivotal role in regional and global climate change [1]. Accurate spatial and temporal estimation of these gases is essential for modelling the climate effects. In the present study investigation of changes of CO₂ and CH₄ concentration spatially and temporally over Indian subcontinent using satellite data during pre and post covid year (2019-2021) has been performed. In this work, satellite data of Thermal And Near infrared Sensor for carbon Observation - Fourier Transform Spectrometer (TANSO-FTS) onboard Greenhouse gases Observing SATellite (GOSAT) [2] and global view data of Global Monitoring Laboratory (GML) of the National Oceanic and Atmospheric Administration (NOAA) [3, 4] data are used to analyze monthly and seasonal changes in 2019 to 2021 over Indian subcontinent. The used GOSAT Level 3 products are the estimated results of the column-averaged gas concentrations for one month on a global 2.5°X2.5° grid, based on the column-averaged concentrations of carbon dioxide and methane of the SWIR L2 CO₂, CH₄ products [5].

To study, the region falling between 5° to 40° North and 65° to 100° East is extracted for consideration and other regions have been masked. Over the Indian subcontinent during the period (2019-2021), generally CO₂ is maximum in May and minimum in September while CH₄ is maximum in November and minimum in June. The seasonal variations of CO₂ and CH₄ over the region are nearly similar to global average of GOSAT and NOAA global view. The study shows that CO₂ concentration increases, 2.23 ppmv from 2019 to 2020 and 2.57 ppmv from 2020 to 2021. CH₄ concentration augments 13.4 ppbv from 2019 to 2020 and 17.4 ppbv from 2020 to 2021. The temporal period of pre and post covid was selected to understand the changes in concentration of these gases due to reduced anthropogenic emissions in the period of Lockdown. The investigation clearly shows that the levels of CO₂ and CH₄ concentrations continued to gradually increase during 2019 to 2021, being unaffected by lockdown.

References

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