

## Multi-scale variability of atmospheric CO<sub>2</sub> using high-resolution satellite observations over Indian region

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Poster

Quantifying and monitoring greenhouse gas (GHG) emissions worldwide is crucial, particularly for future emission strategies (IPCC, 2021). Carbon dioxide (CO<sub>2</sub>) is one of the most significant GHG in the atmosphere in the context of both climate change and global warming. The principal factors driving the recent notable rise in anthropogenic CO<sub>2</sub> emissions include the combustion of fossil fuels, modifications in land use, and cement production (Friedlingstein et al., 2020; Canadell et al., 2021). India emerges as a pivotal focal point in understanding the regional carbon cycle, especially concerning rise in atmospheric CO<sub>2</sub> resulting from the rapid surge in fossil CO<sub>2</sub> emissions, observed at rate 3.8% per year in the period 2012-2021 (Friedlingstein et al., 2022). Due to a lack of ground-based observations over the Indian region, satellites provide a better observational platform to explore the variability of atmospheric CO<sub>2</sub> at different time scales and their links with various climatic conditions. This work aims to bridge this gap by utilizing recent long-term and high-resolution satellite datasets to comprehensively address multi-scale variations in atmospheric CO<sub>2</sub>. We focused to analyse the diurnal, seasonal, and annual scale variability throughout the available time period over the study region through the use of high-resolution satellite observations such as OCO-2 and OCO-3. From OCO-3, we found more soundings during the pre-monsoon seasons (March-April-May) compared to the rest of the seasons. Furthermore regional scale analysis to investigate the diurnal scale variability over different land cover regions will be presented.

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