Multi-scale variability of atmospheric CO2 using high-resolution satellite observations over Indian region

Ravi Kumar
Kunchala
Indian Institute of Technology Delhi, New Delhi
Chiranjit Das, Debanjan Paul
Indian Institute of Technology Delhi, New Delhi

Poster

Quantifying and monitoring greenhouse gas (GHG) emissions worldwide is crucial, particularly for future emission strategies (IPCC, 2021). Carbon dioxide (CO2) 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 CO2 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 CO2 resulting from the rapid surge in fossil CO2 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 CO2 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 CO2. 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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