

NRSC Website-Science Story

“Seasonal and annual variations of CO₂ and CH₄ at Shadnagar, a semi-urban site”

A dedicated high precision Off-Axis Integrated Cavity Output Spectroscopy (OA-ICOS) system was installed at Atmospheric Science Lab (ASL), National Remote Sensing Centre (NRSC), Shadnagar in 2013 as part of the Atmospheric CO₂ Retrieval and Monitoring (ACRM) of National Carbon Project funded by the Climate and Atmospheric Processes-ISRO-Geosphere Biosphere Programme (CAP-IGBP). The OA-ICOS is high precision Greenhouse gas analyzer (GGA) measures continuously atmospheric CO₂, CH₄ and H₂O at 1 Hz frequency. The OA-ICOS is periodically calibrated from the standard NOAA cylinders (Mahesh et al. 2015). Thus, at the study site, about a decade continuous quality measurements of CO₂ and CH₄ at Shadnagar are recorded.

Results of the article titled “Seasonal and annual variations of CO₂ and CH₄ at Shadnagar, a semi-urban site” investigated the seasonal and synoptic variations of CO₂ and CH₄ at the study site. The dominance of anthropogenic emissions and respiration during the morning and night studied. Further, in the article (<http://dx.doi.org/10.1016/j.scitotenv.2022.153114>, IF: 10.75), we reported the mean annual CO₂ concentration at the study site are 394.11±4.44 ppm, 395.83±3.22 ppm, 395.02±5.49 ppm and 399.56±5.46 ppm respectively during 2014-2017 period with an annual trend of 2.01 ppm year⁻¹. An increase in CH₄ concentration from 1.896±0.07 ppm to 1.929±0.09 ppm between 2014 and 2017 was observed with an annual trend of 10 ppb year⁻¹.

The Japan Agency for Marine-Earth Science and Technology (JAMSTEC) developed Model for Interdisciplinary Research on Climate (MIROC, version 4.0) based atmospheric chemistry-transport model (ACTM) model simulation shows the measured CO₂ and CH₄ concentrations are well compared against the model simulations. Details of the research can be found at [<https://www.sciencedirect.com/science/article/pii/S0048969722002042#ab0010>].

