

Trend and pattern in $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ of atmospheric CO_2 during COVID lockdown; observation from Bengaluru, India.

ANKIT SWARAJ¹, PROSENJIT GHOSH¹, MR.
THAMIZHARASAN S, MSC¹ AND BENJAMIN FOSU²

¹Indian Institute of Science

²Natural Resources Canada

Presenting Author: ankitswaraj@iisc.ac.in

Atmospheric carbon dioxide measurement using InfraRed (IR) based spectrometer Delta-Ray for the year 2020 during and after the first waves of nation-wide lockdown during Covid.19 from the urban region of Bengaluru, India is presented here. The instrument provides high-precision measurements of the stable carbon (-38.70 ± 0.05 ‰, VPDB- CO_2) and oxygen (11.707 ± 0.06 ‰ VSMOW) as well as the concentration of CO_2 (704.3 ± 0.2 ‰ ppm). The study was divided into three events: Pre-Lockdown, Lockdown and Post-Lockdown. Highest CO_2 concentration was observed and during the Lockdown with a mean value of 428 ± 15.95 ppm, 10 and 8 ppm more than Pre-Lockdown and Post-Lockdown respectively, which was during the dry summer month, where energy is derived from coal burning beside other household factors. Similarly high lighter $\delta^{13}\text{C}$ values were observed during the Lockdown with a mean value of -9.97 ± 0.57 ‰ i. e, 0.4 and 0.1 ‰ lower than Pre-Lockdown and Post-Lockdown; whereas the highest $\delta^{18}\text{O}$ was observed in the Post-Lockdown with a mean value of 31.99 ± 0.89 ‰ which is 1‰ more than Pre-Lockdown and Lockdown periods. Source apportionment was done using the Keeling two component mixing model and OLS regression analysis. The proportion of individual source composition was calculated adopting values for the two components, with fossil fuel and LPG regarded as the distinct sources. The fraction of Fuel (F_{Fuel}) Coal/Petrol/Diesel are binned as one member and second member constitute fraction of LPG (F_{LPG}). The sources contributed to the regional atmosphere includes fuel dominance with more than 70.78 ± 17 % of fuel fraction (F_{Fuel}) and the 29.22 ± 17 % of LPG (F_{LPG}) use as household combustion source during Lockdown. A 5% and 9 % increment in F_{LPG} is detected for the Lockdown and Post-Lockdown times compared to what was during the Pre-Lockdown during the daytime suggesting food production related burning. F_{LPG} is seen as high as the 66% in the ambient air during period of lockdown, suggesting excess utilization of LPG due to household activities due to food preparation as an implementation of work from home practice from commercial enterprises.