Observation of the GHG by GOSAT satellite, aircraft and ground-based monitoring

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Abstract

Measurement of greenhouse gases is essential for complying with the international agreements to mitigate climate change due to emission of these gases. Basically, the emissions and sink of these gases are important for this purpose but what remains in the atmosphere is easily measurable by ground-based, airborne or spaceborne techniques and can give indications of their emissions or sinks. The ground-based observations are very limited in number covering limited regions over the globe. Therefore, observations with airborne or spaceborne instruments can overcome the limitations of ground observations. Satellites can observe the globe with higher frequency and coverage. Greenhouse gas observing satellite (GOSAT) has been observing greenhouse gases since 2009 providing almost a decade of observations. These observations are helping in inverse estimates of the emissions and sinks of these trace gases and regional to country scale emission monitoring using other statistical methods. NIES, Japan and collaborating institutes conduct ground-based monitoring in several sites in Japan and Asia and operate measurements on passenger airplanes by Japan Airlines (CONTRAIL project). The data from multiple platforms are used in atmospheric transport modeling to estimate regional emissions in Asia. With GOSAT satellite observations, Janardanan et al (2016, 2017) have demonstrated the capability to monitor emissions of CO_2 and CH_4 from continental regions independently by comparing observations to high-resolution transport model simulation. Their results indicated regional biases in the CO_2 (~20% lower over East Asia) and CH_4 (~30% overestimation in East Asia and 30% underestimation in North America) emissions in ODIAC (CO_2) and EDGARv4.2 (CH_4) inventories respectively. A further update of this method, which includes improved transport model simulation, for country scale monitoring is presented for Asia. In this analysis, the methane emissions from India, China and the middle East countries are estimated and compared to the EDGAR 4.3.2 inventory.

References

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