Nitrous oxide observations from GOSAT-2/TANSO-FTS-2: Evaluation and potential

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Poster

Nitrous oxide (N2O), with a lifetime of ~120 years, is the third most important greenhouse gas after carbon dioxide (CO2) and methane (CH4) contributing to global warming. It has a global warming potential 300 times greater than CO2 on the 100-year horizon. N2O emissions are not regulated by the Montreal Protocol and, although subject to the Kyoto Protocol, the ~0.25%/year increase in N2O observed over the last 10 years is expected to continue until 2100. N2O emissions involve both biotic (living organisms) and abiotic (environmentally induced e.g. water, soil, air) processes and are: 1) 60% natural, and 2) 40% anthropogenic. The annual average of N2O in the atmosphere is about 332 ppb (for the year 2019).

Despite its importance, tropospheric N2O measurements and surface emissions/sources remain understudied globally, with limited surface observations. However, sparse FTIR/NDACC instruments monitor N2O profiles and satellite observations performed in the thermal infrared (TIR) from IASI (Ricaud et al., 2009; Chalinel et al., 2022), AIRS and GOSAT (Kangah et al. 2017) provide valuable global data. GOSAT-2/TANSO-FTS-2, with some sensitivity to lower tropospheric N2O, offers potential studies on surface emissions using inversion methods.

This study evaluates the quality of GOSAT-2/TANSO-FTS-2 N2O observations for 2019. Comparisons with ground-based observations, IASI (Chalinel et al., 2022), NDACC N2O profiles and chemical transport models will assess the reliability of GOSAT-2 measurements at different atmospheric levels. The study includes discussion of measurement sensitivities, evaluation results, and potential for inverting N2O surface fluxes.

References:

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