

An Estimation and Evaluation of NO_x Emission from TROPOMI-Observed NO₂ Column over East Asia

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Abstract

NO_x plays a crucial role in determining PM_{2.5} dust and ozone concentrations. East Asia is a significant contributor to the global NO_x budget. The bottom-up NO_x emission fluxes are believed to be uncertain in this region. Therefore, in this study, to evaluate the accuracy of the NO_x emission of UNIMIX emission inventory used in the CMAQ model simulation, the model-estimate NO₂ columns were compared with the TROPOMI observation for 4 months. The CMAQ-calculated NO₂ columns are overestimated by approximately 28-53% in Central East China compared to the TROPOMI-observed NO₂ columns. The SK region is undersimulated by 8-28% in July, October, and January (and overestimated by 18% in April). In addition, NO_x emissions are estimated by a top-down mass balance approach using TROPOMI observation data to more accurately quantify NO_x in East Asia. In the estimation, top-down NO_x emission decreases by 4-32% in the CEC and increases by 9-24% in the SK region, showing spatial and temporal consistency with NO₂ column comparison analysis.

Early Career Scientist

NO, I am not an early career scientist.