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Speaker : Jun-Yu Lu

Advisor : Prof. Fang-Yi Cheng

A top-down assessment using OMI NO₂ suggests an underestimate in the NO_x emissions inventory in Seoul, South Korea, during KORUS-AQ

Abstract

The estimation of NO₂ emissions has a crucial impact on the results of chemical models. Therefore, how to correctly estimate emissions has become an important issue in environmental science. In the past, the mainstream emission estimation method was based on different emission coefficients, which is called bottom-up method. However, this estimation method takes a long time to update and has high uncertainty. In recent years, more real-time and higher-resolution results can be obtained through satellite retrieval of pollutant emissions, thereby improving the accuracy of emissions which is top-down method.

This study uses the bottom-up emission inventory to produce high-resolution NO₂ through WRF-Chem to recalculate the air mass factor of OMI, which is OMI-regional. By mathematical fitting, the budget and lifetime of NO₂ are estimated to calculate the new emissions. Finally, through the observation experiment KORUS-AQ, it was found that the retrieved results were consistent with the observations, and it was understood that the bottom-up emissions currently used in South Korea had an underestimation problem.

Keyword

Top-down method

Air Mass Factor (AMF)

Reference

Goldberg, D. L., Saide, P. E., Lamsal, L. N., de Foy, B., Lu, Z., Woo, J. H., ... & Streets, D. G. (2019). A top-down assessment using OMI NO₂ suggests an underestimate in the NO_x emissions inventory in Seoul, South Korea, during KORUS-AQ. *Atmospheric Chemistry and Physics*, 19(3), 1801-1818.