

## 複数化学種観測による窒素酸化物排出量の推定 Multiple species constraints on surface NO<sub>x</sub> emission inversion

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Satellite NO<sub>2</sub>, CO, O<sub>3</sub>, and HNO<sub>3</sub> data are assimilated into a chemical transport model to estimate global surface NO<sub>x</sub> emissions and their seasonal variation in 2007. The data assimilation of data for multiple species provides comprehensive constraints on the NO<sub>x</sub> emissions by limiting model errors in NO<sub>x</sub> chemistry. The non-NO<sub>2</sub> data changed the regional and hemispheric monthly total NO<sub>x</sub> emissions by 50% and 13-29%, respectively. These large changes introduced by the inclusion of non-NO<sub>2</sub> data imply a large uncertainty in the NO<sub>x</sub> emissions inverted from NO<sub>2</sub> data only. Compared to the emission inventories, the estimated NO<sub>x</sub> emissions show enhanced seasonal variations with the maximum emissions at most of the northern mid-latitudes occurring 1-2 months earlier. An analysis of the background error covariance demonstrates that additional constraints from other chemically related species (e.g., isopren and formaldehyde) have the potential to further improve surface NO<sub>x</sub> emission analyses.

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