

Validation and interpretation of OMI tropospheric NO₂ observations during INTEX-B and MILAGRO

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We present first comparisons of OMI tropospheric NO₂ observations and collocated NO₂ profiles measured on board the DC8 aircraft during the coinciding INTEX-B and MILAGRO campaigns over the Gulf of Mexico. We find that cloud-free OMI and DC8 tropospheric NO₂ columns observed over scenes ranging from strongly polluted (Mexican mainland, Houston) to remote (Gulf of Mexico) are highly consistent, with OMI columns showing no significant bias relative to the independent aircraft measurements.

We interpret our results using the GEOS-Chem chemistry-transport model with improved emissions for Northern Mexico. For the first time, we use the OMI NO₂ data to check national best estimates of bottom-up emissions from NEI99 (USA) and BRAVO (Mexico). We find that NEI99 power plant and other industry emissions over the United States are 40% too high to properly simulate the OMI observations, and that BRAVO emissions for the year 1999 are too low over Mexico.

Furthermore, we present comparisons between NO₂ simulations from the high-resolution (12 x 12 km²) regional chemical-transport model CMAQ and OMI observed NO₂ (13 x 24 km²) over the Houston area to investigate to what extent the spatial resolution of emissions can be usefully constrained with OMI data.