

Comparison between GOME and surface measurements of tropospheric NO₂ over Tokyo, Japan

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We compared GOME (Global Ozone Monitoring Experiment) and surface measurements of tropospheric NO₂ over Tokyo, Japan. GOME observed global distribution of vertical column density (VCD) of tropospheric NO₂ during 1996-2003 [Richter et al., 2005]. The surface measurements of NO₂ volume mixing ratio (VMR) are routinely conducted in the air-monitoring network composed of 120 stations in Tokyo. Since the surface VMR cannot be directly compared with the GOME VCD, we scaled the surface VMR to the tropospheric VCD with the aid of the NO₂ altitude profiles calculated by a regional chemical transport model, CMAQ/REAS (Community Multi-scale Air Quality/Regional Emission inventory in Asia) [Uno et al., 2005]. We followed the method shown by Ordoñez et al. [2006] for the scaling.

The comparison showed that the GOME VCD and the surface VMR agreed better over the unpolluted stations than over the polluted stations, indicating that the GOME observations represented the behavior of NO₂ over relatively unpolluted regions. The GOME VCD and the VCD scaled by the surface measurements had a similar seasonal variation, which was asymmetric with a rapid increase in fall and a slow decrease in spring. The consistency suggests that the GOME successfully observed the NO₂ behavior in the lower troposphere over Tokyo.