Analysis of variation of tropospheric column ozone observed from space

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According to a recent IPCC report (2007), radiative forcing of tropospheric ozone is the third most important component among the green house gases. In addition, tropospheric ozone plays a key role controlling oxidizing capacity, causing photochemical smog. Spatiotemporal variation of the tropospheric ozone over wide range is now a great concern. Satellite measurements have the advantage of providing continuous monitoring of ozone over wide range.

Hayashida et al.,[2008] analyzed tropospheric column ozone (TCO) observed by the GOME (Global Ozone Monitoring Experiment) and ozonesondes to determine the spatiotemporal variation in TCO over East Asia from 1996 to 2003. They revealed that an enhanced TCO belt (E-TCO belt) was observed at approximately 35N throughout the year, and it moved northward and southward depending on season. The enhanced of TCO could be attributed to three factors: the outflow from polluted regions, the effect of biomass burning in Southeast Asia, and ozone intrusion from the stratosphere. But the most important factor is not yet clear.

In this study, we extended the analysis by Hayashida et al., (2008) to the global distribution of TCO. Our analysis also includes the tropospheric ozone residual (TOR) dataset which was derived from the total ozone observed by Ozone Monitoring Instrument (OMI) and the stratospheric ozone observed by Microwave Limb Sounder (MLS), covering from 2004 to 2006 (Ziemke et al. [2006]).

The distribution of TCO from OMI/MLS data shows similar feature to that observed in GOME TCO data. The consistency of the two satellite datasets that were derived from different technique demonstrates the reliability of the results.

We also found a good correlation of the E-TCO belt and the jet stream, suggesting ozone intrusion from the stratosphere. Combined analysis with other satellite measurements including TES will be also reported.

Reference
Ziemke et al., JGR, 111, 2006.
Hayashida et al., SOLA, 4, 117-120, 2008.