

6.142 Satellite measurement of the lower tropospheric ozone enhancement over East Asia - elimination of the effect from the upper troposphere and lower stratosphere.

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Abstract:

The lower tropospheric ozone enhancement over Central and Eastern China (CEC) was reported by Hayashida et al. (2015) by using the Ozone Monitoring Instrument (OMI) multiple-layer product retrieved by Liu et al. (2010). The lower tropospheric ozone distribution maps were first obtained from the UV space-borne measurements by their study. However, to clarify the enhancement in the concentration of the lowermost ozone, it is necessary to eliminate the effect of ozone variation in the upper troposphere and lower stratosphere (UT/LS) because of large smoothing errors in the retrieval scheme. In this study, a scheme was developed to eliminate the artificial effect of UT/LS ozone enhancement on lower tropospheric ozone retrieval. By applying the screening scheme, we could remove the effect of the UT/LS ozone enhancement on the lower tropospheric ozone and show a clear enhancement in the lower tropospheric ozone over CEC in June 2006 and confirmed the conclusion derived by Hayashida et al. (2015).

We also compared satellite measurements with model simulations for O₃ by using a global chemical transport model MRI-CCM2 (Deushi and Shibata, 2011) and a regional model NHM-Chem (Kajino et al., 2012). Those model simulations could well reproduce the observed O₃ enhancement over CEC in June 2006. The effects of emissions from the open crop residue burning (OCRB) in the North China Plain on lower tropospheric ozone were also examined by utilizing the emission inventory developed by K. Yamaji (Yamaji et al., 2010). The difference between the O₃ with and without the OCRB effect revealed that the effect of OCRB on O₃ enhancement is not critical.

References

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