Observation of ozone enhancement in the lower troposphere over East Asia from a space-borne ultraviolet spectrometer - S. Hayashida, et al.

This manuscript is a worthy attempt to establish that ozone in the lower troposphere can be detected, when high amounts occur, from UV spectrometers in space. The effort demonstrated here uses examples of enhanced ozone amounts resulting from pollution events originating in East Asia. The instrument employed is the Ozone Monitoring Instrument (OMI) flying on NASA's Aura satellite.

Comparisons with MOZAIC in-situ ozone measurements from aircraft flying into Beijing for about two years that include the high pollution periods in Spring is the major validation for the source for the satellite data. Indirect validation of the measured enhanced of ozone result from qualitative correlations with other satellite observations of aerosols and CO for one day and a monthly average. It is also noted that MOZAIC measured high CO amounts also during the high ozone event days. The authors also site the results of the Mount Tai Experiment field campaign in central East China which also found strong correlation of ozone precursors and the presence of ozone during the crop burning season. Model calculations conducted under similar situations leading to the results of satellite findings are also referenced. The authors also employ meteorological analysis to demonstrate that the enhanced ozone in the lower stratosphere does not have a stratospheric source. Therefor a strong case is made for the ability to retrieve boundary layer ozone.

The ozone retrieval used in this manuscript is based on those developed by Liu, et al. (2010a), a co-author. In that paper the authors had reservations about separating boundary layer ozone from free tropospheric using UV spectra measured by OMI. In addition to poor vertical resolution there are uncertainties related to surface albedo, aerosols, and calibration. The analysis of the rows and columns of the Averaging Kernels provides a basis for the ability to detect ozone in the boundary, however the physical limitation remain. Although enhanced ozone in the boundary layer may overcome some of these problems the authors should directly address how.

Some reorganization will make the manuscript more logical and easier to read. For example Section 3.2 should be integrated into Section 4.6. Also suggest that Section 3.1.2 be integrated with Section 4.1 particularly since some of the content is repeated.

At the end of the Section 4.3, the authors claim that the ozone enhancements observed in the Mount Tai Experiment field campaign were roughly consistent with OMI results. To further support this claim, it would be beneficial to show that data.