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Interactive comment on "Comparison of high-latitude line-of-sight ozone column density with derived ozone fields and the effects of horizontal inhomogeneity" *by* W. H. Swartz et al.

Anonymous Referee #1

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Although the paper is well written and the analysis methodology is sound, I am having difficulty in appreciating the scientific importance of this work. The main conclusion one derives from the paper is that spatial inhomogeneity in the ozone field makes the line-of-sight (LOS) attenuation data taken at very large solar zenith angles from an aircraft difficult to interpret.This is hardly surprising or a new result. Neither is the fact that by tracing the line of sight through a 3D ozone field obtained from other sources one can calculate reasonable LOS ozone values. Finally, this work doesn't really validate ozone profile data taken during the SOLVE mission in any meaningful way, for the differences in calculated and measured LOS results are rather noisy.

The authors suggest that their work reflects upon the retrieval of ozone field derived from satellites. It is not clear that it does so in any meaningful way. The LOS of a satellite occultation instrument goes through an atmospheric layer twice, which cancels out errors due to linear terms in the variation of ozone with distance along the LOS. This helps in reducing the bias in areas of large gradients, and primarily results in increased noise (due to higher order terms). This is not the case when measurements are made from an aircraft. They also allude to non-occultation measurements such as those from TOMS and MLS. For these sensors the implication of this work is even more tenous. It has been known since the inception of the BUV measurements some 40 years ago that errors in total ozone derived from the technique become large when the slant ozone column becomes large, and that one must know the local O3 profile quite accurately to reduce these errors. However, since one is dealing with scattered light rather than LOS attenuation, such corrections are much more complex to implement than they are for occultation instruments.

In summary, I consider the work largely an academic exercise in data interpretation, providing no particular insight relevant to either measurement, modeling or analysis of ozone. However, since I cannot find any fault with the work, and the description of the work and the figures are of high quality, I have no objection in publishing it.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 11617, 2005.