Interactive comment on “Rapid methods for inversion of MAXDOAS elevation profiles to surface-associated box concentrations, visibility, and heights: application to analysis of Arctic BrO events” by D. Donohoue et al.

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Donohoue et al. discuss and compare rapid methods converting differential slant column densities into surface-associated vertical column densities. Comparisons like this are very interesting in terms of light path independent quantifications of MAX-DOAS measurements. Yet, in this manuscript it was not always clear what actions exactly were performed (e.g. the elevated viewing SA-VCD estimation method is not transparent).

The authors claim having developed the three methods discussed in the study. We agree with reviewer #1 that these were introduced in literature before: To our knowledge, box profile fitting method: Sinreich et al., 2005; elevated viewing VCD estimation method: Hoenninger and Platt, 2002; horizon viewing surface concentration estimation: Volkamer et al., 2009. This is currently not discussed accurately in the manuscript.

Also, the authors indicate that the horizon viewing surface concentration method is a universal method to derive trace gas concentrations. It might be true for the reported measurements in Barrow (with a relatively high surface albedo). However, such conditions are relevant over a limited portion of the globe. Volkamer et al. (2009) showed that in other scenarios (e. g. low surface albedo) deviations of a factor of 2 can occur. Therefore a general validity as claimed by the authors cannot be concluded, and the data presented in this paper must rather be considered as a case study with limited scope for generalization.

Hopefully these comments will be addressed in a revised version of this paper.


