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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Observations of iodine monoxide (IO) columns from satellite" *by* A. Schönhardt et al.

Anonymous Referee #1

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This paper presents SCIAMACHY observations of iodine monoxide using the DOAS technique. The dataset analysed for this study comprises the years 2003-2005. The column observations are compared with year-round ground-based measurements of IO at coastal Antarctica. This work presents an interesting comparison between IO and BrO around Antarctica and conjectures about the possible iodine sources in this environment. The capability of retrieving IO from space is of importance for the atmospheric chemistry community, in particular for our understanding of polar tropospheric chemistry. The manuscript is well written and easy to read. This paper fits very well into the scope of ACP and I recommend publication after comments below have been addressed:

General comment:

- The authors raise a rather interesting point when pointing out that cloud retrievals over ice and snow are currently not available (p. 12966, line 15-17). Cloud screening is therefore a major issue when retrieving trace gases in the polar troposphere. Furthermore, when this works highlights that IO is hardly detectable in areas other than the surroundings of Antarctica. Therefore, the paper would definitely benefit from a more thorough description of how clouds are dealt with and the potential impact upon the retrieved IO columns.

- The authors suggest that transport, and subsequent recycle, could account for the high IO levels observed in the interior of the Antarctic continent. However, a close examination of panel b) in Fig. 7 shows that the IO columns retrieved as far as $>$ 85 degrees south are as large (e.g. ˜ 1 x 1013 molec cm-2) as those over the Weddell Sea. This paper argues that the maximum columns are found over the Weddell Sea areas and also speculates that the sources must be from oceanic and/or sea-ice covered areas. Then, how can such a short-lived species be transported thousands of miles into the interior of Antarctica and still be in comparable concentrations to those measured over the sources areas?. What is the sensitivity or reliability of the IO retrievals at large solar zenith angles?. Could cloud contamination or other factors in the retrieval method influence this surprising finding?. The authors should elaborate more on these points.

- The comparison of the IO columns with the Chlorophyll a measurements for October 2005 is interesting but hardly provides any information regarding the sources of iodine due to the limitation to make measurements over ice covered areas. This paper deals mostly with IO retrievals from space. Therefore I find the sections regarding atmospheric significance and sources too brief and somehow out of context. The atmospheric significance of iodine has already been dealt with in much more detail in different papers in the literature and hence this paper does not provide new insights. The section about the sources of iodine is a touch speculative and not well supported by modelling, laboratory or field work. For keeping the focus of the paper on the IO retrievals, as the title states, I would recommend the authors to shorten the mentioned

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sections.

- Throughout the paper there are several references to comparisons of the IO columns presented here with ground-based observations made by Saiz-Lopez et al., 2007a. After a second read of the paper, the reference to this comparison becomes a little repetitive and it is difficult for the reader to visualize how good the comparison is. It would have been much easier for the reader to have a figure of the IO columns correlated with the mentioned ground-based data set included in this paper

Minor points:

- The IO columns are compared with those retrieved by Saiz-Lopez et al., 2007c however I do not find this reference in the introduction; if other measurements have been reported they should be included in the Introductory Section where the authors mention about previous IO observations.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 12959, 2007.