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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Stratospheric BrO abundance measured by a balloon-borne submillimeterwave radiometer" *by* R. A. Stachnik et al.

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The manuscript presents stratospheric observations of bromine monoxide (BrO) from a balloon-borne submillimetre wave radiometer. Total inorganic bromine (Bry) and the likely contribution of very short-lived substances (VSLS) is inferred from these measurements; a detailed comparison with other available BrO profile observations is included. The manuscript provides important new constraints for the stratospheric bromine loading from novel independent measurements. It is generally well written and I recommend publication in ACP after consideration of some - mostly minor - comments.

Specific comments

Two of the most abundant VSLS, namely CH2Br2 and CH2BrCl were already included in the observations and parameterizations by Wamsley et al. (1998). It is thus not clear whether or not the contribution of CH2Br2 and CH2BrCl is included in the present estimate of "4 to 8ppt" for VSLS. Please specify explicitely which substances are included in the estimate of organic bromine. On a related point: as the individual bromine source gases have different trends, scaling organic bromine to 16ppt may result in a different profile than scaling of the individual gases. Have you checked if that makes a significant difference? This should be easy to do.

It did not become fully clear to me which tracer observations were used to calculate the profile of organic bromine according to Wamsley et al. Only N2O observations from the Odin-SMR (p.28907, l.7)? By the way, the explanation on p.28903, l.13 gives the impression as if Wamsley et al. (1998) provide a correlation with N2O; however, Wamsley et al. (1998) used CFC-11 as reference, so more detail how the correlation with N2O was performed should be given.

The references to Sinnhuber et al. (2002), Schofield et al. (2004), Sinnhuber et al. (2005), and Theys et al. (2007) as given in Fig. 14 are missing in the references list and should be included there. What is "SLS 2007"? (By the way, Sinnhuber is spelled incorrectly as "Sinhuber" in Fig. 14.)

Finally, I don't fully understand how using the spectral residuals in eq. (5) give a meaningful measure of systematic uncertainties in retrieved BrO (p.28899, l.18-20). Are the residuals not by definition orthogonal to the BrO spectral features, so that spectral artefacts that impact the retrieval will not show up in the residuals?

Minor issues and typographical corrections

Abstract, p.28892, l.3: "otational" -> "rotational"

Introduction, p. 28893,28894: For SCIAMACHY the wavelength region used for the

retrieval is given, while for OSIRIS the full spectral range is given. This should be homogenized. Similarly, the discussion of orbits for different satellites (inclination, local time, etc.) can be made more consistent.

p.28894, l.12: and SMILES

Section 2 is rather short. I wonder if parts of Section 2 can be better moved to the end of the introduction ("Here we show..."), and the rest of Section 2 be merged with Section 3, to make Section 2 redundant.

p.28896, l.11: "...steep and deep skirts": this is not clear to the non-specialist. Please provide more detail or remove.

p.28898, l.15 "observedradiances" -> "observed radiances"

p.28898, l.25, eq (5): delta x on the RHS should be delta y (I suppose)

p.28900, l.17: 2001 and 2003 not so "recent" anymore...

p.28911, l.6: "Puk,ite" -> "Pukite"

Fig. 14: "Sinhuber(2002)" -> "Sinnhuber(2002)"; "Sinhuber(2005)"->"Sinnhuber(2005)"

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