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Atmospheric Measurement Techniques Discussions

Interactive comment on "A global climatology of stratospheric OClO derived from GOMOS measurement" *by* C. Tétard et al.

Anonymous Referee #3

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This paper describes a global climatology of nighttime stratospheric OClO derived from measurements performed by the GOMOS instrument on board the ENVISAT satellite. The method used to retrieve OClO from the GOMOS stellar occultation observations is discussed with a focus on the averaging of the measurements enabling the detection of this species with a sufficiently high signal-to-noise-ratio. Then the OClO retrievals are verified through comparisons with balloon observations. Finally, annual and monthly climatologies of OClO slant column densities derived from these GOMOS measurements are presented and discussed.

This study fits well with the scope of AMT and the manuscript is clearly written and well structured. I recommend it for publication after addressing the following comments:

General comment:

The paper describes two (one annual and one monthly) nighttime climatologies of OClO slant column densities (SCDs). Why did you use SCD and not vertical profile of OClO concentration since apparently the spatial inversion of OClO SCDs into concentration profiles is easy to do (you did it for the comparison to balloon observations) ? Using vertical profile of OClO concentration could increase the number of potential users of these climatologies, especially in the modelers community.

Specific comments:

Page 3517, lines 23-24: it is not clear for me how do you determine the exact location of the averaged measurements. Maybe you can elaborate a bit more on this.

Page 3521, line 25: '. . .the retrieval errors are generally better than 50%.' What are the different components of the retrieval error ? Also in Figs. 5 and 6, we don't know what represent the error bars. More generally, including a detailed error budget in the paper would be very useful since this new OClO SCD product is described for the first time.

Sect. 4: I think comparing your retrievals with only two balloon profiles is not a validation but a simple verification. Could you please modify the text accordingly. Also on this topic, you mentioned in the Introduction that vertical distributions of OClO are also available from limb-scattered sunlight instruments like OSIRIS and SCIAMACHY. Why don't you use these measurements to check your retrieval by combining them to a photochemical box-model, ensuring by this way the photochemical matching between GOMOS and SCIAMACHY or OSIRIS observations. This has been done in the past for BrO and NO2 (see e.g. Millan et al. (2012) and Bracher et al. (2005)) and it would make the verification - which is currently the weak part of the study - more robust.

Pages 3525-3526: The presence of an OClO stratospheric equatorial layer is a very interesting result. Did 3D-CTM models have confirmed the presence of this layer since the first publication by Fussen et al. in 2006 ?

Technical corrections:

Page 3518, line 11: I would use 30°S and 30°N instead of -30° and +30°.

Pages 3534-3536: Figs 1-3 do not correspond to their legends. Legends of Fig. 1, 2, and 3 correspond to Figs. 3, I, and 2, respectively.

Page 3539, label of x-axis: the 1E7 and 1E6 factors appearing after the labels are quite confusing. Maybe you can simply multiply the OClO concentration by these factors and change the units between brackets accordingly.

References

A. Bracher, M. Sinnhuber, A. Rozanov, and J. P. Burrows, Using a photochemical model for the validation of NO2 satellite measurements at different solar zenith angles, Atmos. Chem. Phys., 5, 393-408, 2005.

L. Millán, N. Livesey, W. Read, L. Froidevaux, D. Kinnison, R. Harwood, I. A. MacKenzie, and M. P. Chipperfield, New Aura Microwave Limb Sounder observations of BrO and implications for Bry, Atmos. Meas. Tech., 5, 1741-1751, 2012.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 3511, 2013.