

## ***Interactive comment on “Ground-based measurements of tropospheric and stratospheric bromine monoxide above Nairobi (1° S, 36° E)” by S. Fietkau et al.***

### **Anonymous Referee #1**

Received and published: 9 July 2007

Review of the manuscript “Ground-based measurements of tropospheric and stratospheric bromine monoxide above Nairobi (1oS, 36oE)” by Fietkau et al. submitted to ACPD.

This paper presents BrO measurements made with a MAX-DOAS spectrometer at Nairobi (1S) during 2003. Ground-based measurements of BrO in the tropics are very sparse and therefore an important addition to test our knowledge of bromine chemistry in tropical regions. A comparison of the stratospheric BrO (90 - 80 SZA dSCDs) with model results shows fairly good agreement (within 15-20%) indicating that our knowledge of the processes controlling stratospheric BrO in the tropics is reasonable and

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comparable to model/measurement studies done for mid-latitudes.

The authors also made an attempt at determining the tropospheric BrO concentration based on their MAX-DOAS observations using a profile retrieval based on optimal estimation. They found a tropospheric background clearly lower than estimated based on GOME observations but in good agreement with other ground-based observations also showing only a very low tropospheric background in BrO (if any, given all the uncertainties). The results also indicate that there are no appreciable amounts of BrO in the lower-most troposphere and that therefore there are no large local sources in the area around Nairobi.

Major comments:

In summary, a more detailed error analysis for the stratospheric BrO data sets and especially for the profile retrieval is needed in this manuscript. The omission of any discussion of the crossing over of the different viewing angles in the MAX-DOAS data set leaves the reader questioning further conclusions. This needs to be addressed as well. Both concerns are also included in the list below.

Detailed comments:

Abstract, line 24: how high is the high-altitude site, please provide actual altitude.

Page 6529, line 6: I thought that this number might be quite a bit higher based on more recent model studies, please provide a reference for the 25% if it holds up or change accordingly.

Page 6533, line 18: replace 'preferred' with 'used' (or similar)

Page 6533, line 20: add Sinnhuber et al., 2002 reference here

Page 6534, line 6: is this really the total accuracy or rather only the fit error (see page 6538, line 5)? If the fit error alone is 20% then the overall error including temp dependence of cross-sections etc etc should be quite a bit higher. As mentioned above,

a more detailed discussion is needed.

Page 6536, lines 20-22: This paragraph can be a bit misleading since the Schofield et al., 2004 paper is not discussing dSCDs (as the other 2 cited papers are) and hence also has a clear difference in the absolute amount. Probably a good idea to make sure that this is really clear in the text. Also, it might be helpful to look at the Sinnhuber et al., 2002 paper and cite numbers from this paper since there are BrO data sets as 90-80 dSCDs shown for a lot of stations.

Page 6537, lines 2-13: This paragraph could be re-organised slightly; e.g. Figure 5 is discussed before Figure 4, Figures should be renamed or the order of discussion should be changed in the text.

Page 6538, lines 16-18: Replace the first agreement with 'match' or similar; change to: observations 'at' Nairobi; change to something like: 'Ė that the model used in this study to describe the processes controlling stratospheric BrO is also valid for Ė.'

Page 6539, lines 10,11: How do the profile retrievals look for other time periods but Jan-March? Why are they not included?

Page 6539, lines 15,16: Why are the results crossing over from different viewing angles at 65 SZA? It is important to understand this before interpreting the results. Can you please elaborate here? Otherwise if you don't understand what is happening then it might be a bit dangerous to extrapolate other results such as that there is a BrO background in the free troposphere.

Page 6539, line 16-19: It is ok to say that is "indicates the presence Ė" but how sure are you really, given that there might be issues that are not clear yet, see comment above. It is an important result though and it would be good to clarify as much as possible.

Page 6540, line 1: The range of values is helpful but the error estimates need to be added here as well! This will then also help to put your results in perspective when comparing with others.

Page 6540, line 29: the 25% error in the profile retrieval should be discussed in more detail and introduced earlier, e.g. where the actual results are presented.

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Interactive comment on Atmos. Chem. Phys. Discuss., 7, 6527, 2007.

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