

## ***Interactive comment on “Differences in ozone retrieval in MIPAS channels A and AB: a spectroscopic issue” by Norbert Glatthor et al.***

**Anonymous Referee #1**

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### GENERAL COMMENTS

The paper describes the tests performed to understand possible causes of the bias between ozone profiles retrieved from two different spectral bands of MIPAS measurements: channel A (685–970 cm<sup>-1</sup>) and channel AB (1020–1170 cm<sup>-1</sup>), mainly around the peak of the ozone profile.

Several possible sources of systematic errors are considered, but only spectroscopic errors seems responsible of the found differences. Tests with different spectroscopic databases (MIPAS pf3.2, HITRAN 1996, HITRAN 2004, HITRAN 2008, HITRAN 2016 and GEISA 2015) indicate that the major part of the channel AB-A differences might be caused by inconsistencies in air-broadened halfwidths of the lines of the databases. As a consequence, the authors suggest that the air-broadened halfwidths of ozone lines

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in the spectral regions of MIPAS channel A as well as of channel should be reassessed both for the GEISA and for the HITRAN databases.

The paper is clear, and surely it is of interest for spectroscopists and people retrieving Ozone in the middle infrared. Therefore it can be published in AMT after minor revisions that are described below.

#### SPECIFIC COMMENTS:

Pag.4, Section 3. The description of the errors in MIPAS spectroscopic databases should be moved before Sect.7.1, where differences between several spectroscopic databases are quantified, and hence the estimation of the errors on line intensities and line width can be more useful.

Pag. 5, line 17: what 'completely different forward models' means ?

Pag. 5, lines 9-14: I think that these sentences may be misleading in the paper. Indeed, Laeng et al., 2014 shows that from the comparison between MIPAS Ozone with ACE-FTS and MLS, MIPAS is larger than both of them. Since O3 retrieved from channel AB is larger than O3 retrieved from channel A, we can deduce that the use of only spectral intervals in band A may reduce the differences with respect to ACE-FTS and MLS. However, we have to consider that positive differences between MIPAS and ACE-FTS are probably not due, or at least not only due, to spectroscopic issues, since ACE-FTS performs measurements in the same spectral regions as MIPAS and for the O3 retrieval mainly spectral points in the region of MIPAS band AB are used (see [http://www.ace.uwaterloo.ca/misc/ACE-SOC-0027-ACE-FTS\\_Spectroscopy-version\\_3.5\\_Jan222016\\_Rev1A.pdf](http://www.ace.uwaterloo.ca/misc/ACE-SOC-0027-ACE-FTS_Spectroscopy-version_3.5_Jan222016_Rev1A.pdf)). Furthermore, the tests reported in this paper do not indicate which of the two bands A and AB has smallest spectroscopic errors, but only that there are inconsistencies between the two bands. Finally, the change of used spectral intervals in order to reduce the bias with other correlative measurements, that do not represent the true, may not always be correct.

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MIPAS spectroscopic database pf 3.2 sometime is mentioned in the paper (e.g. Pag.9, line 4) as MIPAS spectroscopy, other times (e.g. Caption of Fig.5) as Mipas pf 3.0. Please use consistent terminology.

Last sentence of the paper: 'as far as ozone is concerned we recommend to use version pf3.2 of the MIPAS spectroscopy and not the latest update pf4.45, because the ozone data set in this compilation is identical with HITRAN-2008.' A reference to the spectroscopic database pf4.45 should be added. The presence of 'inappropriate halfwidths' in HITRAN 2008 and following versions seems to involve only the 790- 850 cm-1 spectral region.

#### TECHNICAL CORRECTIONS:

Pag..4, line 23: delete one 'the'

Pag.5, line 25: performed

Sect.5: Fig.4 is mentioned before Fig. 3

Pag. 6, line 15: by neglectING

Pag. 8: line 6: arE

Pag. 8: line 9: follOWing

In general, the figures with several plots are more readable if each plot is identified with a letter (a), b), c)...)

Fig.1 : x-label of bottom plot: please replace 'diff/ppmv' with 'diff/km'

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