

## Response to the comments of Reviewer #1

We thank the reviewer for the careful reading and constructive comments. The reviewer comments are given below in blue and our responses in black.

This paper describes the characteristics and validity of the new data product of MIPAS O3 measurements, including the comparison with other satellite data and also the climatology of O3 distribution. The manuscript is well prepared and is recommended for the publication in AMT.

Below I put some minor comments from the view point of a better readability, particularly for those who is not so familiar with this kind of satellite remote sensing.

-p.2 Line 15: Please clarify the local times of MIPAS observation (or, please say something about the sun synchronized orbit of Envisat). Although such information is provided at the beginning of Sec.4, I think it is still useful for readers to know it in advance at this introduction section.

Done. Information on the Envisat orbit, altitude and local times has been inserted.

-p.3 Section 2: I would suggest to include relevant references about the general introduction of the Non-LTE processes of O3.

Done. A new reference, a book on non-LTE, has been introduced in the 2nd. par. of Sec. 2.

-p.6 Table 3 shows the micro-windows that the authors used in the retrieval. I would like to see an example of L1b spectra at several tangent heights. This gives us an idea about how low the radiance noise is (which the authors describes in page 11 line 5).

We were not sure about including a figure since the paper is already rather long and several spectra of MIPAS are already available in the literature. Nevertheless, to satisfy the referee, we have included a new figure. It shows one spectrum in channel A near 40 km (this channel is mainly used below 50 km); and 3 spectra at tangent heights near 50, 60 and 90 km from channel AB, mainly used to retrieve O3 above 50 km.

-p.7 Line 10: What is the major improvement of the new version 5 of L1b spectra compared to the previous one (particularly compared to v-4.61/62)?

The upgrades in the Level 1b products for version 5 include both scientific and format updates. In particular: i) a truncation of the interferogram to 8.0 cm in order to avoid under-sampling the spectrum for the Optimized Resolution mission; ii) improved Level 1b engineering heights calculation ; iii) Calculation of the quadratic terms for spectral calibration that are provided in the output products; and iv) Additional fields in the Level 1b products, such as the auxiliary L0 data packets that provide information about house keeping data. More info is given at [https://earth.esa.int/documents/700255/707722/MIP\\_NL\\_1P\\_Disclaimers.pdf/17ae8d2b-f1ee-49a8-ade3-1bda7a7c1d7c](https://earth.esa.int/documents/700255/707722/MIP_NL_1P_Disclaimers.pdf/17ae8d2b-f1ee-49a8-ade3-1bda7a7c1d7c)

-p.9 Line 4: "...the calculation of the spectra the contribution (as a...": this sentence appears odd.

Right. It has been changed to: "The forward model also includes the contribution (as a potential overlap with O3 lines) of CO2 lines."

-p.10 Line 11: Threshold of the averaging kernel 0.03, is this an empirical value?

This is based on the many tests we have carried out to characterize the retrieval performance. Retrieved values with an AK smaller than that essentially contains only a priori information.

-p.12 Error analysis for the systematic errors: I would suggest to add a short description about how the authors evaluated the systematic errors (numerically computed by comparing the retrieved profiles using the nominal inversion model and the modified inversion model?).

Correct. We have included a sentence in the middle of Sec. 4, when we start discussing the systematic errors.

-p.16 Line 30: Baron et al. (2011) seems a reference paper for the earlier version of SMILES O3 data.

Correct. That line has been removed.