

Interactive comment on “Ten years of MIPAS measurements with ESA Level 2 processor V6 – Part I: retrieval algorithm and diagnostics of the products” by P. Raspollini et al.

Anonymous Referee #2

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Overview

This article describes the latest ESA processor algorithm (ML2PP V6) for the MIPAS data. This algorithm is an upgrade of the code described by Ridolfi et al. (2000) and Raspollini et al. (2006). The manuscript clearly describes the modifications to such code, such as the Levenberg-Marquard method used, the a-posteriori regularization, the micro windows used, their treatment to negative VMRs, etc. . .

This manuscript is a mandatory reference to all the users of the ESA MIPAS data, I recommend its publication after minor revisions.

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General comments

Please consider using less acronyms, perhaps spelling Gaussian Newton, Covariance Matrix, Averaging Kernel, and Error Consistency.

Please explain the advantages / reasons more clearly for using the regularizing Levenberg-Marquadt method and then an a-posteriori regularization, rather than using just a regular Levenberg-Marquardt method with a smoothing term.

Consider adding synthetic retrievals to proof the validity of your negative VMRs or a more in depth discussion.

Specific Comments

p467 line 13: Why were the MW selected to get similar random and systematic errors for the two phases of the mission rather than to decrease as much as possible the random and systematic errors. Even if this led to different values between the phases isn't that preferable?

p468 line 4: It is not clear if the NOM mode is the NOM mode for FR or OR, I would make the distinction clearly. If the NOM mode described is the FR one, the boundaries are 6 to 68 km.

p468 line 22: The UA mode is the only mode where the number of scans is given. Please provide the number of scans for the rest of the measurements.

p477: Doesn't the error consistency method implies a varying vertical resolution from profile by profile?

p479: Since no regularization is applied to the water vapor retrievals, is this data still influenced by unphysical oscillations?

p485 line 1 / 2: There is no introduction to the MIPAS bands, add a table with the five bands (either in section 1 or 2) with their spectral range, measurement noise (for FR and OR), and with the more abundant molecules measured / retrieved with each of

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them.

p484: For completeness, add a brief description of how the systematic uncertainties were computed.

Minor / technical comments

In general, Figures need to be plotted more carefully:

- numbers in molecules need to be subscripts
- unit brackets need to be consistent among the figures (either () or [] for all the figures)
- please use either height or altitude (just one, sometimes you use both in the same figure - see Fig6)
- In Fig 1, please change the word lambda for the actual lambda symbol.
- In Fig 4, 5, 6, and 7, FR measurements and OR measurements will probably look better in the title of the corresponding plot.

p464 line 18: I believe "continuous" is the wrong choice, since in line 24 (same page) the authors specified that the measurements were nearly continuous due to the hiccup between FR and OR measurements. Perhaps change to: Its unique observation of the atmospheric emission has provided day and night and regularly spaced sampling . . .

p464 line 21: the measurements in the special modes go up to 172 km, no 170 km.

p466 line7 / 8: Order citations by year.

P487 line14: the DoF for ozone are 14 and 21 here but 15 and 21.5 in figure 8 and 9. Please be consistent.

p489 line 6: Order citations by year.

Table 2: consider erasing the MW number; it is probably of no use for the reader.

I think Fig 8 and 9 would look better joined together as done for the AK in the supple-

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mentary material.

The y-label in Fig12 is cut in half.

In the supplementary material, Fig 4 says HNO₃O rather HNO₃.

Fig 7, the caption should say CFC11 instead of F11, just to be consistent

Fig 8, the caption should say CFC12 instead of F12, just to be consistent

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 461, 2013.