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Atmospheric Measurement Techniques Discussions



# *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 #1**

Received and published: 26 February 2013

**Overview:**
The paper describes the ESA Level2 processor ML2PP V6. The processor is used for the retrieval of atmospheric parameters for data obtained during the full life time of MIPAS. The processor is applied to data taken during the first period from 2002 until 2004 where MIPAS was operated in the original full resolution (FR) mode, Additionally, the processor is is applied to the data obtained after reducing the spectral resolution due to mechanical problems and the subsequent measurement in the so-called optimized resolution mode (OR). The authors describe the development and modifications required for the latest processor version, including modifications in the regularization scheme and adjusted microwindow sets. They provide assessments of error budgets



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and vertical and horizontal resolution for both periods, covering the FR and the OR measurements.

The article is important for all who will use these datasets in order to correctly apply the data and interpret the results based on these data. The article is covering and describing all important aspects required. I recommend this article for publication after some minor revisions.

**General comments:**
It was a pleasure to read this article. It is well written and all aspects described in a clear and concise way. However, some sentences appear to be quite complex and long and splitting them upp to shorter sentences could improve their understandability. (e.g. p 465, l 17 to 21, and others) There are a few paragraphs with one sentence only, which could be embedded to adjacent paragraphs.

**Specific Comments:**

**Page 472 Line 117**:
You say that $\mathbf{D}_i$ is a diagonal matrix with diagonal elements equal to those of $\mathbf{K}_i^T \mathbf{S}_y^{-1} \mathbf{K}_i$. Does this approach provide any advantage compared to the common use of the unit matrix $\mathbf{I}$?

**Page 477:**
You present the a posteriori application of the Tikhonov-regularization with a weak constraint. Does this approach provide the possibility for a direct assessment of the smoothing and related errors? Did you assess these errors?

**Page 482, Line 16 ff:**
To which extend does the removal of the $10^{-10}$ ppmv requirement for the last iteration reduce the influence of a possible positive bias, which might have been introduced during the earlier iterations, assuming the last iterations step is comparatively small?



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**Page 483:**
The estimates of the uncertainty of the tangent altitude is unclear. It is difficult to relate the uncertainties of up to 1.5 km (as stated in line 4) to a mean bias of 80 m (line 14).

**Minor/Technical Comments:**

**Page 463, Line 19:**
"...measurements, this made ill-conditioned the retrieval formalism of the MIPAS ..." This sounds strange.

**Page 469, Line 19 - 20:**
Citations should be in brackets or embedded in the sentence

**Page 480, Line 22 ff:**
This sentence is quite long and difficult to understand. Is it correct that the results of one retrieval are used as input for the subsequent species? If yes, then the statement in the sentence before is slightly confusing as the species being retrieved individually might be considered to be a retrieval independent from the previous species, which is not the case.

**Page 482, Line 20:**
Join this sentence with the previous paragraph.

**Page 484, Line 15:**
"percent noise error" should be replaced by "relative noise error"

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