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Atmospheric Measurement Techniques Discussions

Interactive comment on "Position error in profiles retrieved from MIPAS observations with a 1-D algorithm" *by* M. Carlotti et al.

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—Abstract Line 7, comment on the vertical shape of profiles: the point raised by the reviewer is made explicit in the "Introduction" at lines 2-4 of Page 6522 of the original text. In order to strengthen the statement we have modified "the profile" into "the whole profile" at line 3 of page 6522.

Page 6521, Line 26 + Line 28: It is not our intent to review the 2-D operational retrievals. We speak about algorithms and we recall that other exist with 2-D approach. However we acknowledge that Livesey and Read, 2000, GRL was the first to appear (erroneously we had cited this algorithm in Livesey et al., 2006). Therefore, the sentence at lines 25-26 has been modified by citing Livesey and Read 2000, GRL in the

revised text.

Page 6522 Line 11: Sure that pressure plays a role in the error budget of VMR retrievals. However we are focusing here on the "position error" component. The distribution of the information load with respect to pressure is rather symmetric so that it is less important and, on the other hand, we do not consider hydrostatic equilibrium. On the other hand the treatment of also the pressure position error, the use of hydrostatic equilibrium (combining the effects of both T and P position errors) and the respective propagations on VMRs would make the paper too lengthy (another paper could be dedicated to this). We have chosen here to point out the problem of position error; provide an estimate of the size for the major (T) component, and indicate a possible strategy for its correction.

Line 17: Of course a possible strategy to avoid the propagation of T position error is to jointly retrieve T and the VMR target as in Dinelli et al. JQSRT, 84, 141-157 (2003) (for 1-D) and Dinelli et al. 2006 (for 2-D). We point out this fact at the end of Sect. 4.1 of the revised text. In the case of full 2-D retrievals the problem of position error does not apply. In this case we have the problem of horizontal uniformity of the information load distribution; but we are considering 1-D retrievals in this paper.

Page 6523, Line 1: throughout the text we speak of the "retrieval of targets" that are carried out "on simulated observations".

Page 6524, Line 8: The separation between retrieval grid points, the geometrical sampling of the atmosphere, and the spatial resolution (evaluated through the 2-D averaging kernel) of the 2-D system have a complex trade-off. The requested information cannot be easily synthesized but is discussed in the referred papers and references therein. On the other hand the characterization of the products of our 2-D analyses is behind the scope of the present study that deals with 1-D systems.

Page 6525, Equation 1: The information load is a (scalar) property of the clove. It is not directly connected with the retrieval process. The Geo-fit retrieval algorithm retrieves

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profiles that, by interpolation, define the atmospheric field on the vertices. The values needed on the points of optical paths that cross the clove are calculated by means of linear interpolation between the vertices of the clove (see Carlotti et al., 2006 and Dinelli et al., 2010).

Page 6528, Line 14: Added “(along the orbit)” in the revised text

Page 6528, Line 25: In our opinion “with particular atmospheric events” is a second example of coincidence so that it should remain within the parentesis).

Page 6530, Line 17: Because a mathematically ill-posed problem (such as the retrieval of limb observations) becomes singular if the diagonal elements of the VCM matrix are set to zero (division by zero) and you cannot avoid the use of VCM in the Gauss-Newton iterative equation because the covariance (out of diagonal elements) exists in real (apodized) FT observations.

Page 6531, Lines 7-13: MIPAS is (was) backward looking along the orbit track of a (nearly) polar orbit. As explained within the parenthesis at lines 8-9 we distinguish between the descending part (half) of the orbit when the tangent points moves from north pole to south pole (0 to 180 deg of the orbital coordinate) and the ascending part when the tangent points moves from south pole to north pole (180 to 360 deg of the orbital coordinate). The misunderstanding could be on the on the statement “along the longitudinal domain” that in the revised text we have changed into “along the longitudes of a given latitudinal band”.

Page 6532, Line 5: Above and below the ozone VMR becomes so small that the values of its absolute error is dominated by other effects (including the small spectral noise). On the other hand, in order to appreciate correlations outside the reported range, a different colour palette should have been used and, with the new palette correlations would become masked in the altitude range where ozone is mostly present. We have added a parenthesis in the revised text explaining this concept.

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Line 29: Section 4.3 deals with “externally provided T profiles” so the provided field is the one provided by the reference profiles at the blue points. In order to avoid this misleading we have added the specification within parenthesis: “. . .. . .between the surrounding (externally provided) T profiles. . ..” in the revised text.

Page 6536, Line 19: We are speaking here of 1-D retrievals made with a single MW in order to (only) calculate the 2-D AK for the 1-D retrieval. In this case the use of an a-priori would stabilize the matrix inversion but would also mask the origin of the information that is indicated by the AK obtained in this way. To promote the 2-D approach is not a goal of this paper.

Page 6537 Line 3: There is typo (corrected in the revised version). The corrected period is: “. . .reaches 1.5-2 latitude degrees. In the presence of. . .”

Line 14: in the revised text the statement has been changed with “provide satisfactory performance within the VMR retrieval”.

Figure 9, Also. . ..: we miss the point. All the plots here are r.m.s values for both T (upper left panel) and the VMR targets (as it was in Fig. 6).

All the changes suggested by the reviewer and not reported in the above list have been implemented in the revised text.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 6519, 2012.