

Interactive comment on “The horizontal resolution of MIPAS” by T. von Clarmann et al.

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Review of "The horizontal resolution of MIPAS"

by T. von Clarmann, C. De Clercq, M Ridolfi, M Hoepfner, and J.-C. Lambert

General comments

This is a very well written paper presenting the relevant and new concept of horizontal resolution of limb sounding satellite instruments. With a few exceptions the paper is really easy to follow. I agree with referee #2, that this manuscript should be published with minor revisions and ask the authors to consider the specific comments made by referee #2 as well as the mainly minor comments listed below.

Specific comments

1) Page 110, lines 6/7: "The ESA online processor retrieves profiles at the tangent

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points of each limb scan"

Does this mean that the retrieved trace gas abundances (or temperature) at different altitudes are assigned different horizontal coordinates depending on the spatial movement of the tangent point during the limb scan?

2) Page 111, line 11: "In some cases, however, the majority of information of MIPAS profile retrievals originates from the atmosphere slightly beyond the tangent point, e.g. for daytime tropical NO₂ (Figure 4)."

I'm not sure I understand this sentence. Does "tangent point" here refer to the tangent point at 30 km tangent height, or to the black solid line in Fig. 4? Fig. 4 shows, that the centroid distances are at most altitudes slightly shifted towards the satellite (with 2 exceptions at 42 km and about 50 km) relative to the location of the tangent points, which appears to contradict the above statement (if I understand it correctly). Or does the sentence simply express the fact, that (because altitudes below 25 km are not retrieved) the centroid distances are negative for most altitudes?

3) Caption Fig. 4: "Some minor information displacement towards beyond the tangent point is visible for uppermost and lowermost altitudes"

Perhaps I'm not getting the point, but the Fig. shows, that for the lowermost (around 25 km) and uppermost (around 70 km) altitudes there is a minor displacement towards the satellite.

4) Page 111, lines 20 - 25: "Moreover, the interaction ... "

I read these sentences many times, but find it very difficult to understand, why the combination of vertical scanning and satellite movement leads to a denser sampling beyond the tangent point. I really don't want to be picky, as this is a very nice manuscript. I just don't understand what is meant here. Perhaps you can clarify this point further.

5) Page 112, lines 1 - 3: "Most information on temperature originates from a point displaced from the actual tangent point towards the satellite by about 50 to 100 km

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(Fig. 5)."

I suggest adding a brief qualitative explanation why this displacement by 50 to 100 km towards the satellite occurs?

6) Page 115, line 13: ".. the methods to calculate the horizontal averaging kernels can be applied to each limb sounding instrument with lines of sight approximately in the orbit plane .. "

This statement is probably not correct if limb-scatter observations are considered as well. In the case of observations of emissions all the information arises from within the FOV. However, for limb-scatter observation absorption also takes place along the path to the line of sight, where the photons are scattered into the instrument's FOV. Therefore, one would have to consider the horizontal resolution across viewing direction, too.

7) You mentioned that no additional vertical constraint was applied (apart from using the tangent height grid as the retrieval altitude grid). I suggest adding a brief discussion how a vertical constraint will affect the horizontal resolution.

Typos etc.

Page 106, line 2: "altitde" -> "altitude"

Page 106, line 8: "trace species abundances profiles" -> "trace species abundance profiles"

Interactive comment on Atmos. Meas. Tech. Discuss., 1, 103, 2008.

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