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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Characterization of methane retrievals from the IASI space-borne sounder" *by* A. Razavi et al.

Anonymous Referee #2

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In general, the paper "Characterization of methane retrievals from the IASI space-borne sounder" by A.Razavi et al. is well written to characterize the methane retrieval from IASI, and discuss the opportunity to use shortwave band near 2760 micron to increase the sensitivity to the surface methane. However, the authors oversell the product by claiming the error of 1% in the total column. Since the maximum sensitivity is between 4-10 km and the sensitivity below 2 km is low, and the profile error is between 1-2.5%, from my it is impossible to derive the total column in 1%. The VMR of 2.101 pm from global distribution and mixing ratio about 2 ppm in Figure 10 is way too high than reality, indicating some problems in the retrieval. Moreover, this is inconsistent with the claimed error of 1%. This concern has to be addressed and clarified before being suitable for publication in ACP.

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Major comments:

It is not clear the use of a priori information in different regions, particularly the off-diagonal elements in the covariance matrix, as it is related closely related with the adjust of the lower troposphere CH4 as seen in Figure 10. Otherwise, the error of 1% is impossible to reach.

Specific comments:

Given the sensitivity in the Q branch is much larger than in the spectral window selected for retrieval, it is hard to believe to the impact to include and exclude Q branch channels on the retrieved profile was insignificant. More tests are recommended.

Page 7624, lines 5-6: It is not clear "the same priori information is used for each location and time". Does the priori information for different location change? For instance, are the priori file as well as its covariance are the same in the northern and southern hemisphere?

Page 7624, lines 16: the maximum sensitivity in the tropics is between 8-14 km, instead of 4 to 10 km.

Page 7624, lines 20-21: this sentence is not complete.

Page 7625, lines 27-28: what does it really mean "error" exceeding 1.5% ? what is the truth it is compared ? need to revise it.

Page 7626, line 10: normalized mixing ration of 2.101 is unrealistic. Some thing must be wrong here.

Page 7626, line 11: the cut-off latitudinal gradient at 30 N. Is it realistic ?

Page 7626, lines 15-19: looks the error is associated with the altitude, not just emissivity.

Page 7626, lines 26-27: " . . . SCIAMACHY is sharper and located farther south". Is

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it the slope of gradient from SCIAMACHY is larger ? why located farther south ? Not clear.

Page 7628, lines 8-10: is an DOF increase of 0.06 significant ? The difference in Left and right (Fig 9) is very small. How about in the mid latitude or high latitude region ?

Fig 10: Since the sensitivity using v3 is low in the lower troposphere (below 2 km), why does it move even larger than its most sensitivity region at 10-14 km? Some changes must have been made.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 7615, 2009.