**Atmospheric
Chemistry
and Physics
Discussions**

Interactive
Comment

Interactive comment on "First global distributions of methanol and formic acid retrieved from the IASI/MetOp thermal infrared sounder" *by* A. Razavi et al.

Anonymous Referee #1

This manuscript describes the global retrieval of methanol and formic acid from the IASI IR sounder aboard MetOp-A. The manuscript is clear and provides a good overview of previous work on this topic. There are a couple of major points that need to be addressed and some minor issues detailed below. After the authors have addressed these, in particular improving Section 5, I recommend that this article be accepted for publication in ACP.

Major comments:

1. Section 3.1: How were the covariance matrices calculated for methanol (from daily varying IMAGESv2 profiles? Or spatial variability? Or...?) and for Section 4.1 what is

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

the error covariance on the a priori profile of formic acid? How sensitive is the retrieval to the specification of the a priori covariances?

2. Figure 5 and explanatory text: Please provide more details on the "training set" of full retrievals used. For how many days? Over what time period? Globally or in what regions? Are there seasonal differences in the expressions given by equation 3 and 4?

3. Section 3.3: In addition to errors, can you comment on detection limits? Is there a minimum concentration of methanol and formic acid that can be retrieved with IASI?

4. Section 5, 1st paragraph: It's not clear what value there is in looking at global CH3OH v HCOOH correlations. Perhaps the authors could select either enhanced regions to comment on sources or colour these plots regionally as in Figure 12?

5. Section 5: In order to link the observed concentrations with fire activity, it might be useful to show an annual timeseries of monthly mean CH3OH columns, HCOOH columns, CO columns and fire counts over different fire regions. This would provide a more compelling description of the importance of this source to observed concentrations.

Minor comments:

1. Page 21477, line 11: grammar, "among which are methanol..."

2. Page 21477, line 24: grammar, "Other VOC observations..."

3. Page 21479, line 11: grammar, "coordinated measurement campaigns..."

4. Section 1.2: Would be nice to include the Beer et al., TES results in this overview of methanol

5. Page 21480, line 24: grammar, "precipitation (Sanheueza et al...."

6. Page 21480, line 25: The primary reason for the decrease in lifetime in the FT is the scarcity of precipitation

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

7. Page 21482, lines 15-20: Could you comment on the uncertainties on the CH3OH and HCOOH line parameters?

8. Page 21482, line 23: grammar, "in October 2006 in a..."

9. Figure 1: The a priori is shown with vertical resolution exceeding the retrieval. Could you include the 4-layer version used in the retrieval on Figure 1 as well?

10. Page 21485, line 25 and page 21486, line 2: typo: The text refers to Figure 3 not, Figure 4 as given.

11. Page 21486, line 8: What is the range in DOFs for the retrievals?

12. Page 21486, line 25: Is the ozone contamination in the CH3OH retrieval at all altitude dependent?

13. Section 3.2, last paragraph: The statement that 5% of methanol comes from biomass burning emissions requires a citation. While the IASI observations are certainly suggestive of fire emissions, no comparison with models is shown, thus it seems unjustified to claim that models underestimate these emissions. Can you provide some comparison or cite some values for simulated CH3OH columns in these regions?

14. Page 21489, line 15 and line 17: grammar, replace "estimation" with "estimate"

15. Section 4.1: It seems a bit arbitrary to not retrieve over oceans, given that concentrations in outflow may be of general interest. Could you justify this a bit more? Is the signal particularly low over this region? Do the oceans meet the minimum 5K thermal contrast requirement? If not, you may be able to use this later criteria to eliminate this data from your analysis in a more justified fashion.

16. Section 4.1: Can you say anything about vertical sensitivity with this modified retrieval approach? Similarly, how important is the a priori constraint in these retrievals?

17. Section 5: what is the impact of filtering out points with low thermal contrast on these correlations?

18. Section 5: Comment on the vertical sensitivity of the HCOOH, CH3OH and CO retrievals – do they coincide? Are the observations looking at the same air masses?

19. Section 6, final paragraph: Could the authors comment on the challenges of comparing these non-traditional brightness T retrievals with in situ profiles and models? Are averaging kernels routinely estimated for these retrievals, or would characteristic "average" averaging kernels need to be applied when making comparisons?

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 21475, 2010.

C9777