**Atmospheric
Measurement
Techniques
Discussions**

Interactive comment on "Retrieval of MetOp-A/IASI CO profiles and validation with MOZAIC data" *by* E. De Wachter et al.

Anonymous Referee #1

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The abstract and text are poorly written because there are many unsupported statements. The authors instead need to state the biases and calculated uncertainties for each comparison site and then whether the calculated uncertainties from noise, H_2O, temperature, and surface emissivity (or observation error) are consistent with the actual uncertainties (RMS difference between retrieval and MOZAIC data adjusted by averaging kernel and constraint vector). There also needs to be a discussion as to why the biases are changing in an inconsistent manner from site to site (Frankfurt to Windhoek) even though the variability of the MOZAIC data appears to be reasonably captured by the IASI data within the expected random uncertainties. The authors also need to remove all subjective language such "excellent, reproduce, very good, etc." from the text, unless supported by the uncertainty calculations.

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Specific Comments:

— Page 3272 Line 9 Sentence beginning with "Closer" Good agreement means that the data agree within calculated uncertainties. Please provide these uncertainties in this sentence. Also, what does "resp." mean?

— Page 3272 Line 16. As in previous comment. What does "reproduce" mean? Are there in situ data of these fires and the remotely sensed profiles exactly agree with these in situ data? Do they agree within uncertainties? Are there biases?

— Page 3272 Line 20: Again, what does reduced performance mean?

— Page 3273 Line 12: You should also mention MOPITT, AIRS, and TES.

— Section 4.4 I am confused by this entire section. After applying the averaging kernels to the MOZAIC data, the difference between the IASI estimates and the "smoothed" mosaic data should be consistent with the measurement error (due to noise and other geophysical parameters that affect the radiance such as temperature) and estimated sampling error, as well as any biases in the data and NOT the smoothing error as indicated in the text. The authors again have many unsupported statements: ". . . excellent agreement". Excellent agreement (or any agreement for that matter) means that the data agree within the calculated uncertainties; it does not mean that the biases are "small".

What a reader needs to see in this section (for example) is a few statements along the lines of:

"The IASI data in the lower and upper troposphere are compared to the MOZAIC data at two different sites, after the MOZAIC data have been adjusted by the averaging kernel matrix and a priori"

"We find that the IASI upper (and/or lower) tropospheric CO (between XXX hPa and YYY hPa) is biased high compared to the adjusted MOZAIC retrieval by ZZZ%. "

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"After accounting for this bias, we find that the IASI CO retrievals agree (or do not agree) to within the average calculated uncertainties due to temperature, noise, emissivity, and H2O."

If the retrievals do not agree within the calculated uncertainties or if the biases between locations are different then there needs to be a third statement along the lines of:

"Larger then expected differences could be due to the IASI temperature retrieval or to clouds or to other retrieval artifacts not accounted for in the forward model or to non-linearities in the retrieval or to sampling error between the IASI and MOZAIC data. A Future retrieval algorithm or validation campaign will need to address these uncertainties"

— Section 5 Conclusions. Include a discussion of the uncertainties and whether the IASI data agree or do not agree with the MOZAIC data within these uncertainties. Again, remove all subjective language such as "good agreement, excellent etc." unless supported by the calculated uncertainties. Also discuss the variability of the biases between sites and suggest possible reasons for these variations.