

Interactive comment on “Retrieval of tropospheric CO column from hyperspectral infrared sounders – application to four years of Aqua/AIRS and MetOp-A/IASI” by T. Thonat et al.

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We'd like to thank referee#1 for his/her comments. Here are our answers.

p3862 l6: spell out acronym "4A"

→ Done.

p3862 l9: "half a maximum between 200 and 750 hPa": if this refers to the vertical resolution (FWHM of AK columns), please state this explicitly.

→ It does refer to FWHM. This has been stated in the abstract.

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p3862 l17: "relative difference". Is it the average difference?

→ Yes, it is the average relative difference. The text has been modified accordingly.

p3863 l1: In the middle atmosphere, CO is mainly produced by CO₂ photolysis. Therefore, this statement should be restricted to "tropospheric CO".

→ Done.

p3864 l 20: "estimations". Wouldn't "retrievals" be a better word choice?

→ Yes. The text has been modified accordingly.

p3864 l 21: "Here, we use an alternative approach for the retrieval of a tropospheric integrated content of CO, that relies on differences between simulated and observed radiances...". Also optimal estimation relies on differences between simulated and observed radiances....

→ We have added to this sentence the reference to the couples of channels, which is specific to our method.

p3868 l 17: It might be better to refer to the 4.6 um region since 4.7 um (i.e. < 2160 cm⁻¹) is NOT used in the study and it is also strongly affected by O₃ interferences.

→ Since 4.67 um is the central wavelength of the CO absorption band, we use this value. We added O₃ to the list of the interferences because, as you said, it strongly affects a part of the CO band, and because O₃ sensitivities are also calculated, plotted in Fig.1 and appear on Tables 1 and 2, even if very small.

p 3869 l20: Interfering spectral signatures have the potential to bias the retrievals while radiometric noise errors would cancel out on average. Is it really a good way to merge these quantities when defining a parameter that reflects the suitability to measure CO?

→ Here, we want the "interferences" term to quantify any signal that might interfere with the CO signature in the retrievals, and this includes both the uncertainties on the

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input atmospheric and surface data and the radiometric noise. Moreover, even if we present in the paper only monthly means, the product is at the IASI/AIRS spot scale, meaning that the noise is not canceled out by averaging. Last, the difference between the STI with the noise and without is very small, since the typical noise is $\sim 0.1-0.2$ K for those channels.

p3872 l10-19: It is not really clear what has been done to remove potential(?) biases. Have independent satellite observations been used to determine the bias (in this case not being "potential" but real)? Please explain in a clearer way.

→ We are talking about *radiative* systematic biases, and about differences between 4A simulations based on radiosondes measurements and IASI/AIRS colocated observations.

p3878 l 17: typo: ..due to a too strong cloud detection...

→ Done.

p3879 l24: "...a shift of about two months". This is true only for the SH, the time shift in the NH appears to be considerably longer.

→ You're right, it's longer. The fact is the signal in NH is not as clear as in SH because of the impact of pollution from the North Hemisphere. The high values in March-April are due to remaining fire signals in northern Africa, fires in Central America and in the North of South America, but also because the background level is more important. The text has been modified to make this clear.

p3882, l28: "twice better noise". Twice smaller noise?

→ Yes. It has been corrected.

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