

Interactive comment on “IASI carbon monoxide validation over the Arctic during POLARCAT spring and summer campaigns” by M. Pommier et al.

Anonymous Referee #2

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This paper presents the validation of the IASI satellite CO retrievals with in situ profiles from aircraft during the POLARCAT experiments. This is a valuable analysis for users of the IASI data, and a comprehensive and detailed validation of satellite observations is completely appropriate for publication in ACP. However, I agree with Referee 1, that the paper should be improved before publication and with the suggested changes. Following are my specific comments.

The structure of the paper is confusing. I think it would be best to start with a comprehensive discussion of the IASI measurements and the CO retrievals, including the significance of the averaging kernels, and how an in situ profile needs to be trans-

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formed for proper comparison to the satellite retrieval. A discussion of the sensitivity of the retrieval to surface emissivity, etc., would be appropriate here. This could be followed by a discussion of the aircraft measurements, and their extension into the stratosphere with the ACE retrievals. Then the results of the validation comparisons could be shown. Finally the examples of long range transport could be shown, though I'm not sure it really fits with the paper.

Section 5.1: I think it should be emphasized that the transformation of the in situ profile with the averaging kernel and the a priori profile is required to take into account the sensitivity of the retrieval to the true profile. Frequently the transformation is referred to as 'smoothing' which I think is misleading, as the process is far more than that. Also, the colocation criteria are very stringent; I think they could be expanded significantly without harming the results.

Fig. 8a: How are you able to transform the in situ profile that only goes up to 6 km? Are the averaging kernels just truncated at that altitude? This does not make sense to me, and I think is misleading as a proper way to perform validation.

Section 5.3.1: I don't understand why there is such a large difference at the surface between transformed in situ and IASI retrieval. If the IASI retrieval has little sensitivity at the surface, the comparison at the surface should be a priori to a priori. However, the averaging kernel for the surface is generally the largest (Figs 8 & 9), so I guess that explains the difference. Perhaps this could be explained in the paper.

Fig 10 & 13: I think it would be more informative to plot the mean of the differences between IASI and in situ, rather than the means of each measurement. Presumably the measurements for each aircraft cover a large range of conditions that are getting lost in these bulk averages.