

Interactive comment on “Preliminary validation of column-averaged volume mixing ratios of carbon dioxide and methane retrieved from GOSAT short-wavelength infrared spectra” by I. Morino et al.

Anonymous Referee #1

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The manuscript "Preliminary validation of column-averaged volume mixing ratios of carbon dioxide and methane retrieved from GOSAT short-wavelength infrared spectra" of Morino et al., submitted to Atmos. Meas. Tech., covers an important topic, namely the validation of the operational greenhouse gas data products of GOSAT. The topic is appropriate for Atmos. Meas. Tech. and I recommend its publication after the comments given below have been considered by the authors.

Abstract: It is stated that the precision "is considered to be about 1 percent". Is this a
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result of the validation or is this an assumption? This should be a result of the validation but it is not clear from the paper how this conclusion has been derived. Please provide additional evidence that the precision is 1 percent (if this is in fact the case) and modify the paper accordingly (abstract, main part and conclusions).

Abstract: The statement that the GOSAT XCO₂ retrievals show similar features as the g-b FTS data is not supported by Fig. 10. Please modify this statement.

General - relative accuracy: GOSAT has been specified to achieve a relative accuracy of 1 percent for CO₂ and 2 percent for CH₄ (eg, Nakajima et al., 2010). Has this requirement been met or is it not possible with the presented validation approach to verify this? Please add a discussion on this important validation aspect. From Tab. 2 I conclude that this requirement has likely not been met at least for CO₂ as the station-to-station (average) differences often exceed 1 percent (e.g., there is a bias of more than 5 ppm between Orleans and Garmisch or Park Falls). I recommend to add to Tables 2 and 3 the total root-mean-square (RMS) of the average difference (in addition to the mean difference where errors cancel) as a measure of overall station-to-station bias which may be interpreted as an estimate of the achieved relative accuracy.

General - averaging kernels: Have averaging kernels been considered for the comparison? Please add this information.

Section 4.1, page 5621, line 8: Has the AOD been retrieved from GOSAT? Which wavelength?

Section 4.2, page 5621, line 16: It is unfortunate that the maps only show the last retrieved value because earlier retrievals are overwritten. Why have the data not been gridded (averaged) to avoid this?

Section 4.2, page 5621, line 25-26: I guess the statement that the precision is 1 percent is not based on the standard deviation of the monthly mean XCO₂ over Australia, or?

Section 4.3.1, page 5622, line 15 and following: What is the selection criterium for the

data shown on the left of Figs. 4 and 5 (and 7 and 8)? In many cases more data are shown on the left compared to the right but only for the right hand side the selection criteria are given. Please add this information.

Section 5, page 5625, line 1 and following: Please see the comments on the "1 percent precision" statement given above.

Section 6, page 5625, line 12 and following: Please see the comments on the "1 percent precision" statement given above.

Tables 2 and 3: Please also report the correlation coefficients. Please also give the average station-to-station bias (see comment given above).

Fig. 6: Please add the correlation coefficient.

Fig. 9: Please add the correlation coefficient.

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