

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2021-66

Anonymous Referee #1

Referee comment on "Retrieval of solar-induced chlorophyll fluorescence (SIF) from satellite measurements: comparison of SIF between TanSat and OCO-2" by Lu Yao et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-66-RC2>, 2021

General comment

The manuscript of Yao et al. presents a DOAS-like retrieval algorithm to estimate the amount of solar-induced chlorophyll fluorescence (SIF) from TanSat measurements. For a technical paper, the actual retrieval algorithm is insufficiently well explained and results would not be reproducible. The SIF retrieval strategy including Eq. (2) is well documented in the literature. However, it remains unclear how the only novelty, that is the surface pressure to model residual O₂ absorption, is incorporated and affects the retrieval. Perhaps a Figure and sensitivity analysis could illuminate the importance and necessity of this state vector element.

There is some confusion as to when the official OCO-2 data set (IMAP-DOAS) and when the IAPCAS data are used. While I think it is a good idea to compare the performance of the proposed retrieval algorithm (Sect. 2.4) based on OCO-2 L1B data, it is inappropriate to use the IAPCAS OCO-2 data in Fig. 3 (where it is not clear which OCO-2 SIF data has been used), 4, and 5 (again not clear which OCO-2 data set has been used). In fact, it may even disguise shortcomings. For example, the difference maps in Fig. 4 suggest that there is considerably less coverage for OCO-2, while I am certain that the official data provides a better coverage. For Figs. 3, 4 & 5, the official OCO-2 data is urgently needed to evaluate the retrieval performance objectively.

As the authors cite Yao et al., 2021 with the same topic and a substantial overlap in co-authors, it is unclear to me what would justify another publication, especially when considering the shortcomings of the present manuscript.

Minor comments:

L43: Middle Medium

L90: spectrum -> spectral

L143 What is "side radiance"?

L149: significant systematic

L184 Point 2: I believe the opposite is meant here, continuum level radiances outside the range of 15-200 W/m²/μm/sr

L196 & Table 1: The authors mention that there is a small bias between the official OCO-2 product and the results of their own retrieval algorithm. I suggest to add the intercept and slope to Table 1, so that the reader can come to their own judgement as to how well the retrieval algorithm performs.

L256-259: The described quantity should not be referred to as "retrieval uncertainty". In fact, this is the standard error of the mean and is a measure of retrieval error plus natural variability.