

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-66

Anonymous Referee #2

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-RC1>, 2021

The manuscript by Yao et al. presents the retrieval of SIF from TanSat satellite measurements and compares the retrieved TanSat SIF to OCO-2 SIF and GPP data. This study covers a great mission and dataset and the topic is important for the scientific community. The manuscript is written in a concise way, however, there are some open questions which are not/partly addressed. I recommend it to be accepted after the following issues are addressed.

General comments:

- The algorithm presented in this study has already been partly shown, tested and optimized in a previous study. In the present manuscript, the authors describe the used algorithm, but do not explain what is new/different compared to other existing SIF retrieval algorithms. They directly compare the SIF results to other SIF measurements. As this is a technical journal, I think it would be important to have more insight on the used SIF retrieval algorithm, particularly how it compares to existing algorithms, where the differences are, why a new algorithm is used etc. To what extent have the points mentioned for example in Parazoo et al., 2019 (<https://doi.org/10.1029/2019JG005289>) been considered when comparing different SIF satellite products? Why did the authors choose OCO-2 SIF and not for example TROPOMI SIF as a comparison?

- The order of the introduction and the transitions from one paragraph to the next are sometimes hard to follow. The TanSat satellite is mentioned in a different paragraph than the other SIF satellites but without highlighting the differences. It is also not mentioned that first TanSat SIF maps already exist (Du et al., 2018) and why a new algorithm has to be used. The scientific/ research questions are missing in the introduction.

- Besides global maps, the authors present results from a sample region using maps and a

correlation plot. However, besides this visual comparison, I think a SIF timeseries of the chosen dataset in this sample region in comparison to OCO-2 SIF is very helpful and should be discussed.

Minor/technical comments:

L1: I would add something like satellite/spaceborne/ from space etc. to the title

L18: What is a sensitive instrument? Please clarify shortly.

L21: Globally or for which location and resolution?

L24: gridded

L25: Specify what the official OCO-2 SIF product is and what the difference is to L22/ the product retrieved in this study

L25: seasonally-gridded

L27: Where does this GPP data come from (Ground-based/globally, spatio-temporal resolution etc.). What is the result of the comparison?

L36: remove ;

L46: ... and Frankenberg et al. 2011

L94: what about OCO-2 data?

L98: What is the major outcome of this previous study?

L100: What are the research questions for this study?

L101: a bit out of context, what other products are available and why this selection? Maybe move this selection to the retrieval method; Space between number and unit.

L106: Why is the wavelength window name (757 nm, 771 nm) not part of the shown wavelength range (758.3-759.2 nm, 769.6 – 770.4 nm)?

L116: reference missing

L146: Not all readers are XCO₂ retrieval experts, please explain the complexity and why this approach was selected.

L171: Specify the footprints in both panels.

L188: first

L191: add reference for this retrieval approach; for which spatial and temporal resolution and location?

L196: applied to

L197: remove ,remained`

L207: check wording

L221: From which satellite are the SIF measurements in (a)? ,evergreen` instead of ,evergreen`

L224: check wording

L238: The TanSat SIF data shown here is from 2017-2018; ground-based SIF measurements from different stations globally are already available for this time.

L248: Which instrument performances are meant here? Please explain.

L298-306: Are there and what are the differences between the TanSat-GPP and OCO-2-GPP correlation? This is shown in the Figure, but not mentioned in this discussion part.

L315: What are the major improvements/ changes from TanSat to TanSat-2?