

## Comment on essd-2021-237

Anonymous Referee #2

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Referee comment on "Global GOSAT, OCO-2, and OCO-3 solar-induced chlorophyll fluorescence datasets" by Russell Doughty et al., Earth Syst. Sci. Data Discuss.,  
<https://doi.org/10.5194/essd-2021-237-RC2>, 2021

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The authors described the global Level 2 SIF Lite data products for the Greenhouse Gases Observing Satellite (GOSAT), the Orbiting 14 Carbon Observatory-2 (OCO-2), and OCO-3 platforms. This study provides valuable SIF products, hence is of high interest for the SIF and remote sensing community. I recommend a major revision before the acceptance of the paper.

### General comments:

1. For introduction section: the authors described the global Level 2 SIF Lite data products from GOSAT, OCO-2 and OCO-3 platforms. However, the necessity and importance of harmonizing such a dataset was not adequately introduced in introduction section. Why these three sensors? Why not including GOME-2, TROPOMI? So, I suggest to restructure the introduction section to give clear explanations of the inventive of this study.
2. For the introduction of Satellite platforms, I suggest to add a table to show the main specifications of the sensors.
3. For Methods section: the detailed introduction of the SIF retrieval methods is missing. Several papers on the SIF retrievals for the platforms introduced in this paper have been published. Some of them are for simulated data, or improved compared with earlier versions of the SIF product. Which ones are adopted for the current products? So, it's better to give more details on the retrieval methods, as well as the quality control of the products in the paper.

SIF at 740 nm was estimated by SIF at 757 and 771 nm with Eq. (1) and included in the products. But how were the coefficients obtained? It's not clear. Even if there is a relation among them as shown in Eq. (1), the coefficients are expected to change with plant types, solar irradiance, environmental conditions etc. What's more, there is a lack of quantitative evaluation of the estimated SIF at 740 nm. A possible solution is to compare the estimated SIF@740 with the retrieved SIF@740 by TROPOMI, which can be used as a reference.

### Specific comments:

- line 11, second 'has' -> have;  
line 49, PAM is not limited to measuring steady-state Fs;

line 55, are all the three SIF products version 10?  
lines 66-67, what is the spatial resolution of the gridded data?  
lines 71-75, why the introduction of GOSAT is missing?  
line 81, why are some parts of the figure notes in bold? Please be consistent. same problem for all the figures;  
line 89, it's not clear to me why Figures 1 & 2 are put here;  
line 92, signal to noise ratio -> signal-to-noise ratio;  
line 93, remove 'because';  
line 97, measurement precision or retrieval error? how do you get this value (0.5 W/m<sup>2</sup>/sr/um)? 's' should be 'sr';  
line 104, the references are cited twice;  
line 105, I suggest to also provide the spectral resolution in nm, or convert cm<sup>-1</sup> to nm;  
line 199, s -> sr in the unit;  
line 203, criterion -> criteria;  
line 211, section 4.1, please check my comments above;  
line 219, s -> sr in the unit;  
lines 233-234, how did you get the empirical relationship?  
lines 240-241, it's not clear to me how these numbers are used in Eq. 1;  
line 249, why  $1-\sigma$  represents the random component of the retrieval errors? according to Eq. 2 and lines 255-256, it represents the instrument noise;  
line 258, any sources for these numbers?  
line 263, can you explain how you obtained Eq. 3?  
line 265, section 4.4 Bias/offset correction, why did you carry out this correction? This correction was not performed for the original GOSAT and OCO-2/3 SIF products?  
lines 270-271, why do you choose these days for GOSAT and OCO-2/3?  
line 291, ere -> where;  
line 349, Figure 3, legends are illegible;  
lines 378-379, rephrase; how do you define 'weak'?  
line 435, are the top panels for instantaneous SIF, and bottom panels for Daily SIF? these should be explained in the figure note;  
line 446, Figure 8, I would suggest add more numbers for the color scales, especially for the map of ratio.