Reviewer 1

General comments:

The researchers accomplished SIF retrieval from the Sentinel-5P TROPOMI mission and provided data with high quality, which expands the application of TROPOMI data in vegetation monitoring. The methods and materials used in the manuscript are reasonable and described in detail, which can support the publication of the dataset. The dataset is accessible and complete, the quality value and retrieval error of the data were fully evaluated. The TROPOSIF product has a high consistency compared with previous SIF products, and the results are reliable. There are only a few questions to be discussed.

Thank you for the positive comments.

Specific comments:

1. Line 37 to 42: Since Caltech's TROPOMI SIF product has been proven to be effective, the gaps in previous research and the purpose of this research should be more clearly stated.
   The following text has been added (**L63-66**):
   "Our work is aimed at developing a TROPOMI-based SIF processor which can be implemented at ESA's data processing facilities for the operational generation and distribution of the data product to users. In addition to SIF, reflectance spectra from each input radiance spectrum are also included in the product for combination with the SIF retrievals."
2. Line 88 to 90: To what extent can the influence of the atmosphere be considered negligible? Can you add a comparison to compare the retrievals using calculated effective atmospheric transmittance and transmittance set as 1?
   The following text has been added (**L96-99**):
   The effect of atmospheric absorption on SIF retrievals at far-red wavelengths had been previously evaluated by means of simulation in \citet{Guanter_SVD_2012, Frankenberg_2012}. The effect should be in the range $\sim$3--6\% for a typical aerosol optical thickness of 0.2 and observation angles between 0° and 45°.
3. Figure 8: Previous SIF products have shown a tendency that SIF magnitudes decrease with narrower fitting windows toward longer wavelengths near the far-red fluorescence peak and in fitting windows with less water vapor absorption (Parazoo, 2019), which is inconsistent with the results shown in Figure 8, how do you account for this?

   In our case, retrievals in both fitting windows are normalized to 740 nm. For that, a fixed TOC SIF spectrum is used. We find variations in the slope of SIF(743-758) = f(SIF(735-758)) between 1 and 1.5. We argued in the text that "Further research is needed to understand whether the variations in the slopes are due to retrieval biases over some vegetation types or to leaf/canopy radiative transfer effects making the shape of the SIF emission to depend on the leaf and canopy type."

   This text referring to previous results by Parazoo et al. has been added "A dependence of SIF retrievals on the fitting window and atmospheric absorption is also reported in \ citet{parazoo_2019}" (**L283-285**)

Parazoo, N. C., Frankenberg, C., Köhler, P., Joiner, J., Yoshida, Y., Magney, T., Sun, Y., and Yadav, V.: Towards a Harmonized LongTerm Spaceborne Record of Far-Red Solar-Induced Fluorescence, Journal of Geophysical Research: Biogeosciences, 124, 2518–2539.

1. Line 393 to 398: The use of the 735-758nm fitting window is a feature of this research, but the limitations of this window were also stated. Is it possible to select one of the retrievals from the two fitting windows for each observation according to several indicators (e.g. cloud fraction threshold) to merge the retrievals from the two fitting windows and maintain the advantages of both, rather than providing two separate datasets?

   Thanks for the suggestion, this is a very interesting idea. The main limitation to combine the two SIF retrievals in the way that you describe might be in the fact that they might be differently affected by retrieval biases and/or radiative transfer effects, so that the combination of the two data sets might introduce noise in the time series with respect to that consisting in one single data set.
   We have added the following text to the manuscript “Approaches for the combination of the two SIF data streams into a single one will be evaluated in future research” (**L411**)

Technical corrections:

1. Figure 1: The “FT” in the figure note is inconsistent with the abbreviation “FW” in the figure.
   Caption corrected.
2. Figure 2: Only the weights of the first 8 singular vectors are shown in the figure, which is inconsistent with the figure note.

   Caption corrected.