EGUsphere, referee comment RC2
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Comment on egusphere-2022-640

Anonymous Referee #1

Referee comment on "Synergy between TROPOMI sun-induced chlorophyll fluorescence and MODIS spectral reflectance for understanding the dynamics of gross primary productivity at Integrated Carbon Observatory System (ICOS) ecosystem flux sites" by Hamadou Balde et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-640-RC2, 2022

The manuscript written by Balde et al., wish to demonstrate the potential of SIF as a tool for GPP estimation in different vegetation types. The authors find a linear correlation between SIFd and GPP in different sites and also different vegetation types. In the next step, the authors use the random forest method to build a model that predicts GPP from SIF, reflectance, vegetation index (VI), and their combination. All models were able to predict GPP with a good correlation. In all the models using it, SIF was the major component explaining the variation.

Although the authors of the MS show the potential of using SIFd, Reflectance, and VI as a predictor of GPP several issues rise from the MS:

The authors claim there is a linear correlation between SIFd and GPP both in the site and the PFT levels. However, a quick look at the figures (2-4) shows that in most cases at some point the SIFd-GPP relation reaches saturation. The authors did not mention this even once in their manuscript. Several works are demonstrating this relation and discuss its meaning (see He et al., 2020 for example), however, the authors here ignore it and refer to it as a linear relation. Moreover, in many cities and PFT, the linear correlation is also low for the same reason.

- I'm not sure what is the added value of the pooled graph of all PFTs vs. SIFd (Fig. 4).
- It is very hard to estimate the performance of the different models vs. EC GPP in Figure 8. Please consider reducing the size of the dots and making them transparent.
- Line 399: Please try to explain why the high correlation in the DBF and OSH PFT's.
- Line 410: This is not clear to me, the authors mention in the methods section that they took out the cloudy day data.
- Line 414: So, why not do that in your data?
- Line 436: it is problematic to say there is a difference in the models while earlier you mentioned there was no statistical difference between them (line 296).
- Line 447: same comment as above.
- Line 439: delete extra brackets.