



Comment on **essd-2021-209**

Anonymous Referee #2

Referee comment on "VODCA2GPP – a new, global, long-term (1988–2020) gross primary production dataset from microwave remote sensing" by Benjamin Wild et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-209-RC2>, 2021

General comments:

This study introduced a new global GPP dataset using satellite-derived vegetation optical depth (VOD) dataset spanning 1988–2020 in spatial resolution of 0.25° . The method for relating GPP to VOD was proposed in Teubner et al (2019, 2021). This study also presented validation against FLUXNET observation and other global GPP datasets (MODIS, FLUXCOM, TRENDY models). The difference of spatial and temporal GPP dynamics from other GPP reference datasets were shown. However, given the lower VOD-GPP model performance and extremely high global amount of VODCA2GPP, I do have concern about the quality of this dataset and its advantage over other datasets. The writing also needs a lot of improvements since there are both phrasing mistakes and technical mistakes.

Specific comments:

1 The global total amount of VODCA2GPP datasets is not given.

2 line 19, line31, it should be 'at global scale'.

3 line 32, it should be 'different'.

4 line 32-33, it should be 'similar significant increase'. Please check the usage of two 'for'.

5 line 43-44, please reformulate it.

6 line 46-47, please reformulate it.

7 line 51, please use clause.

8 line 53, what did you mean by 'measurement bias'? Is it affected by the distribution of flux towers or just measurement techniques?

9 line 236, please reformulate it.

10 line 245, for site-level validation, you should also use cross validation method.

11 line 264, the subtitle for section 4 is missing.

12 In figure 2, the uncertainty is very high in desert area (more than ten time of the GPP itself, why?), for example, northern Africa, which is blank in figure 1. Please use single-hue color series and check to ensure the consistency with figure 1.

13 In figure 3, please check the unit in both x and y axis. Please use dashed line for 1:1 line. Here, you presented the site-level evaluation for mean annual GPP. What about the annual, seasonal (or monthly) evaluation? In fact, Pearson value of around 0.5 seems to be relatively lower for GPP estimation. Did you try 10-fold cross validation for model performance?

14 line 308, when you mention 'good temporal agreement', you need to specify the region, since the correlation is even negative in tropical America.

15 line 308-309, it should be 'the highest' and 'the lowest'.

16 line 311, please rephrase it.

17 line 313, why monthly GPP anomalies are compared? Why you did not use monthly GPP instead?

18 line 334, here you used 2002-2016. Why did you use 2003-2015 in next paragraph?

19 line 335, there are only three sentences in this paragraph. It would be better to merge it with next paragraph.

20 In figure 6, at global scale, the VODCA2GPP is two times of the MODIS and FLUXCOM. So the global GPP can be more than 200 PgC yr^{-1} , which is the highest estimation as far as I know. You should give reasonable evidence for such value, or it won't be convincing.

21 In figure 7, it should be 2002-2016 or 2003-2015?

22 In section 5.2, TRENDY ensemble is indeed independent from VODCA2GPP. But I couldn't get the meaning of this paragraph. The process-based estimation without accounting for nutrient constraints is also reported to overestimate GPP.

23 In section 5.6, in terms of the VODCA2GPP datasets, more similarities with TRENDY than that of other observational products were mentioned. Is it really a strong point for this GPP dataset?

24 In figure A1, please check the unit in both x and y axis. You can give annual, seasonal (or monthly) evaluation as well.

25 The code for producing the data and figures should also be publicly available in a repository for transparency reason.