Earth Syst. Sci. Data Discuss., referee comment RC1
https://doi.org/10.5194/essd-2022-277-RC1, 2022

Comment on essd-2022-277

Anonymous Referee #1

Referee comment on "The global leaf chlorophyll content dataset over 2003–2012 and 2018–2020 derived from MERIS/OLCI satellite data (GLCC): algorithm and validation" by Xiaojin Qian et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2022-277-RC1, 2022

In the manuscript "The global leaf chlorophyll content dataset over 2003–2012 and 2018–2020 derived from MERIS/OLCI satellite data (GLCC): algorithm and validation", the authors used MERIS and Sentinel-3 data, and inversed radiative transfer model to generate a new global dataset of leaf chlorophyll content from 20003-2012, 2018-2020. The authors did a good job of making their data publicly available. Though the study could be a good addition to the line of research on remote sensing of new metrics such as leaf chlorophyll content, I concern the manuscript in its current form does not demonstrate much progress in science (e.g., more novel and robust algorithm, theoretical exploration on chlorophyll signals, uncertainty attribution) than the previous Croft study. The validation result does not support that the new estimates is more advanced. The longer time series also seem to lose its attractiveness in light a recent leaf chlorophyll product based on MODIS (https://ieeexplore.ieee.org/abstract/document/9875366/authors#authors).

- Specifically, I would suggest the authors to highlight their advances from the previous Croft study. I think both studies used similar set of radiative transfer models, though the choice of parameters might be different. Regarding the parameter's choice, I hope the authors would provide more justification. E.g. it was not clear why Table 3 and 4 gave two sets of parameters for models (N, LCC) though they are use jointly for LCC derivation.
- The authors suggest that they used 4-scale for their modelling process, but I could not find detailed description on how they implement the model (I understand table 3 and 4 both include some parameters, but the workflow was not very clear). Importantly, I cannot figure out its difference to the Croft algorithm and advantages. Also note that LAI and clumping index are important variables describing canopy structure in 4-Scale, and their sources were not clearly mentioned. In particular LAI, as it contributes to a large proportion of the uncertainty in the LCC estimates, which might justify some uncertainty analysis.
- The validation result is a bit unexpected (which means some interesting discoveries might be there!), as the Croft product generally has a good performance for DBF, since

LCC is likely to have larger seasonal variation, it would be easier to acquire a higher R2. Surprisingly, the new LCC product has better performance in EBF, not DBF than the Croft product. I wonder why.

Figure 4 is not very clear. Why would we see one measurement corresponds to many estimates, and what are those synthetic measurements?

Considering the issues above, I apologize that I cannot be supportive here. I encourage the authors to clearly demonstrate their progress in the LCC derivation algorithm, and get to the bottom on the difference between their products and the others, which can guide future users and developers of LCC. Nevertheless, I applaud the authors' effort to make their data publicly available.