Comment on essd-2022-277
Anonymous Referee #3


The manuscript from Qian et al. provided a study to quantify global leaf chlorophyll content over 2003-2012 and 2018-2020 through MERIS and Sentinel-3 OLCI satellite data. This 500-m and weekly leaf chlorophyll data set was generated by using a look-up table-based inversion of soil-vegetation radiative transfer modeling approach (PROSAIL-D and PROSPECT-D+4-scale models). By validating against 161 sampling measurements, this leaf chlorophyll content product achieved an accuracy of $R^2 = 0.41$ and $RMSE = 8.94 \mu g \text{ cm}^{-2}$. Overall, this study is quite similar to the previous study by Croft (2020) in retrieval algorithms, model performance, and satellite data sources. The major differences occur in using Sentinel-3 OLCI satellite data. Regarding the strength of quantifying long-term global leaf chlorophyll content, a recent study by (Xu et al., 2022) used MODIS data to quantify even longer time series chlorophyll data from 2000 to 2020. Given these major concerns, this study needs to strengthen its innovations. For example, this study could leverage advanced machine learning surrogate modeling approaches for leaf chlorophyll content retrieval instead of look-up table approaches. This study can also consider integrating multi-source satellite data from Sentinel-2 or Landsat to quantify high-resolution (e.g., 30-m) leaf chlorophyll. In addition, this study could also be strengthened by collecting more comprehensive ground data for product validation.