**Comment on essd-2022-183**  
Anonymous Referee #3


Review for ESSD-2022-183

Title: A daily and 500m coupled evapotranspiration and gross primary production product across China during 2000-2020.

This study used the PML-V2 model to develop ET and GPP datasets in China. The PML-V2 is calibrated and validated based on the data from 26 eddy covariance flux towers. The GPP and ET data developed in this study are compared with other global ET and GPP products and water balance data at the regional level. This study did a good job on model validation, but there still exist some issues in this stage.

- As a data description paper, the methodology is an important section to let the audience know how the data is developed. However, the model description is not very clear and well organized in this paper. Although the PML-V2 model is already described in other papers, I think more details are still needed and could be put in the supplementary. Whether the code of the model is open source? If yes, a link to the model program should be provided. Why the PML-V2 (China) can simulate daily scale data while PML-V2 (Global) cannot? Are there any improvements in the model?
- The authors claimed the PML-V2 model performed better than other products. The evidence of the high accuracy of the ET and GPP mainly comes from the validation results at 26 EC sites. The 26 EC sites were used to calibrate and validate the model, while other global products did not calibrate and validate based on the same EC sites. If the PML-V2 and other products were used to compare against other new EC sites (not the 26 sites), can it still be the best one? It seems a little bit unfair to claim that this dataset is better than others when other models cannot access these EC data. I encourage authors to also publish these EC data that are used in validation.
- According to the distribution of 26 EC sites (Fig 2), most of them are located in arid regions where ET may be low. The total estimated ET in China may be controlled by the ET estimated in the south region where few EC sites are located. There may exist large
uncertainties in quantifying total ET.
- In the discussion section, two advantages of this new dataset are provided, one is the water-carbon coupled process, and the other is more EC data help constrain the parameters. How are water and carbon coupled in the model? And why does the coupled carbon process help advance the model? There are many land surface models that couple water and carbon processes, but it is not always the case that these models performed better in simulating ET.
- The daily data is one important advantage of this dataset. But there are no details of how daily data is better than the data at the 8-day scale.

Specific issues:

Introduction

L60. The 8-day scale data is enough to detect seasonal changes.

L68-70. Whether this dataset has a better performance in simulating WUE. Different data sources of GPP and ET do not necessarily mean high uncertainties. If a water-carbon model is used to estimate GPP and ET, other information such as nutrient limitation may be lost, therefore, the estimated GPP may not be more accurate than directly observed data.

L86. “While” is not proper here.

Methods.

L109. Please provide the name of Ec, Es and Ei.

Equation 1-6. Reorganize the description of these equations. Separate equations and descriptions rather than list them together.

L151. Is the climate data publicly available? Maybe provide a data source link.

L188. Provide the time period information of these datasets.
Results

Section 3.1. Instead of the detailed description of NSE change between calibration and validation, it may be better to explain the model performance in different PFTs. For example, why PML-V2 doesn't perform well on wetland.

PML-V2 performs well when compared with other mainstream ET or GPP products in China. Please check through the manuscript and make it clear the model only performed better in China.

Performs better in simulating GPP. Add GPP in this sentence.

The units of change rates could be yr^{-2}, mm/yr /yr.

Use the same decimal digits.

Fig 10. What is the SD represents? SD of spatial data or temporal data within a year.

Discussion

What are the time periods of these previous estimations?

Rephrase this sentence.

The global data also have many EC observation data, but not in China. These models were calibrated on a global scale, not only in China, and pursued a global optimal solution.

More spatial analysis should be conducted to prove the strong ability of the model in simulating ET on the double-cropping system. Show some regional analysis rather than
only using EC sites. Why PML-V2 can have this ability?

L395. Which results in this study exhibit a huge potential for carbon sequestration of vegetation in China?

L454. How this misclassification issue was dealt with in this study.