Geoscientific Model Development Discussions

Geosci. Model Dev. Discuss., referee comment RC1
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Comment on gmd-2021-258

Anonymous Referee #1

Referee comment on "Improved CASA model based on satellite remote sensing data: simulating net primary productivity of Qinghai Lake basin alpine grassland" by Chengyong Wu et al., Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2021-258-RC1, 2022

Model optimization in NPP estimation is more important for improving model accuracy and model development. The manuscript intended to use remotely sensed data to replace ground observations was a good attempt. However, the introduction and methodology were failed to provide an appropriate design and description, the major concern were:

First, as the manuscript planned to MODIS products to replace ground observations data, the authors should summarize the advantages and disadvantages for the replacement of parameters used in CASA model. A comprehensive summary of these parameters from previous researches need to be compared before your chosen. From the view of the present manuscript, the references citations were too limited, and can’t offer the reasons why you need to replace the parameters from RS products.

Second, the manuscript used MODIS products to substitute ground observations. As MODIS product has its own uncertainty, have you evaluate the uncertainty of MODIS used in the study region? As far as I know, some Chinese RS products of SOL, land surface temperature, SWC, and FPAR were generated from the view of parameter localization, comparing with MODIS products. Why not choose these Chinese RS products?

Third, as a manuscript of model optimization, the optimization of model parameters should be evaluated one by one, respectively. Integration of all-parameter optimization is difficult to evaluate the contribution of individual parameter optimization. In addition, as you said 'focused specifically on improving the parameters SOL and WSC' (L154-L155), other parameter should be kept the basic expression. It was inappropriate to optimize all parameters of CASA model without evaluation of each parameter optimization individually.

As NDVI could be estimated from MOD09A1, it seems MOD13A1 was redundant. Moreover, temporal resolution of MOD13A1 was different from MOD11A2 and MOD 09A1, how to match them? Furthermore, because the estimated NPP in the manuscript was per month in time unit (part 3.1), the temporal resolution of MODIS products was 8-day or 16-day, how to use the MODIS products for estimating NPP? Another concern is how to estimate NPP in unit of per month from remotely sensed data within one year? And the field data was obtained in July, how to compare estimated NPP with field NPP?

Other minor concerns (this list is not all inclusive):

L40 "CASA is a mechanistic model that describes processes of carbon exchange……" CASA model is one of LUE model not a mechanistic model.

L46 As "FPAR and εmax have been driven by remote sensing (RS) data", please give some citations to support the conclusion.

In the introduction part, the description of CASA model and its parameters should use more formulas to make it clearer to the reader.

L66 Since “A few scholars attempted to introduce RS data for improving WSC, ……”, a comprehensive summary of WSC estimated from RS methods should be concluded here.

L71-72 As the manuscript mentioned “Usually, the spatial distribution of these ground observation points are few and scattered, especially in a small region……”, how to define the scale of the small region? The study intended to use Qinghai Lake Basin as the study area, is it a small region?

In Figure 1, why the samples of NPP field observation was located around the Lake, with no samples in western mountain area. Is this sample representative? A land cover map showed here will be better to demonstrate the grassland distribution of the study region.

Also, the authors need pay more attention to ‘comment on gmd-20210258’ (https://doi.org/10.5194/gmd-2021-258-CEC1)