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Geoscientific Model Development Discussions

Interactive comment on "Development of a semi-parametric PAR partitioning model for the contiguous US" *by* J. C. Kathilankal et al.

Anonymous Referee #1

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Review of: "Development of a semi-parametric PAR partitioning model for the contiguous US" by kathilankal et al. General summary: This paper describes the development of an improved algorithm for calculating photosynthetically active radiation (PAR) in the 400-700nm wavelength range. This algorithm appears to be based on the BRL model of Ridley et al. (2010) although a direct comparison is never made. In my view the sorting of the measurement data could be much improved. The presentation in the figures is rather poor taking the form of scatter plots. A better job could be made by performing separate fits for winter and summer. Obviously something is not optimal in the algorithm for low sun incidence. Therefore I would like to see further analysis by treating the fitting data in a more robust way before I can recommend publication in GMD.

P 1651: Ln 10-29: The authors list a variety of previous models which have been developed and published in the literature. This information would be much easier to digest and compare in a tabulated format with the name of each model, type of parameterization, variable list then reference. To provide a better motivation for the development of a more advanced model as presented in this manuscript, the authors should outline inaccuracies and shortcomings of all the previous models which have been listed with associated uncertainty if available.

P 1651, ln 26: As stated later on at the start of Section 3, the BRL model is similar to that presented here. This should be highlighted in the introduction as it appears on reading Section 3 that this work is in fact an extension of the BRL model using more variables.

P 1652, ln 16: A figure needs to be included showing the location of the 9 AmeriFlux sites so that the reader can gauge the quality of the sampling with respect to latitude and elevation. Six of these sites seem to be at 2 locations as given in Table 1. How are these sites different given their close proximity? Is there sufficient coverage to be sure that the parameterization gives good results across the US?

P 1653, ln 4: Where does RE come from? Maybe from a geo-stationary or earth-orbiting satellite or a measured solar spectrum (e.g. Atlas-3)? How do you account for the fluctuation in RE due to e.g. the 11-year solar cycle or is this irrelevant for this work?

P1653, ln 6-9: This implies clear-sky only measurements are exploited which seems odd considering that the diffuse component increases with respect to cloud cover. Why is fractional cloud cover not a parameter which affects the parameterization?

P1654, ln 6: Why throw out data points of RH 100% then?

P1654, ln 16: Is there any wavelength dependence or plant type dependence of this albedo value and, if so, how is this treated considering that scattering (i.e.) the diffuse

component is also dependent on wavelength.

P1655, ln 5: It would also be logical to compare against the BRL model to show that the authors have actually made improvements to the basic algorithm.

Pg1656, ln 16-17: Is this due to the longer path length through the atmosphere increasing scattering? What is the ratio for diffuse/direct. This implies that the parameterization works well until the direct/diffuse falls below a certain threshold.

Pg 1657, ln 1-5: This implies there should be a different set of co-efficients for each season. Why was this not done when it could improve the parameterization?

Figures 1a and b are not presented well as this is a scatter plot masking any type of relationship between the parameters. The authors need to bin the data with respect to relative humidity.# and then provide a mean plus standard deviation of the data point.

Figure 2: Same comment applies as for figure 1.

Figure 3: Suggests with the correct set of variables the negative bias could reach > 25%? If true please expand the text related to Fig 3.

Interactive comment on Geosci. Model Dev. Discuss., 7, 1649, 2014.