

Interactive comment on “Tree-grass phenology information improves light use efficiency modelling of gross primary productivity for an Australian tropical savanna” by Caitlin E. Moore et al.

Anonymous Referee #2

Received and published: 13 June 2016

The paper “Tree-grass phenology information improves the light use efficiency modelling of gross primary productivity for an Australian tropical Savanna” is of scientific interest. Some issues (listed below) should be solved.

General comments

The use of GCC in the LUE model is thought to improve the GPP estimation because of the strong phenological cycle of the target. In my opinion the phenological cycle is very well represented when fAPAR is used. So the reason for using GCC must be different: replacing fAPAR measurements or testing if a “green” index (likely a proxy

C1

of a “green” fAPAR) provides a better description of photosynthesis than that of total fAPAR.

Cameras pointing to trees: as large part of the ROI is occupied by the background (the sky), I wonder if the observed (and reduced) variability in GCC is not related to variations in sky optical properties during the year. The relation with LAI (Fig 6b) is not helping to figure it out, as the observed relation between GCC and LAI may be spurious (i.e., LAI increase and decrease in parallel to changes in sky optical properties). To disentangle the two effects it would be useful to define some additional ROIs with sky only and analyse the difference with the tree-ROIs selected. Performances of the different GPP models (4, all LUE based) are assessed in terms of r , RMSE and RPE. However, model 1 and 2 (eq 6 and use of EF) are used in prediction while (if I got it well) model 3 (using phenocam index) is in fitting (as two parameters, m and c coefficients) are adjusted. Model 4 (using MODIS) is in between, because a relationship is tuned between EVI and fAPAR. Therefore, results are not comparable in my opinion (see the discussion at page 15).

An interesting point is that the use of the phenocam index appears to eliminate the lag between measured and modelled GPP. The reason for this could be that the total fAPAR used by the other model is the source of this lag. On the contrary GCC may represent a kind of “green” fAPAR that is more in line with photosynthesis. A dedicated section comparing phenocam indexes and fAPAR would be very useful.

Specific comments

1 L 32 r_2 ranging from 0.1 to 0.2 (overstory) is much lower than that of understory but they are both indicated as “well correlated”.

3 L 23 I don't understand what is meant by “Core issues surrounding the remoteness of satellite sensors”

3 L23-25 this sentence is rather obscure (“the diffuse nature of light”?). I would sug-

C2

gest to omit it and only mention that the highest temporal frequency available is one composite every 8-16 days.

3 L 34 I don't understand "via leaf emergence and senescence". Please rephrase.

4 L1-3 Here you are saying that LUE models describes GPP through the relation between APAR and LUE. There is no relation, they are both used to estimate GPP.

Section 2.3 The final field of view of the camera could be provided.

Section 2.3 Can you comment on possible effects of the automatic (and variable) white balance? This can variable from measure to measure. What is the effect on calculated indexes? Few numerical simulations may help in this assessment.

8 eq 16-18 Why is the reflected PAR is not used? This is fIPAR. And the resulting flux is IPAR not APAR 10 L 34 In which sense "predictive" is used here? Is there any validation / prediction on independent data (i.e. not used in fitting)?

Section 3.1 It would be interesting to see the FAPAR curves along with that of the various camera-indexes

Figure 7. Sorry, I am not getting what the 1:1 line refers to. The two variables on the scatterplot have different units and ranges

Technical corrections

3 L 4 Why "cover"?

7 L 5-7 This sentence says that it is homogeneous and it is not. It's a matter of scale. It can be rephrased.

8 L 13 "Absorbed" instead of "used".

11 L9 RCC/ExR looks like a ratio. I would suggest to use "and".

13 L1 I miss the integration in this section. The title of this section could be "Relation between GPP and time series of phenocam and MODIS indexes"

C3

P14 L5-7 Probably not needed, already described.

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-187, 2016.