

# ***Interactive comment on “MODIS vegetation products as proxies of photosynthetic potential: a look across meteorological and biologic driven ecosystem productivity” by N. Restrepo-Coupe et al.***

## **Anonymous Referee #2**

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General comments: The authors tested whether seasonality of GEP and photosynthetic potential could be captured by MODIS VIs, GPP, LAI and FPAR products across four Oz flux towers. Although this is an important topic to link satellite remote sensing data with in-situ land surface observations, I found this manuscript requires substantial improvements.

The authors should stress the novelty of this manuscript and make a compelling conclusion. The authors showed a series of figures and tables, which did not converge towards conclusion which is actually unclear. I think the conclusion is that MODIS VI

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captured seasonality of GEP when key meteorological variables and vegetation phenology were synchronous. If this is the conclusion, this is not new as reported from a series of previous papers (e.g. Gamon et al., 1995 Ecological Applications). If this is not the conclusion, then the authors failed to deliver clear, compelling conclusion. Also I see there is no clear linkages between the title (MODIS VI as proxies of photosynthetic potential. ...) and conclusion.

The role of photosynthetic potential is unclear. In Abstract, the authors stated “. . .through comparisons of ecosystem photosynthetic activity (GEP) and potential (e.g. ecosystem light use efficiency and quantum yield) with MODIS vegetation satellite products. . .”; however, the authors did not report anything related to photosynthetic potential in the abstract. In TBR site, EVI did not agree well with GEP (Figure 5). Then the authors compared EVI with photosynthetic potential in Figure 6, which again did not show correlation between EVI and photosynthetic potential in TBR site. Thus photosynthetic potential did not provide any insight to understand why EVI failed to capture seasonality of GEP in this site. The title says “MODIS vegetation products as proxies of photosynthetic potential”; however, the abstract did not tell anything about photosynthetic potential and the conclusion included only a bit, which was marginal.

Inconsistent terms should be corrected. I found photosynthetic potential is unclear and confusing. The authors used this term to indicate LUE and quantum yield (P2 L7-8) or LUE, quantum yield, GEPsat, and Pc (P11 L11). I think “potential” is not related to LUE; probably, it might be related to LUEmax. In P16 L6, the authors defined potential as “biophysical drivers of productivity”, which seems not related to GEPsat or Pc. Ecosystem photosynthetic activity is another confusing term. It corresponded to photosynthetic activity, productivity, or gross ecosystem productivity (GEP). I recommend using GEP consistently across the manuscript.

Uncertainty in photosynthetic potential should be incorporated. Fig 2 clearly shows the relationship between PAR and GEP is not straightforward. I can see all parameters (quantum yield, GEPsat, Pc, and LUE) showed large variability around the mean val-

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ues. The uncertainties in each parameters might explain little correlation between EVI and photosynthetic potential in TBR site, and might help better interpret Fig 6.

MODIS LST suddenly appeared in Fig 7 and 8. I understand the authors used LST which could constrain GEP reported by Sims et al.; however, it is out of context. See the title again: “MODIS vegetation products as proxies of photosynthetic potential.”

Specific comments:

P2 L2: measured -> estimated

P2 L10-12: I do not think the authors provided results on this argument. I expected comparison between in-situ LAI with satellite greenness index, and between in-situ  $V_{cmax}$  or  $A_{max}$  with satellite greenness index.

P3 L25:  $\times$  -> multiplication symbol

P11 L25: GEP to PAR -> GEP to APAR?

P13 L16: Eq 3 was not related to filtering.

P14 L6-16: I am curious why the authors used coarse resolution satellite estimates of SW and precipitation instead of tower based observations.

P19 L27: remove a comma

P28 L20-22: This conclusion is not true in TBR site which showed EVI did not correlate with LUE and  $P_c$ .

P43 Figure 2 caption: define  $P_c$ . Also, remove the equation of  $P_c$  in the figure which disrupts readership. The colors of dots look different. If this is true, then define; otherwise, use one color.

P44 L5: There was no “grey dashed line” in the figure.

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