Biogeosciences

Discussions

Open Access

EG

Interactive comment on "Sun-induced Chlorophyll fluorescence and PRI improve remote sensing GPP estimates under varying nutrient availability in a typical Mediterranean savanna ecosystem" *by* O. Perez-Priego et al.

Anonymous Referee #2

Received and published: 17 August 2015

Perez-Priego et al. report on an experiment in a Spanish oak savanna where the herbaceous understory has been to a N and P fertilizer application in a full factorial design. The authors measured the CO_2 gas exchange using ecosystem chambers and determined, notably from the same plots, hyperspectral reflectance and several canopy structural attributes (LAI, C/N contents). The objective of the paper is to assess how fertilizer application effects CO_2 gas exchange and hyperspectral reflectance and how to best model GPP using spectral vegetation indices with or without additional modifiers driven by meteorological parameters.

I think this is a unique paper as it combines the 'classical' ecological approach of field manipulation with the question of how to improve remote sensing of GPP. The key point here is that by this experimental design the authors are able to produce GPP and spectral vegetation indices which are scale-consistent, in contrast to other attempts of this kind where coarse-scale satellite remote sensing is combined with eddy covariance flux estimates from time-varying flux footprints.

The structure of the paper is OK and it is generally well written, although at times the style could be improved (it is however always clear what the authors intend to say). Methods appear sound and the graphical presentation is flawless.

According to my opinion, the paper can thus be accepted after minor revisions.

Detailed comments:

(1) p. 11893, l. 3: while I am not a specialist for savanna ecosystems, but would not be 'understory' a suitable and more accessible term for what the authors refer to as 'herbaceous stratum'; if so, please replace throughout the paper

(2) p. 11894: l. 14-16: in my view LUE models operate solely on the assumption that LUEmax is correct for the respective application; for example, you would not use the LUEmax of a tropical forest for a desert ecosystem; neither should one use the same LUEmax for the same ecosystem if nutrient availability, which is know to affect LUE, is different

(3) p. 11896, l. 12: another suitable reference would be Porcar-Castell et al. (2015) from the EuroSpec SI

(4) p. 11896, l. 23: I am a strong believer in hypothesis-driven research; given the 'classical' ecological experimental design, this paper lends itself to formulate a few hypothesis, which would further strengthen the paper

(5) p. 11897, l. 19-24: the abbreviations for the treatments are not used consistently throughout the paper, e.g. sometimes +N or only N is used; make sure that the same

abbreviations are used throughout the text, tables and figures

(6) p. 11900, l. 9: does 3min apply to the combined NEE and RECO measurement or individually to both (i.e. a total of 6min for NEE & RECO)? If so, I suppose that the temperature for the RECO measurement will be higher compared to the NEE measurement, which will bias estimated GPP. Is this an issue and can the authors quantify the effect? In this section it may also be worth stating that apparently a quadratic fit was applied to the dry mole fractions and the flux inferred from the first derivative at t=0 (even though this is detailed in Perez-Priego et al. 2015, this is fundamental information required here).

(7) p. 11902, l. 21: if I understood the methods section correctly, gas exchange and hyperspectral measurements were done sequentially, but not simultaneously (even if the time difference may be small)

(8) p. 11907, l. 20: I think with two months of data the authors should not attempt to assess any long-term effects (years to decades); probably the term 'season should be used here

(9) Fig. 1: the abbreviation SMANIE appears for the first time here and has not be explained before

(10) Fig. 2: is it possible to re-scale the figs and move the title of sub-panel (b) into the panel for consistency with the other sub-panels?

Interactive comment on Biogeosciences Discuss., 12, 11891, 2015.