

Interactive comment on “Using satellite data to improve the leaf phenology of a global Terrestrial Biosphere Model” by N. MacBean et al.

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Anonymous Referee #2

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MacBean et al. used MODIS NDVI to optimize phenology-related parameters in a famous terrestrial biosphere model, ORCHIDEE and found that the model-predicted vegetation phenology had been overall improved via the optimization and the improvements varied with PFTs. The improved vegetation phenology led to shorten growing season lengths and resulted in a substantially decreased prediction of global annual

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GPP by ≈ 10 Pg C yr⁻¹. These information indicates the important role of accurate representation of vegetation phenology in terrestrial biosphere models/earth system models, therefore is useful and helpful for a better simulation of the climate system. The manuscript is very well organized and written, I only have a few minor suggestions.

»We thank the reviewer for taking the time to read and review our manuscript, and for their kind comments.

1) Page 13323, Line 8-9: why select "the greatest % reduction" first guess MS optimization rather than the one with lowest cost function?

»In practice these were the same as the percent reduction was normalized to the initial value of the cost function with the prior parameter vector. To clarify this we have added this sentence to the end of that section (after the sentence mentioned above): “The first guess with the greatest % reduction in the cost function was equivalent to the first guess that resulted in the lowest value of the cost function, as the % reduction was calculated using the value of the cost function using the default (prior) ORCHIDEE parameters”

2) Section 4.5: were the numbers calculated with area-weighted grid-level values? Please clarify.

»They were, but thank you for pointing out the lack of clarification. To clarify this we have added the following (in italics) on P13340 Line 13: “posterior: 162.5 PgC yr⁻¹ calculated using PFT fraction- and area-weighted fluxes for each grid cell – results not shown”.

3) Figure 2: NC3 and NC4 are the same figure.

»Thank you for pointing out this mistake. The NC4 map was indeed wrong. We have changed the figure to include the right map.

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