

## ***Interactive comment on “Optimal Inverse Estimation of Ecosystem Parameters from Observations of Carbon and Energy Fluxes” by Debsunder Dutta et al.***

**Debsunder Dutta et al.**

debsunderdutta@gmail.com

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We thank the referee for the careful, detailed and knowledgeable review of the manuscript. While the review is critical of some of our analysis, we are grateful as the comments will improve the quality of our submission. In the spirit of the open journal, we wanted to write a high-level response before the discussion phase closes (with a point by point response to all individual concerns once we gathered all available reviews).

There is a general concern about the  $V_{cmax}$  variability (and some other parameters). We would like to note that some of the papers cited by the reviewer and others (e.g. Wil-

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son et al 2001) show considerable  $V_{cmax}$  variability, even in systems with almost constant N content. These changes are mostly attributed to substantial in-season changes in the fraction of total N allocated to Rubisco as well as changes in LMA. In addition, most models have no other method of imposing environmental stress than reducing  $V_{cmax}$  by a stress factor [0,1]. The effect of reductions in  $V_{cmax}$  are a reduction in A, which also suppresses transpiration (and stress might also change the Ball Berry slope). We should probably make it clearer that we are fitting an “effective  $V_{cmax}$ ” parameter, which factors in effects from true changes in Rubisco content as well as the impact of stress.

As for novelty: We admit that we haven’t yet used the full potential of SCOPE in the current manuscript, which is our main motivation to use SCOPE as we eventually want to make use of remote sensing data as well (the current setup could have been performed with simpler models). We will add a better description of the potential of using modeled reflectance from SCOPE, in particular for constraining LAI. It will be outlined with a few inversion examples as well, which should alleviate the concern regarding novelty. We will also streamline the narrative and potentially move some sections in the supplementary. Many thanks again for the detailed review.

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