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

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General Response to all Reviewer Comments

Many thanks to the reviewers for a careful, detailed and valuable review of the manuscript. The comments have helped us to greatly improve the quality of our manuscript. The overall major issues raised by the reviewers were regarding (i) the overall novelty of the study, (ii) more analysis and corresponding discussion on variability of retrieved parameters and (iii) streamlining the presentation.

We have addressed all of these issues in detail and made significant revisions to our

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manuscript.

(i) The major novelty of this study lies in developing a flexible windowed fully Bayesian framework for assimilating a number of different constraining data-streams (such as carbon and energy fluxes, spectral reflectance, etc) for estimating the seasonal variability of a number of important ecosystem parameters and improve model prediction performance. In order to take a step forward and demonstrate the complexity and uniqueness of using SCOPE model (in modeling fully resolved spectral reflectance and showing the linkage between coupled carbon/water cycle and canopy radiative transfer) within the framework and clearly distinguishing our work from previous research, we have now included 2 MODIS reflectance bands in our inversion framework. The results indicate that reflectance constrains LAI better which in turn reduced the fluctuations in Vcmax and BBslope leading to more realistic parameter estimates. We have demonstrated the improvement in results with simulations of our study sites.

(ii) More analysis and discussion are presented as to the inclusion of MODIS reflectance along with flux data in the revised manuscript. We have also highlighted the possible connection to seasonal variability in leaf nitrogen and fractional allocation to Rubisco to explain the seasonal variability of parameters from the retrievals (Vcmax, BBslope) and their ranges from available literature.

(iii) We have simplified the model inter-comparison of previous and newer implementation of Photosynthesis. The result and discussion section are also streamlined as suggested. We have moved some details and figures to the supplementary information.

The detailed response to each individual reviewer comment is presented separately in the response to reviewers.

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