

Interactive comment on “Reliability Ensemble Averaging of 21st century projections of terrestrial net primary productivity reduces global and regional uncertainties” by Jean-François Exbrayat et al.

Anonymous Referee #2

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The paper talks about a different approach of reliability ensemble averaging to calculate the average of multi-model estimates of global NPP for future scenario RCP 8.5. This new methodology takes into consideration 2 important aspects while allocating weights to different model estimates for calculating the ensemble mean: performance of the models as compared to the observations and convergence measure. Overall, introducing a new approach to calculate ensemble mean from different model estimates on a global scale is commendable and significant at this point in time when the world is focussing on quantifying the carbon fluxes for future and uncertainties in these es-

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timates are large posing a challenge for scientists to come up with ways of reducing them. The analysis of the results obtained is extensive and comprehensive. However, there are some concerns that seem to be important.

Specific Comments:

In the discussion section, the major point that has been highlighted is the lack of representation of other elements, specifically N, in the GVMs used in this study and how their availability can limit carbon sequestration by vegetation in future. This has also been supported by multiple studies cited in the text. From the point of view of scientific knowledge and the focus on reduction in uncertainty from model estimates, the fact that of the 6 GVMs used in this study, only 2 (HYBRID and SDGVM) include the impact of N on model NPP estimation does not give a lot of reliability on results of this study. There should be some possible explanation for this difference in results of this study (increase in NPP) from other studies (reduction in NPP due to N limitation) to make the results more acceptable and reliable. In terms of introducing a new method for computing averages, the study has done a good job, but in terms of reliability and accuracy of the results of this study, it is questionable. This is a major concern.

There are different time periods that are included in the text. For instance, data from the 3 datasets used (CARDAMOM, FLUXCOM, MODIS) are from 2001-2010. While calculating B_i in equation (2), the difference between model predictions during last 10 years of historical simulations (1996-2005) and NPP from observations (2001-2010) is considered, or so it seems. It would be good to clarify why 2 different time periods are considered for calculating the performance measure (B_i) of models with observed values. Ideally, a comparison should be done for the same time period.

Captions of figures should be improved to include details like time period for which the given figure represents mean. For instance, in the caption of figure 1, what years comprise the historical simulation can be added. Captions should be as complete in themselves as possible.

Title of section 2.2 on page 3 'Estimates of current NPP' is confusing since the ISI-MIP model simulations also include the current period.

In the manuscript, appropriate spaces have been missed between 2 words or a word and a full stop. Like in page 5 line 17, the word 'integratealso'. The authors are advised to go through the text and revise these typographical mistakes.

In section 2.3 on Reliability Ensemble Averaging, before the actual method has been described there is a lot of description of the other methods used for calculating mean. This part from line 10 to 16 on page 5 can be a part of the introduction, where it identifies why these other methods are not serving the purpose and there is a need for a better strategy. Since REA is the method finally adopted in this study, the description of only this method used should be a part of this section 2.3.

Since REA is a new approach introduced for calculating NPP in this study, it would be good if the terms in equation (1) and (5) are described in terms of their maximum and minimum possible values, and their significance to give a more meaningful perspective of this approach.

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