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Interactive comment on “Modelling LAI, surface water and carbon fluxes at high-resolution over France: comparison of ISBA-A-gs and ORCHIDEE” by S. Lafont et al.

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RESPONSE TO REVIEWER #1

The authors thank the anonymous reviewer #1 for his/her review of the manuscript and for the fruitful comments.

1.1 [General comments: This paper is a profound comparison of modeled LAI distributions and LAI maps from EO. It is clear and well structured. Its special quality lies in the combined application and analyses of land-surface modeling and remote sensing parameter retrieval. This integrative approach is very challenging and based on state-of-the-art methods and models. However the paper stops with the comparison of

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results and does not give answers what we can learn from it. This does not mean it is not worth publishing or reading, but it raises more questions than answers. The paper describes the observed facts and tries to explain the quantified differences. These differences are often tremendous. The spatial correlations are mostly very weak. Even pure model outputs using the same input of land cover types and meteorological forcing produce variations of GPP of 60% (annual value). My conclusion from this is that these land-surface models are still too unconsolidated to use them for uncertainty assessments and I would not dare to make any management decisions based on these model outputs. From my perspective, this field of research still needs a long way to go, but at least this is a good first step.]

RESPONSE 1.1

We thank reviewer #1 for these comments. We agree that the differences between the two model are larger than expected, and these results show that much research work is needed to reduce modelling uncertainties. However, it must be stressed that the simulation set-up used in this study is particularly demanding for generic models, as global parameters are used over a relatively small area presenting less contrasting climatic conditions than those encountered in global simulations. As shown in this study, most differences are found in the representation of individual PFTs. Even if the disagreement between models is marked for some ecosystems (i.e. crops), especially for GPP, encouraging similar features are found. For example, while the simulated and satellite-derived LAI seasonal cycle present large differences (Fig. 1), with a shifted cycle for ISBA-A-gs, the various LAI scaled anomalies are remarkably consistent during severe drought events (Fig. 5).

1.2 [Technical comments: (1) Fig. 1, 3, 5 and 9 are too small, please enlarge the individual maps. (2) Please check the colors of Fig. 6. Is it true that Orchidee is this time the red graph? If yes, would propose to change it to blue, since all other plots are the same way.]

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RESPONSE 1.2

Concerning Fig. 6, there is indeed an error in the colour labelling. Thanks for spotting it. In Figs. 6-8, and 10, the blue lines correspond to ORCHIDEE simulations and the red lines correspond to ISBA-A-gs simulations. A corrected Fig. 6 will be included in the final version of the paper.

1.3 [Would it be possible to add the EO based LAI annual cycles in Fig. 6?]

RESPONSE 1.3

Yes. The average satellite-derived LAI annual cycle will be added to the “ALL PFT” sub-figure of Fig. 6. In the figure caption, it will be mentioned that the model simulation are averaged over the period 1994-2007, while the satellite data are averaged over the period 2000-2007. The two satellite products (CYCLOPES and MODIS) present a LAI seasonal cycle with a smaller (lower maximum and higher minimum) amplitude than the simulated one.

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