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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.

Anonymous Referee #2

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This is a well-written and nicely designed model-model-data-data experiment, assessing the ability of two land surface models to simulate the leaf area dynamics over France. Simulated carbon fluxes are also presented. The models and data display some pleasing similarities, but also some rather worrying differences. The methodology is excellent, and the analysis of the results and their interpretation largely well done. We learn much about where there are differences between the models and between the models and the data. However, we do not learn much, if anything, about the causes of these differences. As such, this is more of a technical report than a scientific paper.

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The work will be acceptable for publication if the model descriptions are expanded to include details about how carbon fluxes and leaf area dynamics are simulated, and more on how these details impact on the results. Detailed comments are given below:

7404.8-10 PFT parameters are mentioned, but no details. More information is required about how the models work and the differences between them.

7406.1 How does this 30 day composite window impact on the interpretation of seasonality?

7407.16 Need much more information on how leaf area dynamics are modelled in ORCHIDEE. Also, no useful information about leaf area dynamics for ISBA-A-gs. Also, no information about photosynthesis parameterisations in either model.

7410.14 Surely there must be independent observations to see which is correct

7411.2 I do not see the similarity between the models. ORCHIDEE looks much closer to the data. In Figure 1, ORCHIDEE LAI in northwestern France falls much earlier (July onwards) than ISBA-A-gs, and is similar in this respect to the satellite products. I would expect much of this region to be dominated by C3 crops. However, in Figure 6, C3 crop mean LAI falls to almost 0 by July, whereas ORCHIDEE remains higher for the whole year. This seems rather odd. Having read the description, the C3 crop panel in Figure 6 clearly has incorrect colour assignments. Grassland must be wrong as well.

Why no satellite products on Figure 6?

7414.12 First mention of this difference in LAI definition between the models. Needs more information on the modelled LAI to enable the results to be interpreted (need explanation, not just description – need to learn something!).

7415.16. I would not agree - the PFT types all display approximately the same offset.

7416 There is too little information on how the models treat photosynthesis and respiration to enable meaningful interpretation of the differences in NEE.

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7417 The discussion now gives important information about how LAI is modelled. This should have been in the model descriptions to help interpret the results as one read the ms.

7417.24 Written in this way it sounds as if ORCHIDEE is less good in terms of mechanisms, but surely it performs better in this regard when compared to the data (e.g. Figure 1)?

7418.28 'Shultze' spelt incorrectly?

7419.19 Sudden mention of farming practices. This needs to be invoked earlier. Where has this affected the comparisons?

7420.7 This conclusion could not be drawn from this paper without invoking management earlier and bringing it into the analysis of the simulation results!

7420 Last paragraph: The main conclusion from this work should be that we need better validation data and ways to assess the process representations in the models directly. Benchmarking is reliant on data, not model inter-conformity!

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