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Interactive comment on "Evaluating the potential of large scale simulations to predict carbon fluxes of terrestrial ecosystems over a European Eddy Covariance network" *by* M. Balzarolo et al.

Anonymous Referee #1

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1 General comments

Balzarolo and colleagues used measured carbon fluxes from 32 eddy covariance sites as reference to compare the performances of three land surface models (LSMs) at these locations, when forced with the same meteorology. Most of the paper is well-written, and the analysis manages to keep together the description of biome-specific trends and the model intercomparison. It is completed by a substantial conclusion that interestingly discuss the identified model pitfalls and possible future strategies, notably regarding the modeling of water limitations in summer-dry ecosystems and the incorporation of human management effects. In my opinion this article is suitable

for publication in Biogeosciences, although it sometimes lacks clarity when exposing the methodology and some results. I therefore suggest the authors to consider a few improvements that would make this scientific contribution more reader-friendly.

2 Specific comments

- p. 11860/3: Given the substantial literature existing on LSM optimization with FLUXNET data, I suggest to simply complete the reference by adding "...(e.g., (Kuppel et al. 2012) and references therein)..."
- p. 11860/sect. 2.1.1 and 2.1.2: What are the time resolutions of ISBA-A-gs and CTESSEL models ?
- p. 11865/2-5: It not clear to me why the time selection is a compromise between spin-up effects and forecast errors. Also, the temporal windows listed leads to assume that only daytime fluxes where used, in which case an explanation would be desirable, especially given the mention of daily averages in the metrics introduced later in sect. 2.4. Finally, is the end of the sentence an involuntary copy-taste from the previous sentence ?
- p. 11865/16-19: I am not sure to understand how this sentence connects with the previous one. Do the authors imply that the fact that the small benefit from bias correction only happens sometimes is a warning against "general statements" ?
- p. 11869/11-18: I not sure to grasp the logic of this paragraph. After pointing out that the variability of climate (Cfb-Cfa) explains the variability of performance among DBF sites, what do the authors exactly want to state ? In my opinion the link between sentences and the overall logic should be made clearer.

- p. 11870/6: Here should be added the abbreviation SWC after “soil water content", as it used in the subsequent paragraph.
- p. 11873/1-2: Since the measured NEE_{1998} is positive, DK-Sor is not even a lower carbon sink that year, but a source.
- p. 11873/9-12: The sentence is not clear, and the second occurrence of “lower and higher" seems to be erroneous. I propose to rephrase as follows:
  “Moreover, CTESSEL respectively presents marked negative and positive values of IAV in 2002 and 2003 for DE-Tha evergreen needleleaf forest, respectively indicating a higher and lower carbon uptake with respect to the measured data."
- p. 11873/1-2: ORCHIDEE also significantly overestimates Ta-Reco at FR-Fon.

Technical corrections

- p. 11859/8: “With the aim to improve the simulation of biophysical fluxes..." would be more accurate.
- p. 11860/19: I think it is “(Zhao et al., 2006)"
- p. 11862/8: “Interactively calculated".
- p. 11864/17-21: The two sentences should avoid beginning both with “so".
- p. 11864/28: “3-hourly". Also applies to p. 11865/6 and 8.
- p. 11865/1: “...in time to match the model time step..."
- p. 11867/5:

$$\text{Bias} = \frac{1}{N}\sum_{i=1}^{n}(P_i - O_i)$$

- p. 11868/14: add a comma after “average" ?
- p. 11869/23: DE-Tha instead of DETha
- p. 11871/20: DE-Gri instead of De-Gri
- p. 11871/22: DK-Lva instead of DKLva
- p. 11872/18: “shown" instead of “showed"
- p. 11872/26: DE-Tha, DK-Sor, FR-Pue and IT-Ren, instead of DETha, DKSor, FRPue and ITRen. The same corrections go all over the paragraph.
- p. 11873/8: “Lower negative values" is somewat confusing.
- p. 11873/9: “lower" and “higher" should be switched
- p. 11873/14: VPD has already been defined earlier
- p. 11873/20-21: I suggest to start the second paragraph of sect. 3.4 before this sentence, not after.
- p. 11873/21: “DE-Tha in 2006" instead of “DETha2006"
- p. 11873/24: “...ecological function of GPP at IT-Ren in 2006..."
- p. 11873/25: “Ta-Reco" instead of “Reco-Ta"
- p. 11873/26: “VPD-GPP and Ta-Reco" instead of “VPD and GPP-Ta"
- p. 11875/24: I do not understand the use of “entity" here
- p. 11876/1: “...both croplands and grasslands."
- p. 11876/20: “remains"
- p. 11877/19: “types"

3 References

- Kuppel, S., Peylin, P., Chevallier, F., Bacour, C., Maignan, F., and Richardson, A. D.: Constraining a global ecosystem model with multi-site eddy-covariance data, Biogeosciences, 9, 3757–3776, 2012.

Interactive comment on Biogeosciences Discuss., 10, 11857, 2013.