

Interactive comment on “Appraising the capability of a land biosphere model as a tool in modelling land surface interactions: results from its validation at selected European ecosystems” by M. R. North et al.

M. R. North et al.

gep9@aber.ac.uk

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REPLIES TO REVIEWERS COMMENTS

We thank the reviewers for providing their comments to our manuscript. Their feedback comments have been very useful in further improving the manuscript. Responses to the comments are provided in detail below. We are happy to provide more details or incorporate any further suggestion in any aspect of our work, where it might be required.

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REVIEWER 1:

This manuscript validates a land-biosphere model SimSphere by referring eddy flux data of seven EUROFLUX sites. For this validation, authors evaluated the reproducibility of daily fluxes of the net-radiation (Rnet), latent heat (LE), sensible heat (H), air temperature at 1.3m height (Tair_1.3m), and air temperature at 50m height (Tair_50m) by employing six statistical measures. Overall, authors successfully demonstrate that the model reproduces physical and dynamic processes in the soil-land-atmosphere system.

R1C1: Authors emphasize importance of "generality" for such models, and hence they conducted validation on multiple ecosystems in Europe, then tried to relate model behaviours to ecosystem properties of these ecosystems (eg. P239 L16~28). However, still this study lacks generality, because it only evaluates (a) a single model during (b) daytime of (c) cloud free and (d) stable atmospheric condition days within (e) growing season of 2011. As it is now, this manuscript is only a technical assessment report, and I do not think it can be a scientific paper even after a major revision ANSWER: We have amended the claims that this study achieved wide scale generality and we have also ensured this fact is reflected throughout the manuscript. As you stated, this study aimed to evaluate SimSphere's performance at several European ecosystems, to understand the model's capability of simulating as a factor of ecosystem type. Therefore, to achieve a fair inter-comparison of modelled results alike conditions (i.e. cloud free, atmospherically stable conditions, growing season) were employed so a fair comparison between different ecosystem types could be made. We disagree with the characterisation of this work as a "technical assessment report" as there are many other studies published in the literature already similar to our which aimed at doing exactly what our study did. As we stated in the introduction, until before this study the validation of SimSphere model had been only scattered and had been performed on a very small number of experimental days and at specific land cover types. Thus, we do strongly believe that this study is indeed contributing decisively towards an objective

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evaluation of the models' ability to simulate key parameters characterising land surface interactions.

R1C2: Other major concern is the defectiveness for description of the simulation method. Specifically, descriptions for how authors forced the model (P229 L20~P230 L8) are far from enough to provide repeatability of experiments, which is required for scientific papers. ANSWER: Section 3.3 has undergone major revisions to better inform the reader how to replicate this study. Information has been added on the wind and water vapour sounding profiles (and what data were used to force it), and information has also been added on the boundary layer conditions, and how that was represented in the model's initialisation. We do believe that the information provided in the manuscript is also similar to what has been provided in a number of other similar studies to ours which also aimed at validating land surface process models.

R1C3: Also, authors should present list of estimated parameters and some abstract of forcing data somewhere in the manuscript (such as in Supplementary Information). ANSWER: Table 1 summarises the required model inputs and we do believe that any more detail would not really have to add anything to the paper value and scope, apart from increasing perhaps significantly its length. In preparing our manuscript we also carefully advised on similar papers which have been published already in the scientific literature to respected journals in the field and we didn't see anywhere providing so much detail to be provided as that suggested by the reviewer to be added.

Specific Comments:

R1C4: P220 L10~13: Some references would be required in this sentence. ANSWER: Sentence has been amended and some relevant references have also been added.

R1C5: P221 L12~13: Some references would be required in this sentence. ANSWER: Sentence has been amended and some relevant references have also been added.

R1C6: P225 L12~24: Which parameterization for stomata resistance was employed in

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this study? ANSWER: This has now been rectified in the manuscript and the stomata resistance setting chosen for this study is now indicated. We thank the reviewer for his suggestion.

R1C7: P227 L3 and throughout the manuscript: Through my professional experience, I sense term "parameter" usually refers to a fixed-value for forcing models. But, in this manuscript, it also refers to simulation outputs. I suggest to employ different terms (e.g., outputs) for the latter case. ANSWER: We have amended all reference to "parameters" (simulation outputs) to "model outputs"/"simulation outputs" and "variables" (when not discussing the outputs in relation to the model).

R1C8: P237 25: What are the major differences among the current and earlier versions of the model? ANSWER: We thank the reviewer for this comment. Basically, the updates which were done on SimSphere since it was originally launched were concerning minor changes which were focusing on bugs correction present in earlier versions, the export of new parameters which were previously computed by the model internally (e.g. Lup, Ldown, EF) and also the inclusion of batch processes in the implementation of the model if needed to. However, for brevity we did not explained these changes in much detail in the manuscript, but have referred them for further details to a recent paper published by one of the co-authors.

R1C9: Throughout the manuscript: Discordance of table numbers between the main text and tables. Assuming values in the tables are correct, authors need following revisions at least: P218 L17: 3.54 -> 3.56 P232 L5: 68.19 W m⁻² (IT_Col) -> 68.49 W m⁻² (FR_Pue) P234 L1: -5.11 -> -3.45 P234 L20: 80.41 -> 71.93 P235 L2: -25.88 -> -16.29 P235 L17: 3.33 -> 2.30 P235 L18: 2.30 -> 3.33 ANSWER: We have thoroughly checked the accordance between numbers in the text and the tables and amended the numbers where necessary.

R1C10: Tables 4~8: These tables have to contain R2 values. "Bias" would be replaced by "Bias/MBA". "Scatter" would be replaced by "Scatter/MSD". ANSWER: The tables

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have now been made as the reviewer requested.

R1C11: Table 2: A word "PFT" would be replaced by "Ecosystem Type Abbreviation".

ANSWER: Thank you for this recommendation, the table now reads "Ecosystem Type Abbreviation".

Interactive comment on Earth Syst. Dynam. Discuss., 6, 217, 2015.