

Interactive comment on “Description and evaluation of the process-based forest model 4C at four European forest sites” by Petra Lasch-Born et al.

Anonymous Referee #1

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The manuscript features the process-based forest model 4C. A fairly condensed description of model structure and the major processes is followed by an overview on past model evaluation studies. Then the model is tested against data from four sites in Europe utilizing different stand variables including flux tower measurements. Results of these experiments are discussed and some positive conclusions on applicability of the model are drawn. The model 4C has first been introduced in 1997. Since then it has been applied in many case study applications and evaluation studies. Thus, a summary of major model features and model related publications is a timely effort. However, while the general idea of the manuscript is worthwhile, the current manuscript version suffers, in my opinion, from several shortcomings. I will outline them below.

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(1) The language needs a thorough revision. There are numerous grammar errors, typos and spelling errors. Additionally, there are obvious flaws in several sentences which are either incomplete or include remnants of earlier versions. (2) While the general structure of the model description part is adequate, its implementation is not consistent. The model structure section includes also processes. The water processes in the process section are weakly described. (3) The model structure section needs a thorough revision in its own. The basic and essential structural features of the model needs to be described clearly and unambiguously. For instance, the role of the tree cohorts is never clearly described. There are some statements about the inter-cohort competition. But nothing is said about intra-cohort relationships of trees. Area size of the forest that can be simulated is also not clear. (4) In a manuscript like this one I expected an overview on past model applications and related literature. In Table 2 past evaluation experiments are listed, but no general overview about 4C-related literature is provided. (5) Main part of the manuscript is a new evaluation study that includes four sites across Europe. What has then been gained from these new experiments compared to earlier evaluation studies is never clearly presented. (6) The results section is quite long and includes too many graphs and tables. Some of the material could be moved to annex or supplementary material. In general there is the tendency, that without much context the results for individual stand and tree attributes are listed in no obvious order. Summarizing, it is very demanding to get the essential information from the vast amount of numbers. (7) In Figures 3 and 4 the initial values for observed biomass and simulated biomass show a rather huge mismatch. Please explain why. Labels of y-axes are also not consistent. Please check. (8) Tables 7, 8 and 9 are not well structured. How sites are depicted is not consistent in formats. (9) Correlating time series data of simulated and observed stand level attributes will usually produce impressive R² values without having too much meaning. (10) The discussion deals mainly with the new evaluation experiment. No in-depth well-founded linkages to other earlier studies are provided. (11) There are not that many models available that are applicable over a broad range of tree species and site conditions that could be used for

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climate change impact studies. Thus, provision of the context to other similar models would definitely improve the manuscript. (12) The conclusions are generally positive despite partly rather weak results of the new evaluation experiments. This may leave an interested reader also quite puzzled. (13) The abstract should be revised, too, based on an improved version of the manuscript. Overall, I think that the manuscript in its current form deserves a thorough revision before it can be considered for print. I have added comments and suggestions directly in the pdf of the manuscript.

Please also note the supplement to this comment:

<https://www.geosci-model-dev-discuss.net/gmd-2019-2/gmd-2019-2-RC1-supplement.pdf>

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2019-2>, 2019.