

Interactive comment on “HETEROFOR 1.0: a spatially explicit model for exploring the response of structurally complex forests to uncertain future conditions. I. Carbon fluxes and tree dimensional growth” by Mathieu Jonard et al.

Anonymous Referee #2

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The manuscript by Jonard et al. presents a new spatially explicit forest growth model which aims to incorporate the structural and/or compositional complexity in simulate forest growth, and associated ecological, biogeochemical, ecohydrological, physiological processes. This manuscript focuses on the carbon fluxes and tree growth and validates the model performance against inventory measurements at an oak/beechn forest. The manuscript also demonstrates the potential applications by simulating forest growth based on several projected climate scenarios.

Overall, the manuscript is well written and carefully crafted. The study’s objectives and

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scopes are also generally justified. Below I list my few general comments. I would recommend the manuscript to be published in the Geoscientific Model Development after addressing/considering my general comments.

[1] This is a somehow very complicated model in terms of the number of parameters and model structures, but the model validation really falls short. The model predictions are tested against very sparse observation (i.e., two-time inventory at a single forest stand, only a few types of measurements). Given that this is a new and complicated model; I would question whether such validation is sufficient and robust. Strictly speaking, the comparison between gpp and npp isn't a valid comparison. Also, several parameters used (e.g., Table 2) are fit against the measurements at this specific site. I'd urge the authors should make a stronger case about the model robustness by considering a couple of options, e.g., test against more than one single sites, sites with different structure compositions, or multiple types of observations (e.g., those intermediate variables like respiration, leaf area, biomass). For observations that may be unavailable at the moment, the manuscript should at least point out the critical variables/parameters that need future data collection.

[2] I suggest considering removing or revising the parts of simulating forest growths based on projected climate scenarios. 1) The current model validation (as pointed out above) doesn't test the extrapolation capability of the model, e.g., either in time or under different climatic conditions. If the authors intend to keep the simulation part, they should consider/discuss those aspects in model validation. 2) For this manuscript, I think it may be a better idea to use simulations to demonstrate the capability or powerfulness of this model in simulating the spatially-explicit forest growths, e.g., simulations on forests with a different degree of heterogeneity in compositions/structures. I think it may help elaborate the reasons of why we need such type of model.

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