

Interactive comment on “Representation of disturbance in the Joint UK Land Environment Simulator Vn4.8 (JULES)” by Chantelle Burton et al.

Anonymous Referee #2

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The methods presented in the Burton et al. manuscript refer to the implementation of land-use and fire as a disturbance effect in the JULES land model. The manuscript does not present a clear modelling concept of how the both processes are presented, in terms of qualitative description and/or supporting it by a flow-chart which would also guide the reader through the manuscript. The fact that land-use can be regarded as a disturbance is flawed because land-use change is a permanent, very often irreversible change in land-cover. It is reversible when people abandon their fields and that depends on socio-economic conditions that motivate human decision-making. Such a reflection is missing in the introduction. Introduction The literature overview leaves the reader with an unclear message, other than it is very complex. However, the literature,

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also the cited does allow to conclude which processes are essential to incorporate land-use and fire disturbance in land surface models such as JULES. The problem statement that DGVMs have to properly consider disturbances has been identified already in papers in, e.g. Foster et al. 1998, and has been implemented in many ways in many DGVMs since then. This applies also to land-use.

The methods section starts with explaining how the disturbance term is implemented in the major equation on quantifying changes in vegetation. And here starts the problem of the modelling approach: what is presented is a simply cookie-cutter approach to correct PFT coverage by the proportion of fire disturbance and land-use. Such an approach represents the level of science of the 1990ies. Since then many more advanced approaches also simple ones have been published from which this modelling concept can profit. The remainder introduction of equations in the methods section is referring to already published modelling studies and the text does not explain how this was adapted to the current model version or what was updated given the latest progress in science in that field. Therefore, I cannot identify any added scientific value in terms of modelling approaches from which other modelling groups would profit. Variables in equation 1 are insufficiently defined or explained. The feedback of fuel availability on vegetation distribution is not explained (equation 3). From this starting point or poor modelling concept and inadequate description, it makes in my view no sense to review the remaining part of the manuscript because it makes it impossible to judge if the results produced are based on solid ground or if they can be reproduced. Unfortunately, I cannot give a more positive feedback on this manuscript. But I hope a deeply revised version of the modelling approach will allow to do so in the future.

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