

Interactive comment on “Representation of dissolved organic carbon in the JULES land surface model (vn4.4_JULES-DOCM)” by Mahdi Nakhavali et al.

Anonymous Referee #1

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Comment on 'JULES-DOCM: representation of dissolved organic carbon in the JULES land surface model' by Mahdi Nakhavali et al.

The authors represent a modelling development that makes it possible to have a more complete look at the global carbon cycle. They combine the well-established JULES model with a newly developed model for DOC, including soil carbon processes and leaching. This manuscript is therefore an important step towards a full carbon cycle understanding.

In general I think that the manuscript is well structured and the figures are helpful to understand the outcomes. However, there are some changes needed to make it more

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convincing. While I see some issues that should be clarified/solved first, I recommend publishing the manuscript in GMD after revision.

Major comments/questions

1. Please explain why the authors did not include the production of OC in soils and rivers (i.e. aquatic photosynthesis)? 2. Explain the additional value of adding Turkey Point and Guandaushi. To me it seems that the data from these two sites do not add much information, due to their much shorter time coverage. Also in the discussion it is stated that e.g. Turkey Point is not really useful because it's located at a site that was agriculturally used until 1989. Possibly it would help to remove the Level 2-sites. 3. Discuss the different methods in the study site description. Are there fundamental differences between 'suction cups' (p.8 l.22) and 'tension lysimeters' (p.8 l.32)? Are the observed values comparable? When did this sampling take place (e.g. Turkey Point – 'samples could only be retrieved for 5 separate days'; all in summer? or winter?) (see also comment above (2.)) 4. Elaborate on the model input in more detail: a) Have the data of FLUXNET and WATCH been somewhat corrected to be comparable? b) Mention the names for the parameters as it's used in the tables and equations consistently (e.g. p.9 l.28: bulk density and clay content) 5. Please adapt the figures in a way that makes them easier to understand. a) Fig.2 The extent can be smaller to better see where the sites are. b) Fig.3 Decrease the y-axis range. A maximum of about 20 should be sufficient and the differences a better to see. c) Fig .4 Decrease the y-axis range to a maximum of 40. 6. Combine both parts of the discussion to one. This would avoid the repetitions and can clearly combine all information/discussion on each of the sites.

Minor comments:

a) Define SOC at its first occurrence (p-2 l.28) b) Please use consistent and not confusing naming for the variables/parameters in the equations (e.g. R can mean 'run-off' and 'respiration') c) Connecting the equations to the arrows in the flow chart (Fig.1)

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would help in understanding the calculations. What do the numbers (1) to (12) in Fig.1 mean? They don't seem to match with the equations. d) What is the spatial resolution? e) Make unit naming consistent (e.g. Kg C m⁻² day⁻¹ vs. kg C m⁻² day⁻¹, p.5 l.10 vs. l.15) f) I suggest to rename 'Carbon concentration and fluxes' to 'Validation of carbon concentration and fluxes'

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