

Interactive comment on “Water limitation may restrict the positive effect of higher temperatures on weathering rates in forest soils” by Salim Belyazid et al.

Anonymous Referee #2

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General remarks:

The manuscript describes how weathering rates may change under different climate projections in future. It uses a modelling approach (ForSAFE) on 544 forest sites in Sweden. One has to assume that a huge dataset is available that is used for modelling (but there is no data repository given). In my opinion, the manuscript is in a pre-mature stage and I cannot recommend it for publication. The manuscript is presented more like a technical report and I do not see much added value for the scientific community right now. Furthermore, similar studies have been carried out using another model that finally gave quite similar results. So, the question arises: why doing this exercise

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again? The used model in this study seems to be “a fully dynamic ecosystem model” – but it provides the same results.

I see the following major flaws:

- no link to a data repository or at least to a summary of the data is given (e.g. as supplementary material)
- I would have expected at least a sensitivity analysis of the main parameters used. I see nice maps – but have no idea how reliable or sensitive the projected results are
- what is the novelty of this research?
- no overview of the present state of knowledge and gap in knowledge is given. There are other models and approaches. I would like to see advantages/disadvantages of existing approaches. Other modelling approaches are more physically based, e.g. the percolation theory (see e.g., Hunt and Ghanbarian, 2016). Consequently, I would expect that the theoretical concept is much better embedded to demonstrate why now a modelling exercise using ForSAFE is necessary to be performed.

As previously mention, my recommendation is to reject this manuscript. A fully rewritten and reorganised paper can be reconsidered.

Details:

L. 45: Ref.?

L. 49-54: relation to climate?

L. 74-77: should be extended. There is not only the programme ForSAFE. What about others? Better overview of current knowledge. Derive research questions.

L. 126-144: what about a sensitivity analysis: atmospheric deposition, forest management, ...

L. 170-171: make reference to table

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L. 182: how is the increase in soil temperature calculated? Which soil depth?

L. 209: how is soil moisture modelled? Which soil depth?

L. 225-228: ... so, why doing this exercise? There seems no difference to PROFILE which does not seem to be surprising because it is the basis of ForSAFE (see L. 89).

References:

Hunt, A. G., and Ghanbarian, B. (2016). Percolation Theory for Solute Transport in Porous Media: Geochemistry, Geomorphology, and Carbon Cycling. *Water Resour. Res.* 52, 7444–7459. doi: 10.1002/2016WR019289

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