

## ***Interactive comment on “Dynamic modelling of weathering rates – Is there any benefit over steady-state modelling?” by Veronika Kronnäs et al.***

### **Anonymous Referee #2**

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The study presents soil weathering rates for two sites in Sweden. It is concise and well written, and the subject is within the scope of SOIL. However, I would urge the authors to rethink the focus of the manuscript; the comparison of output from a weathering sub-model within a steady-state model to output from the same weathering sub-model in a dynamic model is somewhat trivial, and the results are unsurprising. Similarly, it is also unsurprising that a dynamic model provides more temporal data compared to a steady-state model. The current aims of the manuscript are trivial. There is merit in presenting the dynamics of weathering; the Title and presentation could be refocused to ‘Dynamic modelling of weathering rates – the benefit over steady-state modelling’. Secondly, the discussion somewhat repeats the results, there are few references to

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literature, and overall it feels more like a report.

I have listed additional points for the authors consideration by page (P) and line (L) number.

P1L10. Do not mention SWETHRO in the abstract. P1L20. The results / discussion of scenario's does not fit with the objectives or title of the manuscript. P1L23. This is not a result of this study. P2L23. Given the importance of weathering (Title / objectives), it is surprising that weathering is given limited attention in the introduction. P2L27. I recommend that you remove the first objective and expand (refocus) the second. P2L30. What is the objective of the scenarios? P3L2. What were the models applied to two forests? P3L3. Please provide more background. For the external reader SWETHRO has no meaning or context. P3L17. Does ‘factors affecting’ mean sensitive parameters? Can you site previous sensitivity studies? P4L14. There is more sand at Hissmossa (Table 2) but more less Quartz (Table 3). How is this? P4L20. It is surprising that a fixed value is used for soil moisture given (a) that soil moisture is an ‘important’ parameter (as noted by the authors), and that (b) the determinants of soil moisture (texture, bulk density and organic matter) are very different between both sites (as noted by the authors). P4L21. The authors need to provide better context (justification) for the scenarios. P5L5. The list of scenarios suggests a study objective different than that presented. P5L25. Given the importance of soil moisture, why are these data not shown (Figure or Table) P5 Figure 1. The difference between PROFILE and ForSAFE in L4 (and L5) at Hissmossa needs more quantitative explanation / support. It might be soil moisture but this is not clearly shown. P6 Figures 2 to 6. Many of the figures forces on magnesium or calcium but the sum of base cations is the focus of the text (primarily). P7L10. The discussion has notably few citations... it is a discussion? P9L15–L19. These are not surprising conclusions (and more-or-less were previously known). Table 3. It appears that surface area is estimated for Clay, Silt and Sand. How are areas for the O horizon estimated?