

Interactive comment on “Weathering rates in Swedish forest soils” by Cecilia Akselsson et al.

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Received and published: 20 March 2019

Overall, the manuscript is well written and clear, although several sections are longer and a bit more tedious than others. In particular section 5 on “Potential for biological weathering”, and section 8 on “Future research” could be streamlined.

The challenge addressed in the manuscript is whether the losses of nutrients due to forest harvest can sustainably be balanced by release of nutrients by chemical weathering. This simple mass balance could be illustrated with a conceptual diagram showing the relevant fluxes at the beginning of the manuscript. Such a diagram might help focus on the important sources of uncertainty in long-term predictions of sustainability.

The most important question the manuscript, and indeed the QWARTS program addressed is if weathering rates, as computed by different models, are greater than or less than rates of harvest loss. The range of weathering values from different models

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gave a sense of uncertainty in weathering rates, but harvest losses were presented as a single value at each site. There must be uncertainty in export losses due to harvesting, and it seems important to convey what these uncertainties are.

Two aspects of weathering that I would have expected to be important (and that might be highlighted in the conceptual diagram I suggest above) are rock type and depth of weathering. The first of these is perhaps simpler to consider. Rock type or soil substrate was not described anywhere or for any site. I could not tell if this was because all of Sweden has the same rock type, and so is dismissed as playing any role in variations in weathering rate or nutrient release, or if something else was going on. I would expect rock type to be the very first control on weathering rate, as nutrient availability on basalt vs limestone vs serpentinite vs . . . is quite different. The depth of weathering is a more difficult problem to address, yet could also be important. Weathering often occurs at depths below the top 30-50 cm.

A few detailed comments: Acronyms should be defined at their first use. Several are not defined at all, or only after their first use (this list may not be exhaustive): UNECE, CLTRAP, EMF, A2M

Whole-tree harvesting is defined on p 3 as being “harvesting of branches”. Does this imply that stems are not included in whole-tree harvesting? This seems contradictory.

Total-regression analysis: what is the temperature sum?

Figure 5: The boxes in the key are so small that they are indistinguishable. The gray patterns all look very similar.

p 8, line 5: Casetou-Gustafson’s name is incomplete. p10, line 4: cation, not carion
p 12, line 9: Ca, Mg and K at 640 sites, not Ca, Mg and K on 640 sites p. 17, line 2:
to sparse grass, not via sparse grass p. 17, line 2: naturally lead-contaminated, not
natural, lead-contaminated. p. 18, line 23: However, in 1996. . . , not However, already
in 1996. . .

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