

Interactive comment on “Biochemical and structural controls on the decomposition dynamics of boreal upland forest moss tissues” by Michael Philben et al.

Anonymous Referee #1

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General comments The authors tested experimentally whether the slow degradability of boreal forest mosses is caused primarily by the chemical complexity of their tissues or the physical structure of the moss cell wall biochemical matrix inhibiting decomposition. The authors used various methods to study the decay rate of mosses, and changes in moss tissue C and N composition and physical structure during the 2.5-year laboratory incubation at two different temperatures. The results suggested 1) the moss cell wall matrix protected labile C from microbial decomposition and 2) the N and C cycles were uncoupled. I find the manuscript very interesting and topical in terms of assessing the role of boreal forest soils as sinks and sources of C. Below comments to the aspects listed by BG: 1. Does the paper address relevant scientific

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questions within the scope of BG? YES. 2. Does the paper present novel concepts, ideas, tools, or data? YES. 3. Are substantial conclusions reached? YES. 4. Are the scientific methods and assumptions valid and clearly outlined? YES. 5. Are the results sufficient to support the interpretations and conclusions? YES. 6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? YES. 7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? YES. 8. Does the title clearly reflect the contents of the paper? YES. 9. Does the abstract provide a concise and complete summary? YES. 10. Is the overall presentation well-structured and clear? YES. 11. Is the language fluent and precise? YES. 12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? YES. 13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? YES, see specific comments. 14. Are the number and quality of references appropriate? I CANNOT ASSES THIS BECAUSE AT LEAST 14 REFERENCES GIVEN IN THE TEXT ARE MISSING FROM THE LIST OF REFERENCES. THE REFERENCES IN TEXT AND IN THE LIST SHOULD ALSO BE CROSS-CHECKED BECAUSE THERE ARE DIFFERENCES IN THE PUBLICATION YEAR OR NAME OF THE FIRST AUTHOR IN SOME CASES. 15. Is the amount and quality of supplementary material appropriate? YES.

Specific comments Page 3, line 13: Tell whether you only sampled green living (fresh?) parts of mosses or was the material a mixture of green and older brown parts.

Page 9, lines 33-35: Uncoupling of the N and C cycles has also been reported as a result of in situ incubations - see Manninen et al. 2016, *Science of the Total Environment* 571, 314-322. Add reference.

Technical corrections (typing errors, etc.) Page 3, lines 18-19 and Table 1: Correct the names of the moss species, i.e. should be *Rhytidiadelphus* spp., *Pleurozium* spp. and *Ptilium crista-castrensis*.

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Page 6, line 27: I think the authors should refer to Table 2 (not Table 3).

Page 7, line 15: Replace 'Figure 2' with Fig. 2.

Page 10, lines 25-33 (and page 11, lines 27-28): Discussion on fungi is very important, given that fungi are important decomposers in acid forest soils. If the authors have data on soil pH at the two sites, it should be added in Table 1.

Table 3: Replace '%Carbon' and '%Nitrogen' with %C and %N, respectively. Replace 'Nitrate' and 'Ammonia' with nitrate+nitrite and ammonium. Use nitrate+nitrite also on page 7, lines 21-22.

Fig. 8: Add a, b, c and d to indicate Figs. 8a-8d.

Cross-check the list of references with references in the text and revise when needed.

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