SOIL
Discussions

Open Access

Interactive
Comment

Interactive comment on "Litter decomposition rate and soil organic matter quality in a patchwork heathland of Southern Norway" *by* G. Certini et al.

Anonymous Referee #3

Received and published: 30 August 2014

The problematic of this paper is about assessing soil organic carbon (SOM) stock, dynamics and chemical characteristics. These questions fall within the scope of SOIL. The aim of this article is to show a link between vegetation cover and soil organic matter composition and decomposition to, ultimately, use vegetation cover as a proxy of soil characteristics. The authors suggest that such a proxy could be used to assess soil C stock and their changes over time. To fulfill their aim, the authors set-up an in-situ decomposition experiment completed with plant and soil chemical analysis. The use of 13CP-MAS MNR is particularly pertinent as it is a good compromise in terms of time and relevance of the results between global analyses (such as Von Soest extraction), which may be not reliable for soils, and molecular analyses (such as HPLC- or GC-MS), which give very detailed compositional information, but are very time consuming. The

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

study site is composed of patch of different wet heathland vegetation. The classification of the different soils composing the mosaic of the study field is well described. Although the results are representative of only one site, they are valuable as vegetation change in wet heathland and Sphagnum peatland is a worldwide issue with consequences on C stock and fluxes to the atmosphere. Results of SOM dynamics under different latitudes would help to understand the functioning of these ecosystems. This paper presents very interesting results on the interactions between environment and litter characteristics on SOM decomposition. In particular, it was interesting to show that Molinia litter lost more N in Sphagnum environment than in any other. This particular point was not developed enough.

My first concern is about the statistics. ANOVAs were used, but not enough details were given. First, the response variables mentioned are soil pH and SOM. It is not clear what is meant by "SOM" and details should be added. For example: "soil pH, solid soil chemical characteristics (SOC, SON, C/N), soil water characteristics (DOC, TDN, ...) and SOM decomposition (remaining mass, litter C and N concentrations and litter C/N)". Second, it is not clear what kind of ANOVA was undertaken: was it a two-way ANOVA with litter type and decomposition site as factors? or one-way ANOVA with decomposition site as factor for each litter type separately? From the figure 3, we can assume that 3 one-way ANOVAs were undertaken as the same letters (a and b) were used for different litter type, but from the Figure 4, we can see that litter type and decomposition environment were compared at the same time, implying a two-way ANOVA. This has to be clarified. Third, there is no mention concerning the ANOVA assumptions of residual normality and more importantly variance heterogeneity. This should be checked and commented, and if necessary data transformation should be applied. The results of the ANOVA may be showed in supplementary materials. Fourth, there are no error bars on graphs. The quality of the graphs and the capacity of the reader to assess the results would be greatly improved by the addition of the standard error. My second concern is about the overall structuration and organization of the manuscript. On the whole, the text is well written (although too much colloquial expres-

sions are used, see technical corrections), but the use of subparagraph would greatly help the authors to structure and improve their discussion and the reader to understand the research undertaken. In the results, subparagraphs could be: "3.1 Solid SOM characteristics, 3.2 Soil water characteristics, 3.3 SOM decomposition". In the discussion part, the subpragaraphs should in few words synthesize the subject discussed. Also, many sentences in the results are actually discussion and should be removed or put into the discussion part (cf technical corrections below). Another problem is the use of Sphagnum capitula to undertake decomposition experiment. Usually, it is the stem section just beneath the photosynthesizing part that is used in Sphagnum decomposition study (see ref below). The use of capitulum causes problems: (i) this is not the plant part that is going to be decomposed in the next year, (ii) few or no data are available for comparison, (iii) because this is the active part of the plant, it may be possible that some photosynthesizing activity occurred during the decomposition process. Such issues should be acknowledged and addressed in the discussion. Also, some missing data would be interesting to add. For example, stock of C is repeatedly mentioned in the introduction. It would be good to use, if data available, the bulk density of each soil to asses a stock of C in the soil under study. Soil drainage is mention as a driving factor but no data are given about water table level or soil water content. The overall quality of the paper would be improved by adding such informations. Finally, in the context of vegetation change, different litter may decompose at the same time at the same location and the mixing of litter may not be additive (Gartner Cardon, 2004, Oikos, 104: 230–246). It can be either synergistic (stimulation of decomposition) or antagonist (inhibition of the decomposition). Although this aspect was not evaluated by the authors in their studies, litter mixing effect should be mentioned in the discussion as it is an important process often observed that can limit the use of vegetation cover as a proxy of SOM dynamics. 50% of plant A with 50% of plant B in the vegetation does not mechanically imply decomposition of 50% of litter A taken alone plus decomposition of 50% of litter B taken alone. This complexity of the soil system should be acknowledged in the discussion and use to make the discussion more conservative.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Technical corrections: Valid for the whole text: all latin names must be in italic P268 - L6: the genius and species name of each plant should be written in full and in italic (the abbreviated name should be written in parenthesis and in italic if it is a Latin word) P269 - LL10-11: do you have any reference to support this? P269 - L14: "however" not needed P270 - L1: change "water rich" by "wet" P270 - L11: add species names to all three genius; if more than one species, list them. P271 - L22: which Sphagnum species? P272 - L10: "couple of hectares", be more precise. This expression has different meanings depending on the country. P275 - L8: air-dried litter is usually preferred (e.g. Bragazza et al., 2007, Soil Biology & Biochemistry, 39: 257–267). Is there a reason why 40°C was used? P276 - LL6-7: the end of the sentence is a results interpretation that should be put into the discussion. P276 - L7: "mimicked" and "sort of" are more colloquial than scientific words. Please change. P276 - L17: "anyway" to be changed or removed P276 - L13-14: as there are no significant differences, you cannot say that or mention it as a trend. P277 - L2-26: results interpretation that should be put into the discussion. P278 - L8-15: decomposition results. Usually, the decomposition rate "k" is assessed by fitting a decomposition model to the observed data (Rovira and Rovira, 2010, Geoderma, 155: 329–343). Calculating such a rate (at least the most common: exponential negative) would ease comparison with other studies. P279 - L2: "maintain memory": not adequate for soils, should be changed P279 - L10: explain why P279 - L11-12: SOM content between soils was not significantly different. Use "tended to be richer" than "was richer". P281 - L7: misunderstanding: sphagnan are not necessarily hard to decompose, instead they induce processes that prevent the organic matter decay (Hájek et al, 2011; Ballance et al., 2012, Carbohydrate Polymers 87: 1326– 1332). The sentence should be restated. P281 - L8: Hájek instead of Hajek P281 - L10: "home-field advantage" is too colloquial, to be changed. P282 - L1: add reference, e.g. Taylor et al., 2001, Journal of Ecology, 89: 126–144 P282 - L7: "anyway", too colloquial, to be removed P285 - L4: coma missing: "J., and" P285 - L13: Hájek instead of Hajek P285 - L25: coma missing: "W., and" P286 - L14: check if "calluna" is written that way in the original paper P286 - L15: coma missing: "I., and"

P286 - LL27-30: place Trumbmore et al., 2009 before Trumbmore et al., 2010. P286 - L31: coma missing: "I., and" P287 - L1: coma missing: "I., and" P287 - L4: coma missing: "A., and" P287 - L7: coma missing: "S., and" P287 - L21: coma missing: "K., and" P292 - Fig. 2: the scale should be added to help the reading of the upper spectra, alternatively, successive gray and white bands corresponding to each main chemical shift regions would ease the interpretation of the graph.

Interactive comment on SOIL Discuss., 1, 267, 2014.