

## ***Interactive comment on “Peat decomposability in managed organic soils in relation to land-use, organic matter composition and temperature” by Cédric Bader et al.***

### **Anonymous Referee #1**

Received and published: 25 July 2017

The manuscript of Bader et al. presents information of peat decomposability in managed organic soils in relation to land-use, organic matter composition and temperature. The paper is well structured and written in fluent language. However, I have few minor and mainly technical comments and suggestions.

Major comments:

1) In materials and methods, more information of the sites, sampling design and samples treatments is needed. The requested new information is listed in the minor comments.

2) Site codes must be uniform throughout the manuscript!

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3) Should add more literature about the organic matter properties and how it regulates/does not regulate decomposition processes.

4) This study focuses mainly on the effects of drainage on decomposition and SOM characteristics, yet the differences in management (i.e. machinery tilling, fertilization) between sites will likely affect to peat decomposability and decomposition as well. Now these management related differences are mentioned first time in the discussion section, but they should be mentioned already at the site description in the materials and methods.

Especially, the current vegetation type (forest, grass, crops) undoubtedly has influence on the current peat properties due to differences in litter quality and quantity. Additionally, in cropland the fertilization will affect to nutrient availability, and thus likely influences on decomposition. At least the variation in litter input should be discussed more detailed.

Minor changes:

Line 33: It is not necessary to Term “peatland” means organic soils, thus “containing organic soils” should be removed.

Line 34: The word “destroyed” should be replaced with something more neutral.

Line 34: Modify to “Drainage aerates the soil. . .”

Line 101: 20 % of carbon released/accumulated in/from organic soils under agriculture

Line 120: I could not find information of the size of the peatlands from the text or the tables. This could be added to Table 1. Additionally, no information of the current water table depths, which expresses the intensity of the drainage and determines the depth of aerobic layer in peat profile, can be found from the manuscript. Please, add this information.

Line 120: Where all the sites originally tree covered?

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Line 125: Uniform site markings. Here you use SKF, KF and elsewhere you use SK\_FL and K\_FL. Double check this throughout manuscript. Additionally, the sites should be organized alphabetically in Table 1 and Supplementary Table1.

Line 127-130: How were the sampling spots chosen?

Line 128: From what site were 8 cores taken and why?

Line 128-130: Rephrase the sentences. Clarify also in which site and why you cored deeper than at other sites on this particular site?

Line 130: What is the volume of the samples?

Line 134: I could not find information on which cores you found mineral sediments. This information could be added for example to Table 1 or Supplementary table.

Line 142: Specify from which samples you conducted the analyses. Did you analyze subsamples from all intersections of each core?

Line 154: How did you select the soil segments? Were they always from the same depths – if not, why weren't they?

Line 155: Did you have replicates of the samples from the same site and depth in different temperatures or did you use field replicates?

Line 156: Again, uniform the site markings. Here you use MCL and in the tables and figures something else.

Line 170: Is it really appropriate to remove the negative values?

Line 179: Modify the citing or remove the brackets around the references:” used by e.g. Hogg et al. (1992), Scanlon & Moore (2000), Wang et al. (2010) . . .”

Line 210: Where was the land-use effect significant? In the topmost 30 cm?

Line 215: Do not start the sentence with words like also.

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Line 231: Replace word lost with the word emitted

Line 232 and Line 236: Again, the site codes are different than in the Table 1 and in the supplementary table.

Line 236: Double check the site comparisons in the brackets.

Lines 257, 259, 264, 298 and elsewhere in discussion: Consider depersonalizing when you talk about the soil profiles and samples. I.e. In the line 257 the part "our soils profiles were close. . ." could be modified to "the soil profiles were close to values that are typical for undisturbed peat".

Line 260: Are the managed sites also tilled and fertilized? This also triggers decomposition. After a long time passes from drainage, and the decomposition processes improved by enhanced oxygen conditions stabilizes, tilling and fertilizing may become even more important factors controlling the decomposition than the lowered water table.

Line 272: Add the management (tilling, potential fertilizing, harvesting. . .) information of the sites to table 1.

Line 292-295: You could discuss also of the effects of management. According to the earlier parts of the discussion section, at least the cropland has been fertilized and tilled with machines. This has likely affected to amount of nutrient availability for decomposers, and thus potentially triggered the decomposition processes.

Line 298: Depersonalize. For examples:" The samples lost, on average. . . ".

Line 298: incubation over one year

Line 314: Please, add the information of the drainage depths to the Table 1. This is important information as the whole study is about drained peatlands.

Line 327: Again, the site codes are different than in the Table 1. Also mention clearly, that these are the same sites as in this study.

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Line 343: below the 60 cm depth

Figure 2: You could set the sampling depths (0-30 cm and <30 cm) as headings on the top of the panels.

Figure 3: This figure is extremely hard to follow. Please reorganize the sites on the left first by land-use type and then alphabetically. Make sure the site coding is uniform throughout the manuscript.

Figure 4: You could bold the blue symbols indicating organic soils. That would make the figure readable even as black and white prints.

Table 1. Organize the sites alphabetically and make sure the coding is uniform throughout the manuscript. Is it necessary to write the abbreviation of the land use type also in the first column after the site abbreviation? Please add the water table depth information either here or somewhere, but just add it. Add information about other land management history beside the drainage (tillage, harvesting, fertilization) and estimations of the intensity. Do you have any estimations of the size of the sites? That would be interesting additional information.

Table 2. I could not find where the footnotes belonged to.

Table 5. Please modify the references in the first column as following: Chapman & Thurlow (1998).

Table 5. In the column expressing “Moisture level” on few rows (e.g. Hogg et al. 1992) is text “Similar”. How is this defined and what does it mean? Table S1./ Supplementary table. Please organize the sites alphabetically or specify clearly why it is in order that not seem to make any sense for a new reader.

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