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Biogeosciences Discussions

Interactive comment on "Black carbon contributes to organic matter in young soils in the Morteratsch proglacial area (Switzerland)" *by* E. Eckmeier et al.

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We gratefully acknowledge Dr. Caroline Preston for her constructive suggestions to improve our manuscript. We revised the manuscript according to her comments, our response is given below.

Section 2.1, l. 10-15. Presence of Oxyrietum digynae, and of larch/stone pine forests: We agree that the section was confusing and we changed and extended this part to be more precise about the process of plant succession. The species Oxyria dignya is present in the proglacial area, but only in initial stages and it was not found at the sites where the soil samples were taken. The larch and pine forests, as a plant community, needed more than 150 yr to establish and they are not present (although some single larch trees or larch stands can be found) at the investigated sites but in adjacent areas

(Burga et al. 2010).

Section 3.1, l. 14-22. Different symbols in Fig. 2 for the vegetation types: We changed Fig. 2 and used different symbols for the vegetation types. It became visible that the highest Corg concentrations were found under vegetation type 2 (pioneer grass communities). Please note Fig. 1 below.

Table 2, Fig. 2. Include the ash data, effect of using Corg (ash free) for Fig. 2, same ash content? All carbon concentrations are given for organic carbon (Corg). The soils did not contain calcium carbonate or other inorganic carbon compounds; only traces (< 0.5%) – if ever - could be observed in DRIFT spectra. The soil is acidic (pH < 6) in the whole proglacial area (Mavris et al. 2010).

Section 3.2, l. 10. Samples AS6: Unfortunately, we cannot reconstruct the site history of samples AS6 and S9. Examples for potential additional BPCA sources could be campfires (although they are prohibited in this conservation area), or dumping of waste containing coal, soot or charcoal residues. Other disturbing factors could be faunal activities or erosion.

Discussion, l. 18-20. We added the numerical code for the two mentioned vegetation types in brackets after each one.

Data for N and C/N, old OM, impact of N-fixing plants such as alder? We added information on N and C/N ratios in the results and the discussion section. The amount of N seems to be related to the vegetation cover, higher N concentrations were found under pioneer grass communities and – in one case - under green alder scrub communities. A specific influence of N-fixing plants was not mentioned by Burga et al. (2010). The pioneer species Epilobium fleischeri is strongly arbuscular mycorrhizal, but plants in closest distance to the glacier were found not to be mycorrhizal which might influence organic matter composition (see additional reference Oehl et al. 2011).

Following editing points were corrected: Section 2.2, l, 1: "ten topsoil samples". Tables

1 and 2: Samples were ordered by years of exposure. Table 2: Fine earth (<2 mm) was used in the figure caption, ash content was not added because inorganic C was not present. Fig. 2: Different symbols were used for the vegetation types (see above).

Figures 4 and 5. Specify whether outlier AS6 was included, include the number of samples in each category under the time of exposure: Fig. 4 was changed by reorganizing the samples in age groups according to Fig. 5 (please note Fig. 2 below). We added the standard error and the number of samples in each group. Fig. 4 shows that the amount of B6CA is slightly but not significantly higher in samples on older surfaces which might hint to an effect of BPCA degradation. Outlier AS6 was included in age group 100-120 yr in both Fig. 4 and Fig. 5.

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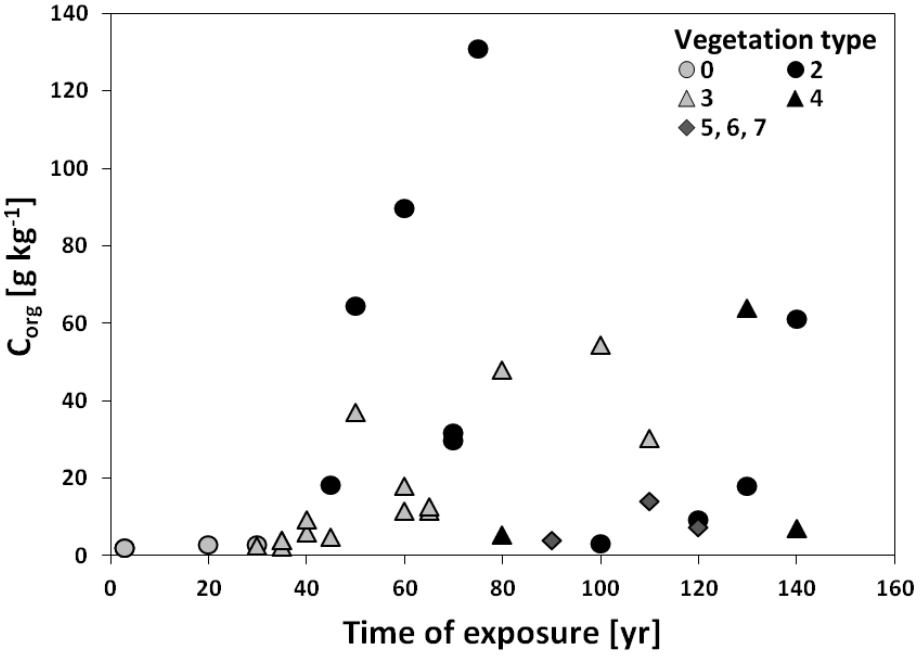

Fig. 1.

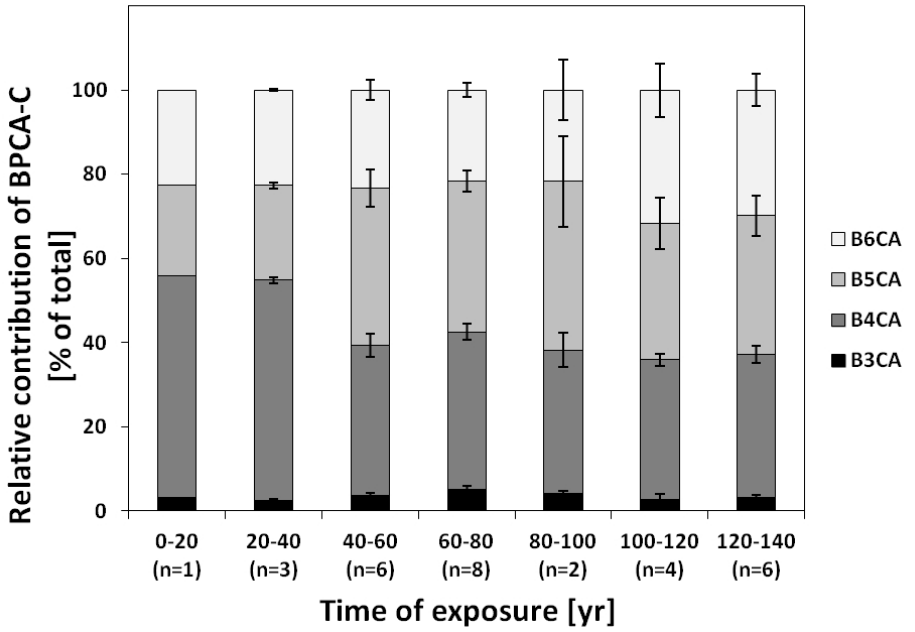
Relative contribution of BPCA-C
[% of total]
100
80
60
40
20
0
0-20
(n=1)
20-40
(n=3)
40-60
(n=6)
60-80
(n=8)
80-100
(n=2)
100-120
(n=4)
120-140
(n=6)
Time of exposure [yr]
B6CA
B5CA
B4CA
B3CA

Fig. 2.