

## ***Interactive comment on “Vascular plants affect properties and decomposition of moss-dominated peat, particularly at elevated temperatures” by Lilli Zeh et al.***

### **Anonymous Referee #1**

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The ms describes a study on the influence of changes in plant cover on the decomposition of moss (sphagnum) dominated peat at two peatlands differing in altitude and temperature. The authors investigated a large number of short cores (~ 20 cm) for changes in peat decomposition based on C/N ratios,  $\delta^{13}\text{C}$  and changes in organic components derived from pyrolysis GC-MS analyses. The authors found out, that sedges and shrubs litter increases decomposition of moss dominated peat, especially at higher temperature. The effect of vascular plants was more pronounced than that of temperature. Peat decomposition appears to be best reflected by  $\delta^{13}\text{C}$ , although its application to distinguish source material from decomposition is seen incomplete. C/N and  $\delta^{15}\text{N}$  appear to be not specific enough to indicate the effects of vascular plants on

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moss peat decomposition. The topic and the conclusions are not entirely new, but this is to my knowledge the most comprehensive study on this topic. Especially the combination of stable isotopes, C/N ratios and pyrolysis GC-MS gives new insights into the role of plant cover for initial organic matter degradation in peatlands on a molecular level. The ms is suitable for Biogeosciences and well written and I suggest publication after addressing some issues.

Specific comments: The use of the term decomposition in peatlands is often a bit unspecific and many different methods (compound specific or only operational defined) are used to determine the degree of peat decomposition. Although the authors describe in the ms what C/N,  $\delta^{13}\text{C}$  and py-GC-MS can show, but it remains unclear when I see mass loss (C/N and  $\delta^{13}\text{C}$ ) or changes in the molecular composition. The problem here, I think is that e.g. C/N and  $\delta^{13}\text{C}$  were used in previous studies to distinguish changes in peat decomposition (here it describes mainly mass loss (polysaccharides), but what the authors investigated in their study is the initial phase of plant material decay (a lot of qualitative changes/ molecular composition) I suggest that the authors make clear what they mean by "peat" and give a clear statement e.g. in their hypotheses what they mean by "decomposition". The authors address the importance of oxygen availability, redox conditions and water levels at the time of sampling. They also mention that oxygen transport into the peat via aerenchym of *E. vaginatum* takes place. However, redox-conditions (here the availability of oxygen for OM mineralisation) are crucial for peat decomposition. For me it remains unclear how much of the observed changes in decomposition/OM quality are related to redox-conditions/water table depth or oxygen transport via the roots of vascular plants and how much to the presence of plant litter from sedges or shrubs. More shrubs and sedges in peatlands are usually a result of drier conditions. Drier conditions mean lower mean water table and aeration/increased decomposition of peat, a bit a hen and egg problem. The authors remain unclear about this in their conclusions.

- The authors tend to use general terms such as L 35 alterations in the environment,...

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L39 plant-soil feedbacks, .L66..hydrological conditions. Please be more specific. - Can the authors give an estimate about the ages of their plant/peat samples. Is time an issue here? - L185-195 The description of Fig. 1 2 and 4 are a bit difficult to decipher. May be disniguish by site. - Table 1: all reference are from one of the authors (Schellekens). Any independent references available here?

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