

## # Referee 1

We are glad for the helpful comments of the referee and for the general support that he/she wants to see the data published. However, the referee raised a series of concerns among which language problems and speculations were the most critical points. We fully see the linguistic problems and would review the manuscript professionally by a native speaker before resubmission. We also see that we included some conclusions, which are not fully supported by the data (see comment below). In our comments we will concentrate on the scientific comments to stimulate the discussion on the topic:

The referee stated that the “2 non-forestry streams were remarkably different, and thus, cannot be considered as replicates.” It was not the aim to use the streams as (mathematical) replicates such as needed for ANOVA. We replicated in both time and space and applied correlation analyses to test for relationships along gradients and not for differences between strict categories. Despite differences between individual rivers (which cannot be avoided in field studies), we demonstrate distinctive patterns for both groups, i.e. forestry and non-forestry streams.

The referee commented also correctly that our correlation analyses do not prove causal relationships. He/she gave examples, where our strong statements suggest such causal relationships and we agree that such statements are not supported by the data. Thus we will carefully go through our manuscript and weaken statements regarding causalities between biological mechanisms and DOM quality. However, we have to say, that the central and scientifically novel conclusions, e.g. on the link (i.e. correlation between stream metabolism and DOM composition in the small streams), are well supported by highly significant relationships.

It was correctly commented that our investigation “does not provide new insights” on seasonality of stream metabolism and the influence on land use on metabolism. We agree that data on this topic have been demonstrated before. Our focus is on the linkage of DOM and whole stream metabolism and the temporal and spatial variability of this coupling rather than on giving insights into this linkage of metabolism and land use. Showing the latter, however, is necessary to address the first (scientifically new) question. However, we will reduce statements on seasonality and land use on metabolism and will focus on our central topic in a revised version. In this context, the referee also stated that we did not measure stream metabolism in winter. In fact, whole stream metabolism measurements under ice (also the soil was frozen) at 0 to 2°C water temperature (Table 1) are on the one hand not possible and on the other hand not necessary for the present analyses.

We agree that this manuscript can be shortened, particularly the introduction (citations) and the discussion. We will do so prior to a resubmission.

The referee stated that we should try to state a hypothesis and restrict our efforts to test it. Our main hypothesis (abstract chapter (18254-18255) and introduction (18257)) was: “We hypothesized that whole stream metabolism can affect the DOM composition and that the coupling of both is influenced by seasonality and different land use forms.” However, with regards to our statements mentioned above, we find that the hypothesis is not fully useful because we cannot verify/ falsify the first part of the hypothesis on the mechanisms with our data. Instead, we now tested the hypothesis that both DOM composition and whole stream metabolism are correlated due to presumably significant effects of

within-stream metabolisms on the DOM composition. Such a relationship has rarely been shown for streams, which are supposed to be net-heterotrophic, with allochthonous DOM-signals not being significantly affected by internal processes (see also reply to referee 2).

The reviewer stated that “metabolism data may be used to characterize the study system but not to demonstrate the influence of season and land use on GPP and CR”. It is correct that the focus of our paper is on the DOM-characterization and on the correlation of metabolism with DOM signals rather than on the effect of season and land use on GPP and CR. In a revised version we will more strictly focus and delete such side-aspects.

k will be included into the equations in the revised manuscript (18261).

The referee suggested introducing the DOM components (Table 2) in the method chapter. The DOM components C1, C2, and C3 are results of the PARAFAC modeling, as described in the method chapter (18263-18264). PARAFAC is a special form of the Multivariate statistic where a structure of redundant excitation and emission maxima is extracted from a big data set (in our case 100 EEM's). The structure of groups of Ex/Em-maxima (=components, Table 2) can now be used to identify the component groups by comparing them with literature findings. We describe how we compared the PARAFAC results with literature data to obtain the needed information of our components in the method chapter. We will clarify that these components stem from the PARAFAC modeling in the result chapter and we will describe the use of this Multivariate statistic in more detail in the method chapter.

The referee asked why we do not use the chromophoric components (C) itself (C1, C2, C3) instead of the ratios (C1:C2, C1:C3, C3:C2). In fact, this was tested, but the results were not fully included in the manuscript. Only low and insignificant relationships can be detected when correlating the single components with HIX (HIX:C1  $R^2=0.29$ , HIX:C2  $R^2=0.06$ , HIX:C3  $R^2=0.20$ ). We found similarly low relationships for beta:alpha:C ( $R^2$  from 0.01 to 0.19) and for FI:C1 and FI:C3 ( $R^2$  was 0.21 and 0.25, respectively). Only the correlation between FI and C2 was significant ( $R^2=0.46$ ). Only this component seems to be directly linked to the freshly (autochthonous) produced organic matter. We used C2 as a single component in Figure 9 where we correlated it with P/R to show the linkage between autotrophy and C2. In a revised version, we will also mention the other, weak relationships when using the single components. However, it is valuable to highlight that the relationships between the components can show much closer relationships to HIX, FI and beta:alpha.

The referee asked also “is it possible to allocate total DOM in the different components?”. This was not the aim of our study, but to our knowledge it is not possible to allocate total DOM in the different components by the use of EEM's.