Referee 2

We thank the referee for these comments, which will help to improve our manuscript. The referee found the presented correlations between DOM compositions and P/R interesting and acknowledged the value of the core topic, i.e. the linking between stream metabolism and DOM composition. The referee commented that his/her major concern is the difficulty he/she had reading the manuscript (writing problems). As stated in our reply to referee 1, we also see this deficit and a revised manuscript would of course be professionally corrected by a native speaker before resubmission.

In the following we will reply to the comments on the content of the paper.

Referee 2 stated that he/she does not "think that the work presented in this manuscript executed the intended goal of the paper. The authors found some interesting correlations between DOM composition and P/R, however, correlation does not necessary mean causation. More experimental work or data would be required before justifying identification of any mechanisms driving DOM composition." We fully agree that correlation does not necessarily mean causation and we will carefully adjust statements in a revised version of the manuscript to avoid possible over-interpretation on mechanisms (see also reply to referee 1). However, correlations of field data are essential to detect patterns under natural background conditions. They can link process understanding as gained from experiments and mathematical modeling to field relevance and, vice versa, to generate hypotheses which can be tested in experiments. Therefore, correlative field data are valuable in the process of knowledge generation and, accordingly, several high-ranked journals, including BG and Nature Geosciences, recently published stand-alone paper of correlative data. The value of our present data is the proof that DOM-pattern and stream metabolism are linked (i.e. highly significantly correlated) under field conditions. Potential underlying mechanisms (which we could not demonstrate by our data), i.e. that primary producers generate DOM and bacteria depredate certain DOM fractions, are well known and do not need to be shown in further experiments. The current understanding on streams is that the systems are predominantly heterotrophic and that the DOM originates predominantly from terrestrial sources. The strong relationship to stream primary production, as found in our study, is a novel finding. We also found DOM quality (FI) changes as well as a low molecular weight organic component (C2) correlated to P/R. This indicates that DOM quality in streams is linked to the metabolic balance. Furthermore, the DOM quality (Fig. 10) as well as the metabolism (Fig. 4) underlies seasonal changes. We believe that such data are of high value for the readership of BG and probably stimulate and support future field- and process studies.

Responses to specific comments of referee 2:

- "If the non-forestry streams are not forested, what are they?". The "open-land streams (=non-forestry) are influenced by cow ranching – with different intensity – which is a typical land use form in this region" (page 18258). While forestry streams were almost exclusively (nearly 100%) shaded by trees, the "non- forestry" streams were surrounded by open land for the whole stretch taken for metabolism measurements and to the vast majority upstream of the investigation area. A detailed description of the whole land scape (Bode catchment), including

the land use forms (% land cover) of our investigated streams is given in our recently submitted manuscript Kamjunke et al. (under revision). We will add a citation of this work into the method chapter of a revised manuscript. And we will see to it that a more detailed description is put into a revised version of our paper.

- The referee asked also if we considered classification in % land use as part of the analyses. % land use was not directly considered as part of this analysis. We merged different land use forms into the categories 'non-forestry' (open land) areas and 'forestry' areas because we used streams contrasting strongly in leaf canopy cover rather than considering gradients in the forest cover. In the temperate zone open land areas are a result of anthropogenic land use changes. This includes deforestation for land use forms like ranging, agriculture, and settlements. 'Non-forestry' areas have generally higher irradiance than 'forestry areas' which can affect GPP in streams and is probably a reason for the signals detected here.
- As mentioned correctly by the referee, we will include k in the equations and give the measurement errors of the metabolism technique (after Reichert et al. 2009) in the revised manuscript.
- The referee asked if we considered the metabolism technique presented in Holtgrieve et al. (2010) to incorporate measurement errors of our method. The authors present a one station oxygen change technique, which is particularly suited to low-gas exchange, high-productivity systems as stated by Holtgrieve and coworkers. Our streams do not fall into this group. Following Reichert et al. (2010) the one station oxygen change technique is only useable in homogenous streams, whereas our streams were very heterogeneous.
- The referee asked also how the DO loggers were calibrated. They were calibrated in the laboratory with a two-point calibration at room temperature (20°C). A correction factor was determined from test measurements at different temperatures in the laboratory (after Reichert et al. 2009). We also placed them simultaneously into the stream bed at the end of each experiment. We will include this more detailed explanation into the method chapter of the revised manuscript.
- The referee commented correctly that the use of DOM component ratios (C1:C2, etc.) is new, and we should include a detailed explanation of the used ratios. Please see response to referee 1 for our explanation. We will include such details in a revised version of the manuscript.