

Many thanks to Torsten Vennemann for the constructive review. The implementations of the corrections will greatly improve the manuscript. We especially thank the reviewer for the editing. Below you can find our detailed responses (in red) to the comments (black):

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### **General comments**

General comments: An interesting manuscript with a nice set of data and a detailed analyses of these data. Although this approach has been used in other rivers, the context within which the questions concerning the impact of the sediment on the brown trout are addressed is also a scientifically interesting question of interest to geo- as well as biogeoscientists and biologists. In addition, the controls and the model used to determine the individual contributions to the sediment as a function of time and place is good as this is also a relatively small catchment river. Sadly, however, the authors do not really get back to responding to this question after a detailed description and discussion of their analyses and data.

In addition, the text is often somewhat confusing and awkwardly phrased. The English certainly needs improving. The text is in some places also too long and there is some repetition of things that are already given in the diagrams or tables.

Hence, the manuscript ought to be revised and rewritten. Overall data and the models and conclusions proposed are valid though.

**Author reply:** Yes, we will revise and rewrite the manuscript. We are fully aware that we are not native speakers and will appreciate any comments or hints to improve the manuscript.

### **Specific comments**

Titel: I would rephrase the title: "Organic matter dynamics and stable isotope compositions as tracers of the sources of suspended sediments".

**Author reply:** Thank you for his suggestion. We changed the title to "Organic matter dynamics and stable isotope signature as tracers of the sources of suspended sediments".

P.454, l.4: The latter results...

**Author reply:** Yes, done

P.454, l.6: Use third person for scientific text: The temporal and... were assessed...

**Author reply:** Yes, done

P.454, l.11: of SS with respect to ...

**Author reply:** Yes, done

P.454, l.15: ... and high rainfall, probably...

**Author reply:** Yes, done

P.454, l.17: ... due to an increase of pasture and arable land downstream of the river.

**Author reply:** Yes, done

P.454, l.19: you need to say relative to what its fraction increased - SS I assume...

**Author reply:** Changed to: "The mean fraction of SS originating from upper watershed riverbed sediment decreased from up- to downstream and increased during high flow at all measuring sites along the course of the river."

P.454, l.20: latter

**Author reply:** Yes, done

P.454, l.22: write out "nitrate" or give also the negative sign for its charge as the ion.

**Author reply:** We will write out nitrate.

P.455, l.11: possibly

**Author reply:** Yes, done

P.455, l.18: "redds"?

**Author reply:** A "redd" is a shallow depression created by the female brown trout in which eggs and sperm are deposited. Afterward, the female covers the fertilized eggs with gravel. We will explain this briefly.

P.455, l.24: either from in-stream sources (autochthonous)...

**Author reply:** Yes, done

P.455, l.28: Recruiement? Is this the right word here in this context...?

**Author reply:** We changed the sentence to "..., with a native brown trout *Salmo trutta* population,

P.456, l.2: increased

**Author reply:** Yes, done

P.456, l.4: Furthermore, ..

**Author reply:** Yes, done

P.456, l.10: reliable tracers Also: no need to mention the isotopes (heavy) of C and N further up in this sentence. For one, both stable isotopes for both elements are always measured in any case and both only have two stable isotopes that are measured as the ratio.

**Author reply:** Yes, done

P.456, l.15: Give the ratios for these isotopes:  $^{13}\text{C}/^{12}\text{C}$  and  $^{15}\text{N}/^{14}\text{N}$ ...

**Author reply:** Yes, done

P.456, l.24: ...IsoSource, which...

**Author reply:** Yes, done

P.456, l.26: This program was used in this ... (again: it is normally better to use the third person form for multi-author manuscripts and scientific text.

**Author reply:** Yes, done

P.457, l. 3: with respect to...

**Author reply:** Yes, done

P.457, l. 9: most river of the

**Author reply:** According to a native speaker, "like most rivers..." is correct.

P.457, l. 12: including terraces...to prevent deep channel erosion and scouring of the bed...

**Author reply:** Yes, done

P.457, l. 15: consists of the Upper Freshwater Molasse (IT IS AN OFFICIAL NAME).

**Author reply:** Yes, done.

P.457, l. 18: ... on the peak of the mountain of Napf, where the ...

**Author reply:** Yes, done

P.457, l. 19 data not Data

**Author reply:** Yes, done

P458, l.7: Personally I think this choice of the term "infiltrated sediment" is unfortunate as I would understand this to be sediment of the river bed that was infiltrated by the river water, taking with it perhaps a very fine fraction of suspended sediment... But it essentially would have been sampled from the river bed rather than a sediment trap...? Why not simply call it "fine fraction of the SS (or FF-SS)?"

**Author reply:** Yes, the term "infiltrated sediment" does refer to fine sediment that was infiltrated with the river water in the riverbed. The sediment baskets were dug in the riverbed and were designed to caught infiltrating sediment (see Schindler Wildhaber et al., 2012).

P.458, l.11: Nitrate when used as the ion must also give the negative charge!

**Author reply:** We will write out nitrate

P.459, l.15: Are the second decimal points justified here? I do not think so as the analytical method clearly gives errors of +/- 0.1 permil. Nitrate as NO<sub>3</sub>(minus)!

**Author reply:** Yes, you are right. We will change it to -30.5‰ and -17.0‰. We wrote out "nitrate"

P.460, l.2: ...measured isotopic compositions (the values have NOT been "seen", nor are they unique - hence not "signature", they are simply your measured values!

**Author reply:** Yes, done

P.460, l.6: source increments of 1% ... were defined.

**Author reply:** Yes, done

P.460, l.20: delete "significant"

**Author reply:** In section 2.1.3 we defined significant level at 0.05. The word "significant" in the text implies previous statistical analyses which were significant at a 0.05 level (original manuscript: t-test and linear regression, revised manuscript: t-test, ANOVA and linear regression). We will discuss this in more detail in section 2.1.3 and indicate the significant results in the tables 1 and 2.

P.461, l.3: ... of agriculturally exploited land (to distinguish it from land that CAN be used for agricultural purposes but is not actually used as such).

**Author reply:** Yes, thanks. Done.

P.461, l.7, ...have an inverse relationship - if you use statistical terms then you need to also specify the degree of significance, but if they are different there is no need to mention "significant"! This applies to the text here and elsewhere too.

**Author reply:** We did not delete "significant" due to the reasons mentioned above.

P.461, l.16: derived from...

**Author reply:** Yes, done.

P.461, l.21: held...

**Author reply:** Yes, done

P.461, l.22-28: This statement is out of place here - of course a landslide implies a high amount of mechanical energy but I guess you did not "observe" these landslides happening, nor did you "observe" that this type of process transfers lower amounts of Corg to the sediments... If, however, you want to make the point that in the upper reaches of the fluvial

system, landslides are or have been common and that this may also result in deeper erosional levels with lower Corg content being exposed and hence also contribute to lower Corg in river sediments further downstream - then say so clearly!

**Author reply:** We will delete the statement

P. 462, l.1-2: Why mention it when it is not significant? Simply say that the values are low at all sites...

**Author reply:** Yes, you're right. Changed.

P. 462, l.8: Difficult to use "never" and "always" here - after all you only sampled once every two weeks and may have well missed some peaks with much higher DOC values! Hence be fair and simply say that your samples did not exceed values of XY.

**Author reply:** Yes, changed

P. 462, l.16: ...below...

**Author reply:** Yes, done

P. 462, l.18: In december I have my doubts whether the biological activity increases measurably as soon as the temperature is for a day or so no longer under freezing! Transport by first "flowing" water after melting at the surface is obviously a better explanation...

**Author reply:** This explanation only refers to the higher values in February. The high value in December can be explained by heavy rain. We will clarify this in the text.

P. 462, l.23: No logic to this sentence... The increase is NOT significant because of low values, if so, because of low contributions from the river water!

**Author reply:** We deleted the sentence

P.463, l.6: delete "significantly"

**Author reply:** We did not delete "significantly" due to the reasons mentioned above.

P.463, l.10: with respect to

**Author reply:** Yes, done

P.463, l.11: below

**Author reply:** Yes, done

P.463, l.18: I do not think that this word exists... due to the application of manure to the arable land...

**Author reply:** According to the online dictionary "LEO", the verb "to manure" exists.

P.463, l.21: Does - if you use did not it would mean it does now...! Delete “significantly”

**Author reply:** Changed “did” to “does”. We did not delete “significantly” due to the reasons mentioned above.

P.464, l.6: are between... the ratios have a value and are not variable (saying that each sample has one fixed measured value).

**Author reply:** Yes, done.

P.464, l.12: Delete “significant”

**Author reply:** We did not delete “significant” due to the reasons mentioned above.

P.464, l.14: marginally

**Author reply:** Yes, done

P.464, l.19: delete “significantly”

**Author reply:** We did not delete “significantly” due to the reasons mentioned above.

P.464, l.21: ... depleted in

**Author reply:** Yes, done.

P.464, l.24: delete significantly

**Author reply:** We did not delete “significantly” due to the reasons mentioned above.

P..465, l. 5: related to different discharge patterns.

**Author reply:** Yes, changed

P..465, l. 5: delete significant

**Author reply:** We did not delete “significant” due to the reasons mentioned above.

P..465, l. 17: low values (values are not light nor heavy as they are relative values without units!)

**Author reply:** Yes, changed

P.466, l.7: delete significantly

**Author reply:** We did not delete “significantly” due to the reasons mentioned above.

P.466, l.8: Avoid the excessive use of the word "significant" - reserve it for cases where you really discuss the statistical distribution of your results and then give its values as correlation coefficient for example. If you simply use it to mention that a measured value is different from another, it is of little use...! You have discussed your analytical method and errors so if you say that two values are different, it is clear that they differ by more than the analytical error of

each other. NO NEED to use significant then. You did not test for the significance in these cases...

**Author reply:** We tested the significance in these cases by ANOVA. Therefore we believe that the word “significant” is appropriate. We mentioned in Section 2.1.3. that “significant” means a p-value <0.05. Additionally, we will indicate significant differences in the tables.

P.466, l.18: This assumption was not really tested with the model, it was just quantified by mixing the components in different proportions ... (or not?).

**Author reply:** Changed to: “To quantify the proportion of the different sources, the IsoSource program was used”

P.466, l.28: from rather than in

**Author reply:** Yes, done

P.467, l.6: weak rather than week

**Author reply:** Yes, done

P.467, l.8-10: have higher uncertainty as there are a larger number of sources possible for the downstream sites. In addition...

**Author reply:** Changed to: “...have higher uncertainty as there are four ( $n + 2$ ) possible sources for the downstream sites with two ( $n$ ) isotopes groups and thus an underdetermined equation system. In addition,...”

P.467, l.17: weak

**Author reply:** Yes, changed

P.467, l.24: Consequently, the...

**Author reply:** Yes, done

P.468, l.4: This depends on how the icicles are formed - they may also be formed by air moisture transport and indicate the transport of, for example water vapour from the river to that side of the river bank... this is not a valid argument here or more information must be given to conclude that the icicles are of exfiltration origin!

**Author reply:** We found real ice formation, which could not be due to water vapor. Changed to: “Moist soil in the warmer season and ice formation during the winter...”

P.468, l.26: "probably, mainly..." Give proper conclusions here: This is suggested to be related to ...

**Author reply:** Yes, done

Also: nitrate or give negative sign for the ion (NO<sub>3</sub><sup>minus</sup>)

**Author reply:** Changed to “nitrate”

P.469, l.2: NO<sub>3</sub>

**Author reply:** Changed to “nitrate”

P.469, l.7: with respect to time and space...

**Author reply:** Changed

P.469, l.17: OK, and what does all of this now imply for the spawning and the trout population  
- Is that not what the authors addressed in the introduction?

**Author reply:** Yes, you are right. We will discuss this point in the abstract and the conclusion. Our data indicate an increase of soil erosion processes on snow free pasture and arable land during the anticipated warmer winter with more frequently torrential rain events (IPPC, 2007). An increase of SS and of organic matter during the brown trout spawning season would be a consequent. Both affect brown trout eggs negatively (Greig et al., 2005).

P.474, l.1: Mean values and standard deviation at the three sites sampled of organic and...Also nitrate as word or give negative sign for the ion

**Author reply:** Yes, changed

P.476, l.1: Mean (range and standard deviation) of ...

**Author reply:** Yes, done

Figure.2: Increase the font here...

**Author reply:** Yes, done.