

Dear Dr. Abril,

thank you, for your feedback on our manuscript. It was checked by a native speaker for grammar and spelling errors, redundancies overlooked after the extensive revision, and complicated phrases were corrected.

Besides, we merged the original results chapters 3.3.1 and 3.3.2 and deleted one level of headings there. Below, we answer all issues raised. The line numbers refer to the version with tracked changes.

Define DOC and SRP in the abstract

The abbreviations DOC and SRP were explained in the abstract (lines 18 and 29).

L30 “while the others more or less resembled the bulk DOC uptake” > Others what?

We added "the other DOM components" (line 30).

L46 “alter the toxicity” increase or decrease or both?

DOM can alter the toxicity in both directions, depending on the toxic substance. However, as this is of no relevance for our study, we deleted it (line 47).

Section 2.1 Site description: it would be informative to localize (as an additional zoomed panel in figure 1, maybe some photographs?) the “several inflows, two natural springs, six drainage pipes”, the “site with groundwater infiltration” the “small wetland”. The “(dense) grass growth on the banks”, the “deciduous forest at the beginning and end of the study reach” as well as the location of stream discharge and water quality continuous monitoring, the “two lateral inflows”, even if this information is resumed in Fig 2.

We did not include this information in our study map as it is of no relevance for the actual study. Our study reach did not include any inflows, as mentioned in L 138, as these would have interfered with our addition study. We fear that providing a lot of details about these inflows, may thus be misleading and confuse readers. A satellite image with the stream, the study reach and the inflows was added to the manuscript (line 130). Besides, a brochure with a detailed map of the study stream can be easily downloaded via the provided internet link in L 119. We have added this information there in brackets.

Fig. 2 “downstream from 1 in m” do you mean downstream distance from point/station 1 in meters?

We made this clearer by using the circle symbol for point 1 instead of the letter 1 (line 148).

L192 you use the term “terrain model” only once a time here in the mat and meth section. Do you mean “digital terrain model”? Is this term necessary?

Thank you very much for this comment! We have corrected the manuscript and used the term "digital terrain model" (line 213). The reason for this is that this phrase refers to the generation of the terrain geometry. Subsequently, "model" or "1D model" is used in reference to the hydrodynamic calculation of the abiotic parameters.

You jump from section 2.5 to 2.7 without section 2.6

Thank you for the comment, we corrected 2.7 to 2.6 (line 221).

L219 what do you mean by “while v_f should compensate this problem”, what problem? Why is it a problem? Please rephrase/explain

Thank you, for pointing this out. We changed to "while v_f is independent of discharge" (line 244, see also Dodds et al 2002; Stream Solute Workshop 1990, and many others).

L220 “U incorporates the concentration of the solvent”, not clear, please better explain

We rephrased the sentence and made this more explicit (line 245).

L222 “because the compensation of hydrologic conditions makes general uptake patterns better visible” not sure what you mean here do you mean that V_f is compensating the changes in

discharge, making the changes in other parameters and particularly the biological ones, better reflected by V_f than U or Sw ?

Yes, correct. As changes in discharge are compensated, v_f reflects biogeochemical processes better. We have rephrased the statement accordingly (lines 247 ff).

L228 > “by doing that”

We corrected the text accordingly (line 255).

L252 “these models” What models? why plural?

Fitting Eq. 1 with data from one DOM component or nutrient is considered to be one model. Because we investigated several DOM components and nutrients we dealt with many models. This sentence was rephrased: We decided to present only the results of the power function (Eq. 1) because its inclusion in the models for the different DOM components showed the highest BF's (highest probability to explain the observed data) in most cases (lines 285 ff).

L254&256 concentrations of what?

We clarified, what concentrations was meant. ...the concentrations of the DOM components and the co-leached nutrients ... (lines 288-289).

L260 thus “we” did not; “restrict the sign” do you mit “fix” or “impose” the sign?

The sentence was changed to “...and thus we did not constrain the sign of m_i .” We think, this is a well suiting term that makes it clear, what we did (line 294).

L262 “this is significant” what is significant?

The sentence was rephrased and split up to "However, such a total collapse is not expected for DOM fractions since microbes can use other C sources. Thus, we incorporated an added" (lines 296 ff)

L281&289 not “by that” > “by doing that” (I doubt the paper has been edited by a native speaker)

Thank you, for addressing this! The sentences were changed accordingly (line 334).

L299&300 not sure “resemblance” & “resembled” are appropriate words. Similarity? Similar...

Yes, the word "resemble" is used correctly here as confirmed by a native speaker. However, we changed the first sentence to "which showed a similar fluorescence as pure quinone" to be more precise (line 352).

L300: “composition” if fluorescence is the criteria, not sure “composition” the appropriate word

This is a common term in this context (as well as DOM quality). Please see e.g. Stedmon et al. 2005, Fasching et al 2020, Stedmon et al. 2008, Graeber et al 2012, and many others (line 354).

L331: “these three” what? Revise phrasing

We added "leachates" to make this clear (line 384).

L333-334 where can we see the lower DOC peaks?

This can be seen in Figure 4. We added a cross-reference in the manuscript (line 385).

L335 “This demonstrates how a low number of observations or erroneous data influences results in Bayesian statistics” how do they influence? Please be more explicit

They lead to a broader posterior probability density. We have added this information (line 386).

L336 “However, although we cannot make reliable statements in all relation to other leachates, we get the probable range of uptake velocities” what statement? What relation? Please explain/rephrase

We have merged the upper part with this statement (and shortened it) for better readability: "During nettles and pig dung leachate additions, the DOC peaks were lower (Fig. 4) and

measurement errors had a higher influence, leading to broader posterior probability densities (Figure 5). This hampered a clear separation of the vf of nettle and pig dung leachates from the vf probabilities of the other leachates. Nevertheless, we can assume that" (lines 385 ff)

L345 taken up slower, WHEREAS SRP,... language editing is needed

We apologize. These error happened during the extensive revision and was obviously overlooked. We corrected the sentence accordingly (line 407).

L373 “Although the model improved decisively in comparison to the one without interactions” improve language

The sentence was changed to: "While the Tyr (C6) model including the interaction with Hum-ter (C2) improved decisively compared to the simple model without interaction terms, the best performance could still be reached with the Tyr (C6) model including the sampling date." (lines 440 ff)

L376 delete “no additional information could be gained from the available data.” Write “For Hum-micter (C3) and N-NO₃, we found no effects of variable collinearity within the models”

Thank you, for pointing this out. The sentence was changed to “For Hum-micter (C3) and N-NO₃, no effects of other variables could be identified with our models.” (lines 444 ff)

L380 delete “we found substantial evidence that”

This part of the sentence was deleted.

L381 Not sure what is the meaning of “concurrent” here

We meant “occurred simultaneously“ and rephrased this statement (lines 450 ff).

L392 “to get the effect, their uncertainty would have on the model” > to get the effect of their uncertainty on the model results?

The sentence was changed accordingly (lines 461 ff).

L396 “Hence, we do not expect a more sophisticated model to reveal any more details” not sure what you mean here

If the measurement errors and the model residuals are close, the information that can be drawn from the data is exhausted. We added this information to the manuscript (lines 465 ff).

L398 “The higher error of the model compared to the assumed effect of the measurements on the accuracy shows that” please improve phraseology.

The sentence was changed to “Since the model residuals are higher than the assumed effect of the measurements the model has still potential for improvement...” (lines 468 ff).

L404 “as also observed”

Thank you. The sentence was changed accordingly (line 487).

L411 “Interestingly, the same sequence of increasing uptake velocities from cow dung leachate to leaf leachate and corn leachate was observed in a laboratory flume experiment using the same organic matter sources as this field study, but different sediments (Weigelhofer et al., 2020)”

The sentence was changed accordingly (lines 493 ff).

L414 “There, however...” improve language

Thank you for pointing this out. The sentence was changed accordingly (line 496).

L418-L419 So what? Do you mean that “in addition, leaf leachate uptake also varies with P fertilization of trees”?

More or less; long-term phosphorus fertilization of trees led to P-enriched leaf leachates which showed a higher uptake than the leaves from non-fertilized trees; we have rephrased this part (lines 500 ff).

L420 I would say it lies in the upper range

In this case not, if one considers the distribution of v_fs found in the literature; in this case, our v_f lies close to the median (line 505).

L427 “was taken up slowest” > most slowly. It looks like this MS has NOT been edited by a native speaker as the authors say

This has either been overlooked by the native speaker or wrongly been accepted after the quite substantial revision. We apologize. The sentence was changed to “... showed the slowest v_f” (line 512).

L430 remove “about”

“About” was removed (line 516).

L438 “was only intermediate in our study” not sure what you mean here

We meant lying between the fast and the slow components in our study, although fast uptake is assumed according to the literature. We rephrased it to: “showed only medium uptake velocities” (line 518).

L437 “The uptake of N-NO₃ was the lowest of all components due to its high background concentrations in the water column” not clear why high background NO₃ induce lower NO₃ uptake, looks like counterintuitive

Because N is in excess, and thus microbial N uptake is strongly P or C limited; besides, if present, NH₄ is preferentially taken up by bacteria due to its lower molecular weight, resulting in a further decrease of NO₃ uptake and in nitrate behaving like a conservative tracer rather than a reactive nutrient; this has been shown by numerous nutrient addition studies, such as Dodds et al. (2014, <https://doi.org/10.1007/s100210000050>), Wymore et al. (2016, <https://doi.org/10.1002/2016GB005468>), Dodds et al. (2003, 10.1007/s00442-004-1599-y)

L443 “huge number of different bacterial strains” not sure what you mean here

“Strain” is the scientific term in aquatic microbiology for “bacterial species” detected by molecular analyses; it means that most of present bacterial species showed this ratio (see e.g. Godwin et al.)

L445 “we do not believe that... Rather, we assume that”. Based on what facts? Looks speculative

Our assumption is based on the following: Because C:P ratio were already in an optimal range during background conditions and even decreased during the additions, pointing rather to C-limitation than P-limitation in our stream (see statements immediately above); and because SRP and DOC uptake were not correlated (see e.g. Tab 6 and results) and N was not limiting; if stoichiometry would have controlled P uptake in our study, we should have seen a clear link between P uptake and DOC concentrations and much higher C:P ratios; for references, see, e.g., by Cross et al, 2005 and Stutter et al. 2020. We have added a short explanation about the P and C demand of auto- and heterotrophs (lines 530 ff).

L458 “However, as the molar ratios of C:P were low in our stream, showing no P limitation, and we also did not raise the SRP concentrations in our stream additionally to the P content of the leachates, SRP-related effects on DOC retention might have stayed uncovered” Almost impossible to understand. Please improve phraseology.

We split the statement into 3 sentences: “However, the molar C:P ratios were low in our stream, showing no P limitation. Besides, most P peaks during the additions were rather

small, containing only the leached P from the DOM sources. Thus, potentially stimulating effects of SRP on the DOC retention may have remained undetected. (lines 546 ff)

Same for the next sentence “performed much better” performed what? You mean have better performance?

The term was changed to “showed a higher probability of explaining the measured values” (lines 551 and 552).

L466 and on several other occasions “This efficiency loss can be explained by the processing capacity of the stream ecosystem, which is influenced by adaptations of the microbial community to usually occurring concentrations” this is a very vague explanation. Usually, biological uptake increases with the concentration of the substrate (first order or Michaelis – Menten kinetics) what is happening here?

Michaelis-Menten is not the only model for uptake kinetics in streams; more often, scientists have observed a Power function that was termed "Efficiency loss model" (see, e.g., O'Brien et al., 2007; Mulholland et al., 2009; Merseburger et al., 2011); here, uptake increases with increasing concentrations, but with a $k < 1$; this happens especially in agricultural streams where the community is adapted to chronic loading (lower uptake rates, but more flexibility towards higher loadings, thus delayed saturation). We have rephrased the statement and added more information to improve the readability and intelligibility also for readers not familiar with addition studies (lines 557 ff).

L467: how can transport become limiting if availability of the substrate increases? This looks strange. I can see that some detailed explanations are given later, I think the discussion should be better worded and structured in order to avoid such crude counter-intuitive statements at the beginning of a paragraph.

Availability of substrate and transport limitations are two key factors influencing uptake, but are not necessarily related (or rather, one of these factors usually dominates the uptake, while the other is neglectable; transport limitation (e.g. due to clogged sediments or thick biofilms) can prevent the reactive solvent to reach the reactive site, thus limiting uptake despite a high availability of the substrate. We have rephrased the statement together with the efficiency loss mentioned above (lines 561 ff).

Page 23 and 24 and at many places in the MS: no need to separate the text in so many small paragraphs

We have merged paragraphs and also chapters of the results section

L488: please explicit what are the “substantial evidences”. Or write later “these evidences are:… good degradation conditions, ideal stoichiometric ratios”, etc… your writing style is too imprecise

"Substantial evidence" is a common term when assessing probability based on BFs. We have made this more explicit in the methods section lines 204-206. Furthermore, we mention that the interpretation was based on BFs explicitly. "Good degradation conditions" are explained by the examples following (such as no transport limitation, ideal stoichiometric ratios, etc.); thus we do not see the "impreciseness" in this term; "ideal stoichiometric ratios" are quite commonly used in uptake studies (see e.g. Cross et al., 2005; Godwin and Cotner, 2018; Stutter et al., 2018, and many others) and are also explained in the introduction lines 51-55; again, we do not see large impreciseness here, but we have added "ideal stoichiometric C:N:P ratios of the organic source for the microbial metabolism" to make it clearer.

L496: sorption on what? Sediments? Again, be precise. We often have to read 2-3 sentences before understanding the first one

We have added "sediments or extracellular polymeric substances" (line 604).

L508: “The INSBIRE approach was developed after the data from the experiment was acquired due to limitations in other data analysis methods developed for inorganic nutrient uptake (Stream Solute

Workshop, 1990), such as the lack of a strategy to handle interactions among DOM components.” I did not understand

In our original manuscript, some readers expected the study to be primarily a method check of the model. This is not the case. The model was only developed after we already had the data (including the high natural variability in the field and thus not ideal to test the strength and weaknesses of the model). We wanted to clarify this here. For better intelligibility, we have deleted the part after "was acquired. Thus, our study represents a case study ..." (lines 625 ff).

I guess a detailed review by co-authors can improve the MS particularly section 4.4

All co-authors and a native speaker have read the revised manuscript. However, due to the extensive revision, the manuscript was difficult to read and check in change-track mode, and some errors have also been overlooked during the final combination of the different revised/controlled versions. We apologize. We have screened the manuscript closely and also it was also checked again by a second native speaker.