Dear Editor,

First of all, thank you for having taken the time to review our paper. We could address all your comment and our answers are below.

* Discussion of the conceptual model: In the introduction (lines 21-29 on page 2 in the revised manuscript) it is argued why a conceptual model is used. After the discussion with the second reviewer, it was written in the reply that the model would in the revised manuscript be discussed more, including also the drawbacks. I think this is still missing (but I might have missed it, in this case the comment is not valid). I read the manuscript before going through the discussion and I stumbled over this point as well (same as the reviewer). While the argumentation about the number of parameters is reasonable and it seems reasonable to use such a model for the purpose of the paper, there are not only advantages of a conceptual model. The dependence of parameters on boundary conditions is already mentioned by the reviewer. However, also predictions made with a conceptual model that go out of the range of the data that were used for calibration and validation have to be seen critically. As the model parameters are not physically based parameters that are related to material properties only, one has to be careful with making predictions. A physically based model is more reliable in this respect. At least one sentence discussing modeling approaches in a more balanced way would be appropriate.

In order to balance the benefits of conceptual vs physically based model we added the following sentence. “Nevertheless, these parameters have to be adjusted to every condition through calibration and validation phases when a more physically model would only require adjusting boundary conditions. In addition, conceptual models are valid for a specific range of input data and should not be used for prediction where conditions lie out of their validation range.”

* Section 2.2.2 (DOC model): I am confused with the mass balance. What are the units of DOC in eq. (9)? Intuitively, they should be mass / volume. However, if the balance is right, DOC has to be a flux (unit mass / (length * time)). It is not clear what flux this should be. Also: That would mean there is no storage in the model, just fluxes that add to zero. Also, there is no time step involved (Delta t = t^(n+1) – t^(n)). This does not make sense to me. The right hand side of eq. (9) is all taken at the old time step t (if I get it right). That would mean I could calculate the flux DOC (if it is a flux) at any time t+1 and would get the same result, no matter what I choose for t+1. It would not even depend on the time span between t and t+1.
Usually a balance with explicit time integration reads
(Mass^(t+1) = Mass^(t) +(Fluxes in – Fluxes out)^(t)*Area*Delta t.
I recommend to check the balance and if it is correct to explain why DOC is here a flux and why there is no storage and why the flux at the new time does not depend on the time span between old and new time.

We acknowledge that the units were confusing. the mass balance and units were checked and corrected. DOC^t_S are the mass auqntity of DOC in eqch reservoir (storage). Fluxes in are PDOC and infiltrated DOC (from rain or Sm , depending on the considered reservoir), fluxes out are CDOC and DOC Infiltration or drainage. The time step was implicit since it is constant and daily (delta t=1), we have had it for clarity. The model is a 1D vertical model and the results can be expressed per unit area (here per m^2). Finally we have an equation following Mass^(t+1) = Mass^(t) +(Fluxes in – Fluxes out)^(t) *Delta t with all terms expressed per unit area and all units are consistent.

*Line 15 on page 7 : Should be 4 parameters, and not 6, right?

Yes, correction made.

*Section 2.2.4, lines 2-3 on page 8: What was the Nash-Sutcliff coefficient calculated for? The water table depth? Please specify. Also: How many observations were used?

NS is calculated for water table depth, it was added in the text. The observation period for calibration and validation are described in 2.2.3

*Line 26 on page 8: I would not only refer to Figure 3, but also to Figures 4 and 5 as you mention here both WTD and DOC.

Yes, the text was modified accordingly

* Line 4, page 9: What means p<0.001? Please specify. Same page: What is a PARAFAC analysis

p is the p value of the Tukey test (2.1.2), we changed to p-value<0.001

PARAFAC is the parallel factor analysis (2.1.2). "PARAFAC is a commonly used method to analyze EEMs based on the decomposition of DOM fluorescence signature into individual components that provide estimates of the relative contribution of each component to total DOM fluorescence (Fellman et al., 2010). " was added in 2.1.2

* Line 1, page 10: How is 'significant' quantified? If not at all, I would suggest to not use the word.

We considered the difference significant since the 2 flux ranges derived from the uncertainty analysis do not overlap 188-394 vs 0-40mm for overflow and 1-79 vs 102-144mm for drainage. We added our description of significant in text. "the difference between overland flow and drainage flow in the two sites can be considered significant as the ranges provided by the uncertainty analysis do not overlap"

* Lines 6-7, page 10: I was puzzled. From Fig. 5 one gets the impression that the triangles lie all above the model line and the circles too for the first period. This would be a systematic underestimation or not?

Not all the triangle and circles lie over the model line although a majority does. In addition if we consider the uncertainty in the measurement, we believe there is no systematic overestimation in this case.

* Section 4.1. on page 11: I agree that a model helps to understand the characterization of fluxes in the different systems. Nevertheless: It is still a model with no comparison or control of measurements of fluxes. One has to keep in mind that it is still an interpretation and not a 'shown truth'.
Yes, although in this case we believe that the uncertainty analysis can help in assessing the validity of the model Even though, we agree that the model is not a "shown truth". A sentence was added 4.2.1 : "However, these results can only be considered an interpretation as there are no measurements of fluxes"