

Interactive comment on “Dissolved organic carbon dynamics in a UK podzolic moorland catchment: linking storm hydrochemistry, flow path analysis and sorption experiments” by M. I. Stutter et al.

Anonymous Referee #1

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This manuscript presents an interesting study on DOC dynamics in a small Scottish catchment. The detailed consideration of not only DOC but also the characteristics of the carbon as quantified by SUVA and the DOC/DON ratio seems especially valuable. The authors claim that the observed dynamics cannot be explained by hydrological controls as done by previous studies, but that DOC biogeochemistry must be considered in more detail. While this certainly might be true, and thus a valuable contribution to current DOC-catchment research, I have to raise some important issues:

1) The manuscript is mainly based on just two events. These events have different

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antecedent conditions as the authors highlight, but also occurred in different seasons (and different years) and were caused by different amounts of rainfall. Given this variability I find it difficult to draw too many conclusions on the difference between these two events. More events would certainly be needed to support the findings. From the text it sounds as if more events might have been sampled; if so, it would certainly be useful to include these data.

2) The spatial coverage of the measurements is rather limited. Basically the integrated catchment response (streamflow) is related to the point observations at a few points. Furthermore, for one central variable, namely groundwater levels, no observations are shown. This data limitation makes it difficult to test different possible hypotheses about the DOC dynamics and their controls. In particular the potential interaction between different landscape units cannot be fully assessed. While I can find the conclusions of the authors reasonable, one could, thus, also come up with alternative explanations, which cannot be falsified based on the available data.

3) There is quite a number of recent publications on DOC catchment dynamics and their hydrological controls. The contribution of the presented manuscript would be clearly of more value if the authors could better link and compare their work to other recent studies such as, for instance, the work of the groups at Western Ontario (Irena Creed et al), Montana State (Tenderfoot study, Brian McGlynn et al), Aberdeen (Chris Soulsby / Doerthe Tetzlaff et al) or SLU Umeå (Krycklan Catchment study, Hjalmar Laudon, Kevin Bishop, Jan Seibert et al).

4) The end members are not clearly defined. Water from the O or B horizon could also be groundwater, couldn't it?

5) Previous studies have found riparian zone dynamics to be of importance. Here the authors found no significant difference in DOC between the riparian and hillslope sites for one snapshot sampling (for which measurement details are not fully clear), but this does of course not mean that they contribute in the same way. The important issue

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is the interplay between different landscape units and the flow pathways within those, including the question of connectivity.

6) More observation, especially also in some spatially distribution, would be needed to better test the hypotheses raised in this manuscript. Without such data, one has to be more careful with conclusions on the importance of different hydrological and biogeochemical processes.

Minor comments:

P214,12ff: could you comment on the local topographic setting of these measurement locations?

P216, 16: as you introduce most other abbreviations, it would be suitable to do this also for DOM

P220, 3ff: the information about the two events might better fit in the material part. In anyway, please clarify the rainfall amounts of the two events, I could not find this information..

P22017ff: please provide the time period for which the 1.5 respective 5.7 mm are computed, flow should have the unit mm/time.

P22, 23: this should be mentioned already in the method section. How was this sampling done, at which depths, spatial resolution

Table 4: Can you explain the high value of DOC in the B horizon pit water?

Fig 1 : could you show land cover (peat!) in this map

Fig 2 & 3 Please use same scale on y-axes, add letters a-d

Fig 2: Hourly rainfall has the unit mm/h

Fig 3 add text about dates on x-axes

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