Response to Reviewer 1

If I have one criticism, it is that the authors do not provide enough justification for conducting the sampling during periods of low summer flow. I am convinced that sampling during summer periods of low flow is important for the reasons the authors state on p. 3264 lines 1-7. Can the insights the authors gained from sampling at low flows be compared or contrasted with what Buffam et al. (2008) found from high-flow sampling? The authors do make a brief reference to different amounts of variability between high and low-flow conditions (i.e. p. 3279 line 21 – p. 3280 line 9), but it would be nice to see this expanded. Would the authors agree that the differences between spring and summer sampling are purely hydrological or are other factors also operating in the catchment?

This important issue is something that we already discuss at different parts of our manuscript (at both the Introduction and the Discussion): page 3264 line 1-7, p3279 L20 to p3280 L9 and on p3283 L7-29, cited below. We think that much of your question is answered herein.

"While high flows and especially spring flood transport most of the NOM, summer base flow was selected for the sampling to afford a good opportunity to observe character differences in the stream network with relatively stable flow conditions, high biological activity and long channel residence time during which in-stream processes, such as photo-oxidation could influence TOC. The low flow conditions are also what the biota experiences most of the time, and favour detection of point-sources of TOC to the stream water network, e.g. high concentrations from mires... The results from our study could have been different if we had sampled at high flow. The detailed information necessary for a quantitative and meaningful interpretation of varying the sources of water during high flow however is not available for our study. However an indication of how this flow variation affects character can be found in a study from this region evaluating the temporal variation of SUVA and A254/A365 (similar to SAR), in nine different catchments (with one lake) (Ågren et al., 2008). SUVA was high in mire streams and decreased during spring flood, forest streams had lower SUVA which increased during spring flood compared to base flow (winter and summer). The opposite pattern was observed for the absorbance ratio A254/A365. The ratio was higher in forest streams and increased during spring flood in forest streams. Mire streams had lower absorbance ratio and it increased during spring flood. These observations of SUVA and A254/A365 could be coupled to temporal variation in molecular weight (Scott et al., 2001) and different temporal responses were found in mire and forest streams. Thus while there were distinct changes in TOC concentration and NOM character as flow rates changed, the spatial variation of TOC (Buffam et al., 2008) and to some extent even NOM character (Ågren et al., 2008); has been found to be less during high discharge situations than during low flow... Schumacher et al. (2006) observed that both spatial and temporal differences in NOM character between five catchments in Scandinavia were minor, which supports our findings that there are small changes in the NOM character. One exception in the literature to the generally low degree of NOM character variability in the landscape is the recent discovery of differences in the bioavailable fraction of DOC from mires and forest (Berggren et al., 2007). Although this was a very small fraction of the DOC (up to 1%), it was found to correlate to absorbance ratio (A254/A365). That

absorbance ratio is similar to SAR in this study where SAR was modelled better by mire coverage than forest (as in Berggren et al., 2007). The sampling was done during a dry summer, and forest areas contribute more stream water during wet situations/high discharge (Köhler et al., 2008; Ågren et al., 2008).”

When multiple references are given to support a statement, the authors should adopt a consistent format for listing them. (i.e. p. 3263 lines 13-14 are alphabetical, p. 3263 lines 11-12 are alphabetical by year and p.3263 lines 8-9 do not appear to be sorted) Some works are cited but not included in the reference list: p. 3266, line 10: Ivarsson 2000 and p. 3279, line 18: Petersson 2002 There is a formatting problem in the references: p. 3290, line 15 should not be indented.

Thank you for observing this. We have now corrected them.

Had the authors considered presenting the data in Figures 2 and 3 with log(Catchment Size) on the horizontal axis? I don’t know if it would change any of the interpretations but would make it easier to see what is going on with the smaller catchments.

We have actually considered using log on the x-axis but we still think that what we want to show is best visualised by the way they are shown now in the manuscript.