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Responses- Anonymous Referee #2

Thank you for taking the time to review our manuscript and for your positive feedback on the overall scope of the paper. Below you will find our responses to your comments, which are greatly appreciated and have improved the paper. Please feel free to contact us with any additional questions or comments.

Responses to General Comments (GC):
GC1: A large amount of interesting data are presented however, they are not fully exploited to unpick specific research questions further than underlining the important role the catchments studied play in DOC export.

Author Response: A primary goal of this manuscript is to establish in the literature a detailed description of DOC exports for this region of British Columbia and the coastal temperate rainforest and to put the results into regional and global context. However, we agree that more specific goals and questions will further strengthen the quality of the manuscript. To address this comment, we have clarified our objectives and have included additional analysis to investigate controls of flow and temperature on DOC concentration and DOM composition, a more detailed investigation of the relationship between PARAFAC components, and some simple statistical comparisons of variables across both seasons and watersheds. We also included a simple regional estimate of DOC flux to emphasize the importance of our results and put them into a global and regional global context.

GC2: I would have liked to see further analysis of the DOM compositional proxies as at present the manuscript doesn't benefit significantly from the addition of the compositional measurements.

Author Response: We have conducted additional analysis using linear mixed models and multiple linear regression to investigate the of discharge and temperature in relation to DOC concentration and DOM compositional data. We have also conducted additional analysis to look at relationships between PARAFAC components. Please see specific responses below for more information.

Responses to Specific Comments (SC):
SC1: Line 140-142. For those not familiar with mapping software a definition of GIS would be useful. Also were catchments delineated using watershed analysis?

Author Response: We included the definition of GIS as "geographic information system". Catchments were delineated using a 3m resolution digital elevation model (DEM) derived from airborne laser scanning (LiDAR) (Gonzalez Arriola et al., 2015). This was included in the text at the beginning of Section 2.2.

SC2: Line 156-158. While less frequent sampling due to logistical constraints is understandable, have you considered how this may impact you load estimations given that large quantities of DOC that are mobilised during periods of intense rainfall? As estimates of load can be skewed significantly if large events are under represented.

Author Response: We made a concerted effort to supplement our routine sampling with additional samples taken during larger events in order to better represent higher peak flows. Comparison of estimates using those additional points resulted in slightly higher load predictions for estimates that include samples from events, but no statistical comparison of the different methods has been made.

SC3: Line 218. What wavelength range did you scan over and at what interval?

Author Response: Included in text, "Samples were run in 1 cm quartz cells over an excitation range of 230-550 nm at 1nm increments."

SC4: Line 219. Were high absorbing samples diluted if they breached an absorbance threshold?

Author Response: Yes, we diluted if samples had absorbance > 0.05 at 250nm. This is included in text.

SC5: Line 228. What settings were used for your fluorescence scans (ex/em wavelengths etc.)?

Author Response: Included in text: "Samples were run in 1 cm quartz cells and scanned from excitation wavelengths of 230-550 nm at 5nm increments, and emission wavelengths of 210-620 nm at 2nm increments."

SC6: Line 240. Define PARAFAC

Author Response: Included definition in text, "parallel factor analysis"

SC7: Line 301. Table listed in brackets should be Table 1 not Table 2

Author Response**:** Oops, sorry! Changed to Table 1.

SC8: Line 327. The range of SUVA254 values reported in the literature is large. Elevated SUVA254 values are commonly found in both tropical rivers (Mann, P. J., et al. (2014), The biogeochemistry of carbon across a gradient of streams and rivers within the Congo Basin, J. Geophys. Res. Biogeosci., 119, 687–702, doi:10.1002/2013JG002442.) and also have been found upland peat catchment of the UK (Austnes, Kari; Evans, Chrisptoher D.; Eliot-Laize, Caroline; Naden, Pamela S.; Old, Gareth H.. 2010. Effects of storm events on mobilisation and in-stream processing of dissolved organic matter (DOM) in a Welsh peatland catchment. Biogeochemistry, 99 (1-3). 157-173. 10.1007/s10533-009-9399-4). However, lower values (<3) are also observed in groundwater dominated catchments (Yates, C, Johnes, P & Spencer, R, 2016, 'Assessing the drivers of dissolved organic matter export from two contrasting lowland catchments, U.K'. Science of the Total Environment, vol 569-570., pp. 1330-1340).

Author Response: We have incorporated these references into the text under the discussion in 4.2.

SC9: Line 333-347. Discussion is creeping in to the results section. Consider deleting or moving some text.

Author Response: We deleted some of this text, and also moved some of it to the discussion section.

SC10: Line 372. Could this variability be quantified in some way?

Author Response: We modified figure 6 to show results from each individual watershed, which we hope better illustrates the variability between catchments. In addition to Figure 6 and Table 1, we don't feel that it is necessary to report and compare the standard deviation associated with each sampling date as this would list the variability between different watersheds at different points in time but the figure already shows this information.

SC11: Line 420-430. I agree with reviewer 1 one on this point. The data could be better exploited to evaluate temporal shifts in DOC/DOM composition as all the data were collected for this purpose. For example it would have been interesting if changes in DOM composition could be in some way evaluated in relation to these change in flow conditions (using either the optical measurements of 13C values). This would have given the paper more of a focus, as reviewer 1 states to investigate 'DOC flushing'.

Author Response: We conducted additional analysis using linear mixed model multiple regression to looking at the relationships between DOC concentration and DOM compositional variables, with discharge and temperature. We refined our objectives to include the rationale for this additional analysis (e.g., possible seasonal and spatial trends and drivers) and to address general comments regarding incorporating DOM data to look at temporal and cross-watershed patterns. The methods for this additional analysis are presented in the new Section 2.7, results are presented in the new Section 3.5, and additional discussion is provided in Section 4.3. Results are also included as a figure (Figure S6.1) and two tables (Table S6.1, S6.2) in Supplementary Material.

SC12: Line 432. Was any work done on investigating the implications of elevated DOC yields on marine foodwebs? If not then remove

Author Response: We removed.

SC13: Line 490-492. What do you mean by DOC-source pools? Are you referring to the flushing of different soil horizons or the mobilising of material from a different source i.e. a source that under normal flow conditions would not be hydrologically connected to the main channel of the river? Also you have not calculated retention time for your catchments? Smaller catchments will always respond quicker than larger ones as they are simpler systems.

Author Response: By "alternate DOC-source pools" we are referring to sources of high DOC that are not associated with wetlands, typically thought of as high-DOC sources. We changed this text to: "the contribution of DOC from sources other than organic soils associated with wetlands…" We have not calculated retention time, but based on stream flow and precipitation data we do know that catchment response time is rapid following rain events. We have provided some ancillary data in the supplementary material (Supplementary Figure S2.2) to provide a qualitative look at response time, or how quickly streams respond to precipitation. This shows, for example, the lag in response in watersheds with lakes, such as 1015 and 693. To clarify this issue, we have changed the wording "retention time" to "response time" in the text.

SC14: Line 353. Work has already been carried out investigating long term trends in DOC flux from a wide range of catchments in relation to changes in global temperatures. See Worrall (2003). Long term records in riverine DOM. Biogeochemistry 64(2), 165-178. Or Freeman (2001) Export of organic carbon from peat soils. Nature. 412(6849) 785- 785.

Author Response: We note this in the text and include references to previous work (including the one suggested above by Worrall).

SC15: Figure 2. Caption is too long and bordering on discussion. Consider making more concise.

Author Response: We made the caption more concise.

*SC16: Figure 3. Are the box-whisker plots showing 1.5*IQR?*

Author Response: Boxes represent the 25^{th} and 75^{th} percentile and whiskers represent the 5^{th} and 95^{th} percentile. We have included this in the caption for clarification.

SC17: Figure 7. This also applies to the discussion but did you study catchments dominated by organic vs mineral soils or is this referring to the soil horizons? If so then consider renaming for clarity.

Author Response: All watersheds contained varying areal proportions of organic (i.e. Histosols) and mineral (i.e. Podzols) soil types. The latter also contain organic horizons at the surface, of varying thickness, so the reported data for organic horizon thickness includes measurements for such cases, as well as for soils that would be classified as Histosols.