



EGUsphere, referee comment RC2
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Review of “Environmental and hydrologic controls on sediment and organic carbon export from a subalpine catchment: insights from a time-series” by Melissa Schwab and co-authors

Anonymous Referee #2

Referee comment on "Environmental and hydrologic controls on sediment and organic carbon export from a subalpine catchment: insights from a time series" by Melissa Sophia Schwab et al., EGU Sphere, <https://doi.org/10.5194/egusphere-2022-705-RC2>, 2022

This manuscript presents a large dataset from a long-term (40 months) sampling campaign of river water and suspended sediment from a subalpine catchment in Switzerland. The authors generated a substantial amount of data, including a 40-month time-series of stable carbon isotopes and radiocarbon activity of dissolved and particulate organic carbon. Time-series data sets like this are incredibly valuable to the scientific community, particularly now as our field aims to mechanistically describe the feedbacks between climate change and the global carbon cycle. This manuscript addresses relevant scientific questions (i.e., what controls the magnitude and temporal variability of river organic carbon export?). The main dataset and introduction of statistical approaches are a great contribution to the field. The methods and statistical analyses used in this manuscript are state of the art, particularly the application of EA-IRMS for high throughput ^{14}C measurements and the application of machine learning-based statistical analyses.

Overall, the manuscript is well-written, but there several points that need clarification and revision, as noted in the major points of concern and the detailed comments below. The authors do a nice job of presenting their data and using statistics to describe the distribution of the data, however, it seems that this manuscript is lacking robust interpretation of the statistical results. Based on the introduction of the paper, I expected their results to provide a mechanistic explanation linking geomorphic and hydrologic processes to organic carbon export from small headwater rivers. However, I was not able to take away any new ideas or significant conclusions from their data interpretation and discussion. Additionally, I find that some of the analyses are not entirely appropriate (i.e. the MixSIAR analysis) and should be either removed from the manuscript or redone to reflect appropriate endmember mixing. To make this manuscript of greater interest to the scientific community, the authors should also provide a framework for integrating their statistical results into Earth system models.

In summary, a number of revisions need to be made before this manuscript can be

accepted for publication in *EGU Biogeosciences*. Major points of concern and suggestions for revising the manuscript are detailed in the attached PDF.

Please also note the supplement to this comment:

<https://egusphere.copernicus.org/preprints/2022/egusphere-2022-705/egusphere-2022-705-RC2-supplement.pdf>