Impact of forest harvesting on water quality and fluorescence characteristics of dissolved organic matter in Eastern Canadian Boreal Shield lakes in summer" by P. Glaz et al.

Associate Editor Decision: Publish subject to minor revisions (Editor review)
by Brian A. Pellerin

Comments to the Author:

Thank you for submission of the manuscript and your responses to the three reviewers. The paper is acceptable in revised form for publication.

Non-public comments to the Author:

Thank you for submission of the manuscript and your response to the three reviewers. Two reviewers recommended major revisions on the original manuscript, while one recommended rejection. Based on your responses and my review of the revised manuscript, I believe it would benefit from a bit more clarification before publication. In particular, reviewer #1 has significant concerns about the study design that I want to be sure are addressed in the text, not just in the response to reviewers.

Therefore, could you please:

1) address in the text - as you have in the response to R#1 - how you justify this study design over BACI or MBACI. (This could presumably be in for form of a short paragraph on the Study Design).

Ok, this information has been added (see p. 11, lines 252-256).

2) address the concerns over sampling frequency and duration earlier in the text rather than in the last paragraph (p. 19, 462-465) as many readers will likely be wondering about this early on as well. You could probably add a sentence at the end of the intro to put these limitations in context of your study goals, e.g. "While the temporal variability and long-term lake response is of interest, our study was designed to..."

We have added a sentence at the end of the introduction to put these limitations in context of our goals (see p. 4 lines 94-97).

3) It's unclear from some of your responses (particularly to R#2) whether you also addressed the concerns in the text. For example, 6a and 6b; some of 7a; 7c; 7e; 9312.21. These are valid points, especially given that a strength of your paper is the optical analysis, so please be sure that you are briefly addressing the reviewers points in the final text as well.

We have now addressed these concerns in the text:

6a. See p. 6-7, lines 149-151.
6b. See p. 7-8, lines 171-178.
7a. See p. 16, lines 376-378 and lines 381-385.
7c. See p. 10, lines 229-231.
7e. See p. 9, lines 200-202.

4) R#2 notes in 7d: "Normalizing it to an independent measure of quantity (e.g. Shimadzu DOC) is a measure of quality." While I appreciate your response, I agree with the reviewer that optical parameters normalized to DOC are indicators of composition more so than of quantity. SUVA is probably the most obvious example of that. I don't think you state that it's a quantity parameter in the text, but if you do, I'd suggest you reconsider (or make your rationale very clear) as some people will disagree and you don't want them getting hung up on a minor detail.

Normalizing the absorbance coefficient by the DOC content provides the absorbance coefficient by unit mass of carbon. The unit of the ratio, L/mgC*m can also be expressed as m^2/mgC that is an evaluation of a cross section by unit mass of carbon. This is rather a quantity than a quality indicator because we do not know the chemical structure of the carbon or the chromophoric species absorbing light in the sample and their concentration. In the specific case of SUVA, Karanfil et al. (2002) state "By combining both DOC and UV_λ, $SUVA_\lambda$ provide a quantitative measurement...". However, we agree with the reviewer that CDOM normalized by an independent measure of quantity allows to discuss the quality of DOM. Chemistry allows hypothesizing the presence of aromatic moieties in the DOC at 254 nm (Korshin et al 1997, NMR data Weishaar et al., 2003). Thus, if we consider temporal or spatial variations in many quantitative $SUVA_{254}$ measurements for an environment, these changes would be caused by a change in the nature or quality of the organic matter, mostly the aromatic content. Therefore, we don't state in the text that this is a quantity parameter.

5) In response to reviewer #2, 7d (request to add Humification Index): this is a reasonable request given that it's a fairly commonly used parameter. While I agree that you have to draw the line on the number of optical parameters to include, is there a reason why you can't simply do the calculation and include it?

Ok, we have now calculated the HIX index (see methods, p. 10, lines 236-241), reported its values and ANOVA results in the Results section (see p. 13, lines 301-302; Table 4 and Fig. 3) and discussed the implications of this index in the Discussion (see p. 17, lines 399-402).

References:

Korshin GV, Li CW, Benjamin MM. 1997. Monitoring the properties of natural organic matter through UV spectroscopy: A consistent theory. Water Res 31:1787.

Karanfil T, Schlautman MA, Erdogan I. 2002. Survey of DOC and UV measurement practices with implications for SUVA determination. Journal AWWA, 94:12.

Weishaar, J. L., Aiken, G. R., Bergamaschi, B. A., Fram, M. S., Fujii, R., and Mopper, K. 2003. Evaluation of specific ultraviolet absorbance as an indicator of the chemical composition and reactivity of dissolved organic carbon. Environ. Sci. Technol., 37: 4702.