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Biogeosciences Discussions

Interactive comment on "Seasonal variability of dissolved organic matter in the Columbia River: In situ sensors elucidate biogeochemical and molecular analyses" *by* Urban Johannes Wünsch et al.

Anonymous Referee #2

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This is a nicely written paper describing seasonal variation of DOM and their molecular characteristics in the lower Columbia River. Such variation is mostly controlled by biogeochemistry and hydrology of the river. Using in-situ sensors to study biogeochemistry of river systems is advantageous over discrete sampling. This paper demonstrates there can be many new information and results to be found even in well studied river systems, such as the Columbia River. For example, using in-situ FDOM to quantify DOC and its flux is not new, but it is a new finding for Columbia River. I think this is encouraging even it is somewhat contradicting with what Spencer found in the past. The manuscript worth publication. I have a few comments, and hope they can

help the authors to make the paper stronger.

1. There was a significant difference between FDOM data between SATURN-08 (S8) and SATURN-05 (S5), and the relationship between FDOM and DOC only applies to S8. Although the authors gave some explanations in the paper, it may worth digging out more details, as the FDOM-DOC relationship is a major finding of the paper. The authors suggest that the difference of FDOM between the two stations might not be due to data quality, but rather local sources of changes down stream of S8. As they mentioned, there are historical data of DOC vs. FDOM in the lower Columbia River. I suggest they dig out those data and overlay their data to see if there is any consistency or inconsistency in all data and the relationship. If they believe there are something 'unusual' down stream of S8, can they try to use their available data to investigate the nature and effects of such sources? I think spending more effort into this may gain more insights into the FDOM and DOC relationship, making the conclusion stronger.

2. In a few places in the introduction and abstract, the text seems to suggest river discharge is one of biogeochemical factors (e.g., p3 at the beginning), which is not. It is hydrology. Need to be consistent throughout the paper.

3. p2, L2, the reference is still from 1981; I believe there should be newer update.

4. Eq 1. Please specify what is the purpose of calculating napherian absorbance.

5. p6, L21, what is LOBO?

6. Section 2.6, no performance metrics of the in-situ sensors were given. What are their precision/accuracy, data quality etc.? Need to be careful what the quality these sensors can deliver. They may not always give the data quality as suggested by the manufactures. Should more systematically describe how these sensors were used and calibrated, and how the data were quality controlled, and in what accuracy and precision these data can be trusted.

7. p6, L30, 'No corrections were made to the in-situ nitrate and phosphate measure-

ments'. Why not, since there are discreet samples for nutrients measured?

8. p9, L18, 65%. It is more like 60% to me.

9. p10, L8, 'parametric correlation analysis'. What is this analysis exactly? Linear analysis?

10. p10, L8-13. The description here is confusing. Fig. 5 did not show Flu vs. FDOM relationship. What the two relationships here mean or imply then?

11. Between Section 4 and Section 4.1, the text here does not seem follow a logic way for presentation. May want to organize it into one or few sub-sections.

12. p12, L15, says rainfall caused decline in phytoplankton abundance. Any data or figure to show?

13. p12, L26, why there is increased terrestrial nitrate runoff in winter?

14. p12, L33, 'high' rainfall during May 2013. But it says low rainfall before this?

15. p14, L8, -7.57 vs. -4.7. I think the measurement error margin was about 10 umol/L, correct? So the difference is within the error margin, is it not? If yes, the conclusion here is not valid. How much of difference is in slopes here? Can that slope difference tell us some information?

16. Figs 2 and 4. There are no captions for sub plots (a), (b), . . .

17. Figure 10. Is there an explanation why USGS data are different than the modeled DOC?

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