

## ***Interactive comment on “Optical properties and bioavailability of dissolved organic matter along a flow-path continuum from soil pore waters to the Kolyma River, Siberia” by K. E. Frey et al.***

**Anonymous Referee #2**

Received and published: 26 October 2015

The authors of this paper explored DOC quantity and quality along the fluvial network of the arctic Kolyma River and present interesting results about changing patterns in concentration, bioavailability, and optical character of DOC from soils to the river mouth. Overall, this paper is an interesting study that addresses an important aspect of carbon cycling in the arctic. DOC release from permafrost soils and the processing of DOC in the aquatic network are precursors of large CO<sub>2</sub> and CH<sub>4</sub> emissions from these systems, and the presented study particularly sheds light on the geographically large variability in soil DOC in contrast to the rather uniform DOC patterns in the main river, emphasizing the great potential of in-stream processing of DOC during arctic summer. An additional strength of the paper is the highlighted potential in applying simple optical

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measurements to assess DOC in these arctic systems on a larger scale. Future studies might benefit and build up on these findings. Overall, the paper is based on a robust dataset, it is well written and has clear illustrations. A few minor revision remarks are listed in the following:

1. In agreement with reviewer #1, I suggest to clarify what the water retention time of the different systems is. It will help to provide an idea about the different timescales of soil-, stream-, and river DOC processing.
2. P12329 L19-22: It is stated twice here that no statistically significant results were found, however the p-value is given as <0.05. If you used the 0.05-level for significance, please check the results and correct either the p-value or the statement "...streams, rivers, and mainstem waters were not statistically different from one another (p < 0.05)...the percentage of bioavailable DOC....did not significantly decrease downstream (two-sample t tests, p < 0.05)".
3. P12330: L15-21: The enumeration of spectral slope values and other CDOM parameters is rather long, I suggest to present these values in a table instead.
4. P12334: L13 & 16-18: The CDOM parameter a<sub>250</sub>:a<sub>365</sub> is here mistakenly referred to as a<sub>254</sub>:a<sub>365</sub>, please correct.
5. P12327 L16: double spelling "using a using a Thermo"
6. P12329 L28: "(Figs. 3a)" only one figure
7. P12329 L17-18: missing blank in "(two samplet tests...)"

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Interactive comment on Biogeosciences Discuss., 12, 12321, 2015.

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