

Interactive comment on “Long term patterns in dissolved organic carbon, major elements and trace metals in boreal headwater catchments: trends, mechanisms and heterogeneity” by S. K. Oni et al.

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I enjoyed reading this interesting and well-written analysis of the long term hydrology and biogeochemistry of the Svartberget catchments at Krycklan. The Introduction had a comprehensive overview of the widely observed stream DOC increases and its possible causes, and the Discussion nicely put the Krycklan results in this context, though the DOC trends at this northern site are subtle. Breaking the trend analysis down by month was helpful and provided additional insight. The breadth of the paper was ambitious, trying to cover not only DOC but most of the major ion chemistry and a few

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trace metals as well in a normal length paper. While I think they touched on most of the highlights, one very interesting result that didn't make it into the text was the significant increasing trend in absorbance (presented in Figure 9) while the DOC trend was relatively flat. This suggests a shift over time to more humic-rich DOC. It would be interesting to reconcile this trend with a recent mercury-focused study of 19 rivers in Sweden that showed quite the opposite – DOC (actually TOC) showed an increasing trend while abs420 was unchanged, suggesting a shift away from humic DOC or that the increase was contributed by a non-humic fraction: Eklöf K, Fölster J, Sonesten L & Bishop K (2012) Spatial and temporal variation of THg concentrations in run-off water from 19 boreal catchments, 2000-2010. Environ. Pollut. 164: 102-109.

Following are a few minor comments on the text, tables, and figures.

Grammar. Numerous subject-verb agreement issues. Incomplete sentence (p. 19128, line 19-20).

General: The text implies that sampling was weekly or biweekly but not necessarily consistent at the three streams. Does this mean that more frequent event-based samples were excluded from this analysis? Some clarification would be helpful.

p. 19131. Section 3.3.1. It is counterintuitive that flow-weighted DOC concentrations would have much higher standard deviations than the unweighted concentrations (which as reported are unrealistically low).

p. 19132, line 1. This apparent decrease in discharge from first to second part of the record is misleading – grouping those four high years in the middle with the latter period would suggest an opposite trend.

p. 19135, Discussion section, general comment. In general the Discussion is well-organized, but I was expecting early on some discussion/ explanation of the relatively subtle DOC trends (in contrast to the prominent increasing DOC trends found elsewhere in the region and beyond). This did not come until section 4.3 and 4.4 – though

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it is very well presented there.

P 19137, line 25. Couldn't the increasing stream DOC trend in April be explained by trend of earlier snowmelt?

Table 1. There appear to be some mistakes. Sulfate shows 11 of 12 months with a decreasing trend but an increasing trend overall. Also for sulfate the units should be specified as for SO₄-S as in the text. The annual value for conductivity is neither bold nor italic – it needs to be one or the other. Why was nitrate (or DIN) trend not analyzed? In the header, "relative to DOC" confused me.

Figure 3. I'm intrigued by whether there is a trend in ET as P-R. By eye it looks like the lines diverge implying an increasing ET trend. At Hubbard Brook and other sites in the northeastern USA we are seeing the opposite.

Figure 4. All of these decreasing deposition trends look like they would be flat if you removed the first few years.

Figure 6. Why was DOC plotted with daily runoff rather than instantaneous discharge?

Figure 7. The caption is not consistent with the individual subpanel legends.

Figure 9. Add a trend line?

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