

***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.***

**Anonymous Referee #2**

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Review: Oni et al. 2012 General Overall this is generally a well written paper containing a lot of information which brings together into one place the research conducted over the last 2-3 decades in the Svartberget catchment. There are some problems with mixing past and present tense.

One issue that is not discussed is the methodology used in chemical and DOC analysis and whether this has changed over the sampling period and could have an effect on the trends seen. For example DOC analysis has moved from persulfate digestion to combustion over the last 3 decades and could be responsible for increasing trends

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seen.

**Specific Comments**

Page 19121 Line 21. Aitkenhead-Peterson et al. 2009 suggested that increased DOC concentrations appeared to be a consequence of irrigation with sodic water on urban landscapes. I suggest then that change is inserted after land use to read “Other factors reported as drivers of DOC in the literature include drought (Worrall and Burt, 2005), landscape disturbance such as land use change (Aitkenhead-Peterson et al., 2009) clear cutting (Schelker et al., 2012) and climate change (Oni et al., 2012a; Schindler et al., 1997).”

P19121 L 21 and Reference list. The wrong reference is attributed to this citation. It should be: Aitkenhead-Peterson J.A., Steele M.K., Nahar N. and Santhy K. (2009). Dissolved organic carbon and nitrogen in urban and rural watersheds of south-central Texas: land use and land management influences. *Biogeochemistry*: 96: 119-129 DOI: 10.1007/s10533-009-9348-2.

Page 19125 Line11: insert ‘the’ before riparian to read ‘As a result, the riparian zone can contribute more to stream. ....’ or change to ‘As a result, riparian zones can contribute more to stream. ....’ Page 19125 Lines 17-21: Long sentence suggest splitting for a better flow. Page 19125 Line 26: suggest replacing ‘are’ with ‘were’ Page 19125 Line 29: suggest use ‘trends’ and not ‘trend’ Page 19126 Line 3 replace ‘use’ with ‘used’ Page 19126 Line 3 – 15. This section seems out of place here and my be better utilized in the site description and materials and methods and discussion sections. Page 19126 Line 23: should the SO<sub>4</sub>-s yr<sup>-1</sup> be SO<sub>4</sub>-S yr<sup>-1</sup>? Page 19127 Line 2: Perhaps use comprise instead of dominated by as you have stated that forests and mire dominate in the previous sentence. To read ‘Forests in the catchment comprise approximately century old Norway spruce (*Picea abies*) and Scots pine (*Pinus sylvestris*) (Laudon et al., 1999).’ Page 19127 Line 6: Suggest change ‘Total annual precipitation in the catchment averages about 610mm yr<sup>-1</sup>, of which about 35–50%

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falls as snow (Kohler et al., 2008) and peak precipitation occur in late summer.' To 'Total annual precipitation in the catchment averages about 610mm yr<sup>-1</sup>, of which 35–50% falls as snow (Kohler et al., 2008). Peak precipitation occurs in late summer.' Page 19127 Line 17: suggest deleting 'listed in' and placing 'Table 1' in parenthesis

## Results

Terms such as 'mean temperature was about 1.7...' do not give the reader confidence in your results. I would suggest including the mean and standard deviation ( $\pm$ ) for all in section 3.1. On page 19127 Line 6 the authors state that average precipitation is 610 mm yr<sup>-1</sup> then on page 19130 Line 7 in the results section the authors state that precipitation was about 610 mm yr<sup>-1</sup> as a reader I would like to see a measure of the variance about the mean.

Discussion P19135 L5 remove 'has' prior to concluded for better flow. P19135 L9 I assume 'flow' is discharge?

P19135 L23-25 "The drop in the flashy spring [DOC] in the later period of record in (C2 and C7) suggest that stream DOC is driven more by intermittent rainfall flushing the top or subsurface layers than prolonged soil inundation from rising groundwater level." See next comment. . . . .

P19137 L9-11 "The drop in the flashy spring DOC from the upper soil layers suggests that stream DOC is driven more by intermittent rainfall flushing the top or subsurface layers than prolonged soil inundation from rising groundwater levels." This is too similar to the sentence on P19135. I realize that here the authors are describing the soil solution but suggest they find another way of describing the potential mechanism.

P19138 L3-5 Suggest change "Our result therefore showed that dry-wet cycle has pronounced effects on [DOC] in intermittent C2 stream, which might be more susceptible to drought conditions." TO "Our results showed that the dry-wet cycle has pronounced effects on [DOC] in the intermittent C2 stream, which might be more susceptible to

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drought conditions."

P19139 L3 Suggest rather than state biological controls are more important under 'this condition' state 'more important with higher moisture and temperature conditions'. Is there a reference for this?

P19142 Description of PCA and what positions chemical constituents hold need some refining. As is this is hard for a reader to follow.

References Aitkenhead-Peterson et al., (2009) wrong reference for citation. This paper in the reference list was published in 2011 and did not discuss DOC.

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