Hydrology and Earth System Sciences Discussions

Interactive comment on "Relations between topography, wetlands, vegetation cover and stream water chemistry in boreal headwater catchments in Sweden" *by* J.-O. Andersson and L. Nyberg

Anonymous Referee #3

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General comments

I generally liked the paper, and the main message conveyed, that topographic parameters as computed from readily available DEM data are able to explain DOC variability, warrants publication. My final recommendation would be 'minor revisions', see below.

My main concern however, is that it is not entirely clear to me what the position of this paper is, with respect to another very recent study by the same authors (Andersson and Nyberg 2008, HP), in which they also showed the strong control of mean catchment

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slope on DOC.

In fact, that previous study use a more extensive data set, of which the present study's dataset is mainly a subset. The correlation between slope and DOC is stronger for this subset. There may be a very good objective reason for selecting this subset of 14 out of 76, but that is not documented in the present manuscript. To what extent are the 14 a 'random' subset of the 76, or are these the most well-behaving catchments? This point should be clarified upon.

Apart from this, I would recommend elaborating more on the results of this study, in relation to the Andersson and Nyberg (2008) results.

Specific comments

Review questionnaire

1) Does the paper address relevant scientific questions within the scope of HESS?

Yes. The quantified relation between terrain and hydrologic response is a core topic of interest within HESS.

2) Does the paper present novel concepts, ideas, tools, or data?

The data analysed is party new, partly a subset from data presented earlier (A and N 2008)

3) Are substantial conclusions reached?

Yes, it was shown that a strong correlation between slope and DOC content exists.

5) Are the scientific methods and assumptions valid and clearly outlined?

Yes, the method being mainly regression analysis

5) Are the results sufficient to support the interpretations and conclusions?

Yes, due to the strong correlations. A potential weak point is that slope is considered

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and not 1/slope.

6) Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?

Mainly yes. 'Slope' can be computed in many ways, and the paper does not state how this was done (slope in the d8 steepest descent direction I assume?)

7) Do the authors give proper credit to related work and clearly indicate their own new/original contribution?

Mainly, but the added value upon the authors' earlier 2008 paper is unclear.

8) Does the title clearly reflect the contents of the paper?

Yes

9) Does the abstract provide a concise and complete summary?

Yes

10) Is the overall presentation well structured and clear?

Yes

11) Is the language fluent and precise?

Yes (but I am not a native speaker)

12) Are mathematical formulae, symbols, abbreviations, and units correctly defined and used?

Yes

13) Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated?

Tables 1,2,5 are not in balance with the more elaborate tables 3 and 4. Given the small

data set (n=18), all data can and should be presented, both in tabular and graphical form (scatter plots)

14) Are the number and quality of references appropriate?

Yes

15) Is the amount and quality of supplementary material appropriate?

Does not apply.

other

Some of the tables and figure could be improved upon significantly, though: There is an imbalance between the terseness with which topographic data is presented, as stats only (tables 1 and 2), and the completeness with which vegetation data is presented (tables 3 and 4). This is especially relevant because the topographic controls on DOC are stronger than the vegetation controls. I would recommend presenting more complete topographic data.

Also, the inclusion of scatter plots of slope-DOC would help gaining confidence in the conclusions. (There are for TWI-DOC, and Andersson and Nyberg 2008 did have scatter plots including slope)

Please elaborate more on the explanatory power of TWI versus slope for DOC. Why is TWI dominated by slope? Because area is increasing in a more regular, linear fashion, and slope is more variable? Because it is log(area) that's in TWI? Why is slope as such used for the regression, and not 1/slope?

Table 4 : Why are the vegetation classes explicitly listed, this in contrast to topographic properties (Table 1). Why are the data presented as binary (present/absent, not as percentage)

Table 5 : How are low / medium 1 / medium 2 / high flows defined?

Technical corrections

Fig 7 : reference to Fig 7 is earlier (1201/16) than to Fig 6 (1201/20).

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