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Hydrology and Earth System Sciences Discussions

Interactive comment on "Diffuse hydrological mass transport through catchments: scenario analysis of physical and biogeochemical uncertainty effects" *by* K. Persson et al.

Anonymous Referee #2

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The authors present a small, but thoughtful and interesting, study of the effects of subsurface spatial uncertainty on modelling diffuse pollutant mass loading to receiving waters in a Swedish catchment. Using a well-justified scenario approach, the authors investigate uncertainty with respect to (a) the saturated hydraulic conductivity (K) field and (b) correlation between net pollutant decay with travel time and K. I only have a few suggestions to improve the manuscript:

(1) The introduction is too lengthy compared to the relatively modest study conducted, please reduce as much as possible. References should be limited to the key ones,

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especially: P4723, L5f: Biased towards papers of the research group. Reduce to key ones and add external refs, e.g. Howden et al. 2011, "Modelling long-term diffuse nitrate pollution at the catchment-scale: data, parameter and epistemic uncertainty", Journal of Hydrology comes to mind but there are many more! P4723, L16f: Reduce to key ones. Certainly omit those cited in next paragraph. P4725, L6f. P4726, L17f: Delete refs as they appear later on P4729. P4732, L18f: Use key refs and perhaps add "and references therein". The total number of 92 (or so) refs is excessive and could easily be reduced by half if not 2/3!

P4726, L7f: Please see how much of this can be moved to the methods section.

(2) While generally well written and exact, the text is often too dense and hard to follow. Please improve readability, for example: P4723, L27f: This would benefit from a bulleted list with another explanatory sentence per point and reduced refs. P4726, L5: Delete "for this quantification, mapping and uncertainty assessment". P4728, L6: Replace "in the form of" with "as". Fig1 caption: Delete "in the schematic illustrations of main flow and transport pathways in the different scenarios".

(3) It is worth highlighting that the authors use a very simplistic subsurface transport model that relies amongst other simplifications on single flow directions approximated by surface topography. This is not a problem but should be made clear.

(4) I agree with Referee #1 that the correlation equation on P4731, L3 seems wrong. It should be something like lambda = lambda_g * (K_g / K).

(5) Some discussions and conclusions are hard to follow and would benefit from more explanation, especially: P4732, L27 – P4733, L6. P4734, L28: Lowest impact, how?

Technical comments

P4722, L13 & P4737, L11: "Of" instead of "between"?

P4723, L24 & P4725, L1: "Dependencies" needs to be defined to help the reader.

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P4725, L14: “Few” instead of “imited”?

P4725, L19: “Point” confuses in this context of diffuse pollution.

P4730, L2: Write “deltax =” in front of sum. Leave out “i =” in front of “N as well as “at a” and “at XCP”. Replace “cell” with “of N cells”.

P4730, L6: Can you add the formula for the mean as for the other 2 key calculations.

P4731, L6: Leave out “i =” in front of “N as well as “at a” and “at XCP”.

P4731, L7: “Results and discussion” if you don’t want to separate out a proper discussion section.

P4733, L4: I don’t think the sentence in brackets is right so should be deleted.

P4734, L18: “associate”

P4735, L9: Bracket after 4.

P4735, L11: Delete 1st “the”.

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