

Interactive comment on “Continental hydrosystem modelling: the concept of nested stream–aquifer interfaces” by N. Flipo et al.

Anonymous Referee #1

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To the best of my understanding, the central argument in this paper, based on the first author's dissertation, is that stream-aquifer interaction varies on multiple space and time scales, and that new modeling strategies can be inspired by the multiscale (also, confusingly, referred to as “multi-dimensional”) nature of the phenomenon. However, the argument is not made very clearly. Much space is devoted to a listing of different available models and the respective resolutions they have been used in; such a listing tells us little about the physical nature of stream-aquifer interactions.

A more useful type of material to compile, in my view, would be quantitative estimates of the importance of stream-aquifer interactions to water and chemical budgets at different scales. Such estimates should be the main basis for deciding whether to take stream-aquifer interactions into account at all in a particular hydrological investigation, and if

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so, what modeling approaches and measurements to employ. Since little of this sort of information is currently detailed in this paper, the investigations pursued are not well motivated and their relevance to applied hydrological studies is not solidly established. I recommend at least presenting and explaining several such quantitative estimates and the basis for them.

Two examples are given of measurement techniques relevant to stream-aquifer interactions at different scales. The first is in-stream sensors of water temperature and pressure that can identify groundwater inflow. The second is the planned SWOT mission's measurement of river surfaces, though it is not clear to me how this sort of remote measurement is supposed to meaningfully inform assessments of stream-aquifer interaction.

A key concept, according to the abstract, is “the innovative methodology MIM (Measurements-Interpolation-Modelling)”. However, the only explanation of it is in the opening paragraph of Section 5. The utility and applications of this “methodological tool” need to be explained much more carefully.

There are also many details of the phrasing that need to be revised for syntax and clarity. A very incomplete listing is given below.

1. 452:18, 453:15 Needless commas
2. 454:1, 460:9, 460:15 media → medium
3. 454:8 bassin' (misspelled)
4. 456:1 Add Fan et al., *Science*, 2013 to the references given on global groundwater-surface interaction studies.
5. 456:2 Is the implication that atmosphere-groundwater interfaces have been studied for more than two decades? If so, give references.

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6. 456:9 “before to reach” → before reaching
7. 456:20 pound → pond (?)
8. 456:10 Chemical gradients may as important in many applications as hydraulic gradients.
9. 458:8ff, 460:9, 471:8ff “consist in” → “consist of”
10. 459:5f This is often the case in arid reaches whose streams arise in moister uplands.
11. 462:25 This was already stated in the previous sentence.
12. 465:1 inverse → invert
13. 471:24 incoming → projected (?)

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