

***Interactive comment on “Technical Note: Linking soil – and stream-water chemistry based on a riparian flow-concentration integration model” by J. Seibert et al.***

**Anonymous Referee #2**

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Thank you for the opportunity to review this paper. I read it with great interest. The presented data provides valuable information addressing the issues surrounding the role of riparian zone in controlling the stream chemical composition. The study provides a conceptual explanation of this control function as well as a simple, yet useful mathematical solution of developed concept. Obviously, the Authors put a lot of work and effort into the experimental work and also in writing this manuscript which I would like to acknowledge here. The paper for the most part is clearly written and would be a good contribution to the Hydrology and Earth System Sciences. I do have, however, few comments which I outline below for the Authors to consider as part of further

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improving this piece of work prior to publication.

Developing their intellectually very attractive concept of a runoff generation mechanism, the Authors made several assumptions. In my opinion some of them need to be discussed at length and supported with consistent arguments (references). The concept and its mathematical solutions were built based on a simple model of riparian zone hydrology that supposed the dominance of lateral matrix flow through the shallow subsurface. This assumption may be reasonable, if at all, only in case of very small, homogenous catchments, but often breaks down at larger scales or in soils and sediments that show network-like preferential flow structures. Eg. it may be not applicable to many agricultural catchments (even very small, with area similar to that investigated by Authors) where tile drains may serve as an effective conduit for the water flux. One should not forget about mole tunnels, very common linear structures in riparian meadow soils - they increase the size of the catchment area in direct contact with the drainage network and provide a direct link between land and stream! The properties of such numerous, both natural and man-made, linear systems and their effect on catchment hydrology have been extensively studied and described in many papers. This limited validity of developed model may be regarded as its serious deficiency. I would like to see some Authors comments in view of my remarks. Specific comments: Page 5604 lines 23-24 “RZ can be thought of as a vertical array of soil solute sources that behave like chemostats” – this statement is rather confusing, please explain it.

Page 5610 lines 19-21 - “it is assumed that the soil water chemical signal is imprinted in the riparian zone instantaneously, or at least at a rate that is faster than the rate at which the water traverses the riparian zone, before entering the stream” – could you provide arguments or references supporting this view?

Page 5619 line 1 please replace MeHg with Methylmercury

Fig. 4 and 5 need better captions; readers may also have a problem to differentiate between computed (lines?) and observed (circles?) data.

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Fig. 4 and 5 The range of lines representing values predicted by the model does not cover the whole range of the values actually observed (circles). Does it mean that model was not performed for the whole soil profile? Please explain. Fig. 5 This looks pretty scattered to me - the fitted line seems a bit of a stretch e.g. chloride

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