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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Toward a conceptual framework of hyporheic exchange across spatial scales" *by* Chiara Magliozzi et al.

Anonymous Referee #1

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General comments

The paper addresses relevant scientific questions on the understanding of process-based interactions between factors operating at different spatial and temporal scales driving hyporheic exchange flows (HEF). Understanding of HEF is important for many applications, for instance, for predicting the fate of contaminates in the surface environment in safety assessments of geological waste disposals. The paper is well written and suits the Journal well. I like the way that the review paper is presented based on various drivers. This gives reader a clear picture of which factors affect HEF.

Specific comments

It might be worth to point out why rivers are not isolated systems but interact contin-

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uously with groundwater in the Introduction. This may be obvious to the authors but may not be so for all readers. Groundwater discharge points generally coincides with topographic lows in the landscape, such as streams, lakes and wetlands (e.g. Marklund et al., 2008). With the seasonal variation, such discharge points can also change with time to become recharge points, and similar temporal fluctuations in the hyporheic zone and large-scale groundwater circulation is not discussed in this paper. An important driver for hyporheic flows are the static and dynamic pressures as discussed by the authors. However, what is actually the difference between dynamic and hydrostatic head gradients around channel morphological elements? A dynamic head (say velocity head) is gradually transformed to a static head along a stream-line that approaches a stagnation point at the bed. The pressure at the stagnation point is also affected by the static head defined by the water surface topography. In the end, the subsurface flow is driven (mostly, in a linear or Darcy flow theory) by static head gradients and this distinction is not so clear in the paper. The further research areas/topics might be worth to highlight in the Conclusions again.

Minor Corrections

Page 2, row 4: floadplain should be floodplain

Page 2, row 6: vertically and laterally (i.e. flood spates, overbank flows, etc.; (Minshall et al., 1985; Newbold et al., 1982, 1981), should be vertically and laterally i.e., flood spates, overbank flows, etc. (Minshall et al., 1985; Newbold et al., 1982, 1981);

Page 13, row 31: water consumption (i.e. ET) should be evapotranspiration (i.e. ET)

Page 16: row 25: . . . strata Angermann et al., (2012). should be . . . strata (Angermann et al., 2012).

Reference

Marklund, L., Wörman, A., Geier, J., Simic, E., Dverstorp, B., 2008. Impact of landscape topography and quaternary overburden on the performance of a geological

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repository of nuclear waste. Nuclear Technology, 163, 165-179.

Please also note the supplement to this comment:
https://www.hydrol-earth-syst-sci-discuss.net/hess-2018-268/hess-2018-268-RC1-supplement.pdf

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