HESSD

Interactive
comment

Interactive comment on "Technical note: Water table mapping accounting for river-aquifer connectivity and human pressure" *by* Mathias Maillot et al.

Anonymous Referee #1

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General comments ——————

This paper presents a rather sophisticated interpolation methodology for water table mapping. The novelty lies in accounting for a priori-unknown groundwater-surface water connectivity and dry well information. I agree that these aspects can be important for water table mapping. The study seems thorough and will certainly be of interest to the readership of HESS.

On the downside, I find that the paper lacks clarity at numerous occasions (see my detailed comments below). It also appears that questions (i) and (iv) stated at the end of the introduction are left without an answer. These questions call for a comparison

of different methods (or different levels of refinement), but no such comparison is presented. I think it would be very informative to do so; indeed, without such a comparison, the benefits of the various refinements are not obvious.

I think that this work can make a great contribution to the literature after these comments are addressed in the context of a moderate revision.

Detailed comments ――――――

P1 L14: Suggest adding reference to a classic publication (e.g. Winter et al. [1998]) to support the first sentence.

P1 L14-15: This sentence is confusing. In this case, the water table is not below the riverbed: it is at the river water level.

P1 L19-20: Suggest also mentioning topography as a controlling factor and adding reference to Bresciani et al. [2016].

P2 L3: What do you mean by "usual estimators"?

P2 L.-16: Also note that Bresciani et al. [2018] obtained good results with the diffusion kernel interpolation method.

P2 L23: Shouldn't it be simply "large uncertainty in the estimation" instead of "large standard deviations of the estimation errors" (this would be the error of the error...)? Same comment on L27.

P3 L5: What "drawback" are you referring to? Obviously, the water table is always largely controlled by recharge. I do not see what point is being made here.

P3 L12: What do you mean by "define the SW-GW connection status"? Maybe you rather mean "determine the SW-GW connection status"?

P3 L20: What does "the dataset analysis" refer to?

Figure 1: Arrows are missing. This makes the figure difficult to understand.

Figure 1: What is "Water profile of river"? Do you mean river water level?

P4 L1: On the previous page you refer to Gaussian statistics, and here non-Gaussian. This is confusing.

P4 L2: Reference needed. Also note that this is not rigorously true. Namely, Desbarats et al. [2002] suggested that this assumption is not appropriate at the scale of a single catchment.

P4 L5-7: Please explain the reason for smoothing the DEM, and clarify the sentence "the search radius is relevant with the average width value of the stream network".

P4 L8-13: Unclear.

P4 L20-21: The value of 10 m seems totally arbitrary. How did you come up with this value? How does the choice of this value impact the results? Furthermore, I did not understand what you did with this first category of data.

P4 L23-24: Should I understand that you refer to the Gaussian score as a variable? This is unclear.

P6 L22: And riverbed thickness?

P6 L23-24: "is submitted to": I guess you mean "is subject to".

P6 L26: "At a station": I guess you mean "At point scale".

P6: L28: What does "such criteria" refer to? Same for "optimization procedure".

P6 L23 – P7 L6: I am getting a bit lost here: which method did you use in the end? I think I ultimately understood, but the organization of ideas could be improved.

P7 L11: What are the "selected UZD data"?

P7 L11: Fig. 5 is referred to before figures 2-4; please correct this.

Fi.g2: Indicate river names on the map.

P8 L7-8: "The study of...": What study are you referring to?

P9 L 6: Not sure about the meaning of "up" and "down": this is confusing. Suggest using "open" and "closed" instead.

P9 L29: Why 0.57? This seems totally arbitrary.

P9 L30-31: Repetition of previous sentence.

P10 L10-11: I think it would make more sense to maximize the total number of sections for which the connectivity status is correctly predicted.

Figure 4b: Out of how many cross sections in total?

Figure 4: (b) is not announced in the caption.

P10 L28-29: "river infiltration towards the aquifer": This does not seem to be supported by the results, which suggest that groundwater flows from the aquifer towards the river (Figure 6b).

References ———

Bresciani, E., P. Goderniaux, and O. Batelaan (2016), Hydrogeological controls of water table-land surface interactions, Geophysical Research Letters, 43, 9653-9661.

Bresciani, E., R. H. Cranswick, E. W. Banks, J. Batlle-Aguilar, P. G. Cook, and O. Batelaan (2018), Using hydraulic head, chloride and electrical conductivity data to distinguish between mountain-front and mountain-block recharge to basin aquifers, Hydrol. Earth Syst. Sci., 22(2), 1629-1648.

Desbarats, A. J., C. E. Logan, M. J. Hinton, and D. R. Sharpe (2002), On the kriging of water table elevations using collateral information from a digital elevation model, Journal of Hydrology, 255(1-4), 25-38.

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