Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC3
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Comment on hess-2022-258

Anonymous Referee #3

Referee comment on "Estimation of groundwater age distributions from hydrochemistry: comparison of two metamodelling algorithms in the Heretaunga Plains aquifer system, New Zealand" by Conny Tschritter et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2022-258-RC3, 2023

Overall, this is an interesting metamodeling application using water quality information to emulate a lumped-parameter model and make forecasts of groundwater age. Two methods were used (gradient boosted regression and symbolic regression) with advantages to each and with generally similar performance. The authors also make a detailed interpretation of the parameter and model behavior.

This is a fine contribution and I have just a few minor comments to consider.

- Line 61: There is some ambiguity to how the model is described here. It's not really trained on data, but rather is trained on the LPM model that, in turn, is trained on data. Being super clear here is important, particularly for readers less familiar with metamodeling
- Figure 1 and in the text: The clusters from previous work are both identified on the figure and in the text, but no context is provided beyond a reference to previous work. A sentence or two would be key to explain this.
- Figure 2 and elsewhere: Many of these water quality constituents are obviously identified by their chemical formulae, but some of not defined. Even if it's in supplemental material, a table defining the quantities would be helpful.
- Line 290: There seems to be a formatting glitch here – hard to understand what the equation is meaning to explain.
- Line 327: more formatting glitches
- Lines 359-362: This is a great point and I appreciate the context because it's true that the extrema of the distribution would be of interest to many users.