Hydrology and Earth System Sciences Discussions

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Comment on hess-2022-69

Anonymous Referee #1

Referee comment on "Spatiotemporal optimization of groundwater monitoring networks using data-driven sparse sensing methods" by Marc Ohmer et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2022-69-RC1, 2022

1. The paper is excellent, it only needs minor corrections/clarifications.

2. Abstract "Our results show that this approach is generally better than the best randomly selected wells". This sentence must be changed because it seems to insinuate than one could change n monitoring wells randomly and they could performed better than the optimized approach (because of the world "generally').

3. Introduction: "there is a dualism between monitoring costs and monitoring quality (i.e., the information gained by monitoring)" This sentence is not logical. Perhaps you mean that the higher the cost of monitoring, the better the quality of the data, provided that the monitoring is well designed. In other words, one could spend a lot of money and yet do not improve the quality of information unless the money is well spent. A deeper issue not addressed in the paper is how the expenditure in monitoring may improve the quality of groundwater, which means that groundwater monitoring is tied up to groundwater management.

4. Introduction: "How does the reconstruction/interpolation error develop when a given number of monitoring wells are reduced? How
does the error of reducing wells according to information content compare to a random reduction?" These sentences are confusing. Perhaps you mean: "How does the reconstruction/interpolation error varies with changes in the number of monitoring wells? How does a random reduction of monitoring wells affect the information content gained by groundwater monitoring?" I urge the authors to improve the logical meaning of their paper's text.

5. Section 2.1.4: you propose that an mxn matrix can be decomposed into matrices Q and R, such that A = QR; then you propose that there is matrix C such that $A\ C^T = Q\ R$; unclear why not : $A\ C^T$ not equal to $QR\ C^T$

6. Section 2.4.2 "Outlier values that exceeded a moving average (window size 11) of ±3 σ were removed during preprocessing"

Perhaps you mean: "Data values that deviate by more than ±3 σ from the moving average (with a window size of 11 values) are considered outliers and were removed from further processsing"

7. Section 2.4.3 " omnidirectional Gaussian semivariogram model" I believe you mean "an isotropic Gausian semivariogram model"

8. Figure 2b: the Pareto front of number of wells vs RMSE: what about Pareto fronts for the other goodness-of-fit criteria? such the NSE or the KGE?

9. Figure 7: add GMW (groundwater monitoring well) to the list of acronyms