

Responses to the Comments of Reviewer#3 on ⟨hess-2022-282⟩

Peishi Jiang Pin Shuai Alexander Sun Maruti K. Mudunuru
Xingyuan Chen

June 8, 2023

Comments by Reviewer #3

Just would like to confirm that I understand your answer correctly. What you mean is Q (with non-MI) \cup ET (with non-MI) where \cup is the union symbol in math, instead of a subset of Q (with non-MI) and a subset of ET (with non-MI) filtered by that both Q and ET have non-MI values at the same time, correct?

That is correct. We added the following texts in the manuscript to clarify this:

” (L345-L247) Note that in the case of knowledge-informed inverse mapping using both observations, we take the union of the Q and ET that have non-zero mutual information as the inputs of the neural network. “

Let me make my question clear.

My question is whether in the original mapping, all the parameters are estimated as a whole. i.e., when the training dataset is applied, the original mapping outputs the estimates of all parameters (shown in Figure 3 (a))? For example, the estimated values of the seven parameters are `priestley_taylor_alpha-snow=0.01`, `priestley_taylor_alpha-snow=0.02`, `snowmelt_rate=0.03`, `snowmelt_degree_diff=0.04`, `perm_s3=0.05`, `perm_g1=0.06`, and `perm_g4=0.07`.

If you applied this combined values of these parameters into the hydrological model, you should get the same time series of discharge (q) for all these seven parameters because you applied the same set of the parameter values shown above. Or for each parameter, you use the estimated value but use the default values for the other six parameters so that for each parameter the discharge (q) calculated in the hydrological model is different and thus the NSEs are different for different parameters in Figure 8(b). Or in the original mapping, each parameter is estimated separately instead of all the parameters as a whole set?

This is my question.

Thank you for the clarification. The original mapping estimate all seven parameters as a whole. Once trained, we further calculate the NSE and mKGE of every parameter estimated by each original mapping on the test dataset so that we can have consistent performance assessment between the original mapping and the knowledge-informed mapping that estimates each parameter separately. To clarify, we included the following explanation in the manuscript:

“ (L266-L269) To have consistent comparisons between mappings with and without being knowledge guided, both metrics are computed for the estimation of each parameter based on the test dataset (note that

while the original mapping estimate all seven parameters as a whole during the training, we calculate the two metrics for each parameter separately during the postprocessing). ”