

Interactive comment on “Quantifying hydrologic connectivity of wetlands to surface water systems” by Ali A. Ameli and Irena F. Creed

Anonymous Referee #2

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Authors characterized surface water and subsurface connectivity of wetlands using a physically based surface-subsurface model. Groundwater level measurements, water chemistry and stable water isotopes are used to illustrate the model performance at recharge and discharge locations. While this is an interesting study, the study can benefit by providing more quantitative measures of model performance compared to observations, justification of the modelling approach compared to the existing coupled surface water-subsurface models and sensitivity analysis.

1) Authors should provide a more quantitative measure of model performance. For example in Figure 3, authors qualitatively compare simulated recharge/discharge areas with interpolated groundwater observations. Similarly, water quality data are used to indicate differences between recharge and discharge zones using the Wilcoxon rank sum test. In Figure 5, the model predicts the second peak much earlier than the obser-

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ventions. The paper can greatly benefit by providing further details about the model's performance as well as discussions about discrepancy observed between simulated and observed outputs.

2) Authors have used a grid-free subsurface flow model to simulate groundwater flow and then used the 2D transient surface water flow of HydroGeosphere. It is not clear why authors did not use HydroGeosphere in the first place as it provides an integrated system to simulate surface water-groundwater interactions. I understand that the grid-free approach is computationally more efficient but authors should justify their approach. Indeed it would be really interesting to see how HydroGeosphere simulations compare with the modelling approach that authors developed. How much loss in accuracy is obtained by assuming steady state groundwater condition in the grid free approach compared to transient simulations?

3) How does the “semi-coupling” approach of surface-subsurface processes in the model impact capturing wetland connectivity and travel time distributions? Moreover, would it be more suitable to use the term one-way coupling instead of semi-coupling as the feedback from the subsurface is not included in this approach?

4) It will be interesting to investigate how changes in climatic condition impact wetland connectivity and travel time distributions.

5) It will be useful if authors provide further details about the model input and time step.

6) Authors need to provide further details about the calibration approach and identify the performance of the model for calibration and evaluation periods.

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