

Interactive comment on “Simulating cold-region hydrology in an intensively drained agricultural watershed in Manitoba, Canada, using the Cold Regions Hydrological Model” by Marcos R. C. Cordeiro et al.

Anonymous Referee #1

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This manuscript presented a watershed modeling study using the Cold Regions Hydrological Model (CRHM). The authors simulated daily hydrologic processes in an agricultural watershed in Canada, with a focus on streamflow in snow-melting seasons. The study is on a topic of interest to the journal. It could be improved by providing clearer description of the modeling framework. Also, Discussion section may need to be revised to be more organized. My suggestion would be major revision.

Specific comments:

1. Line 120-121: The study area is a sub-catchment of the La Salle River watershed,

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so it is shown in Fig. 1b right? Maybe the authors can revise this sentence to make it clearer. Also, what is the importance of this sub-catchment to the watershed? Is data coverage limited in other sub-catchments (in other words, why not study the whole watershed)?

2. Line 144: The stream gauge is located 80 meters downstream of a dam. As a result, streamflow will be significantly affected by human operations of the dam. The authors may need to explain how they introduce anthropogenic impacts into their modeling framework and how they evaluate their model performance from this perspective.

3. Line 174: DEM of 90 m resolution is a little bit coarse for modeling a small sub-catchment of 189 km². Based on Fig. 1, the watercourse is not very detailed. It would be helpful if the authors can show the drainage network they generated and used in the modeling framework.

4. Line 226-232: The model description of CRHM is not clear enough. I understand that there are references of this model, but to make this manuscript a standalone paper, it would be helpful if the authors can provide more information about the main model. Based on description, it seems the model is coupled with SWAT. It would be helpful if the authors can provide a flowchart to explain how their modeling framework works.

5. Line 434: Typo. Change “asses” to “assess”.

6. Figure 11: This figure may need to be revised. I assume there are both simulation and observation lines, but it is hard to distinguish them from each other. Also, legends are missing.

7. Discussion section is long and hard to read. Maybe the author can separate the section into several sub-sections with different topics. Also, the writing needs to be revised to be more concise and focused.

8. Line 555-560: The authors discussed the poor model performance in dry years. It could be helpful to provide some references about hydrologic modeling performance in

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cold regions from previous studies, showing advantages or improvements of the model used in this study.

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