Initial soil moisture condition is one of the most important climatic variables affecting the rainfall-runoff processes. In this study, the author presented a methodology to provide initial soil moisture condition for hydrological model based on the ERA5 Land Surface Reanalysis data.

The topic addressed in this study is important and falls within the scope of HESS. However, the experiments were poorly designed on the basis of very strong assumptions that need to be verified. The results presented cannot justify the usefulness of the proposed methodology. With this regard, I suggest to reject this manuscript. Below, my comments on this manuscript are provided.

Thank you for your comments. We appreciate it so much.

We proposed a methodology that well-utilizes the alternative global soil moisture data to improve hydrological simulation efficiency without warm-up by providing the initial conditions of the hydrological model. And the results show the initial conditions of the hydrological model could be obtained from the processed alternative SM data, which could improve the hydrological efficiency through shortening or skipping the warm-up phase.

Major Comments:

1. Did the model reach the equilibrium condition with only 1-year warm-up? The author should confirm it.

   Yes, usually, the model could reach equilibrium within one year when conducting daily simulations.

2. The author should state which parameters were selected for calibration. In addition, based on the description in Section 3.1 and Table 2, the Case 1-4 were calibrated independently, which indicates that the values of parameters used for each case should be different. If that's the case, the performance difference between each case might also be related to the difference in the values of parameters. How does the author consider this? A reasonable configuration for Case 2 would be keeping all other setup the same as Case 1while initiate the model without warm-up.

Thank you for your comments. The calibrated parameters in BTOP are shown in Table 1. We will add more information about the BTOP model in the revised manuscript.

Of course, the performance difference between each case might also be related to the difference in the values of parameters. But, our goal is to try to get initial conditions without warmup. As long as the results got improved, the proposed methodology is useful. Moreover, if we use the same parameter set for the simulation, the tuning of the parameters for the different initial conditions is useless.

3. The design of the methodology builds on three very strong assumptions that need to be justified: 1) line 170, "We consider its simulated variable are the most representative of the hydrological model". How? Based on observation data or model performance? In line 269, the author further stated that "there is no truth value in this study", which is confusing. 2) Line 190, "we assume that its concept is similar to the value of ERA5-Land soil depth (289cm) minus Sa". How? Do the two parameters in the two models represent similar physical process? 3) Line 196, "suppose we could get relationship between on of the BTOP variables and ERA5-Land SM variables". This is a strong assumption. What is it based on?

For hydrological simulation, we consider, stimulation using the most data is the best. Our object is to find a way to link BTOP and EAR5-Land. Thus, in Line 267, "It should be noted that, since the BTOP and ERA5-Land variables are come from hydrological and land surface models, and the models' fundament are based on many conception assumptions instead of actual physical law (Liang et al., 1994; Albergel et al., 2012; Frassl et al., 2018; Muñoz Sabater et al., 2021), there is no "truth" value in this study." We provide several references to support our experiment design.

4. The author should justify the applicability of LSTM for this study. As an advanced data driven method, large amounts of data are needed to use LSTM,

which is not the case presented in this study.

Thank you for your comment. We talk about data lacking, which is particularly focused on the discharge data. As for the development of LSTM model, we can put much data like global reanalysis data of other variables like soil moisture, and temperature.

5. Instead of only validating the model performance over the period of 2008-2011, which is used for validating the performance of the curve fitting and LSTM, I would suggest the authors further validate the performance of the technique over some independent period.

Thank you for your comment, we'd like to conduct additional validations for this part.

Minor Comments:

1. Title: "Initial Condition" is not accurate, in fact only "Initial Soil Moisture Condition" is discussed in this study

It's our first step to improve the initial conditions of soil moisture. And we will explore other variables in the future.

2. Section 2.1, the author should label the places (e.g., Ojiya, Chikuma River Basin, Nagano and Niigata) mentioned in Figure 1. Otherwise, it's hard for the readers to figure out the locations of them. In addition, I would suggest the authors remove the non-related information such as "one of the best rice-producing areas".

Thank you for your comments. We will improve this part.

3. The manuscript needs revision for language and grammar.

We will carefully improve the language and grammar while revising.

4. In terms of the computational expense, how much the proposed technique is more efficient than the classical warm-up method?

In the aspect of computation expense, they have little difference. The focus of this manuscript is to find a way to skip the warmup phase, therefore, saving discharge data in the ungauged basins.

5. Line 125 is confusing to me.

DEM resolution could affect the performance. Actually, we set a hydrological model with a resolution of 500 m and 1 km. However, as the ERA5-Land data has coarse resolution of 0.1 degrees. So the soil moisture variables from BTOP model were resampled to 0.1 degrees to compare with ERA5-Land data.

6. Line 144, reference is needed after "hydrological simulation".

Thank you for your comments. We will add the reference in the revised manuscript.

7. Line 146, "a better performance" in what?

In the comparison with gauged data, that means EAR5-Land has better consistency with observed soil moisture than other datasets.

8. Line 107 uses "①" while Line 186 uses "(1)". Be consistent.

Thank you. We will modify it.

9. Page 10, what is the time interval of simulated discharge.

We simulated the discharge at a daily time step.

10. Section 4.1, please consider rephrase the second and third paragraphs, which are really confusing.

Thank you. We will improve it.