

Hydrol. Earth Syst. Sci. Discuss., author comment AC1
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Reply on RC1

Yi Nan et al.

Author comment on "The value of water isotope data on improving process understanding in a glacierized catchment on the Tibetan Plateau" by Yi Nan et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-134-AC1>, 2021

Response to Reviewer #1

Comment 1: Water isotope data have long been recognized to have potential value to hydrological process understanding. However, its potentials have seldom been explored in high mountainous areas, where proper understanding on the complicated hydrology is of critical importance for future projection on hydrological conditions. This paper tries to investigate the value of water isotope data on improving process understanding in a glacierized catchment on the Tibetan Plateau. The authors developed a tracer-aided hydrological model and adopted a long time series of water isotope data to feed the model to quantify the runoff components and MTT/MRT. The results shows that the developed tracer-aided hydrological can substantially reduce the simulation uncertainty with the aid of precipitation and streamflow water isotope data. At the same time, the method adopted in the paper can estimate the MTT/MRT in a reasonable accuracy, which opens a new window to understand the hydrological processes in the plateau area. The paper is well structured and the language is well written. I strongly recommend its publication on HESS after properly addressing the following comments.

Response 1: Thank you very much for your comment. We will revise the manuscript according to your suggestions.

Comment 2: MTT and MRT are useful terms to understand hydrological processes in a catchment. The authors discuss the values of MTT/MRT. More discussions on the influencing factors are encouraged.

Response 2: Thanks for your suggestion. We analyzed the influence of the meteorological factors and wetness condition on the MTT and MRT. We found that the MRT is controlled by the soil water content. The backward MTT is controlled by both soil water content and the precipitation amount during dry season and wet season, respectively. The forward MTT has a strong correlation with temperature, which controls the fraction of snowfall and the rate of evaporation. We will add the discussion about this in the revision version.

Comment 3: The seasonal contribution of water sources is an important result, but the values are quite xxx to identified from Fig. 5, better to show the result by a table. It would also be better to show the result of seasonal contribution of surface and subsurface runoff to better understand the seasonal runoff regimes.

Response 3: Thanks for your suggestion. We will present the seasonal contribution of water sources and runoff component in a table in the revision version, and describe the characteristic of seasonal contribution of runoff component (surface and subsurface runoff) in the 3.2 section.

Comment 4: In the multiple-objective calibrations, the NSEdis and MAESCA, MAEiso were added directly. Better to clarify the influence of calibration objective function on the result.

Response 4: Thanks for your comment. This is indeed an important issue, and the weight of each calibration objective should be carefully determined when developing a general calibration strategy. But this study aims to illustrate the benefit from the calibration of isotope, and putting the three objective functions together is used to demonstrate that sound simulation for the three objectives can be produced simultaneously. Our result showed that when three objectives were all simulated well, the uncertainty of parameter and runoff component contribution was significantly reduced compared to the condition when only one objective was satisfied. To this end, the influence of weight of each objective is beyond the scope of this study although it is an important topic, and we will clarify this in the revision version.

Comment 5: The abstract must be concise, summaries the research aims, methodology, results and discussion, and conclusions. This lacks in your abstract.

Response 5: Thanks for your suggestion. We will revise the abstract to make it more concise and contain all the important things in aims, methods, results and discussion.

Comment 6: The conclusions should be brief and more informative. Please cut down the conclusion to a short paragraph.

Response 6: Thanks for your suggestion. We will simplify the conclusion part to one paragraph.

Comment 7: May consider the subscribe "N" to "S" to represent snow for quicker understanding.

Response 7: Thanks for your suggestion. We will change the subscribe of snow to "S" in the revision version.