Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
https://doi.org/10.5194/hess-2022-25-RC1, 2022

Comment on hess-2022-25

Anonymous Referee #1

Referee comment on "Changes of Nonlinearity and Stability of Streamflow Recession Characteristics under Climate Warming in a Large Glaciated Basin of the Tibetan Plateau" by Jiarong Wang et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2022-25-RC1, 2022

In cold alpine regions, climate warming has changed infiltration and hydraulic connectivity due to accelerated glacier melting and permafrost thawing as well as significant glacier and permafrost retreats. It should later the hydrograph pattern including the recession process. Authors analyzed the temporal changes of the recession parameters of a and b in the Brutsaert and Nieber equation in terms of the daily observed discharge during 1980–2015 in the Yarlung-Zangpo River basin (YRB). They obtained interesting results that a decreased and b increased with air temperature rise, meaning increase of nonlinearity and decrease of stability for the streamflow recessions in most sub-basins of YRB due to climate warming. This finding will benefit to establish a method for hydrological prediction and baseflow analysis in cold watersheds.

The manuscript was well-written and easy to follow. It is acceptable for publication after minor revisions.

Since changes of a and b values are highly related to the enlarged groundwater storage or soil active layer thickness, I suggested that authors to clearly state the physical bases of the changes of a and b. I also suggested to explain how the driving forces or changes of soil active layer thickness lead to the initially fast decline of recession (ascribed to the increased b) and finally slow decline of recession (ascribed to the decreased a). I believe these explanations could strengthen the manuscript quality.

Minors

- the decrease of log(a) means the decrease of recession rate and thus increase of the streamflow stability, right?
- Line 100. "…, mean annual temperature varies from -9.3 to 22.0 â□□". Is it right the annual temperature could as high as 22.0 â□□ in the basin?
- Line 104. "Groundwater accounts for about 54% of the annual streamflow". References are needed.
- Fig 3. There is a mistake for the range of mean daily precipitation.

General comments:

This study mainly analyzed in detail the changes in of nonlinearity and stability of streamflow recession characteristics under climate warming induced by climate variation in the Yarlung-Zangbo River basin (YRB) in the Tibetan Plateau, and the spatial divergency of the impact of climate variation between five sub-basins in YRB. The authors did a very detailed research on streamflow recession characteristics changes in the YRB, and the manuscript was well-written and easy to follow. But there are still some problems to be improved. It is acceptable for publication after minor revisions.

Additional evidence, such as the changes in total days with the mean temperature above 0 ℃ in a hydrological year (or the recession period), to further testify to the changes in recession characteristics under climate warming. I believe these explanations could strengthen the manuscript quality.

Minor revisions recommended:

Line 291. Figure 4: The data points of -dQ/dt~Q are usually scattered to some extent as observation errors and other disturbance in stream and catchment. However, there are pretty concentrated and regular in figure 4. I guess the presented data points of -dQ/dt~Q are more likely extracted from fitted recession segments of Q~t instead of observed hydrograph. The data points of -dQ/dt~Q should be directly calculated from observed hydrograph.

Line 40. It is weird to put the spatial resolution and timescale of data in one column in Table 1. Another column for timescale of data is better.

Variable symbols should keep italic type throughout the manuscript.

The reference part should be further improved according to the demand of the HESS.