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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Quantifying streamflow and active groundwater storage in response to climate warming in an alpine catchment on the Tibetan Plateau" *by* Lu Lin et al.

Anonymous Referee #1

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Review comments for the HESS Manuscript "Quantifying streamflow and active groundwater storage in response to climate warming in an alpine catchment on the Tibetan Plateau" by Line et al.

General comments: This work intended to quantify streamflow and aquifer storage volume response to changes in glacier melt and frozen ground thaw at a branch of Lhasa River Basin on the southern TP. However, the work is mostly in a qualitative way and lacks of in-depth quantitative analysis. Therefore, the conclusions are not supported by solid analysis or materials. For instance, in Abstract, lines 29-30, the statement " It is believed that the increased streamflow is mainly fed by glacier meltwater, . . .". Firstly,

there is no quantitative analysis to support this statement in the manuscript. Secondly, in research paper, every statement or conclusion must be supported by solid analysis. How can authors use words like "It is believed. . ."?

The same issues exist everywhere in the text, other examples are, the sentences in Lines 36-42 are mostly qualitative descriptions or deductions instead of solid conclusions. Sentence like "Thus, it is reasonable to attribute the increase of baseflow and the slowdown of baseflow recession process in autumn and early winter to the enlargement of groundwater storage capacity. "

Specific comments: 1. Section 2.3.2. Baseflow separation: It is not clear to me, if the baseflow separation in Fig.4b and Fig.7 are calculated by equations (6)-(7).

2. Section 3.1. Variation of annual streamflow and its components The authors conclude that the changes of air temperature may act as a primary climatic factor for streamflow increase simply based on similar increasing tendency between annual streamflow and annual air temperature, but without any further statistical analysis. I would suggest at least a correlation analysis between precipitation/temperature and streamflow at both annual and seasonal scales.

The statement ". . ., it is reasonable to attribute annual streamflow increase to the accelerated glacier retreat as the consequence of increasing annual air temperature." (Lines 286-288) is also too arbitrary and lack of more analysis to support. One quick way to check is to see if the lost of the glacier mass can support the increase of the streamfow during the study period.

"It can be further concluded that streamflow is recharged by the increased meltwater from the accelerated glacier retreat which may be partly stored in soil and aquifers in the wide and flat valley (Figure 1b), and subsequently discharge into streams as baseflow. " (Lines 300-303) These are all just deductions or hypothesis without validations.

Section 4. Conclusions

“Moreover, the increase of active groundwater storage in autumn and early winter can partly be attributed to the enlargement of groundwater storage capacity by frozen ground degradation, which can provide storage spaces for increased glacial meltwater.” (Lines 404-406). This statement is not supported by solid analysis or materials.

In summary, this manuscript needs more solid quantitative analysis or materials to support the statements on the impacts of glacier or frozen ground degradation on streamflow changes. At least some statistical correlation analyses are needed, e.g., between P/T and streamfow/baseflow, and between P/T and groundwater storage S. Validations for S changes (e.g., well observations or other ways) would be appreciated.

Please also note the supplement to this comment:
https://www.hydrol-earth-syst-sci-discuss.net/hess-2018-541/hess-2018-541-RC1-supplement.pdf

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