



EGUsphere, referee comment RC1
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Comment on egusphere-2022-620

Anonymous Referee #1

Referee comment on "Contribution of cryosphere to runoff in the transition zone between the Tibetan Plateau and arid region based on environmental isotopes" by Juan Gui et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-620-RC1>, 2022

Review on "Contribution of cryosphere to runoff in the transition zone between the Tibetan Plateau and arid region based on environmental isotopes"

It's my pleasure to review this manuscript. Qilian Mountain is the transition zone between the Tibetan Plateau and the arid region, which is important for regional water resource management. This study conducts a comprehensive and detailed analysis on the hydrological process in this region based on solid and abundant isotope data. The results are helpful for understanding the role of cryosphere on runoff processes, which make this manuscript worth publishing. I recommend to accept this manuscript after moderate revisions to address following general and specific comments.

General comments:

- English writing: The English writing of this manuscript should be improved thoroughly. The issues include the choice of word, grammar issue and the structure of sentence. I suggest the authors to ask some native English speaker to edit the language, or use some English editing software (e.g., Grammarly).
- Definition of water sources: The author considers the glacier and snow meltwater as one water source in experiment and analysis. However, I think it is better to distinguish glacier and snow melt. Glacier melt water comes from glacier, which can be regarded as the solid water storage. Snowmelt comes from snowpack, which is formed by the

seasonal snowfall (a part of precipitation). If snow and glacier is not distinguished when designing the sampling work, I suggest the authors to make some discussion on this issue.

- Uncertainty issue: The contribution of water sources is calculated by end-member mixing analysis. The average isotope composition is used to represent each end member. However, considering the isotope composition has strong spatial and temporal variation (especially for precipitation), the uncertainty of the EMMA result must be addressed. Please use some common method to quantify the uncertainty.

Specific comments:

- L25: change 90 years to 1990s
- L47: Immerzeel et al., 2010
- L139-142: The permafrost area is also according to glacier inventory?
- L161: Better to provide some basic information of the precipitation samples, such as the number of station, and sampling frequency.
- L183: change the title to "Meteorological and hydrological data"
- L262: rewrite the sentence "and the weak time variation first increased and then decreased"
- L297-300: rewrite this sentence.
- L322: change 'less' to 'more depleted', 'more' to 'more enriched'
- L326: The paragraph (L326-336) is not a 'conclusion' of above paragraph (L317-325). Consider to combine them and simplify.
- L346-348: The isotopic difference between river and precipitation should indicate that the recharge source is not precipitation. Please check.
- L369-372: Please rewrite.
- L372: groundwater is not shown in the legend.
- L405: What does 'as the third end-member' mean?
- L413: Change clearly to significantly
- L470-472: Please rewrite
- L474: 'directly' or 'slowly'? On my understanding, here it should be a word opposite to 'rapidly'.
- L483-484: When temperature decreases, the soil begins to freeze. Why can permafrost layer release water?
- L502-505: Please rewrite
- 4.1.1: Try to make some discussion on the pattern of meltwater's contribution, rather than simply list the results.
- L515: Change the word 'production and confluence'
- Table 1. Providing drainage area and glacier cover area of each river. Add horizontal lines between different Drainage areas. Otherwise, reader may think Datong River is belong to HIRS.
- Figure 8: This figure should be the relationship between 2H and 18O in different water bodies, rather than the relationship of isotope between river water and various water sources. The figure title is misleading.

