Yang et al. offer to the benefit of the wider scientific community a dataset of stable isotope measurements in several components of the hydrological cycle in a typical permafrost area located in the Tibetan (Qinghai–Xizang) Plateau. The data is well-presented and the sampling strategy was designed to maximize the results. Except for a few minor technical comments, the manuscript is well organized and written and I recommend its publication in the journal, ESSD. One note, though: while the data is good, some of the interpretations are simplistic, they should either be improved, or left out entirely.

Answer: Thanks for your valuable comments. I have improved interpretation of the data to make them easily understandable.

Technical comments

Although the authors call the sampling area a "watershed" it is not clear which is its extent. It would help adding the outlines of the watershed on the map in Fig. 1b. If several watersheds are present (as I suspect), all should be mapped in Fig. 1b. Also, it would help adding the surface streams and all lakes, whether they were mapped or not. This would put the results in a better hydrological context.

Answer: Thanks, I have added the outlines of the watershed on the map in Fig. 1. And all the surface streams and all lakes are mapped.

It is not clear what is the source of water in the springs (lines 142-145) and which are the differences between these. As the authors only offer data and no interpretation (as per journal regulations), potential users of the data need this kind of information.

Answer: Thank you for the useful suggestion. In order to I have determined the recharge sources of supra-permafrost water and sub-permafrost water. (Red words in page 24 line 419-424) In addition, the differences between them are clarified (see the red words in page 8 line 154-162).

Lines 167-168: am not sure what contamination the authors refer to. Please clarify.

Answer: Thanks, I have revised it to make it clear. To avoid the contamination of water vapor from evaporation of shallow soil and surface water, and the mixing of windblown snow. (Red words in page 9 line 178-179)

L168-169: it is not clear whether the water was collected at 20.00 every day or at the end of precipitation, regardless of time, as implied in line 169. I suspect the former, but please clarify.

Answer: Here, in order to facilitate the analysis and calculation, we define one complete precipitation day beginning at 20:00 on one day, and ending at 20:00 in the next day. All data in this defined range is included in one complete day. Actually, all the rainfall samples were immediately collected after the end of precipitation.

L170-171 (and also line 134 above): how was sampling done during periods of freezing? Was ice scrapped from the plate, was the plate put at room temperature? And how was the plate constructed in order to minimize water loss during melting? A photo of the sampling device would help.

Answer: Thanks. As I stated, all the rainfall samples were immediately collected after the end

of precipitation to minimize the effects of evaporation (red words in page 9 line 182-183). No matter during freezing period or during thawing period, each liquid (rain) and solid (snow, hail) sample was collected immediately after the end of precipitation. Thus, every snow and hail sample collected via plate during freezing period was filled in pre-cleaned plastic bags. The excess air in plastic bags was exhausted to avoid the water vapor exchange. (see the red words in page 9 line 183-185)

L 171-172: I understand from here that rain water was collected on a plate? Is this correct? How was evaporation/exchange with moisture prevented? This is crucial for the integrity of the data.

Answer: May be the expression is not very correct. Most of the rain water samples were collected using a precipitation collector made according to International Atomic Energy Agency/Global Network of Isotopes in Precipitation (IAEA/GNIP) precipitation sampling guide (see the red words in Page 9 line 176-178). Only light rain and short-time rain/snow events were collected using a plate: In order to clarify the changes comprehensively and accurately in the precipitation isotopes in the BLH Basin, we tried to collect all samples during every precipitation event, including light rain and short-time events (usually with precipitation amount of less than 5 mm). Accordingly, a wide mouth stainless steel plate (400 mm×600 mm) was used to collect as much as samples of light rain and short-time rain/snow events for analysis. (See the red words in Page 9 line 185-189)

L173: which bottles? Was rainwater collected separately for washing? This entire section (4.1.1.) is unclear, at least to me and needs to be clarified.

Answer: Thanks, I have improved this expression. (see the red words in Page 9 line 190-191): Regarding preserving samples, 100 ml high-density polyethylene (HDPE) bottles were used. Before the sampling, the bottles were washed three times with rain water and then rapidly filled. In addition, I have reorganized this section (4.1.1) to make it easily understandable.

L177-180: while the implication is that lake water was collected for six months per year for six years, in line 180 it is said that water was sampled in 2 months, only. Please clarify. (Table 1 shows more than 2 months).

Answer: Yes, influenced by the Covid-19 and lockdown policies between August, 2022 to December, 2022 in China, only two months' sampling work (June and July) was conducted in 2022. (See the red words in Page 10 line 203-204)

L183: how was sub-permafrost and supra-permafrost water collected?

Answer: The supra-permafrost water and sub-permafrost water were randomly collected using a man-made water ladle at the location where the springs gushing out during each field work. The water ladle was washed using the spring water before sampling. (See the red words in page 10 line 207-209)

L201: please clarify the number of sample – perhaps[s separate the sentence in "boreholes" and "profiles".

Answer: Thanks, I have revised it.

L233-245: this should go under “methods” rather QC

Answer: Thanks, during method I mainly introduced the sampling strategy and the distribution of sampling sites. Here I want to emphasize the normalization and the processes of sample preservation. I have improved this section. (Page 16 line 260-271)

L241: I don’t see how this could be. Please clarify

Answer: I have improved it. During the sampling work of thermokarst lakes/ponds and streams, we do our best to control the sampling time at the same period during every month (controlling the sampling time within one week, i.e., between 17th and 22th in every month) to make sure that all the samples can represent the average level of the whole month. (Page 16 line 266-269)

L244-245: not sure this sentence applies here.

Answer: I have deleted this sentence.

L249: 12 injections of each of the 14 samples?

Answer: Yes, 12 injections of each of the 14 samples were done to adjust the status of the analyzer to the best.

L250-255: please specify the time of this analysis to better understand the drift.

Answer: In order to ensure the data quality, the “high precision” mode was employed during analysis. Under this mode, the analyzing time for each injection is about 8.75 minutes. (See the red words in page 16 line 276-278)

L255-257: please detail the “calibration of the instrument (?)”

Answer: I have added the details. The best-fit linear relationship between the five known calibration values and the analyzer’s reported values was determined. The slope and intercept of the best-fit line through these points are used to calibrate the results of our samples. (See the red words in page 17 line 291-293)

L260-262: so, analysis was restarted every time the ppm dropped below 19000 or increased above 20000?? Or you just used the good/bad info from Picarro’s GUI?

Answer: Yes, if the ppm dropped below 19000 or increased above 20000, the results of these samples were discarded an the we stopped the analysis work. We then checked the instrument and wash the injectors, after this work, the analysis was restarted.

L268: “seasonal variability” is better than “trend”

Answer: I have revised it.

L273-274: on one hand, it is more complex than that, but on the other hand, the seasonal variability could be simply explained by temperature variability. “Transitions of moisture sources” means “changes in moisture sources”?

Answer: Yes, I have revised it.

L282: again, “transitions of source waters and evaporation differences (?)” means nothing, either detail, or delete.

Answer: I have added details to make it clear. ···which is due to the changes in source waters (i.e., precipitation, meltwater of thawing permafrost/ground ice, groundwater) and alternations of evaporation degrees due to air temperature fluctuations. (See the red words in page 18 line 318-319)

L288: “isotopic-positive precipitation” is meaningless. Perhaps “2H and 18O-enriched precipitation water”? Generally, check the manuscripts for stable isotope jargon and correct. Sharp (2017), available here for free (https://digitalrepository.unm.edu/unm_oer/1/) offers good advice on stable isotope nomenclature (for instance, “isotope values” is ambiguous)

Answer: Thanks for your good suggestions. I have improved expressions related to isotopes.

L292: no contribution of winter precipitation (snow)? Also, “stable isotopes of streams” is incorrect/ambiguous

Answer: Yes, here we found that the mean values are equivalent to the average values of annual precipitation, which including the winter snow. In addition, I have revised it to “$\delta^{18}O$ values of stream water”.

L293: please clarify how the short residence time results in less variability

Answer: Due to the short residence time of stream water, the evaporation of water is weak, which limited the enrichment of heavier isotopes.

L296-298: this contradicts the statement in L 293-295

Answer: Actually, in line 293-296, we want to compare the lakes with stream water. In contrast, the stream water exhibits much more stable isotope trend. However, in line 296-298, we take the isotopes of stream water separately for analysis. When the isotopic curve was amplified, the seasonal variability is shown.

L299: please explain the differences between the two

Answer: I have explained the differences. For the groundwater observation, we selected two areas with substantial natural opening springs occurring, i.e., springs along the both sides of the observation stream (named as GSHQ) and spring in the source area of this stream (named as GSYTQ) (Fig.1; 2). (See the red words in page 8 line 154-156)

L311: why during cold periods? I would expect sub-permafrost water to be release from the melting permafrost.

Answer: I have revised it. (See the red words in page 19 line 349-350)

L316: please (!) rephrase. Also rephrase the line below with the position of values left or right of the pp line. Describe the data variability, not the chart itself.

Answer: I have improved the expression and grammar.

L320: more negative isotopes. No such thing exists; see my comment above on nomenclature.
Answer: Thanks, I have revised it.

L324-338: slightly speculative, not sure it fits the scope of the journal, perhaps it should be simplified.
Answer: I have simplified this section.

L388: stream water exhibit a clear evaporative effect, they do not lie on the LMWL (and similar for the lake waters). Ground ice exhibits a clear freezing slope (Jouzel and Souchez, 1982, Souchez and Jouzel, 1984, Lacelle et al., 2011, Persoiu et al., 2011 etc).
Answer: Yes, good suggestions. I have improved the related expressions and interpretations.

Conclusions> please see the comments above on data interpretation and adjust the conclusions accordingly.
Answer: Thanks. I have improved the conclusion.

Fig. 1. Show the outlines of the watershed and the hydrological connectivity. What is the base map in fig. 1b?
Answer: Thank you, I have redrawn the figure 1 to make it clear.