

In this manuscript, Yang et al. present an extensive isotope data set ($\delta^{18}\text{O}$, δD , δ -excess) of samples taken over 6 years from different compartments associated to a permafrost environment (e.g. precipitation, thermokarst ponds, ground ice, etc).

These raw data are available via a link to a data repository. The data are distributed to five different Excel-sheets, clustered by compartments. On the one hand this is legit due to the high number of samples and necessity to include information about sampling sites. On the other hand it complicates the handling of the data.

Answer: Dear Reviewer, Thanks for your valuable comments and patient work on our manuscript. The dataset files will be improved before this manuscript is fully accepted and published online.

The study concept is sound and sampling, sample preparation and analysis have been conducted according to state-of-the-art methods. Specific care has been taken to prevent evaporative isotopic enrichment of the samples.

Answer: Thanks for your positive comments. Concerning the influence of evaporation on the isotopic enrichment, we have done a lot of work to prevent the evaporation of water samples during sampling processes and preservation. I.e., All the rainfall samples were immediately collected after the end of precipitation to minimize the effects of evaporation (Page 9 line 181-183). The sample bottles were filled up without bubbles and sealed with parafilm (page 15 line 235). All the samples were stored at 4°C (page 15 line 238). And in section 4.3.1, All these conducted procedures are needed to avoid the impact of evaporation on the original isotope signals of lake and stream water (page 16 line 264-265).

The manuscript includes a basic description of time-series and borehole data. Further, intercorrelations between different isotopes are shown, which is fundamental in isotope hydrology and justifiable to be presented in a data-description paper.

While there is a growing database of isotopes in precipitation and surface waters, data from permafrost environments are still scarce and limited to some study sites, mainly from Alaska and Siberia, plus a minor scale pilot study from the same study area as in this manuscript (all cited in the text). However, permafrost associated data are important to fully assess the potential of isotope applications within the hydrological cycle, specifically when this is influenced by melting of permafrost archives in course of global warming.

Therefore, I recommend the publication of this manuscript in ESSD after the completion of minor revisions.

Answer: Dear Reviewer, Thank you for your caring and your assurance on my work. We will conduct this field monitor and sampling work, and the relevant dataset of stable isotopes will be continuously updated.

Comments:

Data: I miss a clear statement about analytical error / uncertainty of isotope data. There are no uncertainty values reported in the data files. Line 226ff gives values for analytical accuracy but it is not explained how these values have been calculated. Were samples measured in replicates? Clear and transparent information about analytical uncertainty and how it has been evaluated is essential for a data description paper.

Answer: Thanks. Here in line 226, we want to clarify the guaranteed precision of instrument (picaro L2130-i) that was stated in the factory settings, defined as the instrument precision. We have corrected this expression to "instrument precision" to avoid misunderstanding. (see the red words in page 15 line 253-254)

Thermokarst lake data: these are „mixed data“ so it is not possible to associate data from different seasons/sampling days to specific ponds. Probably those change a lot due to melting? If this is the case, add a sentence or two to the methods part, explaining this issue.

Answer: Yes, you are right. Here we give a detailed interpretation of the sampling processes: During the observation periods, the occurrence numbers of thermokarst lakes dynamically changed among different sampling years (Table 2) due to the interannual variations in the precipitation, active layer thickness, supra-permafrost water, as well as near-surface ground ice. Partial of sampled lakes disappeared in the next sampling year and additional new lakes emerged. Accordingly, we obtained as many as lake water samples to constrain the seasonal changes in the lake water hydrology and try to clarify the influence of permafrost and climate on the water balance of thermokarst lakes in this region. (see the red words in page 10 line 197-203).

Data organization: the distribution of the whole data set to five Excel files is legit. Nevertheless, I suggest to evaluate alternative versions of data management, with a more condensed organization in less or – in best case- only one single excel-spreadsheets.

Answer: Thanks. We have communicated with the data center. And we both agree that the dataset files will be improved before this manuscript is fully accepted and published online. All the data will be sorted and put into one single excel file and the data information will be updated.

I.17: not everybody is familiar with „Xizang“. Please note in brackets that it is Qinghai-Tibet-Plateau at least once in the beginning, which is a term better known to most researchers outside of China.

Answer: Thanks for your suggestions. I have changed "Qinghai-Xizang Plateau" into "Qinghai-Tibet Plateau" in the whole manuscript.

I.87: what precisely is „scarce“? The compartments (thermokast lakes, ponds, etc) or the data from those? Please rephrase for clarification

Answer: Thanks, I have improved it. Here we want to clarify that the stable isotope records of thermokarst lakes/ponds and ground ice are extremely scarce. (see the red words in page 5 line 97-99)

I.99/100: reference to Fig. 1 is needed here

Answer: I have added the Fig. 1.

I.110-120: short description/explanation of permafrost associated terms, such as thermokast active layer, etc, would be beneficent (later on the same accounts for „pore ice, „segregated ice“, etc). The latter here it is written as „active-layer“ while in other parts of the manuscript without dash „active layer“. Please correct.

Answer: Thanks, I have added short description/explanations of permafrost associated terms (see page 2).The active layer is used in the whole manuscript.

I.134: explain how the rain gauge in combination with the steel plate works. Which efforts were undertaken to prevent isotopic enrichment of the sampled water

Answer: Here, I have reorganized this sentence to make it clear. A rain gauge was installed to collect daily rain, and a steel plate was put on the roof to obtain as much as snow samples. (page 9 line 176-189).

About the methods done to prevent isotopic enrichment of the sampled water, we have given a detailed information in page 15 line 248-260.

I.142: how was this identified?

Answer: Thanks for your comments. 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), (Fig.1; 2). Given the intermittent occurrence of these springs among different years and their unstable isotopic signals, we identified them as supra-permafrost water. (see red words in page 8 line 155-159)

I.145: again, provide more details, i.e. from which depths does the water of wells/springs come from, to classify them as sub or supra permafrost

Answer: You are right. I have given a detailed information of this spring. A drinking spring (CSQ) behind the BLH station (Fig. 1), with its aquifer depth (reaching 92 m) being deeper than the permafrost thickness (~50m) in the BLH, is selected to conduct continuous sampling work. In regards to the small fluctuations in water level all the year and little interannual differences in stable isotopes of spring, we identified it as the observation site of sub-permafrost water. (See the red words in page8 line 154-162).

I.179: clarify for which years the Covid-rules did apply

Answer: Thank you. Influenced by the Covid-19 and lockdown policies between June, 2022 to December, 2022 in China, only two months' sampling work was conducted in 2022. (see the red words in page 10 line 203-205)

Figure 2 caption: put the labels of panels before the respective phrase, i.e: (a) General conditions... .., (b) typical feature, etc.

Answer: I have done that.

Table 2 and 3: better write "number of samples". Sampling size is a bit confusing.

Answer: Thanks, I have revised it.

I.224: why actually not melting the permafrost samples directly in the field and further treat and process them the same way as liquid samples?

Answer: Because we didn't have good conditions (there was no sufficient power to support the run of refrigerator) to keep the meltwater samples of frozen soil and ground ice at in cold storage. In addition, the harsh climate conditions in the field was not beneficial for the

treatment of samples.

I.255: describe which lab standards were used

Answer: The laboratory standards we used was provided by LICA United Technology Limited, Beijing, China.

Figure 4: the greyish and turquoise y-axes and labels are not good to read. Explain abbreviations GSHQ and GSYTQ in figure caption or refer to Fig. 2.

Answer: I have improved the figure 4 to make it clear, and give the explanation of abbreviations GSHQ and GSYTQ in the figure caption.

Figure 4: similar scales of y-axes would make data better comparable. I would also change order of the sub plots in a more logical way: move the most negative d18O precipitation down (closer/above PP [mm]), then maybe streams and lakes above.

Answer: Thanks for your comments, I have improved this figure and changed orders of all sub plots according to your suggestions.

I.315ff / section 5.1.3: I assume there is no information / data about different ages of ground ice formation at this point?

Answer: Yes, the ages of ground ice is not concluded in this manuscript. In this study, we aimed to contrate on the variations in stable isotope ($\delta^{18}\text{O}$, δD) of different water components in permafrost regions. Due the little volumes of ground ice in permafrost on the QTP, the traditional dating method is hard to use in the ice dating, can are still work on it.

Figure 5: I suggest to decrease dot-size a bit

Answer: OK, I have improved this figure

Figure 6: again, explain all abbreviations (LEL, FL, AP, SP, WP, etc) in the figure caption, even if they are explained in the text.

Answer: Thanks, I have added all the explanations of the mentioned abbreviations.

I.395: there is something wrong with this sentence, please check

Answer: Sorry for my mistake. I have reorganized this sentence. (see the red words in page 24 line 428-433)

I.421: isotopic values, not contents

Answer: I have revised it.