Dear Reviewer:

Thank you for your letter and for the reviewer's comments concerning our manuscript entitled “Difference of SPAC composition and control factors of different vegetation zones in north slope of Qilian Mountains” (Manuscript Number: bg-2021-127).

According to the comments of the reviewer, we have revised our manuscript carefully. The primary corrections and the response to the reviewers’ comments are as follows.

**Responses to the reviewer’s comments:**

**In this manuscript, Liu et al. explored oxygen and hydrogen isotope signals in precipitation, groundwater, soil water and plant water in different vegetation zones within the upper reach of Shiyang River Basin, and aimed to elucidate internal linkages between various water bodies. Such investigation could deepen our understanding on mechanisms in water cycle and facilitate ecosystem management of water-limited areas. The topic of manuscript falls into the scientific scope of Biogeosciences. The authors selected three representative vegetation zones in the study area, and worked hard to collect many samples last for more than one year. I believe their data are informative and interesting. However, in my view, the manuscript is not well written, including the whole structure, data analysis, interpretation of results, discussion, and language issues. Thus, the current version of this manuscript is beyond the standard of BG, and I suggest the authors resubmit the manuscript after major revision.**

Response: We have gradually improved it by carefully revising every recommendation you mentioned.

**Major concerns**

**1. It is difficult to figure out the background and necessity of this study from the current version. In the initial paragraph of Introduction, the authors only told us that water isotopes were useful with so many sentences, but they didn’t show us the latest developments and trends of isotopic research in soil-plant-atmosphere continuum. In the second paragraph, the authors described soil water,**

**precipitation, and plant water. But they didn't raise any scientific problems. Until the last paragraph, the authors still didn't state the reasons to perform research in Shiyang River Basin.**

Response: Thank you very much for your suggestion. In the second paragraph of the Introduction, we added the latest developments and trends in isotopic research on the soil-plant-atmosphere continuum:

The research of the water cycle based on SPAC plays a vital role in the study of water in arid areas and the sources of plant water use (Price et al., 2012; Shou et al., 2013). Hydrogen and oxygen stable isotope methods have been used to study the water cycle at the interface of "soil-root", "soil-plant" , and "soil-atmosphere", but only a small number of parameters play an important role in the complex interactions of various surfaces (Durand et al., 2007; Deng et al., 2013; Li et al., 2006; West et al., 2006 ). At present, the study of stable hydrogen and oxygen isotopes is no longer limited to a single aspect of the SPAC interface water cycle (Zhang et al., 2016; Penna et al., 2020). The tracer study of oxygen isotopes in soil water-plant water-plant fossils in steppe has been carried out internationally, providing a theoretical basis for studying the spatial distribution of oxygen isotopes in soil water and palaeoclimate (Webb et al., 2003). However, the study of the SPAC water cycle as a whole has not been carried out. In future research, the application of hydrogen and oxygen stable isotope technology to the whole system of "five water conversion" of precipitation, surface water, groundwater, soil water and plant water is a new field worth exploring (Gao et al., 2017; Tipple et al., 2017), which will ultimately solve some core problems in the process of the water cycle and production practice problems (Gao et al., 2017; Peng et al., 2010; Tipple et al., 2017). Through research in different water bodies, such as the composition of hydrogen and oxygen isotope, can further understanding the mechanism of vegetation using water in different water bodies of water (Huang et al., 2012; Yang et al., 2015), such as the migration and transformation of relations between to solve ecological water requirement for vegetation construction in arid and semiarid areas and some key scientific problems of vegetation restoration and provide a scientific basis for ecological environment construction in western (Wu et al., 2016;

2017). In the existing research, how to extend the small-scale SPAC water cycle research results to the large-scale area has become a hot spot and difficulty in the current research.

We rewrote the third part of the Introduction and added the scientific questions of this article in this part:

The Shiyang River Basin is the river basin with the greatest ecological pressure and the most severe water shortage in China. Due to the lack of water resources and the small exchange of energy and water with the outside world, the hydrological cycle is mainly based on the vertical circulation of groundwater-soil water-atmospheric water. The purpose of this study is to: (1) analyze the SPAC water cycle process in different vegetation areas; (2) determine the potential factors that control the SPAC water cycle. The research is helping to clarify the water resource utilization mechanism and the local water cycle mechanism of different vegetation areas in high mountainous areas and provide a certain theoretical basis and guiding suggestions for the practical and reasonable use of water resources in arid areas.

**2. In the current version, Introduction, Results, and Discussion sections were mismatched from each other. From Introduction, I understand the authors intend to analyze the isotopic differences in different bodies and the potential controlling factors. However, no data on the controlling factors were shown in Results, while temperature and altitude were discussed in Discussion, which were not mentioned before. I suggest to reorganize the manuscript and closely link each section.**

Response: We have adjusted the manuscript's structure so that the introduction, results, and discussion parts match each other. In the results, we modify part 3.1 to Changes in meteorological parameters over time; modify part 3.2 to The relationship between stable water isotopes in different vegetation zones; modify part 3.3 to Relationship between soil water and plant water in different vegetation zones; modify part 4.1 to Variation of soil isotope and s between different vegetation zones; modify part 4.2 to Control factors of SPAC in different vegetation zones. In the Result, we added information on control factors:

Soil samples were placed in a 50 ml aluminum box, and the drying method determined soil moisture content. Meteorological data, including precipitation, relative humidity and temperature, are obtained from a meteorological station in the Shiyang River Basin. Figure 2 shows the changes in daily precipitation, relative humidity, temperature and soil water content (SWC) in the study area from April 2018 to October 2019. During the summer monsoon (April to September), the accumulated precipitation accounted for 90.4% of the total precipitation, and the average daily precipitation on rainy days was 3.98 mm. During the winter monsoon (October to March), the accumulated precipitation accounted for 9.6% of the total precipitation, and the average daily precipitation on rainy days was 0.13 mm. During the observation period, the temperature from -16.2℃ to 32℃, and the average temperature of summer monsoon and winter monsoon were 20.20℃ and -0.69℃, respectively. The average SWC value of 0-100cm soil layer varies from 2.58% to 89.96 %, and the low SWC value usually appears in summer, which is related to the strong evaporation of soil and the strong transpiration of vegetation.

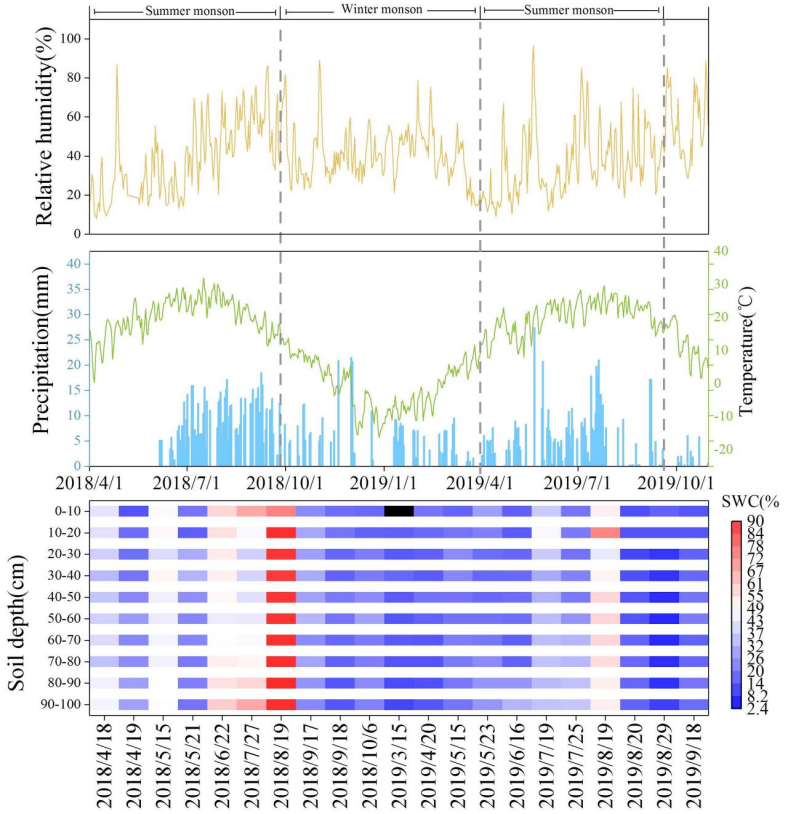



Fig. 2 Diurnal variation of relative humidity, precipitation, temperature, and

SWC (%) from April 2018 to October 2019

**3. A subsection on data analysis is also necessary in the Materials and Methods section. In Results, I found many words like "…smaller than…", "…greater than…", "…the smallest…", and "…closer to…". Such presentations need solid evidence of statistical analysis. So do the comparisons of slopes and intercepts between different water lines. It will also be better to show the quantitative relationships between isotopic information of SPAC and potential controlling factors.**

Response: We have added a data analysis section in Materials and Methods.

Since the isotopic data are generally distributed according to the Kolmogorov-Smirnov (KS) test, Pearson correlation is performed to describe the various correlations between different water types (for example, precipitation, soil water, plant water, and groundwater) and the relationship between isotopes in different vegetation zones and control factors. The significance level for all statistical tests was set to the 95% confidence interval. All statistical analyses were performed using SPSS software.

In results, we added relevant statistical analysis data to support the mentioned words like "…smaller than…", "…greater than…", "…the smallest…", and "…closer to…" and the comparisons of slopes and intercepts between different water lines. We also added relevant content about the quantitative relationship between isotopic information of SPAC and potential controlling factors.

**Specific comments**

**1. L1: As first mentioned in the title, the abbreviation SPAC should be written as its complete form, soil-plant-atmosphere continuum. Also, the authors may want to say "Isotopic differences of…".**

Response: We have added the full form of SPAC based on your suggestion and revised the title. The new title is as follows:

Isotopic differences of soil-plant-atmosphere continuum composition and control factors of different vegetation zones in north slope of Qilian Mountains

**2. L15: "The results showed…".**

Response: We have modified it according to your suggestion.

**3. L26: "…changes of oxygen and hydrogen isotopes in water…".**

Response: We have modified it according to your suggestion.The revised sentence is as follows:

The relative abundance changes of oxygen and hydrogen isotopes in water technology in water can indicate the water cycle and water use mechanism in plants, so isotope technology has become an increasingly important method for studying the water cycle (Gao et al. 2009; Song et al. 2002; Coplen, 2013; Shou et al. 2013)

**4. L41: "…, but also…".**

Response: We have modified it according to your suggestion. The revised sentence is as follows:

As an effective tool, stable isotope technology can not only show the relationship between environmental factors and the water cycle (Araguas-Araguas et al., 1998; Cristhor et al., 2009), water transport and distribution mechanisms (Gao et al., 2011), and but also deepen the way plants use water (Detjen et al., 2015).

**5. L43: Nie et al., 2014.**

Response: We have modified it according to your suggestion. The revised sentence is as follows:

And the understanding of the influence of plant characteristics provides a new observation method for revealing the water cycle mechanism in the hydrological ecosystem (Nie et al., 2014; Yu et al., 2007; Wang et al., 2019) and the connection between water use efficiency and water sources (Ehleringe, 1991; Sun et al., 2005; Chao et al., 2019).

6. **L46: It seems that the "SPAC" appears suddenly here. Necessary conversions of words and content are needed.**

Response: We have added the latest developments and trends in isotopic research on the soil-plant-atmosphere continuum before this sentence as a conversion of the following sentence.

**7. L49: Both "soil water" and "soil moisture" are used in the manuscript. I suggest use one of them.**

Response: We have unified the term as soil water in the manuscript.

**8. L51: Is sampling of the current study involving desert vegetation?**

Response: The sampling in the current study does not involve desert vegetation. The purpose of adding this sentence is to show that the closer to arid areas, the more important soil water is to plant water. We have deleted this sentence .

**9. L56-58: "The source of plant water use can be determined by measuring…".**

Response: We have modified this sentence according to your suggestion. The revised sentence is as follows:

The source of plant water use can be determined by measuring the δD and $\delta^{18}O$ characteristics of plant xylem moisture and soil moisture at different levels (Wu et al., 2015; Meissner et al., 2014; Yang et al., 2014).

**10. L66-70: The sentence is too long, and specific subjects before "can" and "lay" lack.**

Response: We have reorganized this sentence. The revised sentence is as follows:

Combined with changes in the isotopic composition of surface water, soil water and groundwater, the process of precipitation infiltration and runoff generation can be determined (Bam and Ireso, 2018; Hou et al., 2008) and groundwater recharge and regeneration capacity (Smith et al., 1992; Cortes and Farvolden, 1983). Furthermore, it lays a foundation for studying the deep mechanism of the water cycle (Gao et al., 2009).

**11. L70: "plant transpiration" or "vegetation transpiration".**

Response: We have revised this paragraph based on your suggestion. The revised sentence is as follows:

As an important part of the global water cycle, plants control 50-90% of plant evapotranspiration (Jasechko et al., 2013; Coenders-Gerrits et al., 2014; Schlesinger and Jasechko, 2014)

**12. L90: What kind of the drought index?**

Response: The drought index here is the ratio of annual evaporation capacity to annual precipitation. The formula is: $r= E_0 / P$, which is an index reflecting the degree of climatic drought. $E_0$ is the annual evaporation capacity, the unit is mm. It is often

replaced by E-601 water surface evaporation. In the comprehensive zoning of my country's drought index: r between 0.5 and 1 is a humid zone; r between 1 and 3 is a semi-humid zone ; r between 3 and 7 is a semi-arid zone and r is greater than 7 is an arid zone.

**13. L90: "…classified as…", not "divided into".**

Response: We have modified this sentence. The revised sentence is as follows:

The soil is classified as grey-brown desert soil, aeolian sand soil, salinized soil, and meadow soil.

**14. L91-93: Replace these descriptions with exact data.**

Response: We have replaced these descriptions with exact data The revised sentence is as follows:

The Shiyang River Basin is located in the hinterland of the mainland. It has a continental temperate arid climate with strong solar radiation. The annual average sunshine hours are 2604.8-3081.8 hours, the annual average temperature is -8.20-10.50℃, the temperature difference between day and night is 25.2℃, the annual average precipitation is 222 mm, and the annual average evaporation is 700-2000 mm.

**15. L96-97: Add to the previous sentence.**

Response: We have added this paragraph to the previous sentence. The revised sentence is as follows:

the lower reaches of the basin is a warm and arid area with annual precipitation of 200-400 mm, annual evaporation is 1300 - 2000 mm, and the annual average temperature is 4 - 8 ℃ (Wen et al., 2013).

**16. L98: Did the authors investigate vegetation in the study area? If yes, please show the data of vegetation coverage; if not, relevant references should be added. In addition, "relatively good" is not a proper expression in scientific papers.**

Response: Our research team has investigated the vegetation in the study area. We have added reference materials published by the research team and revised this sentence based on your suggestions. The revised sentence is as follows:

The vegetation coverage in the upper and middle alpine regions is better, with trees, shrubs, and grass covered (Wan et al., 2019).

Wan, Q. Z., Zhu, G. F., Guo, H. W., Zhang, Y., Pan, H. X ., and Yong, L. L et al. 2019. Influence of vegetation coverage and climate environment on soil organic carbon in the Qilian mountains. Scientific Reports, 9(1), 17623. doi: 10.1038/s41598-019-53837-4

**17. L102: "Samples of…were collected…"**

Response: We have revised this sentence according to your suggestion. The revised sentence is as follows:

Samples of precipitation, groundwater, soil, and plant were collected at Lenglong (alpine meadow), Hulin (forest), and Xiying (arid foothills) in the Shiyang River Basin from April 2018 to October 2019 (Table 1)

**18. L109: "telling the date"?**

Response: We have changed this sentence to" Simultaneously, the polyethylene bottle sample is labeled with the date and type of precipitation (rain, snow, hail and rain)".

**19. L111: Are there any replicates for soil samples of each soil layer?**

Response: Yes, it is. Two soil samples were collected for each soil layer. Part of the soil samples were dried to measure the soil moisture content, and the other part was used to conduct isotope experiments to obtain soil water isotope values.Each sample was measured 6 times, and the average value was taken to obtain the soil water isotope value.

**20. L117: How many plant species are sampled? How about the position of sampled stems in the canopy? What is the size of stem samples? "xylem stem" should be "stem".**

Response: We collected 3 planting quilts in total, Qinghai spruce and purple-winged salsola in Lenglong, Qinghai spruce in Hulin , and poplar in Xiying. Our sampled stems are located at the bottom right of the tree canopy, which means we are collecting the oblique branches of the tree. The sample size of Qinghai spruce and poplar we collected is about 50cm, and the sample size of herbaceous plants such as Salsola is about 10cm. We have changed "xylem stem" to "stem".

**21. L120: How is the groundwater sampled? What is the depth of water table at each sampling point.**

Response: Groundwater samples were obtained from the groundwater monitoring wells of the Shiyang River Basin Administration, China Hydrological Administration and Gansu Hydrological Administration. The sampling interval is monthly. The depth of groundwater in alpine meadows is 30-60 m, the depth of groundwater in forests is 15-30 m, and the depth of groundwater in arid foothills is 2.5-15 m.

**22. L126: How many isotope standards were used?**

Response: We only used one isotope standard, SMOW, which is the standard mean ocean water, as a unified standard for the isotopes of hydrogen and oxygen.

**23. L133: "Due to the existence of methanol and ethnol in plant water samples…"**

Response: We have revised this paragraph according to your suggestion. The revised sentence is as follows:

Due to the existence of methanol and ethnol in plant water samples, it is necessary to modify plant samples' original data.

**24. L148: Since different water lines have been defined here, I suggest the revised manuscript used their abbreviations hereafter.**

Response: We have used abbreviations for the different water lines in the revised manuscript.

**25. L148-150: These information should be mentioned in the Introduction section.**

Response: We have added these information in the Introduction section

**26. L152-159: Sentences are repeated here.**

Response: We have deleted the repeated sentences.

**27. L163: Is there any data or references for such statements.**

Response: We added relevant references and rewritten this sentence:

According to the Natural Resources Survey Report of Shiyang River Basin in 2020, the vegetation coverage rate of the alpine meadow is 25.95%, and the vegetation coverage rate of the arid foothills is 8.48%. The vegetation coverage rate of the alpine meadow is higher than that of the arid foothills, with better water retention ability and less evaporation of soil moisture (Wan et al., 2019; Wei et al., 2019).

Wan, Q. Z., Zhu, G. F., Guo, H. W., Zhang, Y., Pan, H. X ., and Yong, L. L et al. 2019. Influence of vegetation coverage and climate environment on soil organic carbon in the qilian mountains. Scientific Reports, 9(1), 17623. doi: 10.1038/s41598-019-53837-4

Wei, W., Xie, B., Zhang, X., and Zhang, J. 2019. Spatial heterogeneity of soil moisture and vegetation cover in Shiyang river basin, northwest china. IOP Conference Series: Earth and Environmental Science, 237(5), 052003 (5pp). doi: 10.1088/1755-1315/237/5/052003

**28. L169-171: These results should be based on proper statical analysis.**

Response: The revised sentence is as follows:

According to the weighted average of stable isotopes of various water bodies (Table 2), the soil water isotope value of alpine meadows is -9.16‰, which is the most depleted and the closest to the precipitation isotope value (-9.44‰).

**29. L190-192: Any data or references?**

Response: We have added relevant references:

Csilla, F., Györgyi, G., Zsófia, B., and Eszter, T. 2014. Impact of expected climate change on soil water regime under different vegetation conditions. Biologia(11), doi:10.2478/s11756-014-0463-8.

Li， L. F., Yan, J.P., Liu, D. M., Chen, F., and Ding, J. M.2009. Changes in soil water content under different vegetation conditions in arid-semi-arid areas and analysis of vegetation construction methods. Bulletin of Soil and Water Conservation, 29(001), 18-22.

Western, A. W., and Grayson, R. B. 1998. The tarrawarra data set: soil moisture patterns, soil characteristics, and hydrological flux measurements. Water Resources Research, 34(10), 2765-2768. doi: 10.1029/98WR01833.

**30. L192-194: References are also needed here.**

Response: The increase of vegetation coverage rate of the alpine meadow is calculated according to the rise in grassland area, with data from the comprehensive natural survey report of Shiyang River Basin. According to the complete survey report on the natural resources of the Shiyang River Basin, the natural grassland area of the

Shiyang River Basin was 12,452.72 hectares in 2017 and 13,071.94 hectares in 2019. We can see that from 2017 to 2019, the grassland area of the Shiyang River Basin increased by 619.22 hectares, which shows the increase in vegetation coverage in the Shiyang River Basin. In addition, we have added a description of the mechanism explanation :

On the one hand, with the increase of vegetation restoration, the area of natural grassland in the Shiyang River Basin has increased. Alpine meadows account for the most significant proportion in the Shiyang River Basin, which increases the soil's water retention capacity in the alpine meadows and reduces the amount of soil water evaporation. On the other hand, there is a lot of precipitation in the upper reaches of the Shiyang River. According to Table 1, Lenglong, a representative of alpine meadows, has an average annual precipitation of 595.10 mm, a low temperature, and an average annual temperature of -0.20°C. The lower temperature and higher precipitation also make the soil water evaporation intensity weak in the alpine meadow.

**31. L192-198: Since this is the Results section, I suggest move these content to Discussion.**

Response: We have moved this part to the discussion section.

**32. L197: "The dry foothills…".**

Response: We have changed "The dry and dry foothills" to "The dry foothills."

**33. L209, L212: "affluent" and "abundant" are not proper words here.**

Response: We have deleted "affluent" and "abundant" and replaced it with "enrichment".

**34. L216-217: This is not a convincing conclusion.**

Response: We checked the relevant literature and corrected this conclusion:

In the dry season, alpine meadow plants have the highest concentration of water isotopes (-2.84‰). There is no overlap between soil water and plant water, indicating that alpine meadow plants do not directly use soil water in the dry season. Plant water isotope (-6.04‰) and precipitation isotope value (-6.40‰) in the rainy season are close. The surface and deep layers of groundwater and soil water intersect, indicating

that plant water in the alpine meadow in the rainy season are mainly supplied by precipitation. Groundwater does not directly use precipitation, but Rely on soil water for replenishment. In the dry season, due to the low temperature (average temperature of 0.30°C), there is a large amount of melting ice and snow in alpine meadows, abundant precipitation and abundant melting water, and plants do not directly use soil water. In the rainy season (average temperature 8.72°C), as the temperature rises, plant water isotopes undergo intense evaporative fractionation, and isotopes are enriched. With the increase of precipitation, the surface runoff increases, and the soil underwater infiltrates the groundwater.

**35. L244: Why use 8℃ turning point?**

Response: If the temperature is below 0°C, the air will expand adiabaticly and the water vapor will change adiabatic cooling (Rozanski, 1992). When the temperature is between 0°C and 8°C, the influence of local water vapor circulation is greater. When the temperature is below 8°C, the secondary evaporation under the clouds is very strong (Ma et al., 2018). Therefore, the temperature is divided into three gradients (below 0°C, between 0°C and 8°C and above 8°C) to analyze the relationship between precipitation isotope and temperature. So we use 8℃ as the turning point.

**36. Fig.1: "Shiyang River system"? Is it "Shiyang River Basin"? The letters (a, b, and c) should be explained in figure caption.**

Response: The Shiyang River system is not the Shiyang River Basin. The Shiyang River system refers to the tributaries and main streams of the Shiyang River Basin. We have added the entire Shiyang River Basin map to Fig. 1.

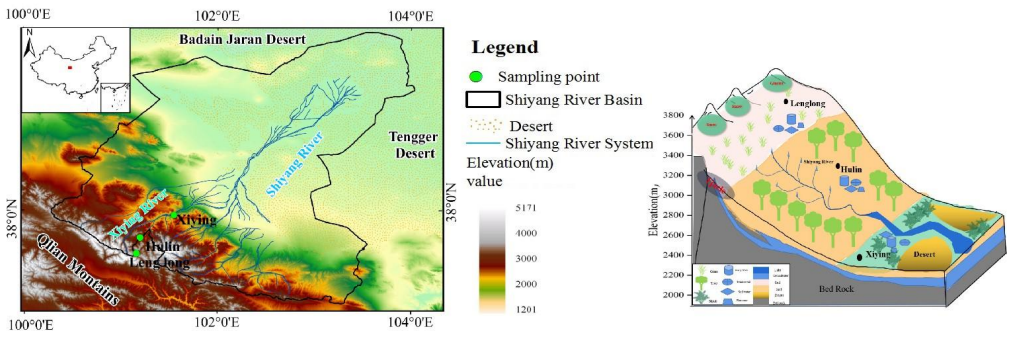
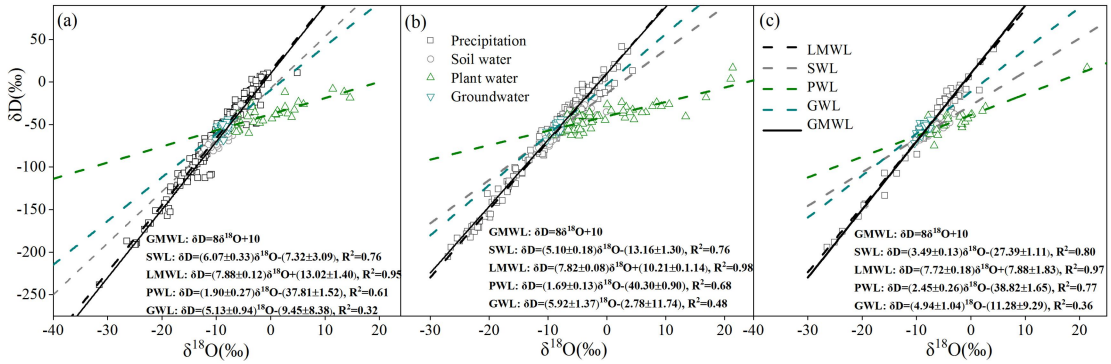



Figure. 1 Study area and observation system

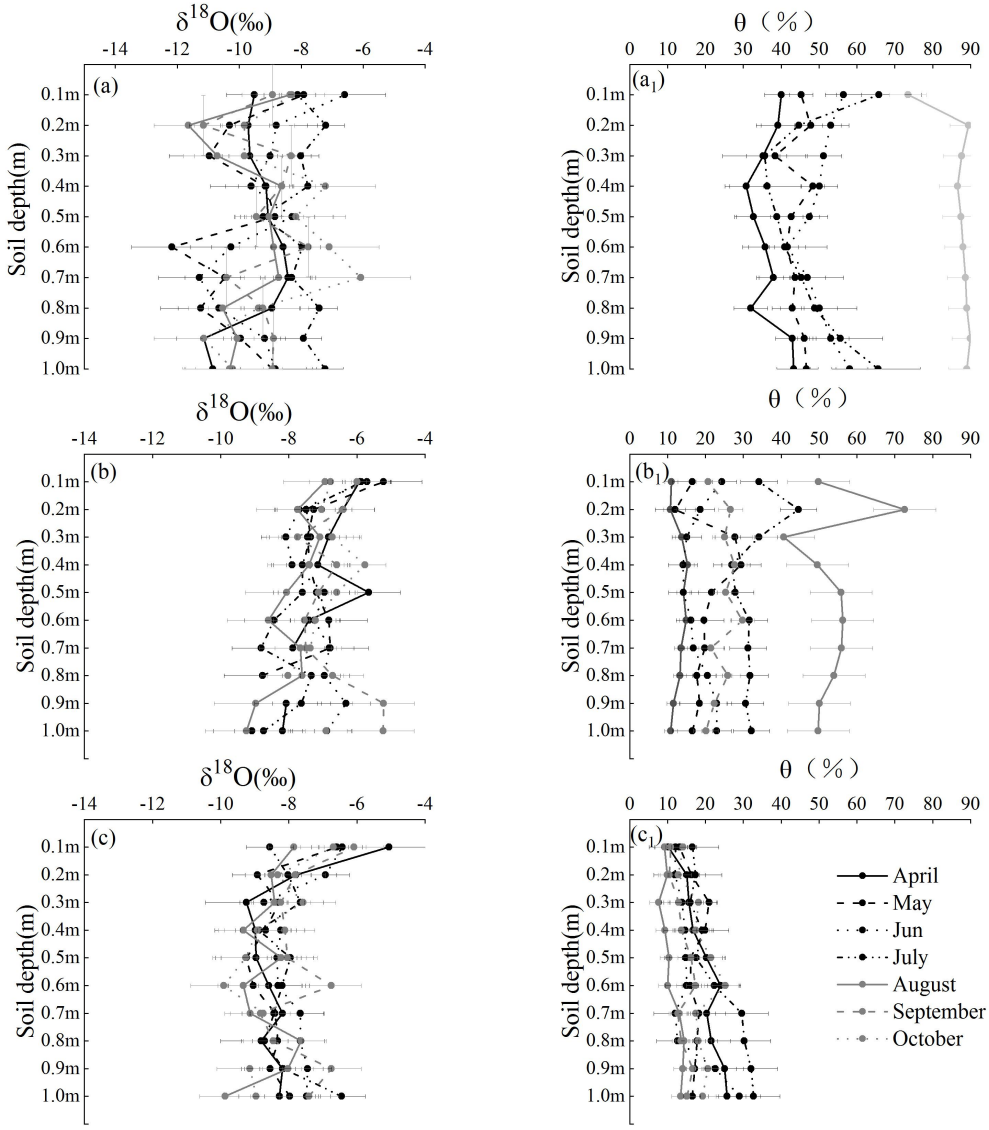
**37. Fig.2: Please rearrange the graphs in a single column or row.**

Response: We have rearranged the graph into a single row according to your suggestion.



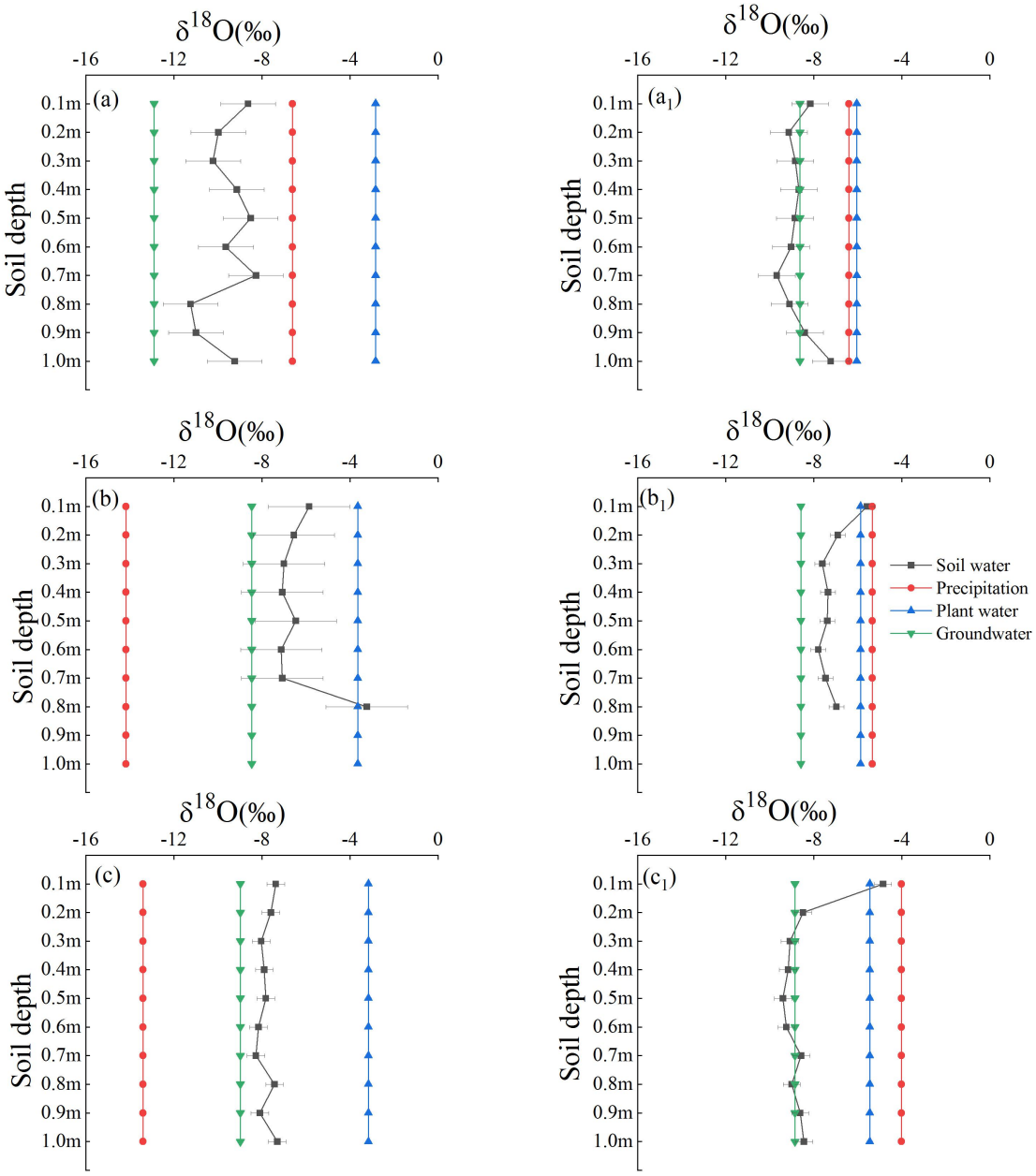

**38. Fig.3: "θ" should be defined here. I also suggest the graphs on the left and right panel using a same x-axis range, respectively.**

Response: We have defined θ in the figure according to your suggestions, and used the same x-axis range to draw the graphs on the left and right panels.




**39. Fig.4: Where are the standard deviations or errors?**

Response: We have added error bars to the graph.




**40. Fig.6: Please define M1, M2 and M3 in the figure caption. How is the situation of hydrogen isotope?**

Response: We have defined $M_1$, $M_2$, and $M_3$ in the caption of Fig. 6. In Section 4.2, a discussion on the altitude effect of hydrogen isotopes is added:

The study area is divided into the rainy season (May-September) and dry season (10-April of the following year), and the relationship between altitude and isotope is analyzed (Fig. 7). The altitude effect of precipitation isotope is stronger than the relationship between soil water isotope and altitude and the relationship between plant

water isotope and altitude, but the relationship between plant water δD and altitude in the rainy season is stronger than the relationship between soil water δD and altitude. It shows that in SPAC, precipitation isotope is most affected by altitude, and plant water isotope is least affected by altitude. As the quality of water vapor rises along the hillside, the temperature continues to decrease, and the isotopic values of precipitation continue to be consumed. From the arid foothills to alpine meadows, the elevation rises from 2097m to 3647m. The average values of precipitation isotopes $\delta^{18}O$ and δD changed from -7.33‰ to -9.10‰, and from -48.62‰ to -54.93‰, respectively. The rate of change was -0.11‰$(100m)^{-1}$, -0.41‰$(100m)^{-1}$ , In the globally recognized precipitation δ18O altitude gradient range, this rate of change is -0.28‰ $(100m)^{-1}$ (Porch and Chamberlain, 2001). The squares of correlation coefficients between $\delta^{18}O$ and δD of rainy season precipitation and altitude are 0.79 and 0.98. The rate of change is -0.12‰$(100m)^{-1}$ and -1.05‰$(100m)^{-1}$, respectively. In the dry season, the correlation coefficient squares of $\delta^{18}O$ and δD with altitude are 0.88 and 0.90, respectively, and the rate of change is -0.18‰$(100m)^{-1}$ and -0.79‰$(100m)^{-1}$, respectively. It can be seen that the altitude effect of precipitation $\delta^{18}O$ is stronger in the dry season ($R^2$=0.88) than in the rainy season ($R^2$=0.79), and the altitude effect of precipitation δD is stronger in the rainy season ($R^2$=0.98) than in the dry season ($R^2$=0.90). The relationship between soil water isotope and altitude is stronger in the rainy season ($R^2$=0.26, $R^2$=0.73) than in the dry season ($R^2$=0.28, $R^2$=0.26). The relationship between plant water $\delta^{18}O$ and altitude is stronger in the dry season ($R^2$=0.11) than in the rainy season ($R^2$=0.11), and the relationship between plant water

δD and altitude in the rainy season ($R^2$=0.62) is stronger than that in the dry season ($R^2$=0.56). It can also be seen from the figure that there are anti-elevation shows in some areas, mainly from forests to dry foothills. This may be related to the existence of reservoirs in the arid foothills. Reservoirs may cause the reversal of the local water vapor cycle-the anti-elevation effect. Generally speaking, there is a negative correlation between altitude and SPAC isotope composition. The altitude effect of precipitation isotope is stronger than the relationship between soil water isotope and altitude, and stronger than the relationship between plant water isotope and altitude.

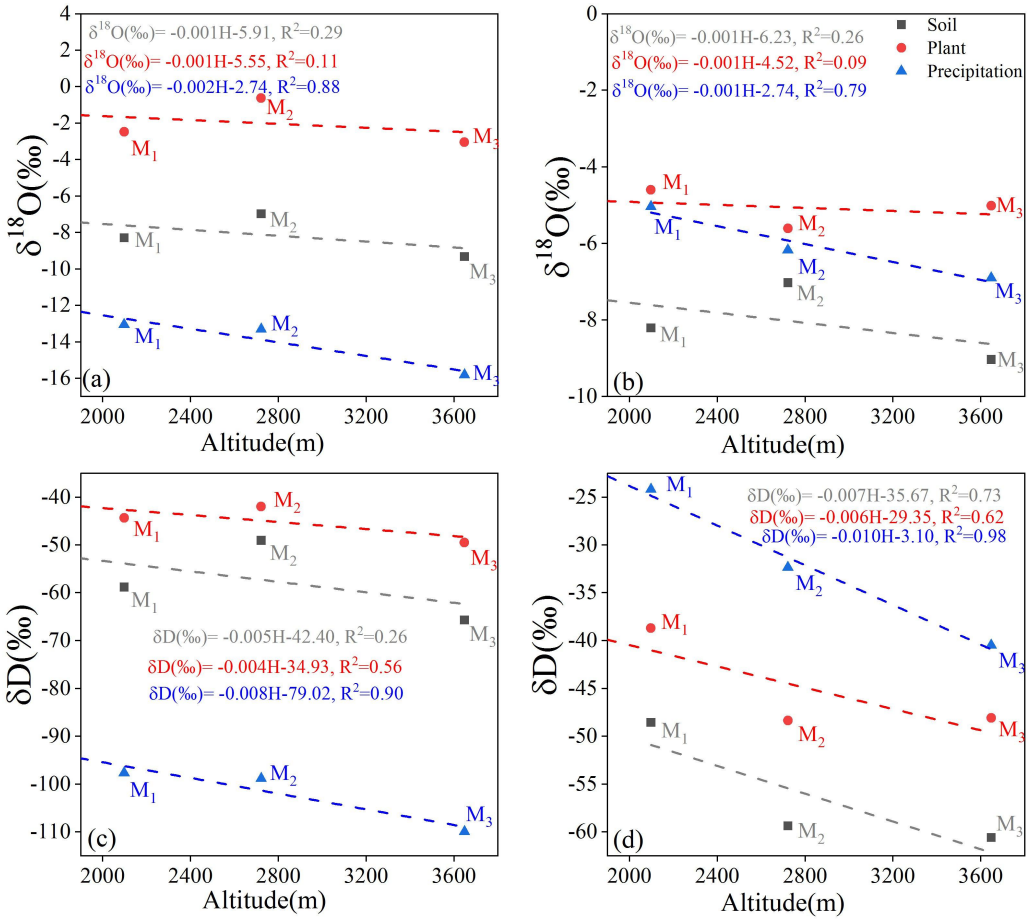



Fig. 7 Relationship between different isotope and altitude in the dry season (a, c ) and in the rain season (b, d), $M_1$ stands for alpine meadows, $M_2$ stands for forests, and $M_3$ stands for arid foothills

**41. Table 1: Are the comparisons including significance testing?**

Response: Because Table 1 is the basic parameter information of the sampling points of the article, including the latitude and longitude, altitude, average annual temperature and average annual precipitation of each sampling point, all the comparisons in Table 1 have not been tested for significance. In Table 2 and Table 3, the comparison of the data has been tested for significance.