Dear Reviewer:

Thank you for your letter and for the reviewer's comments concerning our manuscript entitled “Stable water isotope monitoring network of different water bodies in Shiyang River Basin, a typical arid river in China” (Manuscript Number: essd-2021-465).

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.

Response to Reviewer #1

Reviewer #1:In you study entitled 'Stable water isotope monitoring network of different water bodies in Shiyang River Basin, a typical arid river in China' is an interesting work which tries to share key data (primarily water stable isotopes) from various water bodies. After carefully reading the MS and exploring the dataset attached, I came to the conclusion, that the way this dataset is presented is insufficient for ESSD in its present form.

Response:We have carefully revised the article based on your suggestions. This article is a subject that our research group has been preparing for since 2014. The establishment of observation stations began in 2015, and by 2022, data had been collected for seven consecutive years. The monitoring network is in China's typical inland Shiyang River basin. The basin is densely populated and is one of the areas with the most prominent water resource contradictions in my country. In the river source area, we used stable isotopes to study the effects of water vapour source and altitude on precipitation isotopes and hydrological propagation time in arid regions. In the oasis region, we use stable isotopes to study the impact of human activities on the water cycle. In reservoir channel systems, we used stable isotopes to study the effects of reservoirs on plant water use strategies and the impact of hydraulic engineering on the water cycle in arid regions. In the oasis farmland area, we used stable isotopes to study the effects of different agricultural patterns on soil water movement in the arid oasis area. In the ecological engineering restoration, we used stable isotopes to study the water sources and water resource utilization strategies of riparian wetland artificial ecological forests. In the salinized process area, we used stable isotopes to study the evaporation, leakage, and storage of soil moisture in different vegetation areas in the lower reaches of the Shiyang River basin. We believe this dataset can provide examples for developing ecology, hydrology, and agriculture in other arid inland river basins worldwide. The current form of the paper is not good enough, and we have carefully revised this article.

Main overall concerns:

1. The MS does not fit well into the scope of ESSD in its present form. It lacks to interconnect the data it shares and to show how it is valuable in relation to the Earth's system.

Response:This article mainly introduces the monitoring network established in the Shiyang River basin. Including our sampling point distribution, sample collection, experimental analysis, and data processing. We have used this dataset to publish related papers in ecology, agriculture, hydrological cycle, atmosphere, and hydraulic engineering, including the evolution of water in nature and the impact of human activities on nature. It covers the hydrosphere, pedosphere, atmosphere, and biosphere. Our research group also uses this data set to study global climate change and extreme climate events. We believe that our data set demonstrates some relevant value to the Earth system. We have revised the article in light of your suggestions for the article, and we hope you will consider giving us a chance.

2. The title says 'Stable water isotope…' yet It seems to me that sections 6.2 and 6.3 are the ones that truly reflect the title of the MS. Sadly, the other valuable information that was presented in the earlier sections is not tied into the main logical thread of the MS, nor it is demonstrated how vital those may be to be used with water stable isotopes.

Response:This dataset includes stable isotope datasets and hydrology datasets. We are taking stable water isotopes as the core, including stable precipitation isotopes, stable river water isotopes, stable lake water isotopes, stable groundwater isotopes, stable soil isotopes, and stable plant water isotopes. Our dataset is public, and we want others to have a good understanding of our data when using the dataset. Therefore, we spend a lot of space in the first part of the article introducing our observation network's geographic location, site distribution, system classification, sample collection, processing, and experimental analysis, which is a great help for others to understand the specific conditions of the watershed.

3. The presentation of the dataset is poor. I am missing at least one table/figre that really gives an overview on the whole dataset that is presented in the MS from the variables side. After all that is in the focus according to the title. The information provided in Sect. 4 is relevant, yet insufficient. I am missing an overview figure or table in which every variable, with measurement units, temporal sampling frequency, number of samples for the investigated interval etc. are provided. The reader must get an overview on the dataset that is presented, before any detail on the measurements is discussed.

Response: Based on your suggestion, we added a table reflecting each variable's unit of measure, sampling frequency, and sample size. The newly added table is as follows:

Variable	Year	Unit	Frequency	Number of samples	Sampling sites
Precipitation	2015	‰	monthly	57	XBZ, BDZ, QLX, ZZXL, JDT, SCG
	2016	‰	monthly	42	QLX, XYJZ, HJX, LLL, SCG, XYWG, ZZXL
	2017	‰	monthly	320	HJX, LLL, SCG, XBZ, XYJZ, XYWG, ZZXL
	2018	‰	monthly	397	DTX, HJX, HLZ, JDT, MK, QXZ, WWPD, XBZ, XYWG, XYZ, YXB,
	2019	‰	monthly	390	DTX, HJX, HLZ, HQG, JDT, MK, QTH, QXZ, SCG, WWPD, WYWG, XYZ
River water	2015	‰	monthly	11	CQQ, DTX, WW, XSH
	2016	‰	monthly	89	BDZ, BGH, GGKFQ, HJX, HLZ, JCLK, LKS, LXWL, MTQ, NCHHLH, NQ, QHLYXM, SCG, SCLK, WGQ, XCL, XSH, XYWG, YHRJ
	2017	‰	monthly	214	BDZ, BGH, CQQ, GGKFQ, HJX, HLZ, JCLK, LKS, LXWL, MTQ, NCHHLH, NQ, QHLYXM, SCG, SCLK, WGQ, WW, XCL, XSH, XYWG, YHRJ
	2018	‰	monthly	267	BDC, BDZ, BGH, CQQ, DTX, GGKFQ, HJX, HLD, HLZ, JCLK, LKS, LXWL, MTQ, NQ, QHLYXM, QLX, SCG, SCLK, SDHHC, SWX, SYQ, WGQ, WW, XCL, XSH, XYWG, YHRJ
	2019	‰	monthly	208	BDZ, BGH, CQQ, DT, DTX, GGKFQ, HJX, HLZ, JCLK, JZGD, LKS, LXWL, MTQ, NCHHLD, QHLYXM, SCG, SCLK, SDHHC, SGZZ, SYQ, WGQ, WW, XCL, XSH, XYWG
Lake water	2015	‰	monthly	7	NYSKRK, HYSK
	2016	‰	monthly	13	NYSKRK, HYSK

	2017	‰	monthly	50	HYSSK, NYSKRK, QTH, XYSK
	2018	‰	monthly	131	HYSSK, NYSKRK, QTH, XYSK
	2019	‰	monthly	111	HYSSK, NYSKRK, QTH, XYSK
Groundwater	2015	‰	monthly	7	QLX, QXZ, WWPD
	2016	‰	monthly	1	QLX
	2017	‰	monthly	26	BDC, CQQ, XYSSK, JTL, QLX
	2018	‰	monthly	83	BHZ, CQQ, DTX, HJX,HLZ, HQG, XYSSK, JTL, QLX, QSHSY, QXZ, SWX, WWPD, XJG, XYWG, YXB
	2019	‰	monthly	44	BHZ, CQQ, DTX, HJX, HQG, XYSSK, JTL,QSHSY, QXZ, SCG
Soil water	2015	-	-	-	-
	2016	‰	monthly	58	BDZ, HJX, HLZ, XYWG,
	2017	‰	monthly	263	BDZ, DTX, HJX, HLZ, MQBQ, XYWG,
	2018	‰	monthly	837	BDZ, BGH, DTX, HJX, HLD, HLZ, JXLK, LKS, SCG, SYQ, WGWG, Y7XB
	2019	‰	monthly	2621	BDZ, CQQ, DT, DTX, HJX, HLZ, XYSSK, LKS, QTH, SWX, SYQ, WWPD, XYWG, YXB
Plant water	2015	-	-	-	-
	2016	‰	monthly	14	BDZ, CQQ, HJX, HLD, HLZ, LLL, XYWG
	2017	‰	monthly	69	CQQ, DTX, HJX, HLZ, LLL, SWX, WWPD, XYWG, YXB,
	2018	‰	monthly	59	DTX, HLZ, YXB
	2019	‰	monthly	367	BDZ, CQQ, DT, DTX, HJX, HLD, HLZ, XYWG, YXB

4. The study lacks to show how the data it shares is relevant in hydrological research as one would expect based on the introduction.

Response:We have added hydrological studies related to our data in the Introduction based on your suggestion. Added the following:

We used the data to study: (1) The contribution of circulating water to precipitation. Our research shows that plants' evapotranspiration water vapor contribution is always greater than the surface evaporative water vapor, and different landscapes and special underlying surfaces are important factors affecting the difference in water vapor contribution (Zhu et al., 2018). (2) Below-cloud evaporation of stable precipitation isotopes in mountainous areas, oases, and deserts in arid regions. Our study shows that the below0cloud evaporation is the strongest in summer and the weakest in spring, and the humidification of the reservoir will weaken the below-cloud evaporation (Zhu et al., 2021b). (3) Evaporative losses of surface water were identified using stable isotopes. Our research shows that evaporation from surface water increases gradually from mountains to deserts, and increases in reservoir and irrigation water can lead to evaporation (Sun et al., 2021). (4) Impact of landscape dams on river water circulation in urban and rural areas. Our research shows that the cumulative effect of multiple landscape dams leads to severe water shortages in arid regions (Zhu et al., 2021a). (5) The infiltration process of oasis farmland irrigation water and its enlightenment to optimizing irrigation methods. Our study shows that irrigation water, as the primary source of recharge in this study, can reach soil layers below 1 m, effectively replacing old water in farmland soil (Zhu et al., 2021c). (6) Effects of plastic film on soil water migration in arid oasis farmland. Our research shows that mulching can effectively reduce the evaporative loss of topsoil water and improve water use efficiency during the whole maize growing season (Zhu et al., 2021d).

Sun, Z. G., Zhu, G. F., Zhang, Z. X., Xu, Y. X., Yong, L. L. , Wan, Q. Z., Ma, H. Y., Sang, L. L., and Liu, Y. Y.: Identifying surface water evaporation loss of inland river basin based on evaporation enrichment model, Hydrol. Processes., 35(3), e14093, doi:10.1002/hyp.14093, 2021.

Zhu, G. F., Yong, L. L., Zhang, Z. X., Sun, Z. G., Sang, L. L., Liu, Y., Wang, L., and Guo, H. W.: Infiltration process of irrigation water in oasis farmland and its enlightenment to optimization of irrigation mode: based on stable isotope data, Agr.Water. Manage., 258, doi: 10.1016/j.agwat.2021.107173, 2021c.

Zhu, G. F.,Yong, L. L., Zhang, Z. X., Sun, Z. G.,Wan, Q. Z., Xu, Y. X., Ma, H. Y., Sang, L. Y., Liu, Yu. W., Wang, L., Zhao, K. K., and Guo, H.W.: Effects of plastic mulch on soil water migration in arid oasis farmland: Evidence of stable isotopes, Catena., doi:10.1016/J.CATENA.2021.105580, 2021d.

Specific comments:

Abstract

1. "The purpose of this study is to clarify the hydrological and ecological processes of arid inland river basins in Eurasia and provide a scientific basis for their sustainable development." However, this aim is not achieved at all. The MS

lacks to show how the data presented are interconnected, let alone illustrate such aims.

Response: We add in the abstract the research that can be carried out using these data. The following was added:

We can use these data to carry out the research on the continental river basin ecological hydrology, such as surface water evaporation loss, landscape river water cycle impact of the dam, dam water retention time, oasis farmland irrigation methods, and the atmosphere, such as circulation water inland contribution to inland river precipitation, climate transformation, below-cloud evaporation effect, extreme climate events, which provides a scientific basis for water resources utilization and ecological environment restoration in the arid area.

2. The paper is supposed to be about a water stable isotope monitoring network. Yet it only comes up in the second half of the abstract.

Response: We have revised the Abstract based on your suggestion to include water stable isotopes throughout the Abstract. The revised abstract is as follows:

Ecosystems in arid areas are fragile and are easily disturbed by various natural and human factors. As natural tracers widely exist in nature, stable isotopes can be valuable for studying environmental change and the water cycle. From 2015 to 2020, we took the Shiyang River basin, which has the highest utilization rate of water resources and the most prominent contradiction of water use, as a typical demonstration basin to establish and improve the isotope hydrology observation system. The data in the observation system are classified by water type (precipitation, river water, lake water, groundwater, soil water, and plant water). Six observation systems with stable isotopes as the main observation elements, including river source region, oasis region, reservoir channel system region, oasis farmland region, ecological engineering construction region, and salinization process region, have been built, and meteorological and hydrological data have also been collected. We will gradually improve the various observation systems, increase the data of observation sites, and update the data set yearly. We can use these data to carry out the research on the continental river basin ecological hydrology, such as surface water evaporation loss, landscape river water cycle impact of the dam, dam water retention time, oasis farmland irrigation methods, and the atmosphere, such as circulation water inland contribution to inland river precipitation, climate transformation, below-cloud evaporation effect, extreme climate events, which provides a scientific basis for water resources utilization and ecological environment restoration in the arid area. The datasets are available at https://data.mendeley.com/datasets/vhm44t74sy/1 (Zhu, 2022).

3. The penultimate sentence tries to describe how the dataset could be utilized. This should be much more elaborated on and should be one of the main messages of the abstract.

Response: The penultimate sentence of the abstract has been described in detail according to your suggestion. The following was added:

We can use these data to carry out the research on the continental river basin ecological hydrology, such as surface water evaporation loss, landscape river water cycle impact of the dam, dam water retention time, oasis farmland irrigation methods, and the atmosphere, such as circulation water inland contribution to inland river precipitation, climate transformation, below-cloud evaporation effect, extreme climate events, which provides a scientific basis for water resources utilization and ecological environment restoration in the arid area.

4. The Introduction seems as if it was written to another paper. Considering sections 4 and onward, those are not tied to the questions described in the introduction, which is a major problem. The introduction correctly addresses issues that the dataset at hand could be used to solve. However, when the dataset is presented its values and possible applications are not presented in light of the Introduction.

Response: We have revised the Introduction based on your suggestion. The modified content is as follows:

Arid areas account for 33% of the world's total land area and are characterized by a lack of water vapor sources and fragile ecosystems, which are easily disturbed by various natural and human factors (Qin and Thomas, 2014; Arheimer et al., 2017; Alam et al., 2019). Global and regional climate change exacerbate the uncertainty of water resources (Chen et al., 2017; Thompson et al., 2000; Zhang et al., 2021). In addition, under the influence of human activities, rivers' hydrological and ecological processes in arid areas, especially in the middle and lower reaches, have changed, resulting in many ecological and environmental problems (Gibson et al., 2016; Grill et al., 2015; Shah et al., 2021). To clarify the eco-hydrological process of the arid inland river basin is of great significance to other arid regions in the world.

Although stable isotopes such as δ^2H and δ^{18}O account for a small proportion in natural water bodies, they respond quickly to historical records of environmental changes and water cycle evolution (Vandenschrick et al., 2002; Hah et al., 2020). Stable isotopes provide a useful means of studying regional and global water cycles (Craig, 1961; Vallet-Coulomb et al., 2008; Bowen et al., 2012; Gibson et al., 2016). However, isotopic fractionation runs through every link of the water cycle (Song et al., 2017; Dansgaard, 1964). The hydrogen and oxygen isotopic compositions of different water bodies are influenced by isotopic fractionation (Gu, 1995; Risi et al., 2010a; Sun et al., 2012; Min et al., 2018). At the same time, isotope fractionation may occur in hydrogen and oxygen isotope experiments. For example, the physical and chemical properties of soil may lead to the fractionation of hydrogen and oxygen in soil water (Meissner et al., 2014). In addition, incomplete extraction of water during cryogenic distillation may lead to isotope fractionation (Orlowski et al., 2016). We have always known the existence of these "problems", but compared with traditional hydrological methods, the high accuracy of isotope measurement technology and its resistance to external factors have made it widely used in the fields of hydrology, water resources, and the water cycle, and become an effective tool for solving many major scientific problems (Gat et al., 1996; Kralik et al., 2004; Li and Garzione, 2017). In particular, precipitation-surface water-soil water-groundwater can be regarded as a unified "system" to quantitatively study the hydraulic connection between different water bodies (Burns et al., 1998; Gudkov et al., 2021; Zannoni et al., 2019). Due to the limitations of sampling time, sampling space, and the experimental analysis, there has been a lack of comprehensive research on different water bodies in the same area over a long time, which makes it challenging to study the water cycle in a specific area by using stable isotope comparison.

The Shiyang River basin is the earliest developed area in the arid area of northwest China and has the most prominent contradiction of water resources and ecological environment problems. The Shiyang River basin is an important green barrier between Tengger desert and Badain Jaran Desert. It is one of the inland river basins with high population density in the world. Compared with other rivers in the inland river basin, the water resource per capita is the lowest, and the net utilization rate is over 95%, far beyond the internationally recognized reasonable utilization rate (Wei et al., 2013; Li et al., 2013). We have established an isotope hydrology observation system in the Shiyang River basin, collected stable water isotope data and meteorological and hydrological data from 2015 to 2020, and compiled them into a data set. We used the data to study: (1) The contribution of circulating water to precipitation. Our research shows that plants' evapotranspiration water vapor contribution is always greater than the surface evaporative water vapor, and different landscapes and special underlying surfaces are important factors affecting the difference in water vapor contribution (Zhu et al., 2018). (2) Below-cloud evaporation of stable precipitation isotopes in mountainous areas, oases, and deserts in arid regions. Our study shows that the below0cloud evaporation is the strongest in summer and the weakest in spring, and the humidification of the reservoir will weaken the below-cloud evaporation (Zhu et al., 2021b). (3) Evaporative losses of surface water were identified using stable isotopes. Our research shows that evaporation from surface water increases gradually from mountains to deserts, and increases in reservoir and irrigation water can lead to evaporation (Sun et al., 2021). (4) Impact of landscape dams on river water circulation in urban and rural areas. Our research shows that the cumulative effect of multiple landscape dams leads to severe water shortages in arid regions (Zhu et al., 2021a). (5) The infiltration process of oasis farmland irrigation water and its enlightenment to optimizing irrigation methods. Our study shows that irrigation water, as the primary source of recharge in this study, can reach soil layers below 1 m, effectively replacing old water in farmland soil (Zhu et al., 2021c). (6) Effects of plastic film on soil water migration in arid oasis farmland. Our research shows that mulching can effectively reduce the evaporative loss of topsoil water and improve water use efficiency during the whole maize growing season (Zhu et al., 2021d). Our work will help clarify the impact of the local water cycle and human activities on agricultural production in the Shiyang River Basin, analyze the development trend of inland river basins under global climate change, promote ecological restoration, and provide some scientific reference for the eco-hydrological research in other arid areas.

Sun, Z. G., Zhu, G. F., Zhang, Z. X., Xu, Y. X., Yong, L. L. , Wan, Q. Z., Ma, H. Y., Sang, L. L., and Liu, Y. Y.: Identifying surface water evaporation loss of inland river basin based on evaporation enrichment model, Hydrol. Processes., 35(3), e14093, doi:10.1002/hyp.14093, 2021.

Zhu, G. F., Yong, L. L., Zhang, Z. X., Sun, Z. G., Sang, L. L., Liu, Y., Wang, L., and Guo, H. W.: Infiltration process of irrigation water in oasis farmland and its enlightenment to optimization of irrigation mode: based on stable isotope data, Agr.Water. Manage., 258, doi: 10.1016/j.agwat.2021.107173, 2021c.

Zhu, G. F.,Yong, L. L., Zhang, Z. X., Sun, Z. G.,Wan, Q. Z., Xu, Y. X., Ma, H. Y., Sang, L. Y., Liu, Yu. W., Wang, L., Zhao, K. K., and Guo, H.W.: Effects of plastic mulch on soil water migration in arid oasis farmland: Evidence of stable isotopes, Catena., doi:10.1016/J.CATENA.2021.105580, 2021d.

5. Study area description is sufficient, but it lacks a discussion on how this particular area is important from an international perspective. Indeed, in line 47-49 it is mentioned that the area is important and unique, but there is no reference to back this up, nor it is compared with other similar areas from around the world. Thus the readers of ESSD would not know how important it is globally.

Response: We have added relevant references to support the argument and added comparisons with other watersheds based on your suggestion. Added the following:

We have established an isotope hydrology observation system in the Shiyang River Basin, which is the earliest developed area in the arid area of northwest China and has the most prominent contradiction of water resources and ecological environment problems. Shiyang River basin is an important green barrier between Tengger desert and Badain Jaran Desert. It is one of the inland river basins with high population density in the world. Compared with other rivers in the inland river basin, the water resource per capita is the lowest, and the net utilization rate is over 95%, far beyond the internationally recognized reasonable utilization rate (Wei et al., 2013; Li et al., 2013).

Wei, W., Shi, P. J., Zhou, J. J., Feng, H. C., Wang, X. F and Wang, X. P.: Environmental suitability evaluation for human settlements in an arid inland river basin: A case study of the Shiyang River Basin, Journal of Geographical Sciences., 23(2):331-343, doi: 10.4028/www.scientific.net/AMR.518-523.4874, 2013.

Li, Z., Li, X. Y., and Sun, J.: Impact of Climate Change on Water Resources in the Shiyang River Basin and the Adaptive Measures for Energy Conservation and Emission Reduction, Applied Mechanics & Materials., 405-408:2167-2171, doi: 10.4028/www.scientific.net/AMM.405-408.2167, 2013.

Observation network design

1. This is the section in which a much more detailed and primarily integrated picture has to be presented about the dataset. This is where a flowchart or table has to be included with the sites, variables, sampling frequencies etc. so the reader could see on one page what the whole dataset is.

Response: We have added a table according to your suggestion. Add the following table:

Variable	Year	Unit	Frequency	Number of samples	Sampling sites
Precipitation	2015	‰	monthly	57	XBZ, BDZ, QLX, ZZXL, JDT, SCG
	2016	‰	monthly	42	QLX, XYJZ, HJX, LLL, SCG, XYWG, ZZXL
	2017	‰	monthly	320	HJX, LLL, SCG, XBZ, XYJZ, XYWG, ZZXL
	2018	‰	monthly	397	DTX, HJX, HLZ, JDT, MK, QXZ, WWPD, XBZ, XYWG, XYZ, YXB,
	2019	‰	monthly	390	DTX, HJX, HLZ, HQG, JDT, MK, QTH, QXZ, SCG, WWPD, WYWG, XYZ
River water	2015	‰	monthly	11	CQQ, DTX, WW, XSH
	2016	‰	monthly	89	BDZ, BGH, GGKFQ, HJX, HLZ, JCLK, LKS, LXWL, MTQ, NCHHLH, NQ, QHLYXM, SCG, SCLK, WGQ, XCL, XSH, XYWG, YHRJ
	2017	‰	monthly	214	BDZ, BGH, CQQ, GGKFQ, HJX, HLZ, JCLK, LKS, LXWL, MTQ, NCHHLH, NQ, QHLYXM, SCG, SCLK, WGQ, WW, XCL, XSH, XYWG, YHRJ
	2018	‰	monthly	267	BDC, BDZ, BGH, CQQ, DTX, GGKFQ, HJX, HLD, HLZ, JCLK, LKS, LXWL, MTQ, NQ, QHLYXM, QLX, SCG, SCLK, SDHHC, SWX, SYQ, WGQ, WW, XCL, XSH, XYWG, YHRJ
	2019	‰	monthly	208	BDZ, BGH, CQQ, DT, DTX, GGKFQ, HJX, HLZ, JCLK, JZGD, LKS, LXWL, MTQ, NCHHLD, QHLYXM, SCG, SCLK, SDHHC, SGZZ, SYQ, WGQ, WW, XCL, XSH,

					XYWG
Lake water	2015	‰	monthly	7	NYSKRK, HYSK
	2016	‰	monthly	13	NYSKRK, HYSK
	2017	‰	monthly	50	HYSSK, NYSKRK, QTH, XYSK
	2018	‰	monthly	131	HYSSK, NYSKRK, QTH, XYSK
	2019	‰	monthly	111	HYSSK, NYSKRK, QTH, XYSK
Groundwater	2015	‰	monthly	7	QLX, QXZ, WWPD
	2016	‰	monthly	1	QLX
	2017	‰	monthly	26	BDC, CQQ, XYSSK, JTL, QLX
	2018	‰	monthly	83	BHZ, CQQ, DTX, HJX,HLZ, HQG, XYSSK, JTL, QLX, QSHSY, QXZ, SWX, WWPD, XJG, XYWG, YXB
	2019	‰	monthly	44	BHZ, CQQ, DTX, HJX, HQG, XYSSK, JTL,QSHSY, QXZ, SCG
Soil water	2015	-	-	-	-
	2016	‰	monthly	58	BDZ, HJX, HLZ, XYWG,
	2017	‰	monthly	263	BDZ, DTX, HJX, HLZ, MQBQ, XYWG,
	2018	‰	monthly	837	BDZ, BGH, DTX, HJX, HLD, HLZ, JXLK, LKS, SCG, SYQ, WGWG, Y7XB
	2019	‰	monthly	2621	BDZ, CQQ, DT, DTX, HJX, HLZ, XYSSK, LKS, QTH, SWX, SYQ, WWPD, XYWG, YXB
Plant water	2015	-	-	-	-
	2016	‰	monthly	14	BDZ, CQQ, HJX, HLD, HLZ, LLL, XYWG
	2017	‰	monthly	69	CQQ, DTX, HJX, HLZ, LLL, SWX, WWPD, XYWG, YXB,
	2018	‰	monthly	59	DTX, HLZ, YXB
	2019	‰	monthly	367	BDZ, CQQ, DT, DTX, HJX, HLD, HLZ, XYWG, YXB

2. In the Data and methods, the analytical procedures could be placed in appendix. Focus on the data. The Data set section could be placed in the Data and methods section.

Response:According to your suggestion, we have put the analysis steps in the appendix and the data set part in the data and methods part.

3. Section 6 is way too thin. The dataset is not described sufficiently. It must be embedded into international literature, while meeting the requirement of ESSD “Any interpretation of data is outside the scope of regular articles.” Thus he dataset should be described to such an extent which enables the readers to clearly know the value of the dataset and its applicability.

Response: We have added references in the response section of Section 6 based on your suggestion. The modified content is as follows:

5.1 Changes in runoff

Runoff is an essential part of the water cycle (Amorocho, 1968; Emori et al., 1996;Wang et al., 2009). The flow has obvious seasonal changes, with a large flow in summer and a small flow in winter (Fig. 3). However, CQQ's flow changes are more complicated. As the downstream marker station, CQQ's cross-section runoff changes directly reflect the intensity of interference to human activities in the middle reaches. The flow of CQQ dropped sharply in June, followed by a sharp decline in April due to the agricultural water diversion for irrigation from April to June. According to Table 4, we can see that the average annual flow of JTL in the upper reaches of the Shiyang River Basin is the largest (10.07 m^3s^{-1}), while that of Huangyang River Reservoir is the smallest (3.86 m^3s^{-1}), reflecting the spatial characteristics that the average annual flow of hydrological stations in Shiyang River Basin gradually decreases from west to east and from south to north.

The annual flow dispersion coefficient can characterize the relative change trend between inter-annual changes in regional flow (Hernández-Carrasco et al., 2012). According to Table 3, we can see that the variation range of the dispersion coefficient of discharge at the five hydrological stations in the Shiyang River Basin is 0.03-0.11, indicating that the inter-annual variation of the Shiyang River is relatively large. Among them, CQQ has the largest dispersion coefficient of 0.11, which is related to the strong interference of CQQ by human activities (Liu et al., 2013; Liang et al., 2017).

5.2 Stable isotopes characteristics of different water bodies

In the catchment dominated by precipitation, the seasonal difference between δ^2H and $\delta^{18}O$ values is large (Anderson, 2011).The changes of δ^2H and $\delta^{18}O$ in different water bodies are roughly the same, showing good consistency and all present seasonal changes (Fig. 4). The variation of isotopes of river water, lake water, and groundwater lags behind that of precipitation, which is related to the time difference between surface runoff and underground runoff formed by precipitation. Precipitation δ^2H and $\delta^{18}O$ change in a cosine shape with time. That is, they are depleted in winter and spring and enriched in summer and autumn. This is related to the dilution of precipitation in winter and spring and strong evaporation in summer and autumn (Florea and Mcgee, 2010). Precipitation δ^2H and lake water δ^2H have large variability (the absolute value of the coefficient of variation are 0.82 and 0.7, respectively), and the precipitation $\delta^{18}O$ and plant water $\delta^{18}O$ have large variability (the absolute value of the coefficient of variation is 0.69 and 0.91, respectively). The strong evaporation of lake water in summer and the weak evaporation in other seasons make the seasonal fluctuations of lake water isotopes large. The plant water also has strong seasonal fluctuations in the isotope of plant water due to the strong transpiration in summer.

5.3 Connections between different bodies of water

We used the least square method to obtain the local meteoric water line equation (LMWL): $\delta^2H=7.65\delta^{18}O + 9.75$, its slope and intercept are smaller than those of GMWL, but δ^2H and $\delta^{18}O$ maintain a good linear relationship (R^2=0.96), which is related to the geographical location of the study area (Fig. 5). The Shiyang River

Basin is located in the Northwest inland of China, and it is subject to intense below-cloud evaporation, making the slope and intercept relatively small (Zhu et al., 2021b). It also reflects the existence of a stable isotope unbalanced fractionation effect under the arid climate background.

Precipitation, river water, lake water, groundwater, soil water, and plant water are distributed near GMWL, indicating that they share the same water source. The deviation of the lake from GMWL indicates that it experienced intense evaporation. By comparing the slope and intercept of the relation expressions δ^2H and $\delta^{18}O$ of GMWL and different water bodies, it can be seen that, as far as the slope is concerned, precipitation is the highest (7.65), followed by groundwater (5.11), lake water is the lowest (2.14). There is little difference between the slope of precipitation and groundwater, which means there is a mutual recharge relationship. In terms of intercept (d), the precipitation was the highest (d=9.75), followed by the river (d=-8.44). The light isotopes evaporate preferentially when the water body evaporates in the unsaturated atmosphere (Worden et al., 2007). The combined effect of the dynamic fractionation effect of the river accelerates the ratio of the δ^2H and $\delta^{18}O$ fractionation effects in the evaporated water vapor, resulting in an increase in d in the water vapor and a decrease in d in the remaining water body. The average value of δ^2H and $\delta^{18}O$ of soil water is between plant water and precipitation, but closer to precipitation (Table 4), indicating that the soil is mainly recharged by precipitation. In the δ^2H and $\delta^{18}O$ equations of precipitation, lake water, soil water, river water, plant water, and groundwater, R^2 decreases in turn, and the linear relationship between δ^2H

and $\delta^{18}O$ becomes smaller and smaller. These phenomena indicate that different water bodies have different degrees of mutual complementary. Among them, soil water is the most miscible and is supplied by multiple water sources.

The correlation coefficient between δ^2H and $\delta^{18}O$ of lake water, groundwater, and plant water is relatively low. The evaporation of lake water in summer is particularly intense (Salmaso and Decet, 1997), which leads to a great difference in winter and summer. The stable isotopic value of lake water varies significantly in different seasons, leading to a small correlation coefficient between them. The main recharge source of groundwater and plant water is precipitation. It takes a certain time for precipitation to converge into surface water and groundwater, leading to isotopic fraction, leading to a small correlation coefficient between δ^2H and $\delta^{18}O$ of the two water bodies.

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Minor comments related to the presentation of the study

1. In numerous cases you start the sentence starting with a reference to a figure or table. Please do not start the sentence referring to the content of the figure. State the new finding and refer to the figure in parenthesis. It is not the figure that is important, but the underlying information. Do present the information

first and then cite the figure in parenthesis. Please correct this in every relevant place.

Response: We have stated the sentences at the beginning of each sentence as you suggested, and then quoted the pictures in parentheses. The specific modifications are as follows:

Lin 190: The analysis instrument is LWIA - 24 d liquid water isotope analyzer. The stable isotope data set and the meteorological and hydrological data set are combined into one data set (Fig. 2).

Lin 201: The flow has obvious seasonal changes, with a large flow in summer and a small flow in winter (Fig. 3).

Lin 220: The changes of δ^2H and $\delta^{18}O$ in different water bodies are roughly the same, showing good consistency and all present seasonal changes (Fig. 4).

Lin 233: We used the least square method to obtain the local meteoric water line equation (LMWL): $\delta^2H=7.65\delta^{18}O + 9.75$, its slope and intercept are smaller than those of GMWL, but δ^2H and $\delta^{18}O$ maintain a good linear relationship (R^2=0.96), which is related to the geographical location of the study area (Fig. 5).

2. **L53-56: This aim/hypothesis must be introduced in detail in the Introduction. In addition the Introduction fails to describe sufficiently why is the dataset of the Shiyang River have the potential to reflect on the whole of the Earth's system.**

Response: We have described this goal in detail in the introduction based on your suggestion, and added a description to the introduction describing the potential of the Shiyang River dataset to reflect the entire Earth system. The modified content is as follows:

The Shiyang River basin is the earliest developed area in the arid area of northwest China and has the most prominent contradiction of water resources and ecological environment problems. The Shiyang River basin is an important green barrier between Tengger desert and Badain Jaran Desert. It is one of the inland river basins with high population density in the world. Compared with other rivers in the inland river basin, the water resource per capita is the lowest, and the net utilization rate is over 95%, far beyond the internationally recognized reasonable utilization rate (Wei et al., 2013; Li et al., 2013). We have established an isotope hydrology observation system in the Shiyang River basin, collected stable water isotope data and meteorological and hydrological data from 2015 to 2020, and compiled them into a data set. We used the data to study: (1) The contribution of circulating water to precipitation. Our research shows that plants' evapotranspiration water vapor contribution is always greater than the surface evaporative water vapor, and different landscapes and special underlying surfaces are important factors affecting the difference in water vapor contribution (Zhu et al., 2018). (2) Below-cloud evaporation of stable precipitation isotopes in mountainous areas, oases, and deserts in arid regions. Our study shows that the below0cloud evaporation is the strongest in summer and the weakest in spring, and the humidification of the reservoir will weaken the below-cloud evaporation (Zhu et al., 2021b). (3) Evaporative losses of surface water were identified using stable isotopes. Our research shows that evaporation from surface water increases gradually from mountains to deserts, and increases in reservoir and irrigation water can lead to evaporation (Sun et al., 2021). (4) Impact of landscape dams on river water circulation in urban and rural areas. Our research shows that the cumulative effect of multiple landscape dams leads to severe water shortages in arid regions (Zhu et al., 2021a). (5) The infiltration process of oasis farmland irrigation water and its enlightenment to optimizing irrigation methods. Our study shows that irrigation water, as the primary source of recharge in this study, can reach soil layers below 1 m, effectively replacing old water in farmland soil (Zhu et al., 2021c). (6) Effects of plastic film on soil water migration in arid oasis farmland. Our research shows that mulching can effectively reduce the evaporative loss of topsoil water and improve water use efficiency during the whole maize growing season (Zhu et al., 2021d). Our work will help clarify the impact of the local water cycle and human activities on agricultural production in the Shiyang River Basin, analyze the development trend of inland river basins under global climate change, promote ecological restoration, and provide some scientific reference for the eco-hydrological research in other arid areas.

Sun, Z. G., Zhu, G. F., Zhang, Z. X., Xu, Y. X., Yong, L. L. , Wan, Q. Z., Ma, H. Y., Sang, L. L., and Liu, Y. Y.: Identifying surface water evaporation loss of inland river basin based on evaporation enrichment model, Hydrol. Processes., 35(3), e14093, doi:10.1002/hyp.14093, 2021.

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3. L63: Use the format m3 s-1 everywhere necessary.

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

Lin 63: Nanying Reservoir, and Huanyang River Reservoir, with average annual flows of 7.33 m^3s^{-1}, 10.07 m^3s^{-1}, 9.15 m^3s^{-1}, 3.92 m^3s^{-1}, and 3.86 m^3s^{-1}, respectively.

Lin 206: According to Table 4, we can see that the average annual flow of JTL in the upper reaches of the Shiyang River Basin is the largest (10.07 m^3s^{-1}), while that of Huangyang River Reservoir is the smallest (3.86 m^3s^{-1}), reflecting the spatial characteristics that the average annual flow of hydrological stations in Shiyang River Basin gradually decreases from west to east and from south to north.

4. L64: Please use the Köppen-Geiger climate classification system and refer to its codes. doi: 10.1127/0941-2948/2006/0130.

Response: According to your suggestion, we have classified the climate according to the Köppen-Geiger classification method and modified the sentence. The revised content is as follows:

From south to north, the Shiyang River Basin covers three different climatic regions: the southern Qilian Mountain area has an snow climate with dry winter, with an annual average temperature below 6℃ and precipitation of 300-600 mm; the central corridor plain has a arid steppe climate, the annual average temperature is between 6-8℃, and the precipitation is 150-300 mm; the north has a arid desert climate, with an annual average temperature higher than 8℃ and precipitation less than 150mm (Zhu et al., 2021a; Kottek et al., 2006).

5. L73: Did you set it up before 2015, or in 2015, or at various point in time between 2015 and 2020? Please explain and if necessary, provide a figure illustrating the evolution of the system.

Response: We started to establish sampling sites in 2015, and completed and supplemented observation systems from 2015 to 2020. We have added a table to illustrate the evolution of the sampling system. Add the following table:

Table. 1 Observation system sampling point evolution table

Abbreviation	Full name	Time
QHLYXM	Qinghai Forestry Project	2016
MK	Colliery	2018
BDZ	Transformer Substation	2016

LLL	Lenglong Ling	2016
SDHHC	Tunnel Junction	2018
LXWL	Winding Road	2016
NQ	Ningqian	2016
SCG	Ningtanhe Middle East branch mixed water	2016
MTQ	Wood Bridge	2016
HLZ	Ranger Stations	2016
SCLK	Three-way Intersection	2016
JTL	Nine Ridge	2017
WGQ	The Bridge of the Cultural Revolution	2016
BGH	Binggou River	2016
LKS	Two Pine	2016
QSHSY	Spring River	2018
JCLK	Intersection	2018
QXZ	Meteorological Station	2015
YHRJ	A family	2016
SGZZ	Sigou stckade	2019
SYQ	Laboratory Area	2018
JZGD	Construction Site	2019
XCL	Small Valley	2016
NCHHLH	South Nancha River	2016
HLD	Confluence	2018
NYSKRK	Nanying Reservoir	2015
XBZ	Xuebai Toen	2015
GGKFQ	Reform and Opening Bridge	2016
HJX	Huajian Township	2016
XYSK	Xiying Reservoir	2016
XYWG	Xiying Wugou	2016
XYZ	Xiying Town	2018
WW	Wuwei	2015
ZZXL	Zhuaxi Xiulong	2015
QLX	Qilian Township	2015
BHZ	Protection Station	2018
SCG	Shangchigou	2016
YXB	Yangxia Dam	2017
WWPD	Wuwei Basin	2015
JDT	Jiudun Beach	2018
HSH	Hongshui River	2015
CQQ	Caiqi Bridge	2015
HGG	Hongqi Valley	2018

MQBQ	Minqin Dam	2017
XXWGZ	Xiyin Wugou Township	2018
SWX	Suwu Township	2017
XXGC	Xiaxingou Village	2018
XJG	Xiajiangou	2018
DT	Dongtan	2019
HYSSK	Hongyashan Reservior	2015
BDC	Beidong Township	2017
DTX	Datan Township	2017
QTH	Qingtu Lake	2015

6. Figure 2. The meaning of the different shapes should be explained.

Response: We have explained the different shapes according to your suggestion. The revised content is as follows:

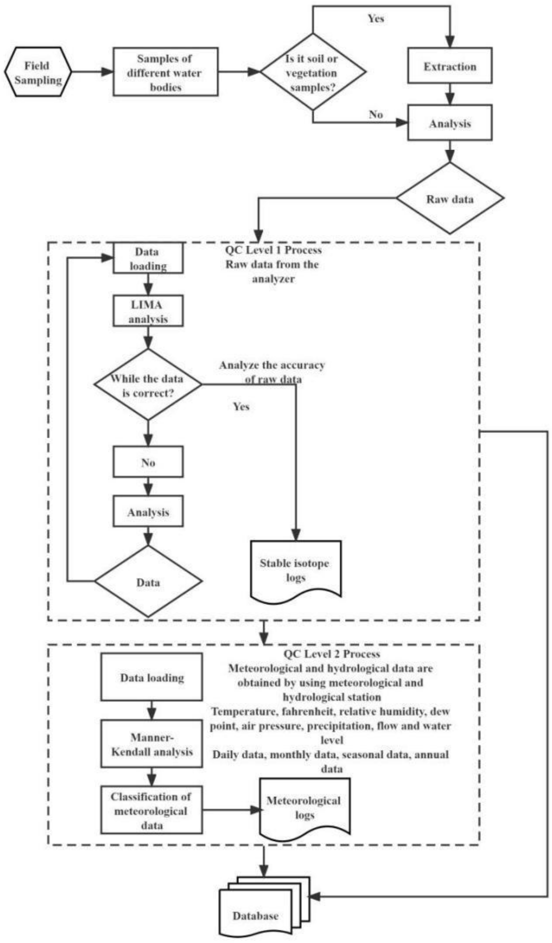

Figure. 2 Extraction, analysis of the instrument and data set production process

Note: *The preparatory work,* *The action plan,* *Judge,* *Input data,* *Data set,* *Database*

7. Figure 5. Please extend the figures' captions following: https://www.internationalscienceediting.com/how-to-write-a-figure-caption/ and the link above. Moreover, the panels are not named.

Response: We have modified Figure 7 according to your suggestions, and the modified figure 7 is as follows:

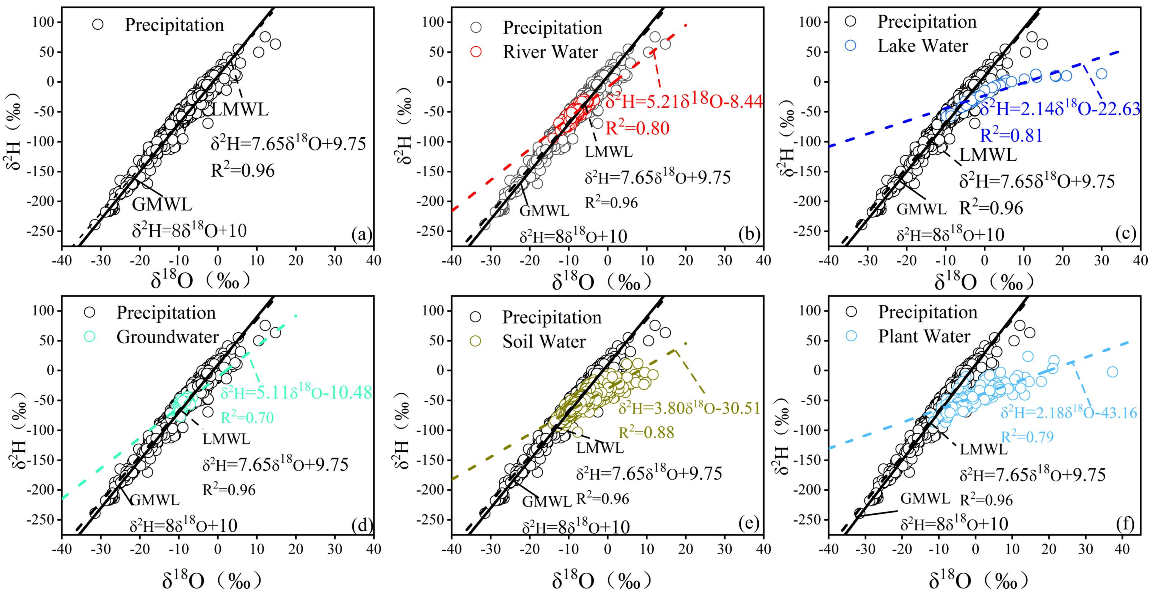

Figure. 5 The change of δ^2H and $\delta^{18}O$ in different water bodies in the Shiyang River basin, (a) is precipitation, (b) is precipitation and river water, (c) is precipitation and lake water, (d) is precipitation and groundwater, (e) is precipitation and soil water, and (f) is precipitation and plant water

8. Dataset: The data is clear, but two temporary .xls files were also compressed with the actual datasets.

Response: We've reuploaded the data set. The new data set is available at https://data.mendeley.com/datasets/vhm44t74sy/1 (Zhu, 2022).