Dear Reviewer,

We would like to thank Anonymous Referee #1 for the valuable comments on our manuscript. These comments will be very helpful to improve the quality of the manuscript. Below is our point-by-point reply to these comments, reviewer's comments are shown in italic; authors' reply is shown in regular text and all the changes are highlighted in red in the revised manuscript.

1. *In the 2.2, were data on the thickness of aquifers, the depth to water table and the hydraulic conductivities measured by this study? or they are from previous studies? If you cited, please add references. The Kuisheng lake should be removed as it forms an independent shallow system.*

Reply: (1) Thanks for your advice. The data you pointed out are from previous studies, we have added a relevant reference and made an explanation for data source in the revised manuscript. In the section 2.2, the relevant changes are as follows: "According to Wang et al.(2010) and the data from Inner Mongolia Second Hydrogeology Engineering Geological Prospecting Institute, the phreatic aquifer is composed of Quaternary and Cretaceous sandstones, with its thickness ranging from 10.52m to 63.54m. In terms of borehole data, the similar groundwater levels in the Quaternary and Cretaceous phreatic aquifers indicate a very close hydraulic connection between the Quaternary layer and Cretaceous phreatic aquifer, which could be viewed as an integrated unconfined aquifer in the area. The depth to water table in unconfined aquifer is influenced by the terrain change, of which, the minimum value is below 1m in low-lying region and the maximum value could be up to 13.24m. The hydraulic conductivity of the aquifer changes between 0.16m/d and 17.86m/d."

The reference newly added in the reference list is as follows:

Wang, W., Yang, G., and Wang, G.: Groundwater numerical model of Haolebaoji well field and evaluation of the environmental problems caused by exploitation, South-to-North Water Transfers and Water Science & Technology, 8, 36-41, 2010(in Chinese).

(2) We have complemented some explanations in the last paragraph of section 2.1 in the revised manuscript as follows: "they are situated in the same watershed in consideration of actual hydrogeologic conditions and groundwater flow field." So Kuisheng lake should be included in the study area.

2. *The discharge terms include the lateral outflow in the manuscript. Do you have any data to support your statement? As far as I know, the subei lake basin is in the regional discharge area.*

Reply: We acknowledge that Subei lake basin is located in the discharge area of local groundwater system. In an ideal world, there is no lateral outflow in discharge area; but in reality, there may be lateral outflow in different aquifers or various groundwater systems. As a matter of fact, a small quantity of lateral outflow exists in the study area and lateral outflow should be included in the discharge terms. As is shown in Fig.3, we can find that lateral outflow occurs in a small part of southern boundary by analyzing the contours and flow direction of groundwater. In addition, Wang et

al.(2010) had gone on with water quantity assessment by using groundwater flow numerical model, the water balance results showed that the amounts of lateral inflow and lateral outflow in unconfined aquifer are $1.48\times10^4m^3/d$ and $0.4\times10^4m^3/d$, meanwhile, the amounts of lateral inflow and lateral outflow in confined aquifer are $1.21\times10^4m^3/d$ and $0.56\times10^4m^3/d$, respectively.

3. *In the Yin's study, the depth of 120 m was determined by the analysis of chemical and isotopic data, so I suggest you to do this as the two basins are located in the different hydrogeological units.*

Reply: Thank you for your kind advice. According to your suggestion, the depth of 120m was determined by the analysis of chemical and isotopic data in this paper. Furthermore, according to the report "Groundwater investigation in the Ordos Basin" from China Geological Survey Bureau(Hou et al., 2006), the maximum circulation depth of local groundwater flow system in the study area is also 120m by using a plenty of hydrochemical and isotopic data, which is a consensus in hydrogeological circle in China.

4. *The temperature of lake water is below zero, please confirm the data.*

Reply: Thank you for your kind reminder. It is a mistake due to our carelessness and we are very sorry for the inconvenience. Table 1 has been corrected and the relevant content about the temperature of lake water has been modified in the revised manuscript. The correct temperatures of two lake water samples, namely EEDS08 and EEDS09, are 1.8 and 2.3°C, respectively in 6 December 2013. The temperature of lake water was measured in situ using an EC/pH meter (WM-22EP, Toadkk, Japan), which was previously calibrated.

5. *I suggest the first sentence of 4.2 should be moved to the introduction section.*

Reply: We agree with the referee. The first sentence of section 4.2 has been moved to the introduction section, the revised content in the introduction section is highlighted in red in the revised manuscript.

6. *The isotopes of deep cretaceous groundwater are enriched with respect to the shallow Quaternary groundwater and the isotopic values are very similar for groundwater from the Cretaceous aquifer. Please give more explain. I guess the reason is from improper classification of groundwater.*

Reply: The relevant explanations have been complemented and highlighted in red in the revised manuscript.

(1) In August, the average isotopic values of deep Cretaceous groundwater($\delta^{18}O$: -8.4‰, δD: -67‰) were enriched compared with the Quaternary groundwater($\delta^{18}O$: -8.8‰, δD: -71‰), but in December, the average isotopic values of deep Cretaceous groundwater($\delta^{18}O$: -8.5‰, δD: -66‰) were depleted compared with the Quaternary groundwater($\delta^{18}O$: -8.2‰, δD: -65‰), the stable isotopic values of Quaternary groundwater had a wider range from August to December than those of deep Cretaceous groundwater. This may be explained by heavy isotope enrichment in the

Quaternary groundwater caused by evaporation given that there was no effective precipitation in the study area during the period from August to December; meanwhile, the deep Cretaceous groundwater may be mainly recharged by lateral inflow from groundwater outside the study area, which resulted in smaller seasonal fluctuations in the isotopic values.

(2) The isotopic values were very similar for groundwater from the Cretaceous aquifer, which indicates that they may be replenished by the similar water source due to the similar geological setting. This also validates the existence of leakage. The similar isotopic characteristic of groundwater from the Cretaceous aquifer may be ascribed to the increasingly close relationship between shallow Cretaceous groundwater and deep Cretaceous groundwater due to changes in hydrodynamic field caused by intensive groundwater exploitation. Aside from the similar isotopic characteristics, there is an obvious hydrochemical distinction between shallow Cretaceous groundwater and deep Cretaceous groundwater. The TDS of shallow Cretaceous groundwater (<120m) varied from 249 to 1383mg/L, 217 to 1239mg/L with averages 506 mg/L and 400mg/L, while the TDS of deep Cretaceous groundwater (>120m) varied from 266 to 727mg/L, 215 to 464mg/L with averages 377 mg/L and 296mg/L, respectively in August and December. Therefore, the classification of groundwater is proper and rational by the analysis of chemical and isotopic data in this paper.

7. *I suggest you combine section 4 and section 5 as in section 5 there are still results rather than discussion.*

Reply: Thank you for your kind suggestions. We have made some modifications about section 4 and section 5 in the revised manuscript. The results in section 5(Discussion) have been moved to section 4.3(Linkage among geochemical parameters of groundwater) newly added in the section 4(Results). In addition, the old section 5.1 and section 5.2 are merged as the new section 5.1(Geochemical processes of groundwater).

8. *In the conclusion, you stated that the deep cretaceous groundwater is depleted in heavy isotopes that is conflict with the data.*

Reply: Thank you for your advice. We are sorry for this inconvenience and acknowledge that the isotopic values of shallow Cretaceous groundwater and deep Cretaceous groundwater are similar, because the average values of $\delta^{18}O$ and δD of the shallow Cretaceous groundwater are -8.3 and -66‰, -8.2 and -64‰, respectively in August and December; meanwhile, the average values of $\delta^{18}O$ and δD of the deep Cretaceous groundwater are -8.4 and -67‰, -8.5 and -66‰, respectively in August and December. Thus, given the precision of the analysis, shallow Cretaceous groundwater and deep Cretaceous groundwater have similar isotopic characteristics in Subei lake basin.

9. *More discussion should be added, particularly the comparison with the similar study in other places in the world.*

Reply: Thank you for your kind suggestion. We have already added more discussion about hydrochemistry and stable isotope composition in groundwater and lake water, and made a comparison with Yin's study on Habor lake basin located in recharge area. The new discussion has been highlighted in red in the section 5. Besides, we added some new corresponding explanations to the abstract and conclusion sections and highlighted the corrections in red in the revised manuscript.

10. *English should be read by native speakers as I found many mistakes in the manuscript.*

Reply: Thanks for your kind advice. We have already asked one of our colleagues, who is a native English speaker, to check mistakes in our manuscript and the mistakes have been revised now. The specific corrections are as follows and they are highlighted in red in the revised manuscript.

Line 18 page 5710; line 25 page 5726; Line 27 page 5727: We have replaced "compared to" with "compared with".

Line10 page 5714: "in the surrounding of Subei lake" is replaced by "around the Subei lake".

Lines 26-28 page 5715: We have replaced "In the present study, the depth of sampling wells is used to classify Quaternary groundwater, shallow Cretaceous groundwater and deep Cretaceous groundwater in combination with hydrogeological map of the study area." with "In the present study, the depth of sampling wells is used to classify groundwater as Quaternary groundwater, shallow Cretaceous groundwater and deep Cretaceous groundwater in combination with hydrogeological map of the study area."

Line 8, page 5716: "were classified into" is replaced by "were classified as".

Line14, 18, 20 page 5717: the preposition "of" is replaced by "in".

Line18 page 5720; line 1 page5721: the preposition "for" is replaced by "in".

Line24 page 5727: "of the study area" is replaced by "in the study area".