

***Interactive comment on* “Direct or indirect recharge on groundwater in the middle-latitude desert of Otindag, China?” by Bing-Qi Zhu and Xiao-Zong Ren**

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Received and published: 30 June 2018

Comments from Referee #1 Interactive comment on “Direct or indirect recharge on groundwater in the middle-latitude desert of Otindag, China?” by Bing-Qi Zhu and Xiao-Zong Ren, Anonymous Referee #1, Received and published: 22 May 2018. The manuscript describes interesting results about the recharge mechanisms of arid zones in China, especially considering the importance of the topic. Despite the multidisciplinary approach, which is very useful in groundwater recharge studies, there are many weak points which have to be improved for a publication in HESS. The main points are listed below: 1) The datasets belong to sampling campaigns carried out in different

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moments (years) and seasons and for this reason in my opinion cannot be discussed together, without a clear distinction between the different phases. 2) A reconstruction of the piezometric morphology as well as a stratigraphy of the considered study areas should be reported. This could help also the discussion of the groundwater preferential pathways. 3) The organization of the paper is still at a draft level, since there is not a clear distinction between the results and discussion paragraphs. Many paragraphs need to be summarized and better explained. 4) The number of figures should be reduced (probably putting together some and deleting others). 5) The English is very poor and there are many typo errors. The reported delta notation is wrong. Due to the consideration of these main points the manuscript can be accepted only if major revision will be reported. Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2018-71>, 2018.

The authors' responses to the comments from Referee #1

Dear Dr/Professor Referee #1: On behalf of my co-authors, we thank you very much for giving us an opportunity to revise our manuscript. We appreciate you very much for your positive and constructive comments and suggestions on our manuscript (hess-2018-71). We have studied your comments carefully and have made revision which marked in red in the revised manuscript. We tried our best to revise our manuscript according to the comments point by point. Attached please find the revised version, which we would like to submit for your kind consideration. Thank you and best regards.

1) The datasets belong to sampling campaigns carried out in different moments (years) and seasons and for this reason in my opinion cannot be discussed together, without a clear distinction between the different phases. Our response: AGREE AND NO CHANGES MADE. Firstly, we thank you very much for this comment from you and we truly agree this point that water samples collected in different moments (years) and seasons cannot be discussed together without a clear distinction between the different water phases. In fact, although we stated in the manuscript that our fieldwork had taken place during the summer season of 2011 and the spring season of 2012, we collected

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the natural water samples at the same time for the same phases in the study area. For example, (1) all the groundwater samples discussed in this paper were collected during the 2011 summer in five days in the Otindag Desert. For other natural water samples discussed in this study, the detailed sampling methods are as follow: (2) all the spring water samples and (3) the precipitation water sample (p1) discussed in this paper were also collected during the 2011 summer in five days in the study area, and (4) all the river water samples and (5) lake water samples were collected during the spring season of 2012 in three days in the study area. This is to say that the water samples within the same phase are discussed together in the paper.

2) A reconstruction of the piezometric morphology as well as a stratigraphy of the considered study areas should be reported. This could help also the discussion of the groundwater preferential pathways. Our response: AGREE AND CHANGES MADE. We thank you very much for this comment. And yes, according to this comment, we revised the manuscript and focused on reporting the geological (tectonic, lithological, sedimentological and structural), geomorphological, hydrogeological and stratigraphical settings of the study area. Please see the section 2 “Regional setting” of the revised manuscript in its pages 2-4 lines 103-188.

3) The organization of the paper is still at a draft level, since there is not a clear distinction between the results and discussion paragraphs. Many paragraphs need to be summarized and better explained. Our response: AGREE AND CHANGES MADE. We thank the you very much for this comment. And yes, we have revised the manuscript accordingly. The structure and content of the paper has been thoroughly reorganized in the revised manuscript, especially for the results and discussion sections, to make the content and context of the paper being more logic, coherent and readable. And yes, almost all of the paragraphs in the paper are newly summarized and explained. The detailed changes can be easily observed in the revised manuscript by reading one of the two resubmitted MS-Word files with the “changes marked” version (in contrast, another version is “clear copy”).

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4) The number of figures should be reduced (probably putting together some and deleting others). Our response: AGREE AND CHANGES MADE. We thank you very much for this comment. And yes, we have revised the manuscript accordingly. We reduced the number of figures in the revised manuscript by putting some figures together and deleting several figures. At last the revised manuscript has 11 figures compared with the original manuscript that including 15 figures. For example, the Figs. 5, 11, 13, 14a in the original manuscript are deleted in the revised manuscript, and the Figs. 7 and 8, the Figs. 10, 12 and 14a are combined, respectively. In addition, two newly-built figures are added into the revised manuscript according to the second comment from you (the detailed content of this comment can be seen above). The specific changes and the final results of these figures can be seen in the newly submitted revised manuscript.

5) The English is very poor and there are many typo errors. The reported delta notation is wrong. Our response: AGREE AND CHANGES MADE. We thank you very much for this comment. We are very sorry for our poor and incorrect English writing in the original manuscript. For the shortcomings of the English presentation and the grammatical edit in the first paper, we have checked and revised the whole manuscript carefully to avoid language errors, and finally we have got the help of a native English speaking professional to check and improve the English quality of the revised manuscript. We believe that the language is now acceptable for the publishing purpose. In addition, the wrong use of the delta notation in the original manuscript, such as $\delta 2H$, has been corrected as “ δD ” in the revised manuscript.

6) Due to the consideration of these main points the manuscript can be accepted only if major revision will be reported. Our response: AGREE AND CHANGES MADE. Special thanks to you for your good comments. We have tried our best to improve the manuscript and made specific changes in the revised manuscript according to the comments from you one by one. These changes will not influence the content and framework of the paper. And here we did not list the changes but marked in red in the revised paper. We hope that the correction will meet with approval. Once again, thank

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you very much for your comments and suggestions.

Please also note the supplement to this comment:

<https://www.hydrol-earth-syst-sci-discuss.net/hess-2018-71/hess-2018-71-AC1-supplement.pdf>

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2018-71>, 2018.

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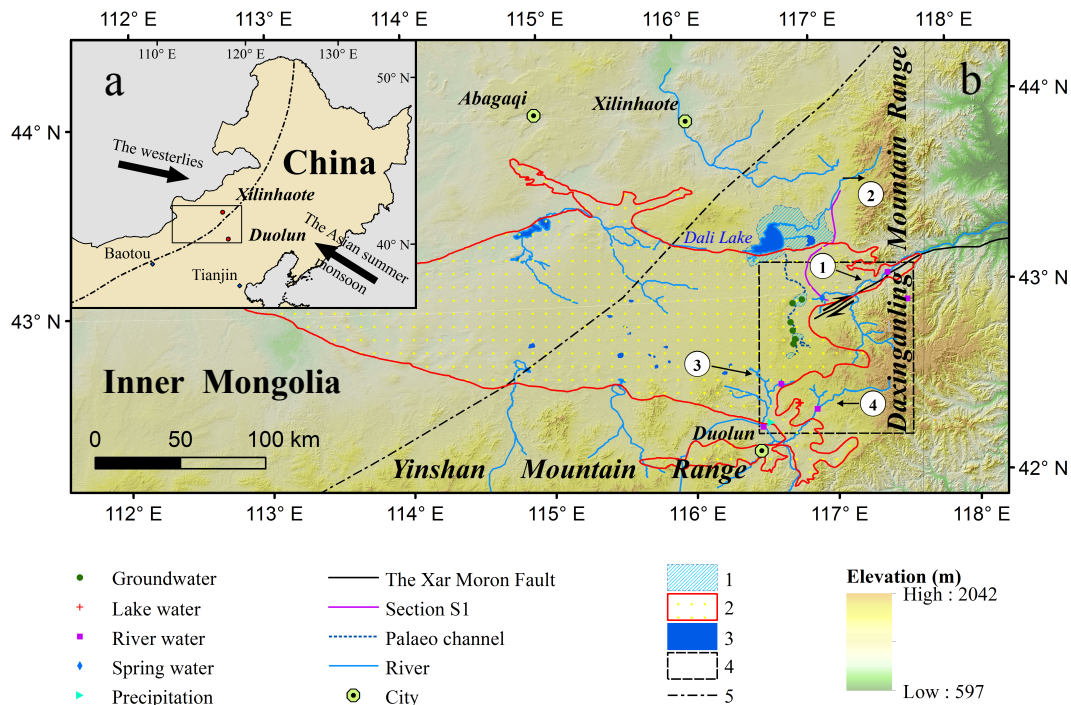


Fig. 1. Fig. 1. The Geographical location of the Otindag Desert in northern China. (a) The study area shown at a large scale, and (b) the study area shown at a smaller scale, with detailed information about t

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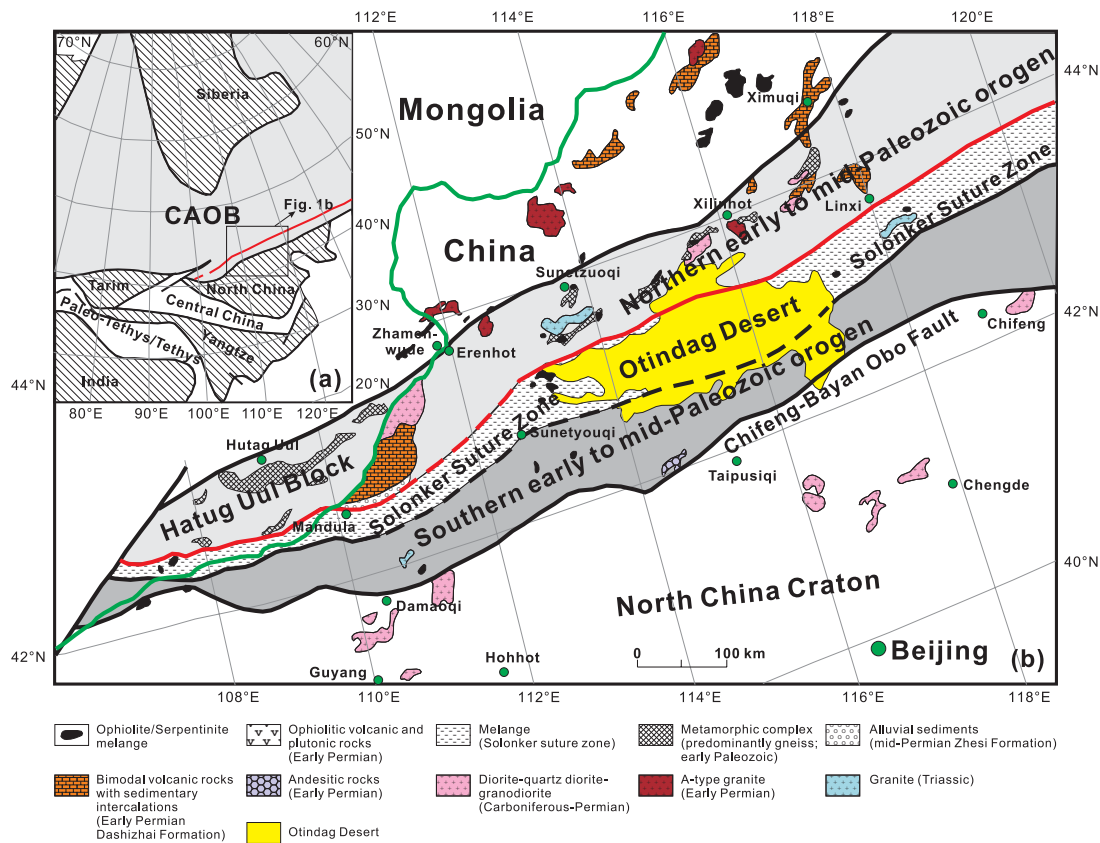


Fig. 2. Fig. 2. (a) Tectonic framework of the north China-Mongolian segment of the Central Asian Orogenic Belt (modified after Jahn, 2004). (b) Geological sketch map of the northern China-Mongolia tract (modi

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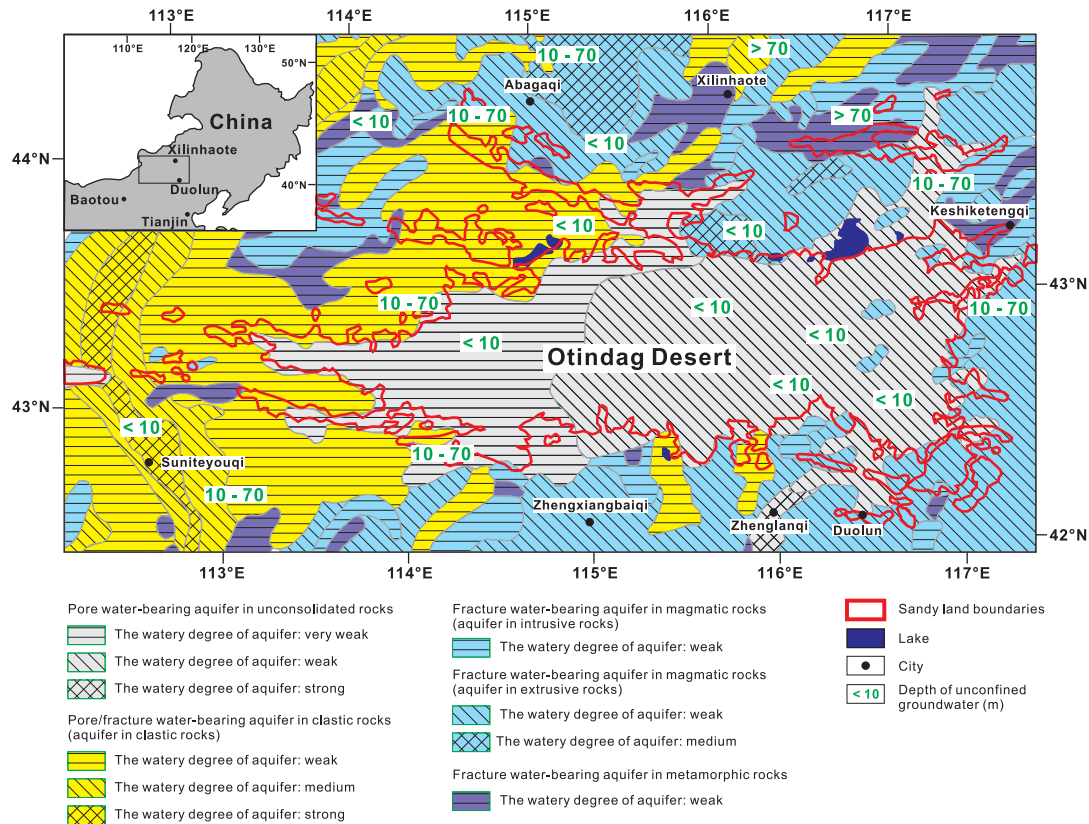


Fig. 3. Fig. 3. The hydrogeological division map of the Otindag Desert.

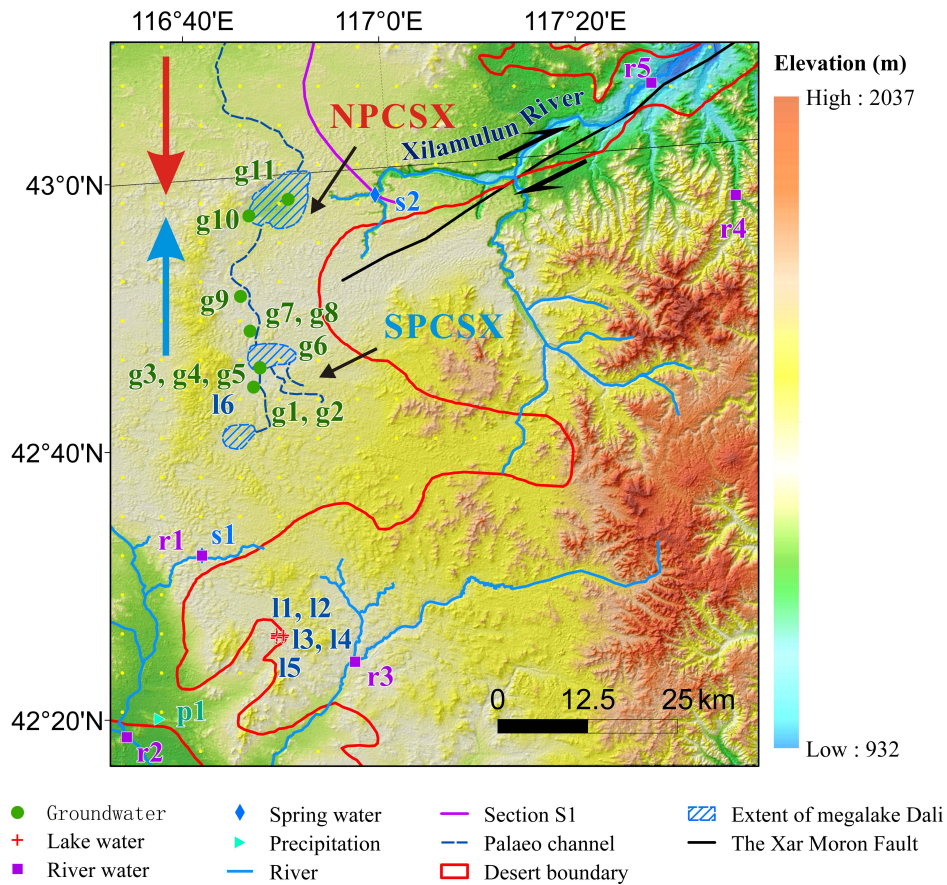


Fig. 4. Fig. 4. The locations of the water sampling sites in this study.

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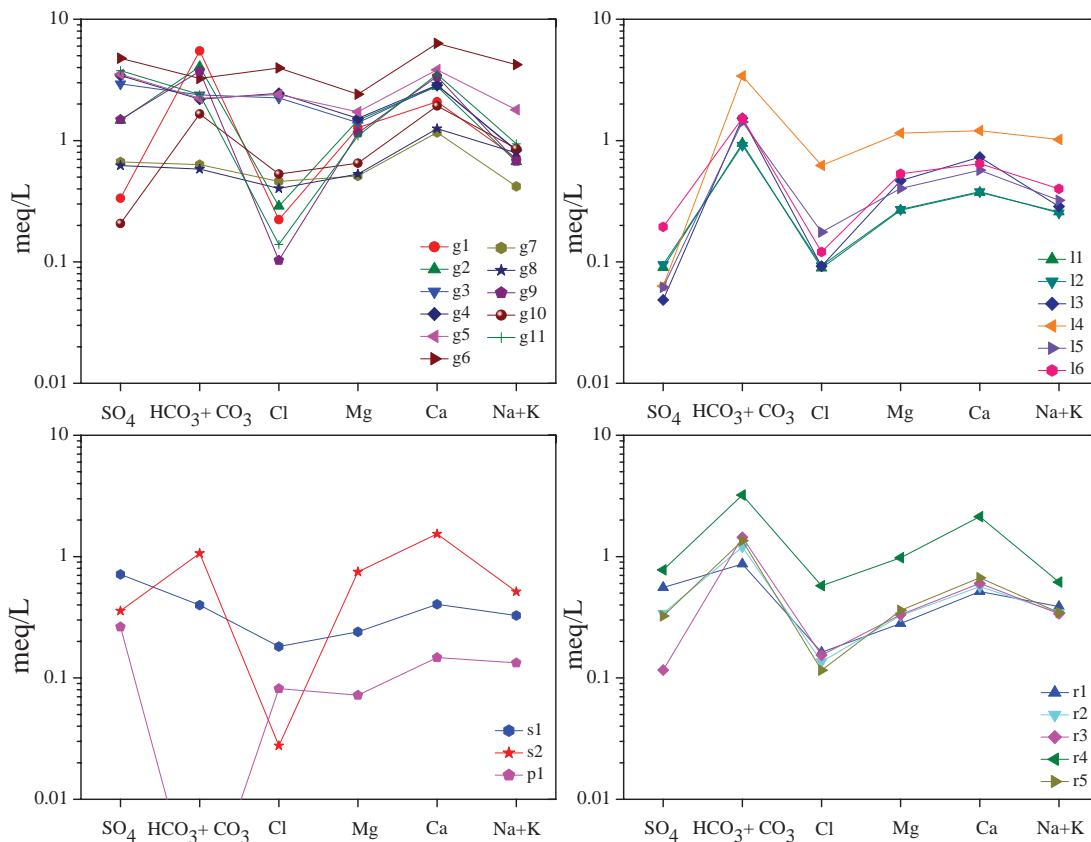


Fig. 5. Fig. 5. The fingerprint diagram showing the variations of multiple ions' concentrations in the studied water samples in an equivalent unit. The HCO₃+CO₃ concentration in the sample p1 was not shown, d

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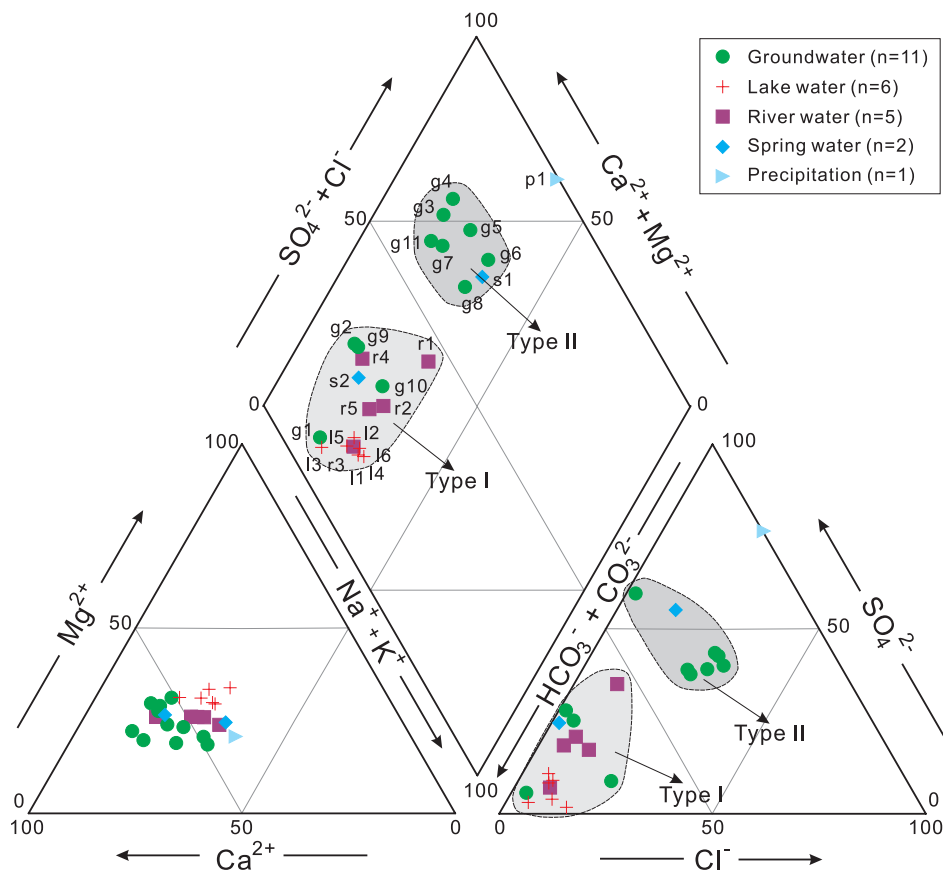


Fig. 6. Fig. 6. The Piper diagram showing the relative abundances of major cations and anions in the studied water samples. Major water types are also shown in this diagram.

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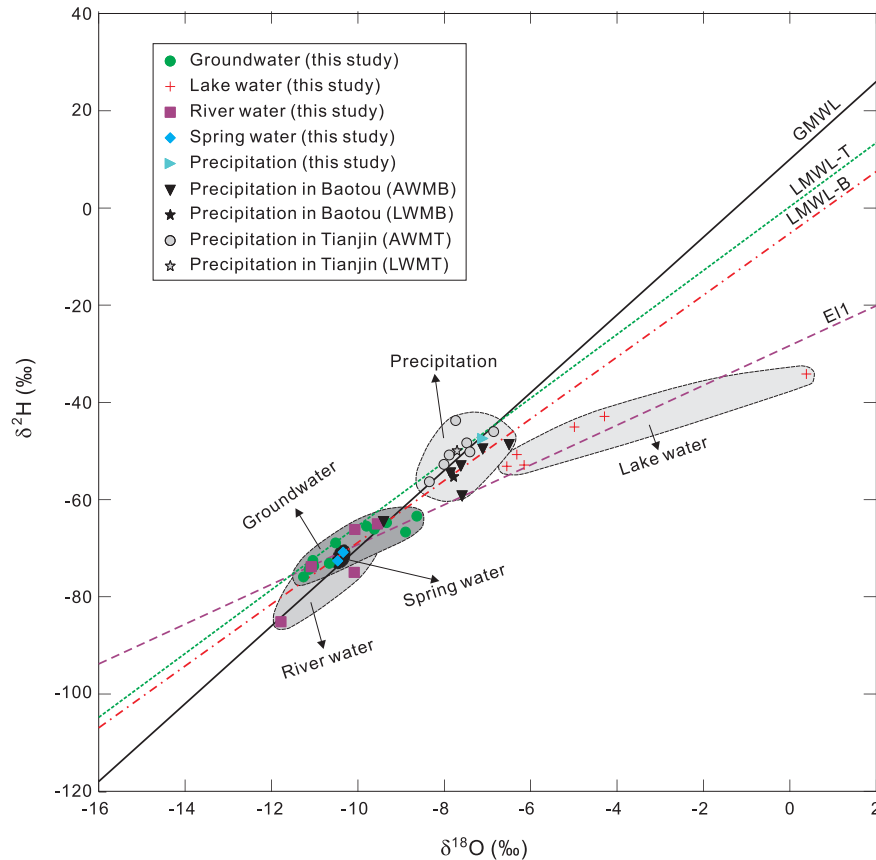


Fig. 7. Fig. 7. The bivariate diagram of $\delta^2\text{H}$ and $\delta^{18}\text{O}$, i.e. the Craig diagram, for the natural water samples in this study. Different relationships between the groundwaters, lake waters, river waters, spring w

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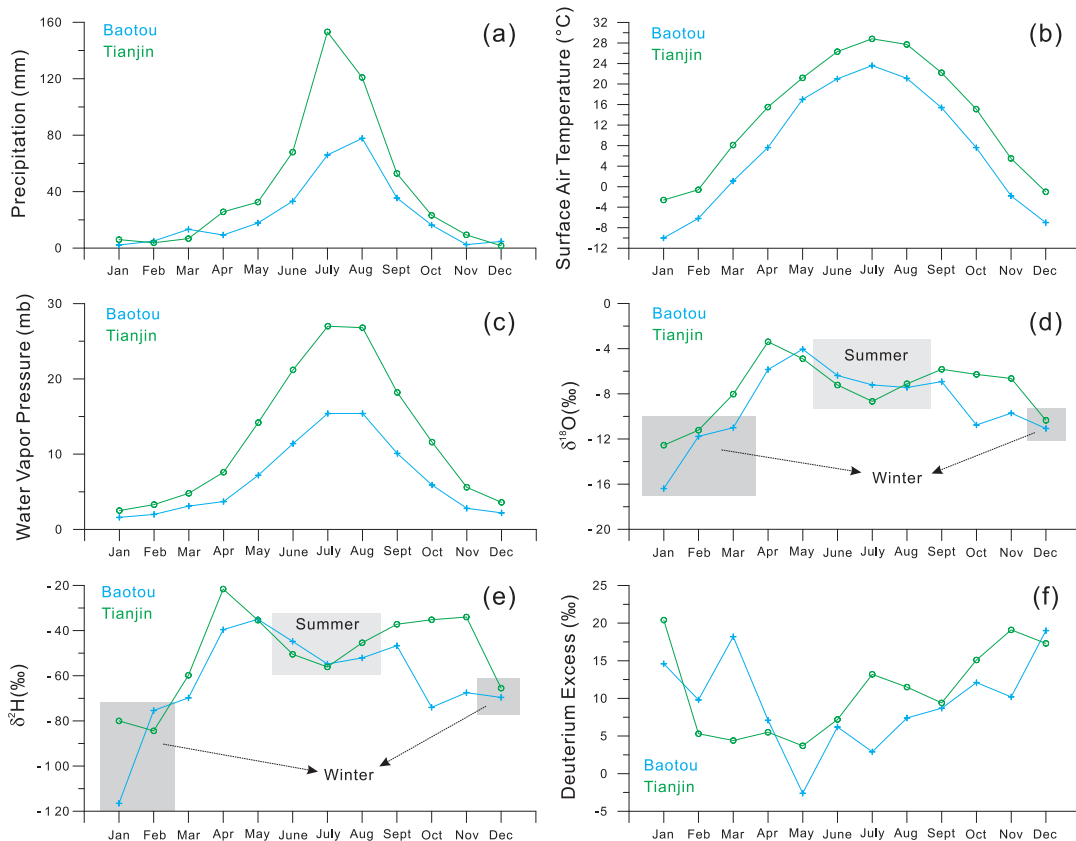


Fig. 8. Fig. 8. The seasonal mean distributions of (a) precipitation, (b) surface air temperature and (c) water vapor pressure from the Baotou and Tianjin weather stations (station sites seen in Fig. 1a) in t

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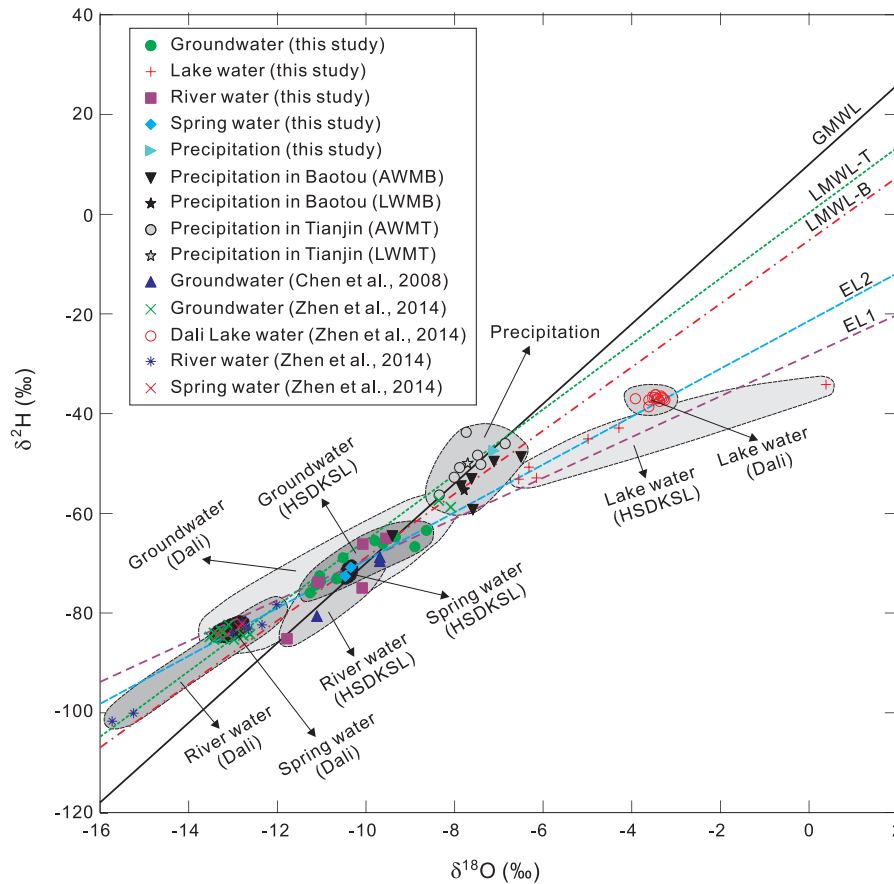


Fig. 9. Fig. 9. The bivariate diagram of δD and $\delta^{18}O$, i.e. the Craig diagram, for the natural water samples collected in the Otindag (this study) and the Dali Basin. Different relationships between the ground

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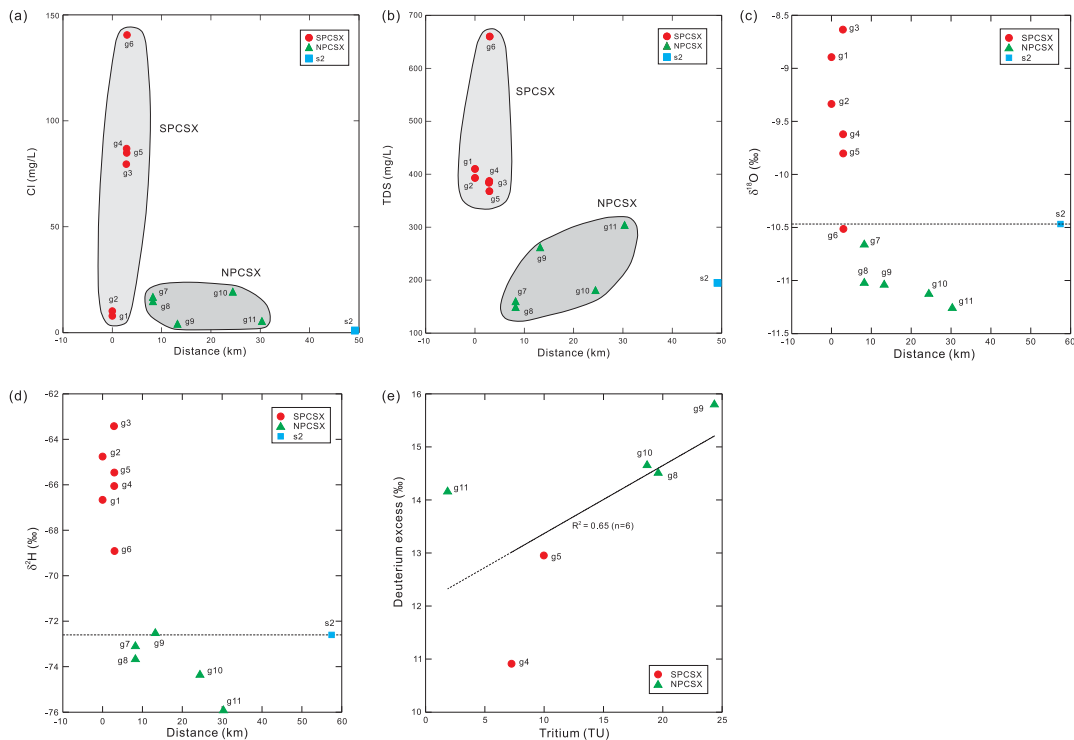


Fig. 10. Fig. 10. (a) Sketch map showing the relationship between the groundwaters in the NPCSX and SPCSX areas, based on variations of (a) the chloride concentrations, (b) the TDS concentrations, (c) the $\delta^{18}\text{O}$

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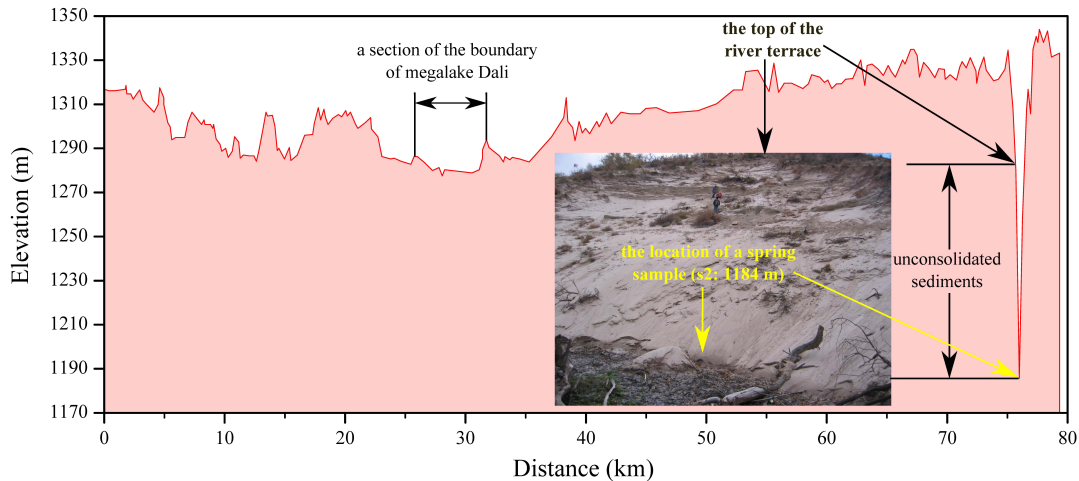


Fig. 11. Fig. 11. Variation of the topographical elevation along the section S1 (see Fig. 1b) from the upstream of the Dali Lake to the location site of the spring water sample (s2) in the riverhead of the Xil

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