

Editor Decision: Reconsider after major revisions (further review by Editor and Referees) (12 Jun 2017) by Christine Stumpp

Comments to the Author:

At this stage of the review process, authors are only asked to answer to the reviewer comments and no revised manuscript is required yet. Therefore, my summary and decision is made solely on looking at the files containing the authors' response.

Two referees thoroughly evaluated the manuscript, and the authors answered in detail to the comments. The main points were:

- 1) more information about the methods is required
- 2) more information about the study site is required (lakes, hydrogeology)
- 3) improve data interpretation of 14C
- 4) consider conditions of evaporation during infiltration (experiment vs. recharge areas)

In addition, I want to emphasize that the authors still need to put the results into a broader context. My initial request before accepting the manuscript for HESSD was followed in the introduction. However, in the discussion and in the summary/conclusion results should also be put into a broader context too (e.g.: What has been found about water sources in other, similar desert regions? What can others learn that e.g. want to identify water sources in deserts at the other side of the world?).

These main and all other comments require some substantial rewriting of the manuscript according to the given answers. I ask the authors to carefully go through the text and -if not done yet- address my additional comment (broader context). A revised version of the manuscript can be uploaded and, I am happy to then reconsider the manuscript for publication after these major revisions were done.

Dear Editor,

Thank you so much for your helpful advice and suggestions! Further to our correspondence a couple of days ago, I'm attaching the revised version of my article entitled "Origin of water in the Badain Jaran Desert, China: New insight from isotopes". I have now completed all of the changes you requested.

We add some discussion to the **Discussion** and **Conclusion** parts.

**Response:**

**Discussion:**

**5.2**

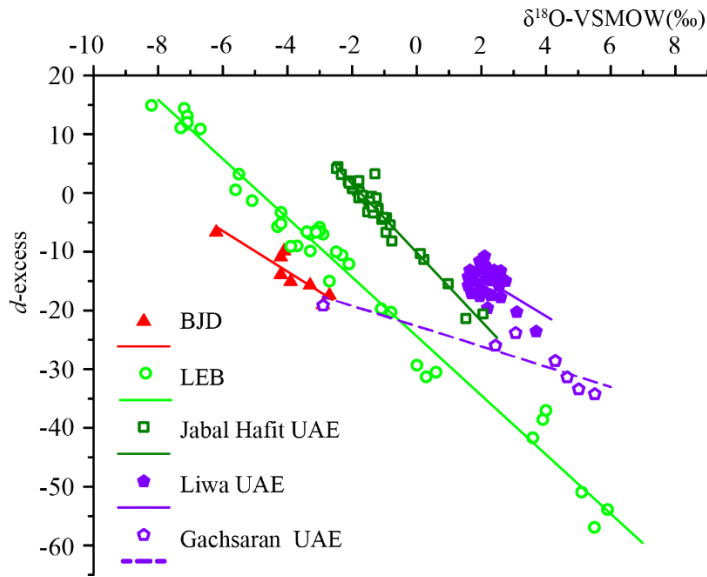
Page 10, Line:19-23.

Similar results were found in arid central Australia (Tweed et al., 2011). Based on the stable isotope ( $\delta^{18}\text{O}$  and  $\delta^2\text{H}$ ) data, Tweed et al. (2011) suggested that groundwater was principally recharged during larger and intense rainfall events, but over longer timeframes, groundwater recharge was predominantly via diffuse processes rather than infiltration of floodwaters, even though the recharge may locally vary with distance from the floodplain.

And Page:10, Line: 32, 33 & Page:11, Line:1-8.

Only a few other studies also reported  $d$ -excess values and  $\delta^{18}\text{O}$  values of groundwater from similar arid areas, such as Lake Eyre Basin (LEB), Australia (Tweed et al., 2011), and Jabal Hafit mountain in the United Arab Emirates (UAE) (Murad and Mirghni, 2012). Analysis of these previously published  $d$ -excess values and  $\delta^{18}\text{O}$  values of groundwater from these arid areas also reveals strong relationships between the two (Fig. 7), suggesting similar recharge processes as observed in the BJD. This implies that previous interpretation in terms of the origin of groundwater may need to be revised. For example, Wood (2010) interpreted the negative  $d$ -excess ( $-34.27\text{‰} \sim -10.8\text{‰}$ ) values of paleo-groundwater as indicative of influx of evaporated runoff into the Red Sea during the last wet period resulting in the negative  $d$ -excess values in the moisture source. However, the strong relationship between the  $d$ -excess and  $\delta^{18}\text{O}$  values of Gachsaran aquifer indicates that the water was affected by evaporation.

*Insert Figure 7*



**Figure 7:** Comparison of  $d\text{-excess}$  and  $\delta^{18}\text{O}$  values of groundwater samples from the BJD (red triangle), Lake Eyre Basin, Australia (green circle) (Tweed et al., 2011), Jabal Hafit mountain, UAE (dark green square) (Murad and Mirghni, 2012), and the two aquifers, Liwa and Gachsaran of Rub Al Khali, UAE (purple) (Wood, 2010). The trend lines are established and plotted in same color following the data.

## Conclusion

Page: 13, Line: 31

This study also demonstrated that the characteristic water isotopic patterns resulting from evaporation could be utilized to help resolve ambiguities in the interpretation of water isotope data in terms of recharge sources, especially, in the arid regions, such as the central Australia and the deserts of United Arab Emirates.