

***Interactive comment on* “Survival of the Qaidam Mega-Lake System under Mid-Pliocene Climates and its Restoration under Future Climates” by Dieter Scherer**

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Received and published: 9 January 2020

(Review comments by referee #3, uploaded by the editor)

Review Survival of the Qaidam Mega-Lake system under Mid-Pliocene Climates and its restoration under Future Climates and its restoration under Future climates. By: Dieter Scherer

The paper provides a nice straightforward estimation of the regional water balance of the Qaidam basin. It is interesting to observe that the water balance calculations confirm that the balance is near zero. It implies that although parts of the basin has

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hyper arid conditions, there is apparently a zero balance. This as such answers the question: can a lake exist for prolonged periods in this basin under arid conditions. I am struggling with the way this is framed. We have no future time series so we can only speculate what will happen in the future. It is interesting that the current trends of climate change seems to lead to a positive water balance. The problem I have is that this does not automatically imply that the lake level will rise. I think the claim of a tipping point (line 15) is not substantiated, it could be a threshold but a tipping point suggest a complete new system equilibrium. This can not be predicted with linear regressions based on the current system dynamics. The link with the Mega Lake is also unclear. No information of its extent, depth etc is given. The existence of such a lake would invalidate many of the assumptions now made to calculate the water balance. Please discuss possible feedbacks in the studied system. You now seem to assume they do not exist, which I consider unlikely.

Minor comments: Line 7: the phrase increasingly arid climates is confusing given the fact that the analysis is not suitable to deal with large long term climate changes Line 14: the restoration of the mega-lake is very speculative given the fact that the calculations are based on 14 years of data. Such a restoration would need ten thousands of years. Line 24: the disappearance of the lake during the last 100 ka is intriguing. What was different? Line 30-40: please provide units and support (10*10 km for example) Line 45-50: please formulate a concrete testable hypothesis. I propose that within the Qiadam basin the water balance is near zero. Line 74: what are valid data? How is this supported by evidence? Line 82-84: is there possibly spatial autocorrelation in your analysis? Line 103: are you implying that there are feedbacks in the system? If this is the case, it implies that you should be very careful to use your regression relationship outside current conditions. Line 120: an important conclusion. Please emphasize this more in abstract and conclusions Line 134: same as above important insight in current system Line 174: how sensitive is your study for spatial resolution? Line 197: how long would it take to fill up the whole mega-lake (with this rate of 49 mm/a) Line 238: how important can the orographic precipitation be? You now assume this not to happen. Ad

how does the presence of a big lake affect this effect?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2019-467>, 2019.

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