

Interactive comment on “Unraveling the hydrological budget of isolated and seasonally contrasted sub-tropical lakes” by Chloé Poulin et al.

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The manuscript is about a water balance in two lakes in the Lake Chad basin. It claims that it has wider applications to the water balance of Lake Chad

The English of the manuscript is pretty good. The form of the manuscript is unconventional and difficult to follow: After reading the manuscript for the first time, I was not sure what the authors wanted to convey. Reading it twice more, I think that the authors using stable isotope analyses on two lakes that they visited each one or two times for a relatively short period during the dry monsoon phase (it is not accessible during the rain phase). I also understand that the authors tested the method for a lake

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elsewhere on Madagascar. The study was mentioned in the abstract and then in the results section. I could not find the name of the site and its description in the material and methods section. I am not sure what the results are. It seems that the proposed method has large uncertainties. This should not be a surprise when trying from point measurements to derive the spatial distribution of aquifers and sources.

This manuscript might contain excellent research. I really cannot judge this from the paper as written. I read somewhere when preparing for class on scientific writing, for an author to get recognition good research that it needs to be written up so that it can be recognized.

The problem with the paper is that it has no clear objective as noted by the first reviewer. The response of the authors to this remark is

“However, we strongly believe that contrary to her opinion, our objectives are clearly stated in the abstract and in the introduction, i.e. to derive quantitative constraints and uncertainties on the hydrological budget of tropical lakes and watersheds from a limited isotope data set, when classical hydrological investigation by comprehensive flux monitoring cannot be deployed for compelling logistical reasons as is the case in remote desert or sub-tropical regions (with considerable security risks) in central Africa as such. “

I am sorry, but I cannot find this objective in the introduction. The words “goal” or “objective” does not appear anywhere. The closest is the following statement

“Studies of inter-tropical lakes raise specific difficulties, mainly related to intrinsic characteristics such as the extremely high evaporation rates, added to high transpiration of aquatic vegetation, huge seasonal variations of fluxes and lake level, and seasonal changes in hydrologic configuration resulting from ephemeral swamps and humid zones flooded during the wet season. Moreover, an even more compelling problem stems from the logistical impossibility to reach the field sites during the wet season, when the tracks network is virtually impracticable during several months. As

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a consequence, we are generally missing critical data for the recharge period, to infer seasonal ranges of variation, and thus annual average values."

Moreover, the introduction should be written in such a way that the objectives follows logically (based on references in the literature that such a study is needed. The citation above is clearly an attempt to do this. However, it falls short. There are no references. Moreover, the evaporation rates over lakes are equal to the potential rate and easy to calculate. Transpiration of aquatic plants have been rumored to increase transpiration, but I have still to see a reference to it. In addition, there are plenty of studies who have attempted and successfully done on lakes in the tropics. The study of Liebe cited in the manuscript is one and I am aware of other studies we have done in Ethiopia and Haiti and the Dominican Republic that looked at lake level changes. Without doubt there are many more. So, there are ways to get around "the tracks network is virtually impracticable" (must mean: the roads are inaccessible). (just use science citation index to find these and other references. I signed the review)

Despite all "the big talk" in the manuscript about Lake Chad, climate change and future needs, this study is about two small lakes in the Lake Chad basin and one in Madagascar where stable isotope analysis is used to do a water balance. Stating this as an objective would helped greatly. It would also be helpful to introduce most of the studies mentioned in the discussion in the introduction. Especially a section on stable isotope analysis and how is applied in this study would have helped greatly. In addition, the reader would be interested to know why this study is better than all the other studies carried out on stable isotope analysis and other water balance studies.

As I indicated above, for me to understand this article well, I would have like to have seen a section either in the introduction or part of the material and methods on the theoretical background of the stable isotope method and its uncertainties. Currently the uncertainties are piecewise introduced in the discussion, making it nearly impossible to grasp the concepts (at least for me). This is not to say that an experienced person in the field of stable isotope analysis would not understand it, but there is wider audience

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reading HESS.

Good practice is that the Material and Methods discusses all locations and methods preferable in the same order as they appear in the results. I noted already before that the study in Madagascar comes as a complete surprise in the results section and without context for this site. I really do not understand it within a reasonable time frame to do this review. I do not have the patience nor the time to look up the previous studies. Moreover, the result section has other parts that are material and methods for example "The local meteoric water line (LMWL) closest to our study sites is given by the rain samples collected at the IAEA station of."

An exact comparison between the lake level measurement and the stable analysis is attempted in the last section of the paper. It is nearly impossible for me to understand it (I am not an expert in the field of stable isotope analysis).

In summary, I agree with reviewer 1, that a complete rewrite is needed. I do not agree with the response of the authors as noted above. Please follow standard writing guidelines. The reader is used to those and makes the manuscript readable. After this is done the manuscript can be evaluated on its scientific qualities

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