Hydrology and Earth System Sciences

Discussions

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Interactive comment on "Evaluation of Lacustrine Groundwater Discharge, Hydrologic Partitioning, and Nutrient Budgets in a Proglacial Lake in Qinghai-Tibet Plateau: Using ^{222}Rn and Stable Isotopes" *by* Xin Luo et al.

Anonymous Referee #2

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This is an interesting and generally well-written paper that makes a good contribution to understanding the groundwater surface water interactions and estimating the lacustrine groundwater discharge in mountainous proglacial lakes in the QTP. The abstract is correctly informative with some remarks (see below). The introduction and the site description take into account previous papers in exhaustive way. The methodological approach for data analysis is modern without particular novelties. High-resolution 222Rn activities, water level, both in water temperature and ,wind speed together with stable isotopic data are quite impressive.Many studies have done to explain the high

222Rn concentrations in groundwater near the coast, with the intent of defining a hydrogeological investigation method, which can also be used for coastal aquifers by means of 222Rn and its ancestor 226Ra. However,it is rare to use this method on the QTP. It is suitable for publication in HESS following moderate revision as outlined below. I think that the paper requires a) A rethink abut what material is strictly necessary in Section 4 and/or better guidance to how the information addresses the main points of the paper. This is probably the major concern. b) More consideration as to how this study can inform others elsewhere in the world. I hope that the comments are useful to the authors in revising this study.

Abstract Line 36: DIN and DIP should be written in full name, rather than the abbreviation. Lines 38-39: Not clear what you mean by this.

Introduction Lines 56-57: the citations should be shown in the chronological order. Check them in the whole text.

2.1 Sit descriptions Line 149: 4030 m asl, use the full term when it first occurs. Line 161: 4150 m changes to 4150 m.a.s.l. Line 173: Does the 'pore water'refer to groundwater? What types are the sampling wells? What depths do the wells pump from?

2.2 Sampling and field analysis & 2.3 Chemical analysis (should be "Chemical and isotopic analysis") Quote the precision for all of the parameters and lower detection limits where important.

Lines 192-210: This is a standard technique and the description of it could be shortened.

Lines 337-339:"δ18O in the lake water ranges from -13.06‰ to -12.11‰ with an average of -12.41‰ (n=7), and δ2H ranges from -91.83‰ to -87.47‰ with an average of -89.0‰ (n=7)." should be changed to "δ18O in the lake water ranges from -13.1‰ to -12.1‰ with an average of -12.4‰ (n=7), and δ2H ranges from -92‰ to -87‰ with an average of -89‰ (n=7)." Keep δ18O values in one after the decimal point and δ2H in

single digits in the whole paper.

4.Discussion Do the adjoining lacustrine aquifers receive ('recharge') to sustain the inferred rate of groundwater discharge? And is the inferred width of the zone of lacustrine groundwater discharge compatible with the physics of the groundwater flow system and hydrological cycle? Did you consider the lag time between recharge and chemical changes in the lacustrine aquifers? Please consider the relationship between Fig 5 and Fig 6 to give a relevant illustration on chemical components and isotopic data.

Fig. 6 The conceptual model of 222Rn transient model looks well. But the associated illustration in the text is not convincing on the flow pathways for the 222Rn sources. Clearly some components of the conceptual understanding are not supported by the data. The manuscript would also benefit greatly from a more thorough literature review, which in-turn will help establish the objectives of the work.

My main concern with the paper is with the 222Rn analysis that I don't think is well enough explained to be convincing. Doing a more thorough job on this will add material.

Conclusions This section just summarizes the main findings of the project. In the introduction you make some general statements about the need to understand processes in these impacted lacustrine aquifers in general. In this section explain in more detail how your project helps us to understand processes in these environments more broadly; the paper will have more impact if researchers from elsewhere in the world can see relevance to their studies and a paper in a major international journal such as HESS needs to have broad appeal.