The manuscript presents the results of a model to simulate the isotopic composition of small groundwater-connected lakes in different locations under different future climate scenarios. The approach is not new, however is interesting for the projections and the considerations discussed for future climate scenarios and recharge conditions. In particular, it provides a useful tool for improving our understanding of catchment hydrological processes. Hence, this is a nice work and warrants publication in this journal. However, I have noted a few issues that need to be addressed before the manuscript is considered for publication. Please see my specific comments below

We thank Reviewer 1 very much for considering this manuscript, and for all of the helpful comments. Please find our responses to Reviewer 1's comments below.

The authors used a lake water budget where the inflow by runoff is considered negligible. This consideration is not explained and there are not geological and hydrogeological description in the paper that could justify this. So, I suggest the author to briefly justify this sentence.

The chosen kettle lakes do not have any surface stream inflow and are set in fluvioglacial deposits. Overland flow to lakes in the study areas is considered to be low because of the permeable nature of the sandy soils. Moreover, in such a particularly cold continental climate, runoff occurs mainly during the snow melt period as well as groundwater recharge. In previous study on Lacasse lake, we have seen that runoff is negligible face to precipitation and groundwater inflows. Moreover, considering a runoff to kettle lakes negligible has been used by other authors in similar climatic contexts (Isokangas et al., 2015; Krabbenhoft et al., 1990). However we agree with the reviewer that it has to be notified in the text and keep in mind in the uncertainties of the model. Sentences have been added in the method part and in the conclusion for this assumption.

The author assumed a steady state condition for the lakes, it could be under present condition but how it's not clear how this assumption could be true when the authors run future scenario. Under climatic changes and different recharge conditions, are these assumptions satisfied or there is a range in which they could be considered valid? Please, may the authors argument better this part.

A steady state can be considered because, in cold continental climate, lake water level does not vary significantly throughout a year, and water level variation is negligible on the considered yearly time steps. Moreover, considering a steady state lake has been widely used by other authors in such cold continental climates (see, among others, Gibson et al., 2015;Yi et al., 2008;Turner et al., 2010;Kluge et al., 2012;Kluge et al., 2007;Malgrange and Gleeson, 2014).

If we consider a transient state, the balance equations become:

$\frac{dV}{dt} = I - E - Q = cste$ at the considered time step

and $V\frac{d\delta_L}{dt} + \delta_L \frac{dV}{dt} = I\delta_I - E\delta_E - Q\delta_Q$

which gives $\frac{d\delta_L}{dt} = (I_G\delta_G + P\delta_P - E\delta_E + \delta_L(P + I_G - E - 2cste)) / \mathrm{V}$ at the considered time step.

The use of this equation does not significantly change the results because $P+I_G-E>>dV/dt$. In the future, changes in fluxes of the yearly water balance will not be significant enough to modify this because all parameters (P, I_G and E) should increase between 0 to 50% on a year in considered future conditions (see Figure 2 and Rivard et al. 2014). Moreover, steady state is considered on a monthly time scale for lake Lacasse because it has been already shown that, for this lake $I_G>>dV/dt$ and this will not change in the future considering water balance parameters predictions (see Arnoux et al., 2017b for more details about lake Lacasse isotopic water balance). Considering these dynamics, we

agree with Reviewer 1 that considering steady state impacts the results, but we consider this to be negligible on the considered time step and assume a steady state in the calculations.

In the eq.9 (L231P9) there is the term (–B/V dt), I think that it is not correct because if eq.9 is the solution of eq.8 it means that the eq. 9 is the solution (hence without dt). Please revise or better justify this passage.
Eq 9 is the expression of δ evolution in time, depending on δ at the time step before and the considered time step. We forgot the time in the A and B terms units, that is why it was probably confusing, units have been modified in the paper (L230 P9).

The authors do not report the isotopic data, but they say that samples were collected from the top of the epilimnion and from the base of ipolimnion, in case of lake water stratification. But it's not clear what values they use in the model? Average? But in this case for evaporation what values do they use? Please detail this. I suggest also to add a table with isotopic data of lake groundwater and rain water and for Lake Lakasse a figure illustrating the variation of isotopic composition monthly. This could better show the influence of melting periods; hence the authors say that in the 8.5 scenario the isotopic composition would decrease because of melting effect, but in the text, there are not data that support these (or references). Please add data or references.
All isotopic data (precipitation, groundwater, lakes) are available in Arnoux et al, 2017a (joined) for lakes average values used in the model and in Arnoux et al., 2017b (joined) for lake Lacasse monthly values. Evaporation used comes from climate models, and δ_E is calculated with the isotopic model (cf P8). For RCP 8.5, evolution of temperature, humidity, evaporation and precipitations are illustrated on Fig 2 and show increase in precipitation, evaporation and in temperature more pronounced than RCP 4.5. A description of monthly parameter evolution regarding scenarios and melting effect can be found in Rivard et al. 2014. The text has been improved to better explain from where data used come.

Do the authors test the sensitivity of the model to investigate the dominant controls on the lake isotope system (a good reference is: Jones et al., 2016. Quaternary Science Reviews, 131:329-340)?
Thanks to Reviewer 1 for this interesting reference. Sensitivity analyses has been done on the model in the two references related to the data Arnoux et al, 2017a and b and show that the model is more sensitive to E, h and δ_G. A sentence has been added in the method part about this purpose.

May the authors describe better how they calculate or estimate evaporation (E)?
What values of humidity do the authors use? (ie. from meteorological station?)
Evaporation and humidity come from climate model, as described P10 and 11 and illustrated on Fig 2.

The authors repeat in the abstract, in the introduction and in the conclusion that the paper illustrated the effect of future trend on lake geochemistry, but in the paper they discuss only the isotopic composition of water and some consideration about phosphorus load. There are not discussion or results about geochemical data (ie. pH, anions, cations, alkalinity, oxygen dissolved in water. . .), so I advise the authors to add these data or discussion or to delete the sentence.
We agree with the reviewer 1 that this paper focuses only on a part of lake geochemistry evolution, which are isotopic composition and phosphorous load, and does not treat the complete lake water chemistry which was not the paper aim. As suggested by the reviewer, sentences in abstract, introduction and conclusion have been modified. However, as this paper focuses still on lake geochemistry even if it is a part, we decided to keep the title.

In my opinion, the last paragraph about phosphorous is not well connected with the previous part dealing with isotopic model and future scenario. I suggest to link these two parts. Moreover, the phosphorous geochemical behaviour should be different in stratified lake with anoxic water at the bottom. It's not so easy to estimate the quality evolution along different lakes. Do the authors consider the lake geochemistry and thermal/oxygen stratification when they discuss about P load on different lakes?

We agree with Reviewer 1 that this part is more qualitative than the rest of the paper. How recharge changes can influence P load to lakes is not often taking into account in model studies and we thing that it can be an important aspect to consider. That is why, in this paper, where we talk about how lake geochemistry can change in the future regarding recharge changes, we propose a first estimation of how P load to lake could be affected by recharge change. It is a first step for a more complex model, based on P dynamics in lakes, to determine more precisely how lake will be affect by P load changes in future. Some sentences have been added in this part to better make the link with the rest of the paper and better explain the associated assumptions.

L183P7: Is the accuracy calculated in relation to deviation of international standard? And what are the international standards used? What is the reproducibility?

δ values are deviations in per mil (‰) from the isotopic composition of the international standard which is Vienna Standard Mean Ocean Water (VSMOW). The measurement accuracy is ± 1 ‰ vs VSMOW for δ2H and ± 0.2 ‰ vs VSMOW for δ18O, considering reproducibility (P7).

Is the parameter B (L230P9) m3? I think that is should be a Volume/time.

Thank you to Reviewer 1 for this helpful comment, parameters units have been modified.

L271P10: Flake? Is it a typo?

Flake is the name of the lake model used in the climate simulations (see Mironov et al., 2010;Martynov et al., 2012).

Fig.4: what does the box-whisker describe? (average/median and standard deviation/confidence range/non-outlier min and max?)

The bow-whisker describes median, first and third quartiles and maximum and minimum values, this has been added to Figure legend.

L474P20: ". . .significant relationship. . ." what does it mean statistically? Do authors perform statistical test? And what?

The relationship is highlighted by the Figure 8, not by statistical tests; the sentence has been modified regarding this comment.

Fig.9: It's not clear what this figure illustrates. Do they points represent P loads? Is it the results of the model? Please, explain better what the figure wants to describe.

The figure 9 is the result of what is explain in the paragraph and is here to illustrate lakes sensitivity regarding percentage of changes in recharge and in population and therefore in P loads to lakes. The description of the Figure has been improved: The shaded area represents the scenarios for which lakes may be under risk of too high P loading, and therefore at risk of a decrease in water quality. Dots represent lakes in the four study areas for three recharge scenarios.

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