Dear Editor and Reviewers,

We appreciate very much the valuable and constructive comments on our manuscript entitled "Evaporation and sublimation measurement and modelling of an alpine saline lake influenced by freeze–thaw on the Qinghai–Tibet Plateau" (ID hess-2023-100). We have carefully revised the manuscript according to your comments. The following paragraphs respond to the specific comments of referees, the original review comments are listed first in their originals (in italic), followed by our itemized responses. All line numbers listed in this response refer to the manuscript with tracks. Hope this revision can adequately address comments raised by referees.

Best regards,

Sincerely yours,

Authors of the Manuscript

Point to Point responses to Reviewer's Comments

- ***Reviewer: 1***

In this study, the authors quantified evaporation/sublimation (E) during ice-free and ice cover periods (IFP and ICP) for a large lake on the Tibetan Plateau. Field observations were collected between 2014 to 2019 and used to quantify evaporation/sublimation (E) and then used to determine the main controls on E during the IF and IC period and annually. The results highlight a vast E (23%) during ICP in Qinghai Lake, and revealed the differences in controlling factors of E during IFP and ICP. This manuscript remains a very interesting piece of research, which provides important new insights by 6 years of direct observation. My previous comments/concerns have been adequately addressed with additional analysis and explanation by the authors, and as such the results and conclusions of the new version are more convincing. A few relatively minor issues remain but I believe that these should be able to be addressed without the need for further review.

Response: Many thanks for your positive and constructive comments. We have carefully checked the overall manuscript and corrected many format errors.

Specific comments:

1) Line 41, '2003–2017' may be '2003~2017' as shown in Line124, 314, 315 and so on.

Response: Many thanks! Yes, we have corrected it in this revision.

2) Line 104, '0.037°C/yr' should be '0.037 °C/yr'.

Response: Thanks a lot, done.

3) Line 131, '−0.1°C' should be '−0.1 °C'.

Response: Thank you very much, done.

4) Line 135, I do not think it is precise to claim that the length of ICP is more than 100 days in QHL. The length of ICP was 83~121 days during 2002~2014 (Fig. S4 in this study), with only a very few years exceeding 100 days. Thus, 'lasts more than 100 days' is suggested to be 'lasts approximate 100 days'.

Response: Thank you for pointing out this. We agree with this and corrected as: <u>'lasts approximate 100 days'</u> in Line 137.

5) Line 338, 'This indicated that E of QHLwas mainly controlled by WS' should be 'This indicated that E of QHL was mainly controlled by WS'.

Response: Many thanks! We revised this sentence as suggested in Line 342.

6) Line 348, '−0.01°C/yr' should be '−0.01 °C/yr'. The authors need to carefully check the format of the full text, space is needed between numbers and units.

Response: Many thanks! We have carefully checked the overall manuscript and corrected many format errors.

7) Line 367, '0.73–1.38' may be '0.73~1.38'.

Response: We have corrected them, thank you!

8) Line 404, '3h−1' should be '3 h−1'.

Response: Done.

9) Line 485, 'reduction of 11.1%' should be 'reduction of 7.56%'.

Response: Thanks for your careful suggestion. The value '11.1%' is a miswriting of '7.56%', and we have corrected it in this revision in Line 490.

10) Considering the difference in the driving factors of lake evaporation during IFP and ICP, it should be very cautious in year-round E simulation by the traditional formula of E, before a reasonable verification in different seasons. One speculative comment is whether the Penman formula series considering both aerodynamics and energy balance would work well for evaporation simulations during both IFP and ICP, although the parameter input for this model may be a bit more complex. I think this is worth exploring in the future study.

Response: Thank you again for your constructive comments. Yes, we agreed with your point. The energy-budget-based methods (Such as the Bowen ratio energy budget, Penman, Priestley-Taylor, Brutsaert-Stricker, DeBruin-Keijman and lake thermodynamics methods) are the best choice for lake evaporation simulation when heat storage in the water can be estimated accurately (Wang et al., 2019), which indicates the observation and simulation of the thermodynamics of the vertical gradient of lakes are very important for the accurate estimation of lake evaporation. Considering the complexity of model parameters, Penman formula series was not used in this study.

In addition, as in your previous comments, the main highlight of this study is the finding of a vast E (23%) during ICP in Qinghai Lake and the differences in controlling factors of E during IFP and ICP by 6 year-round continuous EC observation. Hereby, we further concentrated on verifying the consistency of the accuracy of the traditional models for the evaporation simulation during ice-free periods and ice-covered periods, because almost all models were

calibrated and verified against evaporation observations during the ice-free periods, while evaporation (or sublimation) during the ice-covered periods was either not calculated or unverified.

Moreover, as your suggestion, we are exploring the applicability of different types of models to simulate lake evaporation over the Tibetan Plateau in our next study (Figure R1) and are designing the observation system of lake thermodynamics parameters, such as sampling of lake ice in ice-covered periods (Figure R2), and verify and develop a suitable 1D or even 3D lake thermodynamics evaporation models for Qinghai Lake (or even lakes in the Qinghai-Tibet Plateau) in the future study.

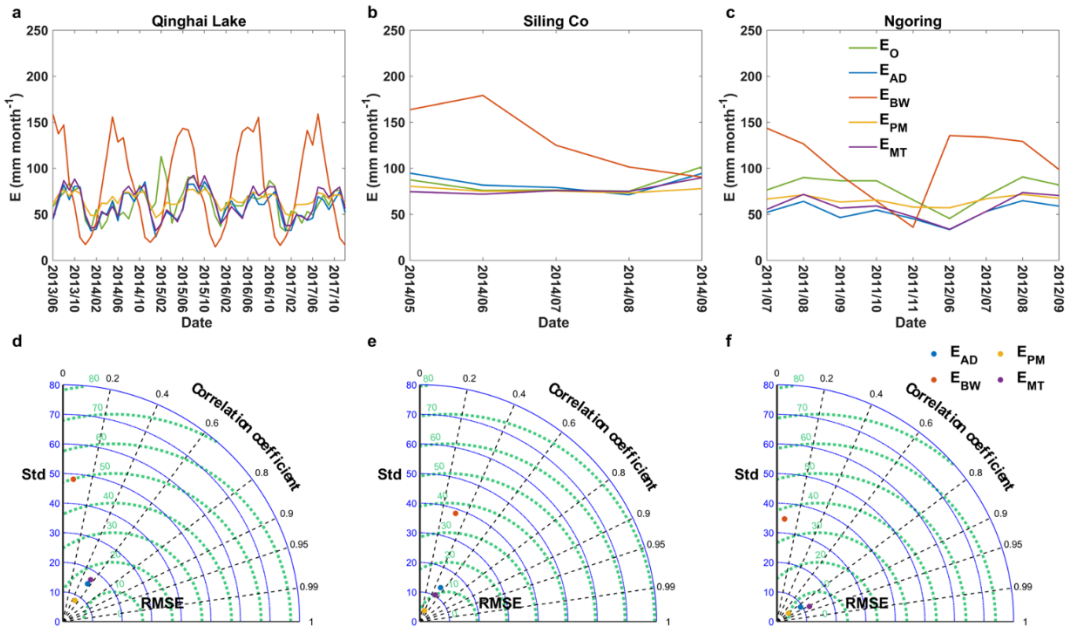

Figure R1. Comparison in observed (E_O) and simulated evaporation obtained using the calibrated methods of atmospheric dynamics (E_{AD}), Bowen ratio (E_{BW}), Priestley-Taylor (EPM) and mass–transfer (E_{MT}) in Qinghai Lake, Siling Co and Ngoring.

FigR2. Sampling and measurement of lake ice of Qinghai Lake in Feb 2023.

References:

Wang, B., Ma, Y., Ma, W., Su, B., & Dong, X. 2019. Evaluation of ten methods for estimating evaporation in a small high-elevation lake on the Tibetan Plateau. Theoretical and applied climatology, 136, 1033-1045.