

## ***Interactive comment on “Thermal regime, energy budget and lake evaporation at Paiku Co, a deep alpine lake in the central Himalayas” by Yanbin Lei et al.***

### **Anonymous Referee #1**

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The manuscript uses in situ hydro-meteorological data to investigate the thermal regime, energy budget components and the evaporation amount of an alpine lake on the Tibetan Plateau. The objectives of this study meets the scope of HESS; the in situ measurements are important for the understanding of these high-elevation lakes and the conclusions are reasonable. I consider the manuscript being an important results for understanding of these high-elevation lakes in this important area. However, there are still some questions needed to be answered and some mistakes needs to be corrected. The following comments are given and a revision is needed for accepting the manuscript to be published. Major comments: 1, Ice cover forms during the winter season in Paiku Co. Thus, what's the influence of ice cover to

your results? The energy budget and evaporation amounts during the ice covered season is quite different from those during ice free season. However, not enough information on ice processes are given in the manuscript. How to consider the energy budget and evaporation amounts during ice covered season in the manuscript? How to get the Bowen ratio during winter season? How much energy may be used for ice processes? As ice surface temperature is not observed, what's the influence of the ice processes to your results. All these information need to be addressed in detail in the revised manuscript. 2, lake level variation is an important content of the manuscript, as shown in Introduction and discussion. However, the lake level measurements are missing in the manuscript. These information should be added in the manuscript. Minor comments: 2, line 24, "significant lake level decrease in post-monsoon season while slight in pre-monsoon". Slight what? 3, line 92,  $S$  is the change in lake water energy, but in line 115, it is renamed as lake heat storage, in some place different names are used; it should be kept same. Similarly, what is the "total heat flux" in line 238 and 360? 4, In equation (3),  $R_a$  is the longwave radiation from lake surface,  $\epsilon_a$  is the atmospheric emissivity, it should be water emissivity. However, in equation (2), it is defined as downward longwave radiation to lake. it should be corrected. 5, In line 107, I think it is inappropriate to define Bowen ratio by "Gianniou and Antonopouls, 2007", some classic reference should be given here. 6, In line 118, the definition of  $\Delta T$  is not clear? How many layers are defined in vertical direction? 7, Line 135, "the largest temperature difference". Temperature difference between which layers. Similarly, line 137, what is the gradient between which layer? 8, Line 172-175, water circulation along the south-north transection is not evidenced by the observations. Ever give evidence or remove the sentence. 9, Line 187-191, the comparison of the two in situ measurements is not convincing, as the environment and other background information are quite different. Thus, I suggest to remove this part, or give much more information on the comparison. 10, In line 257-258, as change in lake heat storage has quite similar variation with that of net radiation. Why a positive correlation is obtained between lake evaporation and water heat storage change, but

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a negative correlation with net radiation. 11, Figure 1 and Figure 2 can be combined together; Figure 3, A and B is given in the figure, but not in the notes; Figure 5, 10m and 20m comma is needed; Figure 8, a and b are used, but in figure it is (A) AND (B); Figure 9, Bowen ratio is given also for winter season, but is may not fit for winter ice covered season. 12, In line 63 “oC”; “W/m<sup>2</sup>”, I think it is better to use “W m<sup>-2</sup>”;

Please also note the supplement to this comment:

<https://www.hydrol-earth-syst-sci-discuss.net/hess-2019-421/hess-2019-421-RC1-supplement.pdf>

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