

## ***Interactive comment on “Turbulent mixing and heat fluxes under lake ice: the role of seiche oscillations” by Georgiy Kirillin et al.***

### **Anonymous Referee #1**

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This paper proposes an extensive review and research on determining the turbulent mixing and heat fluxes under lake ice by a series of experiments and theoretical mechanics calculation. The article's experimental workload is very rich and the research contents are meaningful. However, there are some obvious technical and language description mistakes in this article. Therefore, I think this article is suitable for publication after some minor modification.

### Comments and Suggestions for the Author(s)

Technical Advice: ĩAñ For conducting some advances on the reading this article, please increase a flow chart of the test this paper at the end of section 2. Then, please add symbol list and calculation parameter table in this paper. Therefore, the readers can understand the process of experimentation. ĩAñ In the paper, theoretical and simu-

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lation calculations were carried out for the heat flow problem of fluids under lake ice. Some basic theories of fluid mechanics and thermodynamics were used in the calculation of the article. However, whether the overall fluid-solid coupling characteristics are taken into consideration during the temperature-dependent process of the ice body? That is, from the perspective of fluid-solid coupling thermodynamics, the influence of temperature on the mixed state of ice water and the effect of ice-water mixing state on the ambient temperature are estimated. In this paper, the author divided the ice sheet into different layers on the base of depth. Whether or not the bulk structure of the ice material is considered to have a thermal effect on the different layers? From the ice material itself, ice crystals, bubbles, impurities, etc. have an important influence. Considering the ice layer, the air flow between the layers (although very small amount) and the water flow (mainly between ice and water) seem to have a certain influence on the temperature change. Fig. 1 has shown the geographical distribution and depth distribution. It is great. However, ice materials are not artificial materials, and their formation has great natural laws and meanings. Among them, the flow direction of water and the flow speed of water have a very important influence. So, I suggest the author add hydrogeological map and water temperature change map of this lake in this paper.

Details: Figures Please unify the line style annotations in the text. For instance, please modify Fig. 5 for using one group of line labeling for A/B/C/D. Please modify Fig. 8 for adding the group of line labeling for line red and black in the Fig. but not in the Fig. title. Please add symbol distinction in Fig.9.

English: The English of this paper is native. However, please split some long sentences into a few short sentences.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2018-376>, 2018.

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