

The manuscript entitled “Turbulent mixing and heat fluxes under lake ice: the role of seiche oscillations” from Georgiy Kirillin, Ilya Aslamov, Matti Leppäranta, and Elisa Lindgren presents original results on energy transfers in lake water under ice cover. The wording is very clear and the English much better than I can judge. The paper is well structured and increases the knowledge on the mechanism of the transfer of wind kinetic energy to under-ice turbulence and its importance to the seasonal ice melt. The conclusions of the work may be very useful to improve the parameterizations of the boundary heat flux at the ice base, which are relevant to the sciences of hydrology and Earth System. So in my opinion the paper can be published after some minor improvements.

Page 2

line 14: (Fig. 2): It is the first reference for a figure - it should be figure 1

line 15: The following sentence has no verb: “For typical thickness of IL of ≤ 1 m, the conductive heat flux amounts at $\leq 1 \text{ W m}^{-2}$.” Please rewrite

Page 3 – Section 2.1

The current Figure 1 should be referred to in this section.

If available, it would be useful to add more information on under-ice water climatology

Page 4

In page 4, I is defined as net PAR irradiance, but in page 6 I is defined as the kinematic flux of the short-wave solar radiation. Please be consistent. In addition explain what you mean by short-wave solar radiation and which the relation between these and the PAR radiation. Please indicate the spectral bands of the definitions.

line 27: “sampling rate 0.5 Hz”. This frequency is enough of to take in account all the relevant scales of the turbulence? Please comment.

Page 5

line 10: It is not clear how *Noise* is computed?

line 11 “to discard corresponding values with subsequent interpolation between the neighboring values”. I do not understand this sentence. Please explain better.

line 14: “The estimations based on the averaging time of 20 min and $r = 0.4$ m were adopted for the further analysis 15 averaged over the three beam estimations.”. Why?

line 16: “For registration of”. Maybe is better to write “To access” or “To measure”

Page 6

line 24: “warmer is the water”. In the IL, right?

Page 7

line 4: QL was not previously defined.

line 17 – 18: The level at which air temperature and wind were measured should be indicated.

line 18: $s^{-1} \rightarrow s^{-1}$

line 23: The sentence “The ice was snow-free (snow thickness < 1 cm)” seems to be in contradiction to the information in line 20: “a thick ice-cover with more than 50% of snow-ice”

line 24: “a cross-section”. The same cross-section used before?

Page 8:

line 14: “suggestion”. Are there any evidence/reference for this suggestion?

line 16: To integrate Eq. 3 the radiative profiles are not enough. How have you compute the other terms?

line 28: “The stratified IL occupied the 2-m thick layer”. According to Figure 4 the IL is thinner than 2-m

Page 9:

Line1: “the TKE dissipation rate ε increased”. Increased relatively to what? Maybe the sentence should be rewritten beginning with the "background" values...

Line 5: “The dataset on the TKE dissipation rate covered a longer period than the temperatures in the IL”. How, as TKE dissipation rate is computed from the temperatures?

line 14: “ had no effect”. Based on Fig. 7, it seems that there are some effect.

Page 20

Label of figure 7: The scales in which each series is represented should also be indicated in the label.