

General comments.

Given the faulty design and lack of quality assurance of the monitoring program, a qualitative analysis of the data is as conclusive as that given in paper. The observation record at Habarova, though not quite as long as that at Kusur, is still quite lengthy. It is closer to the mouth of the Lena River and, hence, more representative of the transport of thermal energy to the Laptev Sea. In addition, it does not appear to be influenced by the proximity of input from tributaries, although this is not obvious from the paper. What is needed here at this stage, rather than the application of a complex mathematical model using questionable inputs, is the development of an appropriate experimental design. Anonymous reviewer #1's thorough analysis details the many technical difficulties in this paper. It is difficult to see how they might be corrected without major revisions.

a) The fact that measurements at Habarova gauging station is not influenced by the proximity of input from tributaries was stressed in the manuscript, please see Pg 7, 30-31 (previous version). Some discussion on this issue was also present in the previous version of the manuscript.

b) Any additional data are precious, so it is important to understand whether the apparent contradiction in the available data can be reconciled. Numerical simulations were designed to assist the analysis. Due to the lack of information, they remain qualitative. The simulations do not involve a complex mathematical model. They serve to give more credence to qualitative arguments. We definitely agree that a better observational program is needed, but it would not compensate for the data collected over the past years. Also this study gives an idea of what should be measured (discharge rates of small tributaries, its temperatures, cross-sectional water temperature distribution at Kusur GS under different conditions). The available hydrological notes based on observations (as already mentioned in the old version of the manuscript) confirm the existence of the cold current. The question is how this current affects the temperature distribution in the Lena River. The estimation of the role of different factors requires *time series* of observations focused on *specific problem*.

b) The first experiment shows that small tributaries upstream Kusur station can influence the measurements. At this stage we did not solve any optimization task. The 2d experiment is speculative, and, as you correctly mentioned, we did not have other choice. But this experiment shows that temperature difference cannot be fully explained by the influence of these small tributaries and this result cannot be attributed to our speculation, model characteristics or solving optimization task.

c) Please, find answers to the comments kindly provided by Reviewer 1.

Specific comments.

2 15 Use of acronyms like "GS" for common nouns like "gauging station" is not standard.

Yes, but it is just for the convenience, because there are other types of stations (meteorological, for example) with the same name on the same positions.

3 5 "web source" is not a recognized reference. There are numerous occurrences in the paper.

The web sources have names and you can find the full links and date of the latest access in the Reference list.

3 10 The description of the monitoring frequency is unclear. 3 15 An unorthodox measurement technique with no quality assurance.

This information is provided by hydrological service, we do not have information about quality assurance. The quality control was presented, but we did not know the procedure.

4 6 A "fairway" in the US is on a golf course. What information does "The left bank is shallow" add?

Thank you for the point. We have replaced 'fairway' by 'main ship channel'. We did not say 'bank', we wrote 'branch'. It gives information that the bulk of the Lena River freshwater flows to the right from the island of Tit-Ary. Only minor portion of the discharge goes to the left branch. This information was indirectly used in the Discussion.

5 9 Do authors mean "presence of a trend" rather than "presence of trend"? Numerous occurrences of the missing article, "a". 5 14 Do authors mean "consider the period" rather than "consider period"? Numerous occurrences of the missing article, "the". 5 30 "for example, are close" rather than "for example, close"?

Thank you, we have tried to improve our grammar.

5 21 "Sic" ?

We removed it.

6 4 "bootstrap analysis" is not explained.

It is the standard name of one of statistical method. The reference is given.

6 21 "water temperature still can increasing"?

This was a typo. It is corrected.

7 12-13 "The possible reason for this puzzling disagreement could be the non-representativeness of measurements at one or both the stations". Agreed. This is an 8 10 The description of the model, "COMSOL", is inadequate. 8 12 The description of the term, "wall function", is inadequate. 8 30-35 Confusing. 9 8-9 "It is highly expected due to the use of wall functions."? 9 10-15 The description of Equations (1)-(3) is inadequate.

We have put more information to the issues mentioned. The 'wall function' is a standard term, however, references have been given.

10 33 "Proving" is not the correct verb here.

Thank you. We have corrected it.

11 21 What does "Optimization" mean here, and how was it done?

Please, find details in the updated version of the manuscript.

12 28 Define “talik”

The short explanation has been added to the new version of the manuscript.