

**Review of :The water temperature characteristics of the Lena River at basin outlet
in the summer period. Paper # hess-2016-254**

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General Comments

The purpose of the paper appears to be two-fold. One, is to explain the perceived anomalous increases in observed water temperature from the site at Kusur to the site at Habarova (Khabarova) (Page 2, Lines 14-17). The second, it seems, is to determine whether or not the long-term observations at Kusur represent the mean stream temperature of the Lena River (Page 4 Line 15). Given the size of the Lena River's watershed and the associated estimated average annual streamflow (~17,000 m³/sec), knowledge of the river's thermal energy budget would seem to be important, most notably if the Earth's temperature increases, as most climate models predict. This is certainly consistent with the goals of the journal.

However, while acknowledging the need for accurate estimates of both flow and water temperature, there are significant challenges to doing so in this case given the need to synthesize, or, in the words of the authors, "optimize", flow data, the crude manner in which the earliest field observations of water temperature were made and the poor choice of a stream temperature measurement location at Kusur. Application of a numerical model to enhance available observations is consistent with the notions of Bayesian analysis and state estimation. In this case, however, the task is daunting. The authors are left to speculating on many processes that affect the thermal energy budget including streamflow dynamics, river-atmosphere heat exchange and streambed heat transfer. This leads to a litany of apologies by the authors for the high degree uncertainty in their analysis. Matters are made worse in the paper due to poor grammar, questionable logic, and missing information. I have given some examples below of the structural and scientific issues associated with this paper.

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.

Specific Comments

Page	Line #'s	
2	15	Use of acronyms like "GS" for common nouns like "gauging station" is not standard.
3	5	"web source" is not a recognized reference. There are numerous occurrences in the paper.
3	10	The description of the monitoring frequency is unclear.
3	15	An unorthodox measurement technique with no quality assurance.
4	6	A "fairway" in the US is on a golf course. What information does "The left bank is shallow" add?
5	9	Do authors mean "presence of <u>a</u> trend" rather than "presence of trend"? Numerous occurrences of the missing article, "a".
5	14	Do authors mean "consider <u>the</u> period" rather than "consider period"? Numerous occurrences of the missing article, "the".
5	21	"Sic" ?
5	30	"for example, <u>are</u> close" rather than "for example, close"?
6	4	"bootstrap analysis" is not explained.
6	21	"water temperature still can increasing"?
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.
- 10 33 “Proving” is not the correct verb here.
- 11 21 What does ”Optimization” mean here, and how was it done?
- 12 28 Define “talik”.

These comments are by no means exhaustive. Rather they give a flavor of the many editorial and scientific issues associated with this paper.