

Interactive comment on “Determinants of thermal regime influence of small dams” by André Chandesris et al.

Anonymous Referee #2

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General comments:

In general, the paper discusses a relevant research issue, as is discussed based on the literature in the discussion. It is apparently based on an interesting dataset (though with some limitations, mentioned below), but the presentation and discussion of the results is relatively poor and not very clear, and calls for major revisions.

It should be made more clear (in the introduction etc.), that the results are probably not easily transferrable to other areas, as the chosen study sites are quite homogenous (focus on a certain region of France). Furthermore, the study would greatly benefit from including more temperature data from the same site for several years – one would expect to also see quite some inter-annual differences. As this does not seem to be possible, the authors should at least discuss this shortcoming. Especially as the

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authors try to hint at a regionalization (e.g. at the end of section 4.1), this should be discussed better: What, for example, about the different groundwater regimes – are we talking about gaining or losing rivers? Etc.

The overall result – that the most important drivers of temperature regime changes in dams are residence time and surface area are not particularly surprising. Discuss this. (maybe one could even come up with some empirical linear relationship or empirical model, including those parameters, and water temperature, air temperature, solar radiation etc.?)

Specific comments:

Section 1: Please include some more general explanation on why the whole issue of dams changing the thermal regime is relevant (make your motivation more clear)

Line 27: “These determinants are candidate to generalize results” – sentence a bit unclear, please reformulate

Line 47: “During summer, the factors leading to warming are: (i) the input of heat from upstream” – maybe you should be a bit more specific here. Mention why you focus on summers. What do you mean by the input of heat from upstream? Tributaries that are warmer than the main stream?

Line 50: If you talk about different anthropogenic influences on stream temperature, you probably also should mention cooling water from power plants etc.

Line 56: > 15 m of what?

Line 61 ff: These two “predictions” you are mentioning from 1983 and 1990 should be verified by now? Can you say something about this?

Line 84: With a height smaller than 5m?

Line 88ff: Be more precise here. There are few articles even considering temperature effects? Those are the 43 sites or articles?

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Line 106: “with closed riparian canopy or aquifers” – what do you want to say here?

Line 106ff: “This is the reason why it seems preferable in a first study to focus on the single effects of the impoundment immediately downstream the dam.” – please reformulate/make your motivation more clear. How exactly is this resulting from the above?

Line 130: How is a “day of heat wave” defined?

Section 2.2: Mention right away in the text how many dams you study. And how did you chose those specific sites?

Line 145: Make it clear that the temperature sampling was performed for single summers (or two) per site, between 2009 and 2016

Section 2.5: Please elaborate further on how you performed your PCA. Illustrative variables are explanatory variables? “In order to identify characterization of the impacts of the different dams” – reformulate, unclear!

Section 3.2/Fig. 4: I understand that the scatter plot for Dompierre shows “type 2”, so like in Figure 3. However, Neuf in Fig. 4 does not show “type 1”, like in Figure 2, because there is almost no difference between minimum temperatures up- and downstream. And, why don't you simply show the same data in your timeseries plots (Fig. 2 and 3) and the scatterplot (Fig. 4) to illustrate the two types. Also, better to combine the figures and make the two types more clear by that.

Section 3.3: 0.46% of what?

Section 3.5: Specify how you calculate your differences (downstream – upstream?). And don't groups B1 and B2 both exhibit net warming? Be more precise.

Section 3.7: Confusing to speak of “short period of time” or “three consecutive days” – what you actually do is to look at shifts in intra-daily temperature variation.

Section 4, first paragraph: Some of this would be better in the introduction. Same

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applies to first two paragraphs of section 4.1.

Line 317, 318: Again, specify the sign of your temperature differences.

Line 344ff: Is *Salmo trutta* a common species in the rivers of your test sites?

Line 378: “The thermal landscape is therefore potentially very fragmented due to this fact alone.” What do you mean by this and the following sentences?

Line 385: Please specify which “spatial generalization elements” you mean.

Technical comments:

Be consistent with thousand separators (for example, you have 2 710000, 96 222, 59071)

Be consistent on how to write “run-of-the-river dam”.

Line 38: Why do you cite Rader et al., 2007 as part of the review by Ellis and Jones?

Line 42: “precipitation”, not “precipitations”, this comes up several times

Line 68: reformulate to “they are expected to increase downstream water temperature” or similar

Line 78: “(ROE, sept 2017)” why is this cited this way?

Line 59: “water temperature patterns for tens of km”?

Line 72ff: “very imprecise depending on national databases. For example, the International Commission on Large Dams”

Line 90ff: “Dripps et al. (2013). . .” – please reformulate, sentence unclear

Line 95 ff: “Hayes et al. (2008) in the region of the Great Laurentian Lakes” – all this paragraph contains typos and grammar mistakes, please revise

Line 101: Maybe “explaining variables” is a better term

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Sector 2.1: Please revise language. Remove repetitive “on a basis of 230 000 km streams with permanent flow”

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2019-136>, 2019.