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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Stream temperature evolution in Switzerland over the last 50 years" *by* Adrien Michel et al.

Anonymous Referee #1

Received and published: 25 September 2019

This is a well written and extensive article that investigates and compares stream temperature, discharge, air temperature, and precipitation trends across Switzerland. In general, I think this is a very interesting historical perspective on how hydrology, weather, and elevation may interact to shape stream temperature responses. On some level, this article almost does too much – there are a lot of analyses! However, I would favor including all of the information as framed, and reducing the number of figures. The article will certinaly add an interesting perspective to the existing stream temperature literature.

Major comments:

-What strikes me in reading this article is that it is billed as a trend assessment of stream temperature, but in reality, the authors have endeavored to characterize trends

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in discharge, precipitation, and air temperature as well. With this in mind, I recommend the authors slightly recast their scope and title to indicate the breadth of their analyses. Given so much of the results and discussion are focused on comparing amongst these different trends, I think recasting will only strengthen the manuscript.

-I do appreciate that the authors interpret their stream temperature trend assessment in terms of trends in air temperature, precipitation, and discharge. However, I have two questions and concerns:

First, their interpretation is largely based on data-driven relationships, and not mechanistic relationships. Therefore, inferring correlation means one variable is “driving” or altering the other is not an accurate interpretation. Therefore, I encourage them to revisit some of the statements in their manuscript to more carefully contextualize the responses they see and their interpretation (e.g., pg 15 lines 1 – 5; pg 21, lines 22 - 23)

Second, I’m not sure looking at relationships between annual trends in stream temperature, air temperature, and precipitation are helpful. Would we expect a change in discharge to impact stream temperature, based on first principles? (Even when we know that more water is harder to heat up, if that cold water occurs in a time of the year with limited energy input, does it matter?) What matters much more is when that change occurs, as is described in in the seasonal analysis.

-As someone who thinks a lot about trend analysis of stream temperature, I have found that stream temperature trends can sometimes be driven by outliers, even when using methods that are robust to outliers. For this analysis, are trends robust? If the trends are recomputed with one or two years less of data, do the general trends hold?

-While I like that the article is strongly framed in the context of changes in Switzerland, what I currently feel is missing is a historical perspective on other stream temperature trend assessments. What have others found in the context of historical stream temperature trend analysis? How do the results from this study compare? Broadening the

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findings from this specific geographic region would place the study in a larger context, and would add to its impact.

-At current, the article may include too many figures. I'd strongly encourage the authors to reduce the amount of information they show in the main text, and translate more information to Supporting Information.

Minor comments; Pg 3 line 12: "the longer ones" – what does ones refer to? Could you be more specific?

Pg 8 line 7: "which is low for outliers" – I'm not sure what is meant by this

Pg 14 line 1: pluralize "mean"?

Pg 14 line 23 – 24: there's a missing word in here

Pg 17 line 15 – 16: a little awkward – clarifying would help!

Pg 21 line 30 – peculiarity?

Figure 6: It would make the figure more interpretable and cleaner if the figure titles are moved to be labels for the x-axis instead

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