

Interactive comment on “The effects of climatic anomalies on low flows in Switzerland” by Marius G. Floriancic et al.

Marius G. Floriancic et al.

floriancic@ifu.baug.ethz.ch

Received and published: 15 October 2019

We thank Anonymous Referee 1 for the positive and constructive feedback. We appreciate the suggested corrections and will address them in our revised version. Below we list our response (in bold) to the reviewer’s comment (in italics).

Floriancic et al. explore how anomalies in precipitation and potential evapotranspiration shape the occurrence and magnitude of annual low flows across 380 Swiss catchments. The varying time period for the precip and PET anomaly calculation, with the end point being the day of the low flow, is a novel method for completing the joint analysis of climate drivers on annual low flows. I found the conclusions to be well-supported by the data. I particularly like how Figure 6 illustrates the role of long periods of PET

C1

in development of extreme low flows. The paper is well-written, and the methods are clearly outlined. I find this manuscript to be a significant contribution to the field, and I recommend it for publication in HESS. I have the following few minor/technical comments that should be easy to address:

Thank you.

L100: change “There were years whose lowest” to “There were years when the lowest”

We will correct this.

L140-142: Sentence starting with “However,” incorrect figure reference at end of sentence – should be Fig. 2ab.

We will correct this.

Figure 4: Suggest changing the color-scheme to something that is color-blind friendly.

We will evaluate the color options for Figure 4 to improve its visibility and make it colorblind friendly.

L308-311: Based on the winter precipitation versus annual low flow analysis completed in this study, I don’t think this statement is sufficiently supported. As stated earlier in the paragraph, winter precipitation does not always accurately represent SWE. With such a range of catchment elevations (and thus climate conditions), a more detailed analysis would be needed to determine the impact of SWE on summer low flows.

We agree that the role of SWE in summer low flows cannot be directly inferred with the available dataset. In the revised manuscript we will point out that we compare the amount of previous winter precipitation (rather than SWE) to magnitude and timing of summer low flows.

L314: “most work has discussed individual drivers” – statement suggests that some work has analyzed multiple drivers of low flows, but no studies are referenced here. Section should reference the relevant studies listed in the introduction on L68-70.

C2

In the revised version, we will list the appropriate citations here.

L319-321: I struggled to directly relate these broader implications statements to the results. How will the impacts be different between spring and autumn? What are the different implications of PET anomalies in May versus September? These implications are likely obvious to the authors, but on the first read through – I did not make the connection.

In the revised version, we will emphasize how antecedent conditions with regard to soil moisture state and subsurface water availability, and the water demand by vegetation in a catchment, matter. It is not sufficient to look at (the combination of) anomalies only, as the same combinations may occur throughout the year with different results, depending on soil moisture and vegetation state. Therefore, it is also necessary to include the timing of these anomalies together with general climatology of a basin.

L350: Data availability – Rather than making the data available “upon request”, I would encourage the authors to provide open access to the compiled data used in their analysis (streamflow, catchment-averaged weather and climate conditions, PET, etc.) through an archiving medium such as figshare.com. While not essential, it would be beneficial.

We will publish the dataset in the “open access” ETH library collection. However, unfortunately we cannot supply the full daily mean streamflow dataset as they are only available at the Swiss cantonal authorities and the Swiss Federal Office of the Environment upon request. Nevertheless, our dataset will include the date of low flow occurrence (2000 – 2018) and the magnitude of the annual lowest flow (Qmin), and we will include contact information for the relevant organizations where the streamflow time series can be obtained.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2019-448>, 2019.