

## ***Interactive comment on “Long-term changes in Central European river discharge 1869–2016: impact of changing snow covers, reservoir constructions and an intensified hydrological cycle” by Erwin Rottler et al.***

### **Anonymous Referee #1**

Received and published: 1 December 2019

The manuscript analyses river discharge and climate data from a number of different tributaries and gauges along the Rhine river in order to describe and analyse possible changes in runoff regimes and their controlling factors/processes. Of particular interest is the focus on stations where long term data sets are available.

#### General Comment

In general, I find the manuscript well organised, and especially the strict separation of result description and discussion I like. It is easy to read, and as far as I am able

C1

to judge as a non-native speaker, well written. The topic of the manuscript is highly relevant and will provide an important contribution to the current discourse and climate change impact on hydrological system, that is worth being published in HESS.

Specific Comments, that needs urgently to be addressed:

- The introduction is very compact (nothing wrong with that), but should explore and elaborate a bit more on the weaknesses of current approaches to analyse long time series of data. The statement (page2, line 22) “. . . new sets of analytical tools to extract information stored in this times series needs to be developed, tested, and applied . . .” is not justified by a critical review of currently available methods. Also, the advantage of then developed (own developments??) or applied methods to existing ones needs to be demonstrated.
- You use many abbreviations – as far as I can see they are all properly introduced/defined the first time mentioned, but a list of symbols/abbreviations would very much help, especially when reading the manuscript over longer time periods.
- The calculation of QMOV is not fully clear to me. From Fig.3 and section 3.1 (Discharge observations) it looks like daily quantiles are calculated from 148 values (single date, 1869-2016). How are “Changes in Seasonality” calculated – section 3.2 mentions the application of a 30day moving window. Is it operation on the previously extracted daily quantiles or does it operate on the daily runoff values and the quantiles are calculated from there. In my opinion there would be arguments for both ways. You should also clarify when you filter the data are highly correlated and I am not sure whether the TST estimator is made for these conditions. Please clarify and add some information on this.

Minor Comments:

P2, l28-30: Why focus on snow cover, as a hydrologist I would be more interested on the snow water equivalent.

C2

P3, I13: It would be good to hear something about the test for homogeneity.

P3, L5ff: Please use dot for separating decimal figures throughout the manuscript (1.20 10<sup>4</sup>)

P5, I2: which plots are addressed here.

P5, I13: How you define flood?

P11, I29: "anthropogenic" - is this a statement that CC is mainly driven by men, otherwise I would CC-driven changes.

In my opinion, the paper needs some moderate revisions as mentioned in the specific comments which would significantly improve the paper and make it suitable for publication in HESS.

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