

Interactive comment on “Aspects of seasonality and flood generating circulation patterns in a mountainous catchment in south-eastern Germany” by T. Petrow et al.

T. Petrow et al.

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Thank you for considering our manuscript with major revisions for publication in HESS. We would like to thank you for your helpful and detailed suggestions and criticism how to improve the manuscript. Please find our response and how we tackled the criticism to all suggestions below. Your remarks are marked with "-", our response can be found directly below the remark.

General Comments

- In order to estimate the statistical parameters of the annual flood peak discharges, the data of both summer and winter floods were used by the authors. In the Mulde catchment, however, these are the floods of different origin as one can conclude from

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the paper. As opposed to summer floods, precipitation is not the only and the determinant source of winter floods; snowmelt rate strongly influences on flood peak discharge in winters. This fact can lead to heterogeneity of the discharge series analyzed in the paper and instability of the estimated statistics. I suggest excluding winter floods from the statistical analysis.

We agree with you. However, in the beginning of the analysis we didn't know about these seasonal differences in the catchment. We emphasized this in the introductory Section through the formulation of questions which will be analyzed and answered in the article. We found that the analysis of AMS and summer maximum discharges leads (at least in this case) to the most reliable results. Therefore we left the analysis based in the AMS in the article.

- I have not found in the paper any results confirming the conclusion that the landscape characteristics influence on the changes in the flood statistics over the basin area only slightly (as compared to precipitation). As it follows from the beginning of Section 4.4, this conclusion is based on the results shown in the preceding section. A reader could conclude from Section 4.3 that the statistical parameters change from one sub-catchment to another but it's not obvious that the role of landscape characteristics is minor. It is also shown in Section 4.3 that the direct relationship exists between the location of the precipitation field and the location of the flood event; this result testifies to the influence of precipitation on flood generation but does not testify against the influence of the landscape characteristics on flood generation. On the other hand, spatial variations of the landscape characteristics strongly control (for example, through infiltration losses) magnitude of rainfall floods in many river basins and influence on differences in temporary flood statistics over a basin area. Probably, this is not the case for the Mulde catchment (because of a medium area, peculiarities of flood generation in a mountainous basin) but it should be clearly shown in the paper.

We revised the results section and included one Section for the Landscape characteristics with a table (Table 4) showing the percentages of the analyzed landscape

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characteristic. The argumentation is now much stronger that the spatial and temporal distribution of the precipitation is the most influencing factor for large discharges in this catchment.

Specific Comments

- 1. In my opinion, the significance of the exposed distinction in coefficients of variations and skewness over the basin area looks questionable. As it follows from Fig. 7, coefficients of variation are rather close (0.7-0.8) for all gauges except Berthelsdorf and Nossen. Distinctions in coefficient of skewness are more visible but sample variation of this coefficient should be too large. I suggest testing statistical significance of the exposed distinctions of the comparable statistics or, at least, to show standard deviations of their estimations.

We tested the significance of the differences with a test for small sample sizes (confidence interval (95%) and can confirm our results statistically.

- For the lengths of the data samples used in the study, the Kolmogorov-Smirnov test is unsuitable to reveal the best fits of distribution function. I suggest excluding the testing from Section 3.1.

The Kolmogorov-Smirnov test is described in the literature to have the condition that the data sample includes at least 20-30 data samples. There are no limitations for larger samples (sample size up to 90). All analyzed gauges in the Mulde catchment fulfil the condition. Moreover, the test is commonly used in the literature for these purposes. Therefore, we kept the test results in the paper.

- As it is rightly pointed in the Introduction “independence, homogeneity and stationarity are required characteristics of the data to legitimate flood frequency analysis”. However, only stationarity is statistically tested in Section 3.1. Please clarify the sentence “a threshold time of 7 days between two AMS floods ˇE guarantees the independence of two close-by flood events”. Was such a threshold selected because the time

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of concentration for the basin is much smaller than 7 days? Statistical homogeneity of the flood series is not tested (see General Comments).

Yes, the concentration time is much smaller than 7 days. We included this information in the text.

Technical Comments

- A part of the text is repeated twice in Section 2.2.1

We deleted this paragraph.

- Table 3; Figs. 5, 6 illustrate prevalence of magnitudes of the summer floods over the winter ones. Three illustrations look redundant for one result.

We deleted Fig. 5 because of the redundant information with Fig. 6 (now Fig. 4 and Table 3).

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