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Hydrology and Earth System Sciences Discussions

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

Anonymous Referee #1

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General comments

The paper focuses on the statistical analysis of different data sets of the Mulde catchment in south-eastern Germany (discharge, precipitation, Großwetterlagen) and investigates interrelations between those data sets and to explore flood regimes. The paper addresses relevant scientific questions within the scope of the journal. However, the paper (only) presents an exemplary study which does not exceed existing knowledge. Results gained by other studies in similar environments are confirmed (however, the references cited are significant and available). Unfortunately the new and original contribution does not become clear. Nevertheless the paper presents significant results

as flood prediction and estimation of flood risk is one essential hydrological issue for the future. The scientific methods used in this study are valid and clearly outlined. The language is fluent and precise, mathematics seems to be correct. The paper is in principle well structured while some subsections still need to be restructured or moved to other sections/subsections (see specific comments). In summary, the paper comprises a setof statistical analyses which are carried out with profound knowledge. Results are discussed, but the sythesis of the different analyses in the paper remains unclear for most of the paper.

Specific comments

- In my opinion the title is not adequate as “Großwetterlagen” only play a minor role in the paper as provided.

- The abstract does not contain sufficient information. One or two introductory sentences as well as some more concrete conclusions should be provided.

- Some parts of the introduction should be moved from to the methods section (e.g. details on AMS, POT, distribution functions; p.590, l.24 to p.591, l.28).

- The catchment description is very detailed; a lot of information is provided which is not used for further analyses. I am not sure whether all information provided is really required. On the other hand information on soils and geology is not provided which is stated to be not important later on without performing further analyses?!

- The paper includes too many figures. Some of the figures should be skipped which do not provide new results or which are almost not discussed in the text (for suggestions see below).

- Most parts of the results section of the paper just describes figures but does not provide further interpretation of the results to develop a synthetic message and to draw some profound conclusions. This section needs to be rewritten. A continuous thread

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and a sound argumentation are required. Some interpretation of results should already be provided in this section as there is no additional discussion section.

- Not all statements in the conclusions' section are proven by the analyses performed in the study presented (precipitation may be the dominant influence on runoff generation, but it has not been proven by this paper that it is; not all other landscape characteristics have been analysed in detail!). Some conclusions are not consistent (supplementation of the FFA by analysing landscape characteristics while it was stated earlier that most of the landscape characteristics have no major influence on spatial patterns of flood statistics). Please check the conclusions sections carefully, and draw more substantial conclusions (Conclusions are not a summary!)!

- Please, mention the date of access of cited www-addresses

Technical comments

Abstract

- p. 590, l. 6,7: "Ěfrom west to east" within the catchment of investigation?

- p. 590, l. 14-16: Why is it necessary the traditional flood frequency analysis? In which way? Please be somewhat more concrete in the abstract!

Introduction

- p. 590, l. 22/23: "the focus is set on" instead of "will be".

- p. 591, l. 6: add "or" before the last element of the listing.

- p. 591, l. 7: estimated "by".

- p. 591, l. 10-13: Please split the sentence into two sentences.

- p. 591, l. 21: Jain and Lall, 2000 or 2001?

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- p. 591, l. 22-24: Independence is not always given when analysing annual maximum series (e.g. events on 31.10. / 1.11.); definition of criteria to avoid this dependence of events is necessary.

Study area

- p. 593, l. 20: The catchment is split into how many zones? Which soil and geology related properties are used to define the zones? Is the presence of groundwater reservoirs the only criterion? (that's what the manuscript tells me) What about soil texture, soil depth, etc.?

- p. 594, l. 13: Both winter floods? They were not mention before. Two winter floods?

- p. 594, l. 14: How do you define high damages? Please be more specific!

- p. 594, l. 22: "Ulbrich et al., 2003" instead of "Ulbrich, 2003"?

- p. 594, l. 23: "11.6 Billion EUR" instead of "11600 Million EUR".

- p. 596, l. 4-7: Please use a structured list instead of the numbering in the text.

- p. 596, l. 17: Using a cubic interpolation scheme does not consider topographic effects in the rainfall interpolation. Are they not relevant?

- p. 597, l. 5-8: Which one of the 30 Großwetterlagen in Tab. 2 represents Vb?

Methodology

- p. 597, l. 19: MQH = mean maximum annual flood discharge?

- p. 598, l. 1: please add an "and" before the last element of the listing.

- p. 598, l. 4/5: Which hypothesis is tested by applying the Kolmogorov-Smirnov-Test?

- p. 599, l. 5-10: The results of such a statistical analysis could / should be proven by the application of a process based catchment model?! From such a model application one could learn a lot about flood generation mechanisms.

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- p. 599, l. 15: skip “manually”

- p. 599, l. 15-17: Why do you analyse only data of one stream gauge? Is this gauge representative? Performing the analysis for several gauges would exclude the effects of measurement errors! (e.g. gauges Bad Düben, Erlin, and Wechselburg)

Results

- p. 599, l. 1/2: Repetition, was already mentioned before.

- p. 600, l. 18: Skip the names of the 4 gauges, they were already mention figure 5. For what reasons these 4 gauges were selected out of the 15?

- p. 600, l. 22/23: Are the results representative for all gauges? Do the other gauges show the same systematics?

- p. 600, l. 23/24: Figure 6 is mentioned, but there is no description of the results which are shown by that figure, and there is also no interpretation at all.

- p. 600, l. 25/26: Final interpretation of this section is trivial.

- p. 601, l. 2/3: Repetition, was already mentioned before.

- p. 601, l. 5: “In the beginning the assumption was made thatĚ” instead of “the assumption could be made”?

- p. 601, l. 8-13: Results presented in Figure 7 are described. Is an interpretation of the impact of rainfall or catchment characteristics on these statistical characteristics possible?

- p. 601, l. 16-19: The events affecting all subcatchments - are they summer events or winter events?

- p. 601, l. 21/22: How the 6 events analysed in Figure 9 were selected? The highest peaks in the time series? Or 6 of the 11 events affecting all subcatchments? Which criteria?

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- p. 601, l. 23-28: How this threshold of ten year peaks is determined? Arbitrarily?

- p. 601, l. 25-28: Concerning Fig 9: Is there a real difference between 1938 and 1958? For both events, there is a factor 5 between the lowest and the highest return period?!

- p. 602, l. 10-12: The correlation between precipitation fields and flood return periods could be expectedĚ

- p. 602, l. 14/15: If there is no influence of catchment characteristics on statistical flood characteristics - what is the reason for the flood? Why is precipitation distributed unequally? May be the reason of missing correlation also lies in the interpolation of precipitation; id topography would have been considered, it could be expected that topography would be correlated with precipitation and therefore with flood generation. (What about soils and geology? Has that been investigated?)

- p. 602, l. 24-28: Is snow the only reason? What about antecedent soil moisture, frozen soils, etc.?

- p. 603, l. 7-9: Please relate this analysis to Table 2!

- p. 603, l. 11-13: Please indicate the presence of the Großwetterlagen in the Mulde catchment in Table 2!

- p. 604, l. 3: Why “although”?

Conclusions

- p. 605, l. 1/2: This statement has not been proven by the analyses performed in this study (although it is probable). The contributing factors could be analysed by modelling exercises.

- p. 605, l. 10-12: Why should the FFA be supplemented by the analysis of landscape characteristics if they show only minor influence? Precipitation seems to be the only influencing factor?

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References

- p. 606, l. 29-31: Jain and Lull, 2000 or 2001?

Tables

- p. 609, Table 1: What is “Mean flood discharge”? Mean annual maximum? If not, which threshold is chosen and how defined?

- p. 610, Table 2: Please add information on the probability of occurrence in the Mulde catchment.

- p. 611, Table 3: Why do you present absolute values? Relative values could be easily compared between the gauge stations.

- p. 612, Table 4: Why these 4 stations were selected (see comments in the text)?

Figures - p. 614, Figure 2: For which analysis has the land use map been used? Skip the figure.

- p. 616, Figure 4: Please remove grey colour from the figure background; please mention the equation of the regression line.

- p. 618, Figure 6: For which reason the 20% threshold was determined?

- p. 619, Figure 7: Please use gradients in colour and size of the symbols to better distinguish the gauges.

- p. 620, Figure 8: What can we learn from this figure? No interpretation is included in the text. Skip the figure.

- p. 622, Figure 10: Symbols in the upper 3 pictures are difficult to distinguish; lower 3 pictures are distorted.

- p. 623, Figure 11: Please use different symbols and colours to better distinguish between the Großwetterlagen.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 589, 2007.