

Interactive comment on “Assessing winter storm flow generation by means of permeability of the lithology and hydrological soil processes” by H. Hellebrand et al.

Anonymous Referee #2

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* General comments

In this paper the existence of a link between runoff-coefficient (the winter value, here called C-value) and basin characteristics is investigated. The topic is of great interest for hydrologists. The focus is on a GIS-based procedure. The authors compare the relations between the C-value and the permeability of the substratum of the basin (permperc) along with modeled hydrological soil processes (hsp).

The results of this research are interesting, however I suggest to consider other descriptors (for example climatic descriptors) along with a higher number of basins. Merz et al (2006), for example, found that the spatial distribution of runoff coefficients is

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highly correlated with mean annual precipitation but weakly correlated with soil type and land use. On this basis I would say that even if C (the winter runoff coefficient) expresses the saturated state of the basin, the mean annual precipitation could be a significant variable to discern, for example, between wetter and dryer basins. This fact depends, evidently, on the spatial variability of annual-rainfall into the Nahe basin.

Finally, I would suggest to describe more deeply and in detail the methods used in the paper (see the specific comments) and to perform a revision to settle those points. Specific comments follow.

* Specific comments

In Line 13 of page 1894 I would change "It is assumed that..." with "It is demonstrated/proved that..."

The explanation of the assessment of the hydrological soil processes is limited to lines 1 to 26 of page 1896. Here the authors refer to previous works, especially to Scherrer (1996). In my opinion one more paragraph should be devoted to explain this methodology, given the importance of hsp in the analysis.

I would add a table, in Section 2 (page 1897), with the parameters (permperc, SOF123, SSF123 and DP) of the 16 basins used for the analysis. This simple addition would allow the traceability of results.

The study focuses on 16 basins over 71. The reason of this choice (line 15 of page 1898) is not clearly explained.

In Table 1 and in line 19 of page 1900, the standard deviation of the C-values is introduced without comments. I would spend some more words on the variability of C during winter season. This would give an explanation to line 12 of page 1901: "the more or less constant C-value during winter..."

Line 1 to 3 of page 1901 are dedicated to the results of the Principal Component Analysis where the best combination of hsp is shown. I would include some other significant

combination of variables as well, for example the three strongest combinations.

Model III is defined as the union of model I and II. In my opinion one should consider also other combinations of hsp, that perhaps may yield a greater R². The significance of a variable in a regression depends on the other independent variables that are considered: SSF1+SSF2+SSF3 not necessarily is the best parameter choice if one consider also permperc. Then, for the multivariate regression of Model III, I would suggest to use the adjusted R² (instead of R²) and I would perform a significance test (for example the classic Student t test) to assess the significance of both the independent variables.

The nonparametric Kruskal-Wallis test is used to assess the independence of the estimated C-values of each model. The authors state that the H₀ hypothesis is accepted. However the null hypothesis of this test is that the samples come from the same population. For this reason, I would say that H₀ is rejected, instead of accepted. Moreover, the confidence level that has been used (or, alternatively, the probability associated with the test statistic) should be declared. In line 6 of page 1904, I would write "The ... test that was used to test if the models agree substantially gave a negative result" instead of "The ... test that was used to test if the models differ substantially gave a negative result".

* Technical corrections

Line 11 page 1894: "The models used ... in the models", I would erase the final "in the models".

Line 1 page 1897: substitute "assed" with "assessed".

Line 10 page 1900: The same sentence is repeated 2 times.

Lines 14-17 page 1901: the sentence is not clear.

Lines 5-7 page 1903: the sentence is not clear.

Lines 2-3 page 1904: the sentence is not clear.

I would separate Figure 4a,b from Figure 4c,d (using different numbers).

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