

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

H. Hellebrand et al.

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Author comment for RC S486: 'comments and technical corrections', Anonymous Referee #2, 09.07.2007

C = reviewer comment A = author comment

C: 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).

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C: The results of this research are interesting, however I suggest considering 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 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.

C: 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

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

A: "It is assumed that..." has been replaced by "It is demonstrated that...".

C: 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.

A: An extra part has been added that describes the Scherrer method better. See lines 75-86.

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

A: An extra table has been added, which provides the percentages of the permeability of the substratum and of the dominant runoff-producing processes of the Nahe basin

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and its 16 sub-basins.

C: The study focuses on 17 basins over 71. The reason of this choice (line 15 of page 1898) is not clearly explained.

A: Only for these 17 basins “dominating runoff generation processes” (DRP) were available. Therefore, the study focused on these basins. This is now better explained in the text. See as well lines 116-119.

C: 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..."

A: The results of the C-value calculation are now more extensively discussed (lines 212-218 and lines 224-232). A graph with box plots representing the C-values of each basin was added as well to indicate their annual variability.

C: Line 1 to 3 of page 1901 is 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.

A: The methodology has been rewritten and includes now an assessment of the 3 strongest combinations as derived from the PCA (lines 181-184). New results are given in lines 244-257 and lines 287-295.

C: Model III is defined as the union of models 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 considers also permperc. Then, for the multivariate regression of Model III, I would suggest using 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.

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A: The non-parametric Mann-Whitney U test was added to the methodology (lines 184-186) in order to assess the significance of both the independent variables. New results are given in lines 297-306.

C: 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".

A: The part has been changed according to the suggestions of the reviewer. See also lines 311-315.

Technical corrections

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

A: The final "in the models" has been erased.

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

A: The word has been corrected.

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

A: Repeated sentence has been removed.

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

A: The sentence has been removed from the text.

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

A: The sentence has been corrected (lines 342-345).

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

A: The sentence has been corrected (lines 368-371).

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

A: The figures have been separated.

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