



Interactive comment on “Validation of two precipitation data sets for the Rhine River” by C. S. Photiadou et al.

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“General comments: Overall the topic of this paper is in general relevant, suitable for HESS and definitely of interest for the hydrological community due to the increasing interest in long time series of climatic parameters to be used in hydrological applications. The paper describes the extension of two precipitation data sets (CHR08 and E-OBS) for the Rhine basin. The authors compare the performance of these data sets using them as an input for a conceptual hydrological model (HBV-96) and evaluate the statistics of the model performance. The results indicate that both data sets show good agreement in terms of extreme discharges and the CHR08 perform well in reproducing hydrological regimes, and spatial distribution of correlations with observed discharges.

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In contrast the performance of the E-OBS data set regarding the hydrological regimes is rather poor. The paper is structured, organized, and all tables and figures are helpful. The list of references should be updated according to the technical comments below. To summarize, I am recommending moderate revision of the submitted paper according to the specific suggestions given below.”

Reply to General Comments: We would like to thank the anonymous referee #2 for his general interest.

Specific Comments A) The major specific comment is about the way the different precipitation data sets were used in combination with the HBV-96 model. First of all a description of the model setup is missing and the length of a calibration and validation period is not indicated. In my opinion it is obvious that the CHR08 is performing well if the model was only calibrated based on the CHR precipitation and temperature data sets. It would be an improvement to use both data sets (CHR08 and E-OBS) for the model calibration.

Reply to Specific Comment A: In the revised manuscript, a clear section of the HBV-96 set-up is added. We distinguish the data sets used to force the HBV in each run and describe the set-up of the model used in these runs. The calibration length for the CHR data set is indicated in page 5472, lines 17-19 and covers the period of 1961-1995. The calibration of the HBV-96 with CHR08 and E-OBS would possibly improve our results. We decided to use HBV as is, similar to the way as done in other studies, such as Te Linde et al. 2010.

B) The nomenclature of the three major sub-basins (German, Moselle, Swiss) is not very precise. The "Swiss" catchment (Station Basel) also includes parts in Austria, Lichtenstein and Germany; the "Moselle" catchment (Station Cochem) parts in France, Luxembourg and Belgium; and the "German" catchment incl. the Moselle catchment has also parts in France. Additional to that the delineation of the Moselle catchment in Figure 1 is not correct.

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Reply to Specific Comment B: It is true that this separation is not precise. The separation into these three major basins was made according to the source of the available data. First, the REGNIE data covers the specific part of the Germany that is called here the German basin. Second, we called the Moselle catchment, the area of the basin that was completed with the data set from the University of Trier. Third, we called Swiss catchment the area of the Rhine basin that was complete with the data set provided by the ETH and is referred to as the Alpine data set. The nomenclature of the three major basins will be fully described. The nomenclature will be change into the geographical position; the “German” sub-basin will be referred to as the Lower sub-basin, the “Swiss” sub-basin will be referred to as the Upper sub-basin and the “Moselle” sub-basin will be named as Western sub-basin.

C) The introduction part of the paper could be shortened, because it contains not relevant information for the objective of the paper.

Reply to Specific Comment C: In the revised manuscript, the introduction is rewritten and irrelevant information is removed.

Technical corrections: 1) p.5466, 26: "Munich Re, 2004" is missing in the reference list. 2) p. 5469, 5: "Leander, 2009" is missing in the reference list.

Reply: These were due to an error in the Latex script. Leander, 2009 is added in the reference list and Munich Re, 2004 is removed from the revised manuscript.

3) p. 5471, 19: Replace "basis" by "basin".

Reply: This has been replaced.

4) p. 5473, 27 to 5474, 2: Change sentence "...2008 daily sub-basin averaged precipitation are created from ..." to "...2008 a daily sub-basin averaged precipitation data set was created from ...".

Reply: Sentence has been changed in the revised version.

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5) p. 5475, 8: Delete ", in press".

Reply: "In press" has been deleted and corrected also in the reference list.

6) p. 5476, 22: Replace "(above)" by "(upper part)". 10) p. 5477, 11: Replace "(below)" by "(lower part)".

Reply to comments 6 and 10: The "above" and "below", mentioned in the Results section, have been changed to upper and lower part, respectively.

11) p. 5477, 26: Replace "Figure 4a" by "Figure 4 (left part)". 12) p. 5478, 17: Replace "Fig. 4b" by "Fig. 4, right part". 13) p. 5478, 21: Replace "Fig. 5a" by "Fig. 5, left part". 14) p. 5478, 27: Replace "Fig. 5b" by "Fig. 5, right part". 30) p. 5491, Figure 4: Change figure caption: "...(a) Lobith..." to "...Lobith (left)..."; "...(b) Cochem..." to "...Cochem (right)...". 31) p. 5492, Figure 5: Please be consistent with the order of the legend elements and the font size. 32) p. 5492, Figure 5: Please provide complete captions for the figure. 33) p. 5493, Figure 6: Change figure caption: "...(a) winter maximum..." to "...winter maximum (left)..."; "...(b) summer minimum..." to "...summer minimum (right)...". 34) p. 5493-5496, Figure 6-9: Please be consistent with upper and lower case in the axis label. 35) p. 5494-5496, Figure 7-9: Please provide complete captions for all figures.

Reply to comments 11-14 and 30-35: All the suggestion have been added in the revised manuscript.

7) p. 5477, 4: Replace "12 420 m3" by "12420 m3/s" and "16 669 m3" by "16669 m3/s". 8) p. 5477, 6: see comment 7); Change format of numbers and replace all "m3" by "m3/s". 9) p. 5477, 8: Replace "m3" by "m3/s". 29) p. 5490-5496, Figure 3-9: Correct unit for discharge from (m3) to (m3/s).

Reply to comments 7-9 and 29: The correct units have been added in the revised version.

15) p. 5479, 8: Replace "wires" by "weirs". 19) p. 5481, 28: Replace "wires" by "weirs".

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Reply to 15 and 19: The word “wires ” has been replace by “weirs”.

16) p. 5479, 11: Replace "R2" by "(R2)" and "RMSE" by "(RMSE)". 17) p. 5479, 12: Replace ", Nr" by "(Nr)". 21) p. 5487, Table 1: Replace "...coefficient R2" by "...coefficient (R2)". 22) p. 5487, Table 1: Replace "... efficiency Nr" by "... efficiency (Nr)".

Reply to 16-17 and 21-22: The suggestions have been added in the revised version.

18) p. 5479, 13: Replace "catchments" by "sub-catchments".

Reply: This has been corrected.

20) p. 5482, 4: Replace "RMSE Nr" by "RMSE and Nr". Reply: This has been corrected.

23) p. 5488, Figure 1: Location, scale and grid north are missing. 24) p. 5488, Figure 1: Display the major rivers. 25) p. 5488, Figure 1: Catchment delineation of the Moselle is not correct. 26) p. 5488, Figure 1: Selection of names for the three major sub-basin (German, Moselle, Swiss) is not well defined. Better use names like e.g.: Alpine/High Rhine, Upper Rhine, Middle Rhine, Lower Rhine, or use the river names of the sub-catchments directly.

Reply to comments 23-26: Figure 1 has been correct and presented in the revised version, in the proper format. The comment concerning the selection of the names is answered in the Reply of the Specific Comment C and it has been taken into account for Figure 1.

27) p. 5489, Figure 2: Change "REGNIE Daily" to "REGNIE daily" in the upper part of the figure. 28) p. 5489, Figure 2: Enlarge font size of "REGNIE daily emulated" in the lower part of the figure.

Reply to comments 27 and 28: Figure 2 has been corrected and presented in the revised version with the new names of the three major sub-basins.

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References Te Linde, A.H., Aerts, J.C.J.H. and Kwadijk, J.C.J.: Effectiveness of flood management strategies on peak discharges in the Rhine basin, Journal of Flood Risk Management, 3: 248-269. doi: 10.1111/j.1753-318X.2010.01076.x., 2010.

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