

Interactive comment on “Detecting the influence of land use changes on Floods in the Meuse River Basin – the predictive power of a ninety-year rainfall-runoff relation” by A. G. Ashagrie et al.

Anonymous Referee #3

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General comments including scientific questions/issues ("specific comments")

- 1) The paper address the relevant scientific questions within the scope of HESS by studying the relation between land use changes and hydrological processes on a river basin scale. The findings are of relevance for water management issues.
- 2) The authors present novel concepts by combining rainfall-runoff modelling with time series analyses. One constraint by studying the effect of land use change or other anthropogenic factors on the discharge by statistical analyses is the high variability in the discharge which can be related to climatic variability. By applying the rainfall-runoff model together with long hydrometeorological time series these effects may be filtered

out to a large degree and the remaining variability in the discharge time series may be studied with regard to other factors .

3) The study emphasis the findings of other works that the influence of land uses changes for meso- and macro scale river basins can be regarded as a minor factor. The detection of the systematic deviation between observed and modelled discharge data for a longer time period and the open question raised for their explanation opens the floor for a wide range of more detailed studies in order to bring more light to the hypotheses ranging from the homogeneity of the input data , the stationarity of the hydrological system as well as the rainfall-runoff model itself.

4) The scientific methods and assumptions are valid and clearly outlined with exception of the calculation of the potential evapotranspiration as well as of the actual evapotranspiration. Also it is not clear stated how the information about land use is used within the model HBV, e.g. which model parameters are affected.

5) The results are sufficient to support the interpretations and conclusions with regard to changes in annual and seasonal discharge fluctuations. Unfortunately, the interpretation with regard to floods as indicated by the title is limited due to the temporal resolution for modelling of one day as well as the simplified modelling of the flood routing process.

6) The description of model runs and calculations is sufficiently complete and precise to allow their reproduction by fellow scientists with the constraints mentioned in terms of calculation of evapotranspiration.

7) The authors give proper credit to related work and clearly indicate their own new/original contribution.

8) The title didn't clearly reflect the contents of the paper due to the fact that mainly the annual and seasonal discharge variability are studied with respect to the impact of land use changes. Also the expression " the predictive power" should be more raised

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as a question in the title than as an declaration.

9) The abstract provide a concise and complete summary.

10) The overall presentation is well structured and clear with exception of the description of the spatial structure of the model HBV (e.g. subdivision of the sub basin in height zones and land use classes) and the calculation of the evapotranspiration.

11) The language is fluent and precise.

12) No mathematical formulae are used. The symbols, abbreviations, and units are correctly defined and used. The exception is the terminology and use of potential evapotranspiration and interception.

13) As mentioned before the calculation of potential evaporation interception , and actual evapotranspiration should be clarified. Fig.1 (location of precipitation and gauging stations) should be enlarged. The hydrographs shown in Fig 5 should be better distinguished by a proper choice of line style. This is true for Fig.8, too. In Fig .6 the scales of the y-axis should be adapted. 14) The number and quality of references is appropriate.

15) The amount and quality of supplementary material is appropriate, generally. I miss a plot of the time series of the ten-day maximum discharges (observed and modelled) in order to show the stationarity or instationarity of flood occurrences in the Meuse basin and how this trend (if available) are reconstructed by the model.

Technical corrections

p. 533 , line 28, skip: regime p. 541 , line 26, add: January and (January and December 1993)

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 3, 529, 2006.

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