

Interactive comment on “A curve number approach to formulate hydrological response units within distributed hydrological modelling” by Eleni Savvidou et al.

Anonymous Referee #2

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The manuscript describes a methodology for the calibration of the hydrological model HYDROGEIOS based on a systematic delineation of Hydrological Response Units (HRUs) defined using a Curve Number approach. The methodology is applied at the Nedontas River basin in Greece where it is shown that it results in good model skill primarily in terms of river discharge. The manuscript is focused and well written, and clearly within the scope of HESS. However even though I believe it is a very well designed application, my opinion is that its scientific contribution is limited.

Specific Comments:

1) A major issue with the present study is the quantification of the relative importance between the model calibration and the model skill. To my understanding HYDRO-

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GEIOS introduces a large degree of empiricism to resolve hydrological processes, and key properties might be neglected (for instance there is no reference on the model description concerning snow accumulation and melt). In other words, can the importance of calibration be quantified given the potential limited skill of the model due to its parsimonious structure?

2) Their key classification of the CNs is based on the empirical equation of eq. (1). This equation was produced for river basins in Greece and Cyprus and in the present manuscript it is also validated for a catchment in Greece. Could those results be extrapolated to different areas? Was the Nedontas catchment used for the derivation of eq. (1)?

3) Even though it is not the scope of the paper to introduce the hydrological model, more information about the parametrizations (and equations) used for the simulation of the hydrological processes would be helpful.

4) To my understanding, model validation (and calibration) is carried out using river discharge which lumps all components of the water cycle. Given the relatively large differences in the magnitude of the rest of the components are there data to validate it? In a sense can the authors prove that the good performance in terms of discharge is a real feature without error compensation between the rest of the components of the hydrological cycle (e.g, ET, leakage etc)?. Can the authors construct an objective function for calibration that includes multi-source information?

5) The introductory and motivation part of the study is quite unbalanced compared to the rest of the sections of the manuscript. The reader needs to reach page 7 to start understanding what the methodology of the present study is. I strongly recommend the authors to tighten those sections to improve the readability of the paper.

6) Figure fonts are very small. Please increase them to improve readability.

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