

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

Anonymous Referee #3

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Thank you for inviting me to review this paper. The paper describes an interesting approach that could be useful also in the context of engineering practice. Although it is not very clearly structured, I think it presents an interesting method that will contribute to the scientific community.

1. Structure of the manuscript

I was a bit confused by the overall structure of your manuscript. The distinction between introduction and your methods is not clear. I think that some parts of section 3 belong to introduction and others to methods. The title of section 4 is redundant and somehow misleading, since 4.1 and 4.2 refer to the CN method in general. In 4.2, you describe an approach for creating raster CN maps, the application of which goes beyond HRU

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delineation (as you mention in page 27 line 20). Thus, I think it should not be under the title: “CN approach for HRU delineation”. I suggest that you merge the parts of sections 3 and 4 that refer to your proposed methods in a “Methods” section. The scope of research (if necessary) should come right after the introduction and before the methods, but anyway you need to rephrase it (for example, the paragraph in page 5, line 6-11 is redundant).

I think that the summary before your conclusion (section 7) is too extensive: you may consider rephrasing or even omitting the paragraph in page 27, lines 11-19. Your conclusions should be more laconic. I would suggest you have one paragraph for each conclusion. For example, you could split the paragraph starting at page 27, line 30 in two: one for your conclusion regarding subjectivity vs objectivity and one for the correspondence of HRU response with the CN values.

2. Main points of research

“assign as many parameters as can be supported by the available hydrological information”

In page 27, line 27-28 you recommend that the number of HRUs should equal the number of the available hydrological stations, but it is not clear how this conclusion emerges from your results. You should show what the results of the proposed CN approach would be if the method was applied with fewer or more HRUs.

“reduce the effort for model calibration, simultaneously ensuring good predictive capacity”

Since time and effort are important for your study (page 25 line 1-2), I think you need to be more specific regarding Table 3 (especially because the union of layers and the CN approaches do not differ a lot). Is the efficiency of page 20, line 15 the same with the one that you mention in page 14 line 13? I suggest you elaborate more on that. In page 20, line 21-22 you refer to the terms unsatisfactory and acceptable. How do you define

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those and what are the thresholds? Looking Fig. 8 I do not think that your proposed method's results are really improved. The second last peak before the summer is not caught by any model version. This peak also does not appear in the other hydrometric stations. Could it be a measurement issue?

3. Case study

Since you try "to better represent the physiographic properties of the river basin", you should take into account that the basin was burned in 2007 (http://ocean.space.noa.gr/diachronic_bsm/, you may also check the 2011 google earth street view images of this area). Thus, the map in Fig. 5b (derived from 2000 land cover data) does not correspond to your simulation period. Did you apply the correction you mention in page 8, lines 27-28? It is not clear if this is your recommendation: in that case you need to explain it, otherwise you should provide a citation. Anyway, I believe that this approach is unsuitable for this case study. This is particularly important since evapotranspiration accounts for the 1/3 of your hydrological budget.

4. Figures

For Fig. 1 (and 2 maybe) please provide a color legend. I was a bit confused by Fig. 1c and 2a, in that 88 appears in red and in yellow and 64 and 49 are both green. I guess color expresses the CN classes, so probably these are just typos.

In Fig. 3 the Evapotranspiration from the Upper zone storage is denoted as Evapotranspiration from lower zone.

In Fig. 5 please enlarge the legend.

In the text you cite Fig. 7 before citing Fig. 6.

In Fig. 6a, the legend shows 18 classes, and so is written in page 17, line 21. However, in the caption of Fig. 6a it is 34 classes.

5. A few suggestions

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Page 7 line 10: I feel here is a good point to explain the meaning of high vs low CN values in this section rather than in page 25, lines 11-14.

Page 7 lines 24-25: Reference?

Page 8 line 1: What are the higher values that would be otherwise inferred?

Page 11 lines 6-8: Again you use passive voice, thus making it confusing: who recommends? If it is you, then explain why, otherwise provide citations.

Page 11 line 8: You may comment the quality of your data later in the manuscript.

Page 14 line 31: Which station do those temperatures refer to?

Page 20 line 26-onwards: You should cite Table 4 when mentioning the efficiencies.

6. Technical comments/suggestions:

Page 5 line 23: do you mean "compared the" instead of "compared to"?

Page 5 line 24: "area" instead of "areas".

Page 6 line 10: "increases" instead of "increase".

Page 7 line 32: "in" instead of "is".

Page 8 line 22 & 32: you may cite Table 1. You may also include the ranking in the supplementary Tables.

Page 9 line 3-4: Consider rephrasing, maybe: According to the above classifications, the dominant classes of permeability, land use/cover and drainage capacity, as well as the corresponding indices iperm, iveg, and islope (ranging from 1-5) are assigned for a given area.

Page 11 line 5: This makes it essential to...

Page 12 line 8: replace "are" by "is".

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Page 14 line 12-13: Consider rephrasing: In the last version of HYDROGEIOS, a modified efficiency index has also been introduced to account for. . .

Page 19 line 13: Omit “of” between “most” and “parameters”.

Page 19 line 24: I think you mean “combining” instead of “combing”.

Page 27 line 28-29: It is not very clear, do you mean: “and also makes it possible to take advantage. . .” ?

Page 27 line 33: “thus” instead of “this”.

Page 28 line 6: “CN” instead of “CN’s”.

Page 28 line 14: parameterisation: be consistent with your spelling.

Page 29 line 13: physically-based.

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