

## ***Interactive comment on “SCS-CN parameter determination using rainfall-runoff data in heterogeneous watersheds. The two-CN system approach” by K. X. Soulis and J. D. Valiantzas***

**Anonymous Referee #2**

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**Scientific Significance:** The manuscript proposes developing an additional parameter to the SCS Curve Number (CN) method to formalize runoff calculations from mixed cover watersheds. This contribution may have merit in engineering applications where the SCS method is preferred for historical reasons. However it does not advance forward modeling of hydrologic response, especially in ungaged watersheds.

**Scientific Quality:** This manuscript claims to test the hypothesis: “the observed correlation between the calculated CN value and the rainfall depth in a watershed reflects the effect of the inevitable presence of soil-cover complex spatial variability along water-

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sheds”. Yet the premise of the theoretical development is to develop a function which varies the aggregate watershed CN between the values of two CN parameters as a function of precipitation depth (P). The main purpose of this development is apparently to resolve the non-uniqueness of the CN required to calculate outflow for a given catchment over a range of P values with a new function. This is achieved by supplementing CN<sub>a</sub> with the new parameters, CN<sub>b</sub> and a representative area weighting factor,  $\alpha$ . The boundary CN values are intended to represent two homogenous subareas within a catchment. . It is not clear how this curve fitting exercise supports the hypothesis. Perhaps as important, how this approach is an advance on the USDA TR-55 method for superimposing CN synthetic hydrographs for subcatchments with uniform cover is not discussed in the manuscript.

**Presentation Quality:** The manuscript is not clearly written and needs substantial editorial attention to make the authors points more clear. Grammatical errors are also abundant throughout the paper and should be corrected. Examples from the abstract include:

P8964 line 4 “can be estimated by being selected from” should be revised for grammar

P8964 line 4-22 “it is more accurate to estimate the 5 CN value from measured rainfall-runoff data (assumed available) in a watershed. Previous researchers indicated that the CN values calculated from measured rainfall-runoff data vary systematically with the rainfall depth.” These sentences are contradictory.

P8964 line 11-12 “the inevitable presence of soil-cover complex spatial variability along watersheds is being tested” is unclear. Perhaps “spatial variability in soils and land cover”.

P8967 line 21-22 “make the CN be considered as a random variable” should be revised for grammar

Many of the figures have spelling errors, e.g. ‘envelop’, are difficult to read (Fig. 13),

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and vary widely in style and font selection.

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