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Influence of Curve Number variation on peak discharge of small catchment

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In this study, we have examined the impact of Curve Number variability on peak discharge, estimated with the use of lumped parametric model SEGMO. Analysis has been conducted for a small (82 km2) agro-forested lowland catchment, located in the center of Poland. Both, the curve number, which is determining runoff depth from rainfall depth, and the IUH characteristics (such as lag time, time to peak, maximum ordinate), which are used to transform the runoff depth into direct runoff hydrograph, have been estimated on the base of recorded in the catchment rainfall-runoff events (Banasik et al. 2011, Banasik et al. 2013). All of them include some stochastic variables, however IUH has been approximated, and used in computation as deterministic.
A big variability in CNs has been found, when they were computed from recorded rainfall-runoff data. Next, using the 40 rainfall-runoff data set, the curve numbers were computed again, for each of the ordered pairs, and finally plotted against rainfall depth. Curve numbers were found to approximate an exponential function, varying with storm depth (i.e. decreasing with rainfall increase), and approaches a constant value ($CN\infty$=69.8, which was very close to that value estimated on the base of soil type and land use) at higher rainfalls, what is call a standard behavior (Van Mullem et al. 2002). Standard error of estimation of CN was 1.54. The examination indicated high sensitivity of the flood discharge, estimated as catchment response to 100-year rainfall, to CN changes.

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