



Estimation of flood frequency by SCHADEX method - in Nysa Kłodzka catchment

M. Osuch (1), R.J. Romanowicz (1), E. Paquet (2), and F. Garavaglia (2)

(1) Institute of Geophysics Polish Academy of Sciences, Hydrology and Hydraulics, Warsaw, Poland (marz@igf.edu.pl),

(2) EDF/DTG, Grenoble, France

Estimation of design flood using Continuous Simulation (CS) has emerged as a very active research topic across academic institutions in Europe. CS is based on the use of rainfall-runoff models, of various complexity, for transforming precipitation data into river flow. By coupling a rainfall-runoff model with a stochastic rainfall model, Monte Carlo simulations can generate long series of synthetic rainfall being transformed into river flow from which flood frequency characteristics can be deducted. This approach is favoured by politicians and water managers, as it allows the influence of water management and climatic changes to be taken into account during the estimation of flood frequency curves. The other approach to FFA is based on the available historical maximum annual or seasonal flow data and consists of fitting theoretical cumulative distributions to observations. These theoretical, parameterised distributions are used in practical applications to derive flow quantiles with a desired probability of exceedence for the purpose of water management.

The aim of this work is an application of a continuous simulation approach to flood frequency analysis (FFA) using the Nysa Kłodzka catchment as a case study. The applied method is SCHADEX, a probabilistic method for extreme floods estimation which combines a weather pattern based rainfall probabilistic model and a conceptual rainfall-runoff model, within a stochastic event simulation framework. In that method, the distribution of areal precipitation is described by a compound probabilistic distribution based on weather patterns sub-sampling (MEWP distribution). These patterns represent synoptic situation and allow for disaggregation of heavy rainfall data into homogenous subsamples (Garavaglia et al. 2010 a and b). Extreme flood estimation is then achieved by stochastic simulation using MORDOR rainfall-runoff model. The resulting FFA curve is compared to an outcome of a seasonal maxima approach (recommended method in Poland).

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