MISSING DATA REPRESENTATION BY PERCEPTION THRESHOLDS IN FLOOD FLOW FREQUENCY ASSESSMENT

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Summary: Flood flow frequency analysis (FFA) plays one of the key roles in many fields of hydraulic engineering and water resources management. The output of the FFA are sets of flood quantiles which are the base for the next step of the flood related analyses. The reliability of these results depends of many factors, and the first one is the reliability of the input data - datasets of the annual peak flow. In practice, however, engineers often encounter the problem of incomplete datasets (missing data, data gaps and/or broken records). In this paper, we perform at-site focused analysis, and a complete dataset of annual peak flows from 1931 to 2016 at the hydrologic station Senta of the Tisa river we use as the reference dataset. From this original dataset we remove some data and thus we obtain 15 new series that have gaps of different lengths and locations. Each dataset we further subject to flood frequency assessment using USACE HEC-SSP Bulletin 17C analysis, which introduces the concept of „perception threshold" that can be used for missing data representation. For the data representation in HEC-SSP we use infinity for perception threshold upper bound and different lower bounds for all missing flows in one dataset, so that we create 56 variants of input HEC-SSP datasets. The flood flow quantiles assessed from the datsets with missing data and different perception thresholds we evaluate through percentage error relative to the reference dataset and confidence interval width as uncertainty measure. The results for datasets with one gap up to 23% of the observation period, indicate acceptable flood quantile estimates are obtained even for larger return periods, by setting a lower perception threshold bound at the value of the highest observed flow in the available series of annual maxima.

Keywords: Flood flow frequency analysis, Bulletin 17C, perception thresholds, missing data, HS Senta