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Development and comparison of two types of models for estimation of the flow duration curves in the ungauged basins in the Sava River Basin

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The main aim of this study was to develop, verify and compare two different type of models (or approaches) for estimation of flow duration curves for the ungauged basins located in the Slovenian part of the Sava River Basin. The Sava River contributes approximately 25% of the Danube's total discharge and has a drainage area of approximately 96 400 km2, which represents approximately 15% of the Danube River basin. In Slovenia, the Sava River basin forms the central part of the country and has a drainage area of approximately 11000 km2, which is more than half of Slovenia's teritory. Daily streamflow data for the period from 1991 to 2006 for all available gauging stations located in the Slovenian part of the Sava River Basin were used. We compared the modelling results for two types of approaches. The first approach consisted of fitting the flow duration curve for each of the gauging stations to the well known types of flow duration curve equations (models) and modelling the relation of the parameters of these empirically derived flow duration curve models to the geological, geographical, meteorological and other easily obtainable characteristics of the river (sub)basin. The other approach included development of individual models for each of the significant flow characteristic values from the flow duration curve (Q95, Q90 Q50, Q30, Q10 and Q5) by using the M5 data driven method (M5 machine learning method is used for generation of regression and model trees) and then combining the use of these individual models to produce a flow duration curve based on the use of easily obtainable characteristics of the river basin. The results were compared and tested both visually and numerically.