



Analysis of the rising limbs of the high flow events

L. Stravs, M. Brilly

Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia (email: lstravs@fgg.uni-lj.si, mbrilly@fgg.uni-lj.si).

Modelling the rainfall-runoff relation is a constantly evolving discipline in the field of hydrological science where different more or less successful approaches exist. Well known are conceptual models that are based on the prior knowledge of all the hydrological processes in the form of theoretically developed or empirically derived equations. With the help of machine learning method M5 for generation of regression and model trees we analysed how and to what degree the following attributes:

- total precipitation amount preceding the high flow event for each of the precipitation stations in the particular river basin,
- precipitation intensity for each of the precipitation stations in the particular river basin and
- flow rate Q_0 at the start of the high flow wave

influence the following characteristics of the rising limb of the high flow events:

- flow rate increase dQ for particular high flow wave,
- mean 'flow rate increase – duration of the rising limb' $[dQ/dt]_{MEAN}$ ratio and
- 'maximum flow rate increase – duration of the flow rate increase' $[dQ/dt]_{MAX}$ ratio.

Hourly precipitation and discharge data were used since times of concentration are rarely longer than one day on Slovenian rivers. We discovered patterns uncovering the

influence of these attributes on the rising limb of the high flow waves' hydrographs. Some of the obtained relations and results could also serve as a great helping tool for operational flood forecasters and can also help us to better understand the processes occurring in river basins at the time of the rising water levels of the high flow events.