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Precipitation interception modeling using machine learning methods at the experimental river basin Dragonja

L. Stravs (1), M. Sraj (1), M. Brilly (1)

(1) Faculty of Civil and Geodetic Engineering, University of Ljubljana, Jamova 2, SI-1000 Ljubljana, Slovenia (mbrilly@fgg.uni-lj.si)

The Dragonja River basin was chosen as an experimental river basin, since it is interesting because of the intensive natural reforestation in the last decades, which has caused a decrease in minimal and maximal flows. At the same time no noticeable precipitation and temperature changes have been perceived. The main intention of the research was to figure out the impact of reforestation on the water balance of the entire river basin. Precise measurements and analysis of individual components of the forest hydrological cycle were made. Contemporary measurement equipment was used. For this reason, two forest plots in the deciduous forest above confluence of the Dragonja and Rokava rivers were selected at the end of the year 1999. One is located on the north-facing slope (1419 m^2) and other on the south-facing slope (615 m^2). Measurements started in autumn 2000. Precipitation above the canopy, throughfall and stemflow was measured on both research plots. All mentioned quantities were measured automatically with digital recording of results every 10 minutes. Rainfall above the canopy was measured with a tipping bucket rain gauge and with a totalisator (manual gauge) for control. Throughfall was measured with two steel gutters in combination with ten manual gauges, which were emptied and moved randomly every time. The spatial variability of throughfall was captured in this manner. Stemflow was measured on two most typical species in each plot. In the north plot oak and hornbeam trees were selected, and ash and oak trees in the south plot. Each tree was fitted with a rubber collar around the stem. Precipitation, intensity and length of the rainfall events, air temperature and relative humidity, wind-direction and wind-power were also measured. Relative (to the rainfall) amount of precipitation interception by the forest was modeled using machine learning techniques (decision and model trees) and

new knowledge about hydrological processes in the experimental river basin Dragonja was learned. Results clearly show the influence of plot-orientation (north, south), the total amount of precipitation, temperature and the seasonal time of the year on the amount of precipitation interception by the forest.