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Application of the multiple correspondence analysis for the evaluation of rain event characteristics influence on rainfall interception

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Rainfall interception by birch (*Betula pendula* Roth.) and pine (*Pinus nigra* Arnold) trees was measured in small urban park in the city of Ljubljana, Slovenia from beginning of the year 2014. Three and a half years of measurements of throughfall, stemflow and rainfall in the open were analyzed to estimate the influence of rain event characteristics on rainfall interception. A new approach using multiple correspondence analysis (MCA) was implemented. MCA is a multivariate statistical method for descriptive rather than quantitative variables, and can be used to estimate the relationship between the variables. The results are presented using diagrams, in which the proximity of the variables corresponds to their interdependence and the location of the variables (positive or negative domain) corresponds to their positive or negative correlation. The analysis included information from 176 events, showing the relationship between rainfall interception of birch and pine trees and rainfall amount, duration and intensity, wind speed and direction, drop number and median volume diameter (MVD), expressing raindrop size. The numerical values of the variables were transformed to the descriptive ones using classes regarding the threshold values of the variables (more or less than threshold), which was determined through sensitivity analysis. The thresholds were 6 mm for rainfall amount, 4 h for duration and 1.8 mm/h for intensity, 1.3 m/s for wind speed, 8 cardinal directions for wind direction, 1.5 mm for MVD and 10,000, 50,000 and 100,000 raindrops for their number. The MCA again showed the dominant influence of the rainfall amount, as the ratio of rainfall interception to rainfall amount decreases with increasing rainfall amounts. MCA including the wind characteristics gave a new insight into its influence on rainfall interception. The results expressed two new directions of occasional wind corridor according to the nearby buildings which were not visible using other methods of data analyses. The presented analysis, using MCA, confirmed results of previous analyses using other methods and offered a new insights into the process.