Key words: autocorrelation, low flow, low flow deficit, low flow duration, Mann–Kendall test, Pit Under Threshold

Summary

The main goal of this study is to assess the long-term dynamics of low flows occurrence in catchments located in different environment conditions: mountain river: Wisłoka and its tributaries and upland river: Upper Wieprz with tributaries. Analysis of low flows occurrence was based on variability of basic low flow characteristics (duration time and volume of low flow episode) in period 1983–2013. In studied period, more low flows occurred in mountain rivers, however the time of duration was shorter than in upland area. On uplands, more years without low flow episodes were observed. For stationary of annual series analysis Shapiro–Wilk, Ljung–Box and Mann–Kendall tests with autocorrelation correction were used. About half of studied series does not complete the terms of normal distribution. For this reason, trend studies were performed by using nonparametric tests. Mann–Kendal test showed descending trends in almost all gauging sections located in upland region and only in one located in mountain rivers. In half of series there was a significant, confirmed by Ljung–Box test, first rank autocorrelation – in both duration time and volume series. It was found that in tested series, there were two types of autocorrelation function. First type of function, that occurred mainly in upland area, was characterized by long-term memory, where similar periods last for about 10–11 years. In other cases, ACF indicated a short memory of episodes and occurred in catchments with higher flow dynamics.