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GROUNDWATER RESPONSE TO CHANGES IN PRECIPITATIONS IN NORTH-EASTERN ROMANIA

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Abstract

Changes in the climatic and hydrological variables in North-Eastern Romania indicate that the region has mostly a common evolution in terms of precipitation and hydrostatic level of groundwater. This can influence human communities in the region, given that sources of public water supply are predominantly from underground. In the analysed region with more than 8.000 sqm, 50% of the population lives in the rural area, where the main water supply source is provided by the underground water, mainly from individual wells with depths between 1 and 10 meters (only 10% from the rural population is connected to a centralized water supply system). That means the underground water resources are subject to overexploitation, especially given the prevailing economic activities associated with agriculture and construction involving high water consumption, predominantly from underground. Seasonal and annual data series of precipitation and hydrostatic level over a period of 31 years (1983-2014) and collected in 36 hydrogeological stations (73 wells) and three weather stations have been used. The trends were detected by employing Mann-Kendall test and Sen's slope, and the correlation between the two variables was performed based on Bravais-Pearson correlation. The main results of the paper are: increasing trends are dominant both for annual and seasonal data sets of precipitation, but the great majority of the slopes detected are not statistically significant. In winter, precipitations have a decreasing trend and the slopes are statistically significant. In terms of hydrostatic level, most of the trends detected for near-surface wells are decreasing, while in depth, increasing trends are dominant; the most important change was seen in the deep gap between 200 and 300 cm; correlation between precipitation and hydrostatic level is stronger and more frequent for summer (more than 86% of pairs were found statistically significant) and autumn (more than 80%), and is fable and less frequent for spring and winter due to trans-seasonal distribution of precipitation.

Key words: climate changes, groundwater level, precipitation

Received: February, 2016; Revised final: February, 2017; Accepted: February, 2017

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