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2.1
Global climate change and water budget

title: **Spatial and temporal changes in groundwater runoff development in the Nitra River Basin, Slovakia**

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Changes in surface and groundwater extremes occurrence and their severity are observed more frequently in Europe in the end of the 20th Century and in the beginning of 21st Century (Hisdal et al., 2001; Briffa et al., 2009) in connection to climate changes (Bloschl et al., 2007). Methodology of streamflow and groundwater drought evaluation was published by Tallaksen and van Lanen Eds. (2004). A lot of local studies for various countries were published recently. Studies of streamflow drought in Slovakia were published by Majercakova et al. (1997), Demeterova and Skoda (2009), Fendekova et al. (2009), and by others.

Groundwater runoff spatial and temporal changes were studied in the Nitra River Basin (Slovakia) complemented by study of changes in selected physical and chemical parameters of surface and groundwater. Drought propagation through the hydrological cycle was studied starting with meteorological drought occurrence in four main sub-basins of the Nitra River Basin — in the Upper Nitra, Bebrava, Zitava and lower Nitra.

Parameters of surface and groundwater drought were derived using the threshold level method for streamflow and baseflow values, as well as for groundwater levels. Baseflow values in a daily step were calculated using the local minimum method for different length of N-day period (5–30 days) using the BFI+2 program (Gregor, 2008). Groundwater runoff estimated by method of Kille was used as a reference value.

Occurrence of groundwater drought periods was analyzed stressing the differences in surface and groundwater drought duration, as well as the time shift between the starting and ending dates. Spatial propagation of groundwater drought downstream the Nitra River basin, as well as temporal development of groundwater drought frequency was studied; being complemented by study of seasonal changes in basic physical and chemical parameters of the surface and groundwater.

Important differences between the groundwater drought occurrence in four studied sub-basins was proved, the increased occurrence of drought periods was documented since nineties of the 20th Century and in the period 2002–2008, being more severe in the lower part of the Nitra River Basin and in the Zitava River sub-basin.

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