



Comparison of base flow estimation using two hydrological models and some hydrological programs in the terms of groundwater drought assessment

Andrej Machlica, Oliver Horvat, Milos Gregor, and Miriam Fendekova

Faculty of Natural Sciences, Comenius University in Bratislava, Department of Hydrogeology, Bratislava, Slovakia
(machlica@fns.uniba.sk)/+421260296701

Reliability of groundwater drought identification depends on suitable methods and input data. Often, base flow values derived from the total flow by different equations are used for groundwater runoff estimation. However, there could be some differences between real natural conditions and estimated results. Another possibility for groundwater runoff estimation offer hydrological models and hydrological programs. In the study, base flow estimated by two hydrological models BILAN (Kasperek in Tallaksen and van Lanen Eds., 2004) and FRIER (Horvat, 2008) were compared with results of new hydrological programs BFI+3.0 and FlowComp 2.0 which are included in new developed hydrological package named HydroOffice (Gregor, 2009). The conceptual model BILAN has been developed to simulate components of the water balance in a catchment, the FRIER model is a rainfall-runoff model with distributed parameters. The BFI+3.0 and FlowComp 2.0 programs are included in the HydroOffice package which is highly modular and orthogonal free software package for users interested in water sciences. It actually contains hundreds of functions, grouped into independent modules (www.hydrooffice.org). Daily discharge data are needed for base flow estimation by BFI+3.0 and FlowComp 2.0. Solutions by hydrological models BILAN and FRIER need at least data on precipitation, temperature, air humidity, discharge. Data on cloudiness, sunshine duration and snow cover are needed but it is not strictly necessary for FRIER model runs. The main reason why models and programs were compared was to find the simply way how to estimate the base flow values, which could be compared with total water balance at next steps. Threshold level method and SPA method were used for groundwater drought identification. Both methods are included in hydrological package HydroOffice. The main issue of this methodology is to point out at the fact that some methods for groundwater drought identification are more suitable and some less. There are a lot of factors which could be included to the proper interpretation of drought but also in base flow.

Acknowledgments: this work was supported by FP6 Project 036946 WATCH.

References

- Kasperek, L. 2004: Lumped physically-based models in Tallaksen, L.M., Van Lanen, A.J. Hydrological drought. Processes and estimation methods for streamflow and groundwater. Development in water science 48, Elsevier, 2004, pp. 579.
- Horvat, O. 2008: Description of The Rainfall-Runoff Model FRIER, Podzemna voda, Vol. XIV, No. 1, SAH Bratislava, 37 – 45
- Gregor, M. 2009: The potentialities of programming usage in hydrogeology. Rigorous thesis, Department of Hydrogeology, Faculty of Natural Sciences, Comenius University in Bratislava, pp. 68, [in Slovak with English Summary], www.hydrooffice.org