



Analysis of the effects to Groundwater heads in the Upper Danube Catchment due to change in climate and landuse

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Understanding the interaction between climate and groundwater bodies (GWB) has become increasingly important when considering the effects of climate change. The analysis of changing groundwater levels over the last 30-100 years in the Upper Danube catchment has provided a wealth of information about the behavior of different GWB, their reaction to climate change, and possible future trends. Furthermore, influences due to landuse, unsaturated zone thickness and surface water can be derived through groundwater time series analysis. Within the GLOWA-Danube project (Barthel et al., 2005) time series data from over 1000 observation wells were collected in order to provide an extensive basis for further investigation.

A first comparison clearly indicated that individual observation wells respond strongly to regional and seasonal factors. Observation of the moving average of long-term time series data of near surface quaternary regions show the influence of long wave fluctuations which may normally remain unnoticed due to strong seasonal changes. Besides the effects of the dry summer 2003, an apparent autocorrelation with a lag time of approximately 7 years can be noticed throughout the catchment.

This work presents the first results of an in-depth statistical analysis investigating the relationship between groundwater level fluctuations, and regional and site specific factors such as land use and geology. The assumption is made that GWB with similar regional and site specific factors show a similar behavior of their groundwater level fluctuations. On the basis of the obtained study results, a concept for modeling changes in

groundwater coupled with regional climate change scenarios is to be developed. Such a concept must be able to include the relationships between both key processes and regional factors in a manner which allows for the regionalization of transfer functions. An approach similar to the hydrologic study carried out in the well-known “Predictions in Ungauged Basins” initiative will be applied.

Literature

R. BARTHEL, V. ROJANSCHI, J. WOLF, J. BRAUN (2005): Large-scale water resources management within the framework of GLOWA-Danube. Part A: The groundwater model. - *Physics and Chemistry of the Earth, Volume 30, Issues 6-7, 2005, Pages 372-382*