



Methods for assessing hydrogeological similarity and for classification of groundwater systems on the regional scale

Ezra Haaf and Roland Barthel

University of Gothenburg, Department of Earth Sciences, Gothenburg, Sweden (ezra.haaf@gu.se)

Conducting groundwater modelling and resource analysis on the regional scale is often complicated by the scarcity and uneven distribution of observations over space and time, the uncertainty of structures, inputs and processes as well as the inherent heterogeneity and variability of hydrogeological conditions. In order to improve modelling and prediction of poorly-observed groundwater systems, information could be transferred from similar, but more well-explored and better understood systems analogous to PUB (Prediction in ungauged catchments). To achieve this, the overarching goal of this study is to develop an approach to statistically extract relevant information on structure and state from observed and well characterized locations in order to derive a classification scheme of functionally similar groups. At the core of the approach will be the classification of (i) static hydrogeological characteristics (such as aquifer geometry and hydraulic properties) (ii) dynamic changes of the boundary conditions (such as recharge) and (iii) dynamic groundwater system responses (groundwater head and chemical parameters) as well as the systematic use of the dependencies of system responses on explanatory factors. With a classification framework in place, insight can be gained into the behavior of less well-observed groundwater systems and underlying processes can be better understood. Furthermore, it is expected that regional conceptual models can be checked without the need of numerical groundwater models as well as that missing values in time series can be filled.

Apart from illustrating the general approach and the main ideas of groundwater systems classification, we show a number of promising methods that can be used to establish a classification framework for groundwater systems assessment. The focus at the current stage is on finding relevant statistical methods that can be used for identifying and quantifying similarities/dissimilarities of groundwater hydrographs. Furthermore, the methods are compared to a visual classification as a reference. The presented methods can be seen as a starting point to develop the above mentioned comprehensive framework for groundwater assessment on the regional scale based on similarity.