



An approach for classification of hydrogeological systems at the regional scale based on groundwater hydrographs

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When assessing hydrogeological conditions at the regional scale, the analyst is often confronted with uncertainty of structures, inputs and processes while having to base inference on scarce and patchy data. Haaf and Barthel (2015) proposed a concept for handling this predicament by developing a groundwater systems classification framework, where information is transferred from similar, but well-explored and better understood to poorly described systems. The concept is based on the central hypothesis that similar systems react similarly to the same inputs and vice versa. It is conceptually related to PUB (Prediction in ungauged basins) where organization of systems and processes by quantitative methods is intended and used to improve understanding and prediction. Furthermore, using the framework it is expected that regional conceptual and numerical models can be checked or enriched by ensemble generated data from neighborhood-based estimators.

In a first step, groundwater hydrographs from a large dataset in Southern Germany are compared in an effort to identify structural similarity in groundwater dynamics. A number of approaches to group hydrographs, mostly based on a similarity measure - which have previously only been used in local-scale studies, can be found in the literature. These are tested alongside different global feature extraction techniques. The resulting classifications are then compared to a visual “expert assessment”-based classification which serves as a reference. A ranking of the classification methods is carried out and differences shown. Selected groups from the classifications are related to geological descriptors.

Here we present the most promising results from a comparison of classifications based on series correlation, different series distances and series features, such as the coefficients of the discrete Fourier transform and the intrinsic mode functions of empirical mode decomposition. Additionally, we show examples of classes corresponding to geological descriptors.

Haaf, E., Barthel, R., 2015. Methods for assessing hydrogeological similarity and for classification of groundwater systems on the regional scale, EGU General Assembly 2015, Vienna, Austria.