

Definition of new indicators for the characterization and classification of karst aquifers using discharge time series

Hakoun V, Bailly-Comte V, Charlier JB, Ladouche B, Maréchal JC

The aim of this abstract is to characterise and classify the hydrodynamic behaviour of karst springs using the main information contained in the karst spring flow records, with robust indicators. This work has been carried out in the framework of the GeoERA RESOURCE project (<https://geoera.eu/projects/resource9/>) which aims at demonstrating the potentials of the harmonization of information about Europe's groundwater resources.

In a first phase of characterisation, we seek to determine the main information contained in the karst spring flow signal. To do this, we apply and compare the values of indicators used in karst hydrogeology on daily time series of 35 French karst springs. This comparison allows us to identify three major pieces of information: the magnitude of the flow, the inertia of the flow variation and the capacity of the aquifer? to drain over the long term. In addition, it allows us to propose 3 robust indicators to describe this information: the mean flow, the ratio between the standard deviations of filtered discharge time series using a 250 days moving average filter to the raw time series, and the ratio between percentiles 0.25 and 0.5.

In a second phase of classifications, we seek to propose a 2-dimensional classification scheme that allows us to describe the karst groundwater resource availability (KGRA) at a karst spring and its capacity to sustain a minimum flow over the long term. In order to describe KGRA, a new indicator that combines the average flow and the inertia of the hydrosystem is proposed. This KGRA indicator and the ratio of percentiles are finally used in the classification scheme that is applied to French karst springs. Overall, this relative classification scheme informs on groundwater availability and resilience of karst springs.