



On the hydraulic characterizing of the quaternary sedimentary media of Bucharest City

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The hydraulic conductivity of geological media is a complex property to describe. This property can change many orders of magnitude over short distances as it is even considered to be dependent of the observation scale. Current trends of hydrogeology studies show an increase need of geospatial databases. Such databases usually store, in a coherent and logical structure, different types of information (such as geological hard/soft data, hydraulic properties of the geological facies, stress factors and boundary conditions).

An optimal use of the geospatial databases for groundwater flow modeling for example, will require exploring extended possible uses of the stored information. For clastic sedimentary rocks, considering that measured values of the hydraulic properties are not always available simultaneously with lithological data, it will be practical to estimate or to predict a domain of variation of such properties on the basis of the lithological description. Consequently, indirectly estimated values or variation domains of the hydraulic conductivity should be deduced by using the lithological description data. Such values can be used to verify models parameterization obtained by applying inverse calibration techniques or will reduce manual calibration efforts by providing narrow trial and error intervals.

The present study gives an approach that can be used to characterize sedimentary media in terms of hydraulic conductivity on the basis of the lithological description. This relies on the results of a statistical analysis of a set of 647 well specific capacity tests conducted in quaternary clastic rocks (southeastern part of Romania) combined with a lithological description adaptation procedure. The analysis of hydraulic tests allowed the determination of statistical parameters of the hydraulic conductivity of basic lithological materials. As for the lithological description adaptation procedure, it transforms a complex lithology description into a set of basic lithology categories which are in turn well characterized hydraulically. Such simplifications were necessary due to the complexity of the lithological description used to store geological data into the hydrogeological geospatial data.

As application, the proposed approach is used to elaborate an urban groundwater flow model for a pilot zone in Bucharest city. The approach provided inputs for an inverse modeling using pilot points method. A second application is also presented where the proposed procedure for parametrizing the sedimentary media is used to assess the spatial distribution of the exchange flow rates between two overlaid aquifer units encountered in Bucharest City.