

Application of the regional groundwater flow concept in the hydraulic evaluation of a partially confined carbonate area (Budapest, Hungary)



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ABSTRACT

The main focus of this work was the investigation of groundwater flow systems at Budapest (Hungary) and in its western surroundings where an active hypogenic karst area, the Buda Thermal Karst can be found. During the research, hydraulic interpretation of measured, pre-production well data was carried out by the joint application of pressure versus elevation [p(z)] profiles, tomographic fluid-potential maps, and hydraulic cross-sections. The application of these basic hydrogeological research techniques has resulted in a transparent, regional flow pattern representing gravitational flow systems in a topographically and geologically complex area built-up by confined and unconfined carbonates, which proved to be hydraulically continuous. Namely, heterogeneities of the hydrostratigraphic build-up (i.e., aquitard units, faults) do not cause compartmentalization in the flow field, just intensify vertical hydraulic gradients which otherwise depend on the flow regime (i.e., recharge or discharge), and generate typical p(z) profile patterns and fluid-potential anomalies on tomographic fluid-potential maps and hydraulic cross-sections. Consequently, the previously well-known location of natural discharge areas, as well as the differences in the discharge distribution (one and two-component) and related cave forming processes between them could be explained. In addition, among the premises of hypogenic karstification, regional upward flow conditions were confirmed along the main discharge zone of the area.

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