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Improving pumping test interpretation in karst aquifer by diagnostic plot method

Study of groundwater resources using pumping test started with Theis solution. It allows estimating the hydraulic parameters of porous aquifers such as transmissivity and storage coefficient from the water drawdown. Various methods exist to interpret well-test for different boundary conditions in porous or fractured aquifers. Assumptions are still needed to apply the Theis solution and its derivatives to karst aquifers. The diagnostic plot method is a method to assist hydrogeologist to interpret the pumping test. It appears to be useful to identify flow regime and discriminate conduit and matrix flows in karstic aquifers.

This study aims to carry out pumping test and apply diagnostic plot method in two geological settings to improve the hydrogeological understanding of karst aquifer. We also discuss how the diagnostic plot method enhances the classical pumping test interpretation.

This study concerns the carbonate aquifer of the Huveaune watershed near Marseille city in southern France, including the recharge area of the main regional spring Port-Miou. We use a database of pumping tests performed in two geological contexts: an alluvial confined aquifer with channels and a carbonate aquifer located in the surrounding of a large polje showing the karst evolution of the local environment. Results will open perspectives for groundwater management for water supply in this Mediterranean region.

Keywords: pumping test, diagnostic plot, SNO Karst