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Extended Abstracts

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5.1
Modelling as a tool of groundwater assessment

title: **Estimating transmissivity from specific capacity for artesian aquifers in the middle Venetian alluvial plain (NE, Italy)**

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INTRODUCTION

In the northern high Venetian plain a single unconfined aquifer is present and its water table is located at depths of 50–100 m. Further south the water table intersects the topographic level, creating a series of plain springs called "fontanili" and marking the passage between the high and the middle Venetian plain. Downstream from the "fontanili" line the differentiation of the cover determines a multi-layered aquifer system resulting from depositional events of alluvial materials and marine transgressions.

The studied area is located in this middle Venetian plain in the provinces of Venice and Treviso covering an area of about 200 km^2.

Here we have identified 10 superimposed aquifers (from 15 to more 300 meters in depth), and except the first all the other aquifers are artesian with a spontaneous flow.

METHODOLOGY

In order to calculate hydrogeological parameters of these artesian aquifers, we have carried out some pumping tests on private wells (2 inches), both aquifer tests, using a well and a piezometer, and well tests (step drawdown test). In the site where was conducted the aquifer test was always carried out a step drawdown test. All the tests were made using digital manometers to monitoring the potentiometric levels.

During the aquifer tests the potentiometric level variation in time into a piezometer located near the pumping well was monitored, instead during a well test the pressure variation, changing the flow rate, was measured into the pumping well.

Empirical formulas Transmissivity vs Specific Capacity, derived from literature (Christensen, 1995; Razack and Huntley, 1991; Srivastav et al., 2007) and obtained in our similar stratigraphic zone, were considered processing well tests data. Results indicate underestimation of the transmissivities comparing them to the aquifer test results.

Considering the quicker well test respect to a classic aquifer test and the opportunity to execute a lot of well tests, we take into account the necessity to introduce a specific empirical relationship between aquifer and well test in presence of these 2 inches private wells and an essentially gravel composition reservoirs.

The obtained relationship (Fig. 1) come from a correlation on the same site between aquifer tests transmissivity (T) and Specific Capacity, considering only the aquifer loss (Δ) in the well performance equation, obtained by a well tests. It's a linear-type formula: $T = m\ Q/\Delta + b$, where m and b are respectively the angular coefficient and the intercept value, Q is the flow rate and Δ is only the aquifer loss. The regression was calculated by the R code (R Development Core Team, 2009), which is a free software environment for statistical computing and graphics.

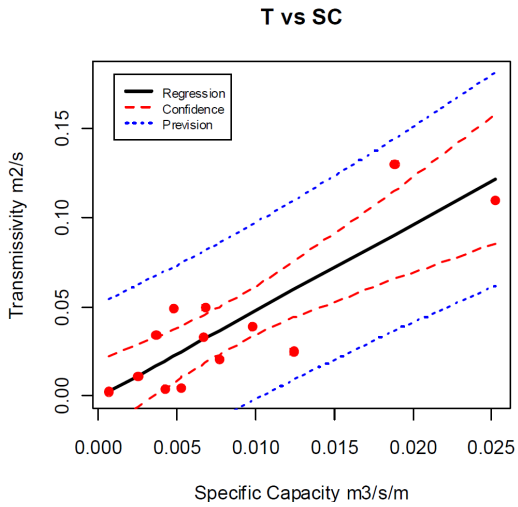

Figure 1. Linear regression Transmissivity vs Specific Capacity.

CONCLUSION

At present this relationships, still under development, presents a good regression coefficient $R^2 = 0.72$ and a residual median of –0.0001469. This experimental relationships is suitable for the hydrogeological characteristics of the middle Venetian plain, where gravel aquifers are present and for the well characteristics drilled in this area (artesian wells with a diameter of 2 inches).

The principal advantage in this relationship is to obtain a plausible transmissivity value performing only a well tests. Thus by a quick and relatively simple test, compared with a more precise but also more complex to execute aquifer test, the transmissivity distribution in a large area can be investigated.

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