Geophysical Research Abstracts
Vol. 14, EGU2012-9157, 2012
EGU General Assembly 2012

A new simulation model to evaluate interaction between neighbouring hydro-geothermal installations developing the deep Malm aquifer in the Munich region

J. Bartels (1), F. Wenderoth (2), T. Fritzer (3), B. Huber (4), M. Dussel (5), E. Lüschen (5), R. Thomas (5), and R. Schulz (5)

(1) Geothermie Neubrandenburg GmbH, Seestrasse 7 A, D-17033 Neubrandenburg, Germany (bartels@gtn-online.de), (2) AQUASOIL Ingenieure & Geologen GmbH, Standort Berlin, Joachim-Friedrich-Strasse 48, D-10711 Berlin, Germany, (3) Bayerisches Landesamt für Umwelt, Lazarettstrasse 67, D-80636 München, Germany, (4) HydroConsult GmbH, Afragässchen 7, D-86150 Augsburg, Germany, (5) Leibniz Institute for Applied Geophysics, Stilleweg 2, D-30655 Hannover, Germany

Currently, the Molasse basin (Bavaria) is the most dynamically developing „Geothermal region" in Germany. This is particularly relevant considering the cogeneration of heat and power.

For a profitable operation very high production and reinjection rates of the geothermal well doublets or triplets are required as the energy source to such installations. This implies drilling targets with excellent structural and facial conditions, i.e. fault zones or reef areas. In turn, this forces special spatial arrangements of neighbouring well doublets which lead to mutual hydraulic influence. Hydraulic interaction is expected to increase because of an increasing number of installations in the nearest future. The new simulation model presented here allows for a quantitative analysis of the current state, for the first time on a scale larger than a single project.

The model covers an area of 57 x 47 km around Munich. On the one hand it is based on a detailed revision of the existing structure and hydrogeological models. To initialize the numerical model a simplified, generalized layer structure of the aquifer was derived from all available well data ("standard profile").

On the other hand a 3D-seismic survey was carried out in the core region of the new model SW of Munich (5 x 7 km). Within the context of the revision of existing 2D seismic results in the other parts of the model area layer structure and fault zones were determined from this data. Furthermore, a facies variation map was derived from 3D-seismics and a 2D-seismics reevaluation. It was applied to "overwrite" the hydraulic conductivities of the standard profile within the affect-ed layers.

The complex model structure and the achieved quality of model calibration are presented. Already in the stage of model calibration, hydraulic interaction between operating or tested wells was a key feature.

Model calibration led to an improvement of the structural and parameter model of the geothermal reservoir in the following fields
- Influence of the preferred flow across fault zones
- Regional variability of the hydraulic conductivity in main inflow horizons of the wells

A surprising result is that in the course of calibration the standard profile had only to be altered in large scale patterns and only in the main inflow horizons of the wells.

By implementation of an improved hydrogeological and structural model as described and calibration with the complete set of well test data in addition to data of operating installations an improved ability in predicting the influence of operation of future geothermal power and heating plants is provided. Such a prognosis is demonstrated by an example scenario.