Geophysical Research Abstracts
Vol. 12, EGU2010-10101-2, 2010
EGU General Assembly 2010

A proposed new method for inferred geothermal resource estimates: Heat in Place Density and local Sustainable Pumping Rates

J. Florian Wellmann (1,2), Franklin G. Horowitz (1), Hagen Deckert (2), Klaus Regenauer-Lieb (1,2)

(1) Western Australian Geothermal Centre of Excellence, University of Western Australia, School of Earth and Environment, Crawley, Australia (wellmann@cyllene.uwa.edu.au, 08 64887321), (2) Institute of Geothermal Resource Management (igem), Am Langenstein 21, D-55411 Bingen

Heat in place analysis and estimates of sustainable pumping rate are standard methods in geothermal exploration of hot sedimentary aquifers and enhanced geothermal systems. Shortcomings of the standard method are: (1) the available heat in place is evaluated for a whole resource area (large scale), obliterating gradient information in available heat; (2) sustainable pumping rates are only performed for one particular target location (local scale) rather than providing a map of sustainable rates for the entire reservoir. Both factors are important for assessing the choice of location and commercial viability of a potential geothermal plant. We present here a method to overcome this scale dependence and propose that it is possible to evaluate both heat in place and estimates of sustainable pumping rate on a map basis.

Our approach is integrated into a workflow that incorporates geological modeling and fluid and heat flow simulation of a broad resource area. The results of the simulation are used to evaluate the heat in place density at every location. To upscale the estimations of sustainable pumping rates, we developed an approach that allows location-based calculations everywhere in the resource area, also taking into account the results of the flow simulation. We thus obtain maps for both factors. These can be directly used to analyze viability of promising targets.

We apply our workflow and analysis to a typical hot sedimentary aquifer setting and demonstrate the application from the initial geological modeling to the flow simulation and finally maps of heat in place density and sustainable pumping rates. As the analyses are integrated into one workflow, a direct model and analyses update is possible when new data becomes available. It is thus an ideal tool for early exploration stages.

As our approach resolves the scale difference between heat in place and sustainable pumping rate estimates, and provides both analyses in a map view, it has the potential to be a valuable tool to identify optimal targets in a hot sedimentary aquifer resource area.