Q-con GmbH

News

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Using induced seismicity as pressure gauge for in situ reservoir pressure

Induced earthquakes occurring in subsurface reservoirs carry information on in situ stress and pressure conditions. Q-con has developed a new methodology called SHPM to retrieve this information. We have demonstrated the performance of SHPM for a geothermal reservoir in the Cooper Basin, where pronounced induced seismicity has occurred (see Baisch, 2020).

While we were able to prove the concept of SHPM with this data example, on open question remained to what extent results can be transferred to other subsurface reservoirs.

Within the framework of the H2020 research project S4CE we have conducted a new study evaluating the performance of SHPM when applied to other geothermal reservoirs.

The study indicates that SHPM can resolve the temporal 4-D evolution of *in situ* hydraulic pressure changes on a reservoir scale in all our test cases, even when initial stress conditions were strongly heterogeneous within the reservoir. The resolution of the 4-D hydraulic pressure scales with the intensity of the seismic activity and becomes limited if only few earthquakes have occurred.

Our results indicate that SHPM can become an important tool for calibrating numerical models of geothermal and hydrocarbon reservoirs, where induced seismicity is pronounced. We have published our results here.

Temporal evolution of in situ hydraulic pressure in the Paralana (Australia) geothermal reservoir during fluid injection. Small inset in upper figure left shows reservoir boundaries in map view as well as location of injection (star). Colored pressure curves show temporal pressure evolution at the colored locations in the inset. Bottom plot shows injection pressure measured at the well head.