THE HYDRORIFT EXPERIMENT

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Abstract

Understanding the behaviour of fluids in the deep upper crust and at the brittle/ductile crust transition is of importance regarding both academic and industrial fields. Hydric fluids are thought to play a major role in the seismogenic cycle, mainly by decreasing friction along major faults. However, considering the complexity of the gouge at large seismogenic faults, fluids are evidently involved in other processes such as hydrofracturing before and during the fault slip and volume variations due to phase changes. This complexity is increased in supercritical conditions due to the compressibility and high enthalpy of supercritical fluids. Regarding the industrial point of view, the exploration and exploitation of deep hydric fluids is a recent challenge, partly motivated by the working out of conventional shallower reservoirs in geothermal areas but mainly due to their high energy potential. The HYDRORIFT experiment is part of the French project GEOFLUX that aims at understanding the behaviour of fluids in the deep upper crust using a range of different methods (e.g. in situ geophysical data, 3A-press rock mechanics experiments, physical, numerical and analogical modelling) The GEORG project (Geothermal research group) and HS ORKA support the project.

The HYDRORIFT experiment involves both ISOR (Iceland GeoSurvey) and a group of French GEOFLUX scientists in a geophysical experiment on the Reykjanes Peninsula in Iceland including both high-resolution TEM/MT studies and seismic tomography. This study follows a previous successful five-month seismic experiment in the same area (Geoffroy and Dorbath, 2008). The objective is to better stress the significance of the velocities anomalies discovered in the area following the 2005 experiment (notably beneath Kleifarvatn Lake) and to reach a more accurate physical knowledge of the geometry and time-evolution of the different fluid reservoirs within the active rift zone in Iceland. An array of 30 seismic stations, including three broadbands, was deployed in May 2009 for a six-month period. We present the details of the new seismic experiment as well as our first results mixed with those of the 2005 experiment.

Reference

Geoffroy L. and C. Dorbath, 2008, Deep downward fluid percolation driven by localized crust dilatation in Iceland, *Geophysical Research Letters*, 35, 1-6.