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The GEISER project: Analysis of induced seismicity in the Reykjanes geothermal system, SW-Iceland

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The GEISER (Geothermal Engineering Integrating of Induced Seismicity in Reservoirs) project is funded by the European Commission, and addresses one of the major challenges the development of geothermal energy resources is facing, induced seismicity in geothermal reservoirs.

At Iceland GeoSurvey, data from three geothermal sites in Iceland, Hengill, Krafla and Reykjanes, are being investigated as part of the GEISER project. These sites are situated in a comparable volcanic setting, but with very different seismic response to injection. They, therefore, offer a great opportunity to study the influence of particular parameters on induced seismicity.

Two large geothermal power plants are currently in operation on the Reykjanes peninsula, in Svartsengi and Reykjanes. Operation in Svartsengi started in 1976 and injection started in 1984. Operation in Reykjanes started in 2006 and injection started in 2009. In additon to the national seismic network, a local seismic survey was operated by the University of Iceland, and the University of Wisconsin, in Reykjanes from December 2008 until May 2009. Around 320 earthquakes have been located during that period. The seismic dataset consists of continuous waveforms from 11 seismic stations around the tip of the peninsula. The seismic activity is currently being analyzed, with relocation of earthquakes using the double-difference algorithm, evaluation of focal mechanisms of the earthquakes, and investigation of the relationship with injection and production data and the geological setting. Preliminary results of the analysis will be introduced at the conference.