GeoThermal ENGINEERING

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GeoTief – development of an automated sampling device and data processing software

Gas sampling at fumaroles at the summit of Mount Bakers, US state of Washington.
Source: W. Chadwick - Archived United States Geological Survey link, https://commons.wikimedia.org/w/index.php?curid=3491081

Information:
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Status: Completed

Project description:

In the geothermal energy sector, fluid samples are mostly taken occasionally and manually. A high number of the world's geothermal areas are difficult to access and sampling involves considerable efforts. Incorrect sampling and/or inadequate storage of fluid samples frequently causes unsuccessful analyses. In most cases, repeat sampling is time-consuming and associated with high costs.
During the exploitation of a geothermal reservoir, fluid samples are usually only taken during the production test after drilling the first well and in the event of changing operating parameters. In one federal state of Germany, however, there exists now the requirement to monitor groundwater quality at the drilling site with monitoring to start before drilling the first exploration well.

The objective of the research project GeoTief was to develop an automatic sampler for all types of low-enthalpy fluids (cold groundwater and thermal water of hot springs and geothermal wells) and an automated data processing software for all types of geothermal fluids (low- and high-temperature resources). The automatization of sampling is beneficial for long-term monitoring of groundwater wells (environment) and hot springs at the flank of volcanoes (hazard assessment) as well as for individual sampling by less experienced geoscientists and assures a reliable and reproducible sampling procedure. The GeoTief sampler (now called GEO AFS) was designed for samples mainly for the analysis of fluid chemistry and

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selected isotopes as well as continuously records via flow-through chamber of the on-site parameters e.g. temperature, pH-value, electrical conductivity, redox potential (E_h-value) and flow rate. The automated and guided data processing is beneficial for less experienced geoscientists dealing with chemistry and isotope data for assessment of geothermal resources.

The sampler was tested at three groundwater wells in Germany. The analytical results of the samples taken automatically were crosschecked with manually sampled fluids of the same site. To our satisfaction, the laboratory analyses showed better results with the automatic sampling device!

The project was initiated by GeoThermal Engineering GmbH (GeoT) and was implemented in cooperation with the engineering company Roth & Partner GmbH. GeoT was the geoscientific coordinator of the project and defined a catalogue of requirements for the design of the automatic sampler and the selection of suitable test sites. Furthermore, GeoT was responsible for the manual sampling and the supervision of the automatic sampling as well as the evaluation of the analytical results and the development of the automated and guided processing software for chemistry and isotope data.

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Project partners

- GeoThermal Engineering GmbH, Karlsruhe
- Engineering Company Roth & Partner GmbH, Karlsruhe

Company profile

GeoThermal Engineering GmbH (GeoT) is an engineering consultancy and project developer specialized on deep geothermal energy projects. The company joins a professional and qualified team of geoscientists and engineers and has established itself as a competent and reliable partner for projects in the deep geothermal market. GeoT's portfolio includes the entire project development ranging from geological exploration to supervision of drilling work. For international geothermal projects, GeoT is involved in several joint ventures. Furthermore, GeoT is integrated in several research and development projects in cooperation with well-known universities and research institutes.

Portfolio (excerpt):

Exploration: geology, geochemistry, geophysics (incl. 2D/3D seismic surveys), geomechanics, hydrogeology, feasibility studies, risk analyses, exploration strategies, well path planning, well site geology

Consulting: market research, economic consultancy services, political consulting, business consultancy, due diligence, financing and funding, risk mitigation, project management, public relations

R & D: project initiation and funding possibilities, applications, project coordination, networking