



Microseismics for Geothermal

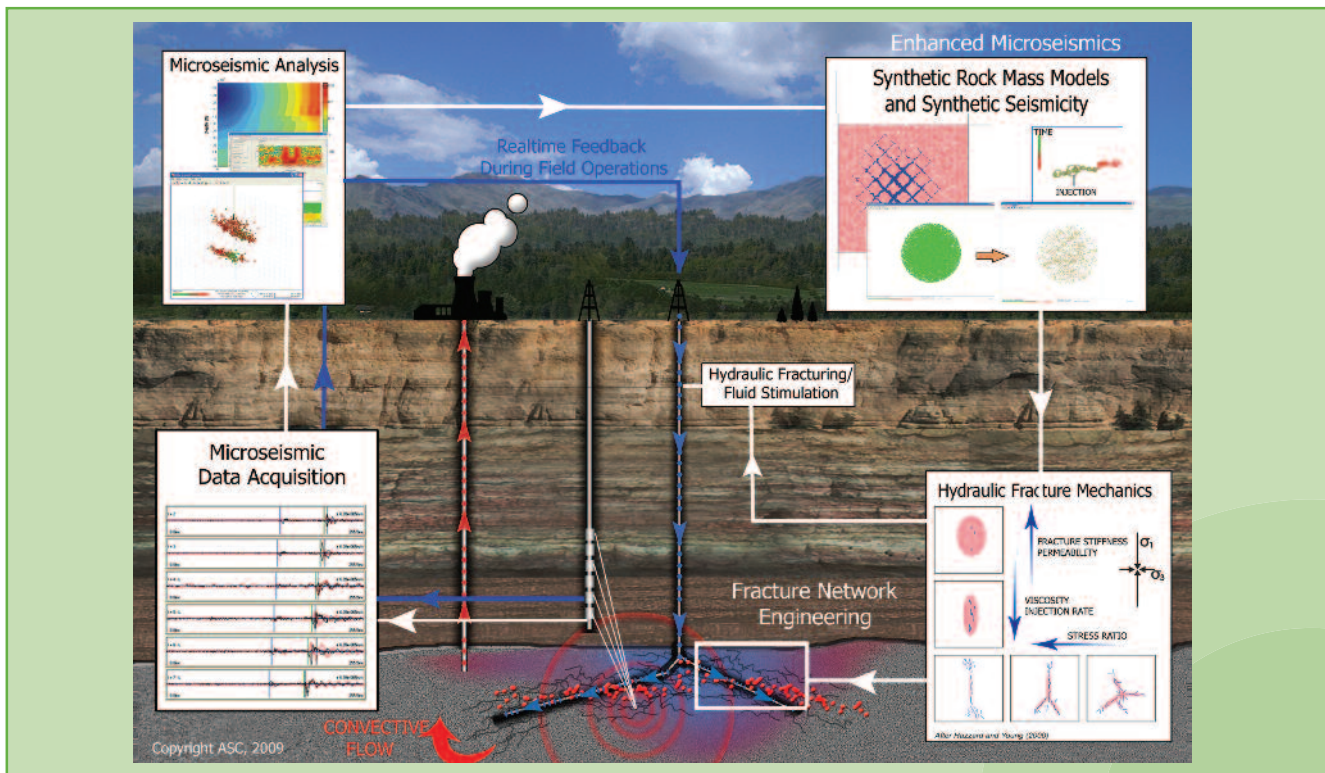
Fracture Network Engineering
in Geothermal Reservoirs

Applying Seismology to the Engineered Environment

Microseismics for Geothermal

Microseismic monitoring allows engineers to image and visualise active fracture networks within developing or producing geothermal fields.

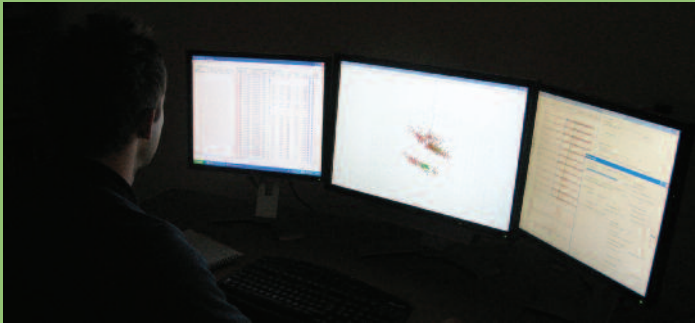
- Real-time monitoring and optimisation of hydraulic, chemical or thermal stimulation of geothermal fields.
- Monitoring the development of Enhanced Geothermal Systems (EGS).
- Increase the productivity and recovery of the reservoir and assist in the design and optimal location of production wells.
- Enhance our understanding of long-term reservoir behaviour.
- Investigation of active fault zones, compaction and subsidence.
- Estimation of key parameters for analysis of reservoir production capacity.



Full range of services for the geothermal industry at:
www.appliedseismology.com/geothermal/

Services for the Geothermal Industry

ASC has pioneered the application of microseismic technologies to geothermal field development through its InSite Seismic Processor and Enhanced Microseismics Program.

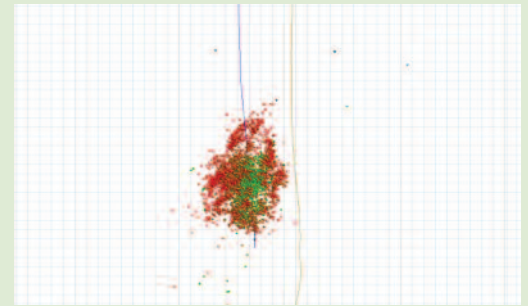


Real-time monitoring of microseismic data can provide feedback information to engineers during fracture network stimulation that affects production efficiency.

Post-processing yields a greater understanding of the treatment history and long-term reservoir behaviour. Microseismic parameters and clustering analysis yields treatment zones and provide for an assessment of potential pathways for fluid flow, delineates active fault structures and can image the fluid-pressure front movement within the reservoir.

Fracture mapping, including distribution and mechanics, provides likely target volumes for new development wells and validation of predictive models.

ASC provides a fully integrated processing service from array design, through data management and processing to advanced interpretations with dynamic numerical models to better understand the growth and activation of the fracture structures.



Software and Data Acquisition

InSite is a software solution for hydrofracture and field monitoring providing a fully three-dimensional microseismic source analysis.

- Our flagship software is fully automatic, can be run in real time and provides advanced data management, processing and visualisation features.
- The InSite software suite is independent of any hardware product or vendor. It can be interfaced to data streams from geophone strings to provide real-time data capture, or used off-line for advanced post-processing analysis.
- InSite's Frac Manager provides an integrated studio for management of microseismic data sets and geophysical fracture information with advanced processing and visualisation techniques.
- We provide fully-featured microseismic training courses focussed on the principals behind the technology, processing algorithms and hands-on experience of using the software.

Microseismic software for the geothermal industry at:
www.appliedseismology.com/geothermal/software.aspx



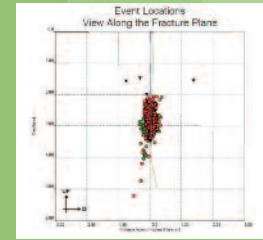
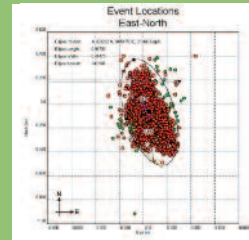
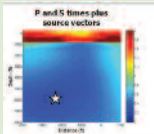
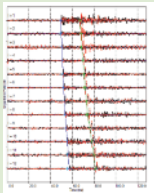
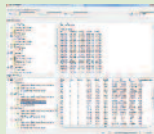
Experience and Innovation

ASC is involved in the only commercial EGS project in the EU and for over 10 years we have undertaken international research programs for the monitoring of rock damage at reservoir scale.

We continue to develop unique algorithms for managing and processing microseismic data through hydrofracture treatments to whole-field monitoring. Our software release and support system provides these latest technologies through our website client-login area.

Our InSiteDB database technologies are networking remote microseismic geophysicists and clients to real-time and post-processed data sets and results.

Our Enhanced Microseismics program provides an integrated interpretation of the rock's hydrodynamic response through correlation of fracture network structures with Synthetic Rock Mass (SRM) geomechanical models.



Applied Seismology Consultants



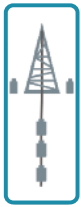
ASC specialises in providing commercial microseismic monitoring, processing and advanced analyses in a range of sectors including petroleum, geothermal, carbon sequestration, engineering, mining, radwaste storage and laboratory testing. From May 2009 ASC is an Itasca International company.

Services are targeted at supplying an integrated work package along the full data path through sensor array design, data acquisition, processing and interpretation.

ASC's leading software, InSite, developed for more than 10 years as a complete solution for ASC's consulting operations, is now used by many international organisations for in-house processing and management of seismic data.

ASC has a Quality Management System certified in accordance with the standard BS EN ISO 9001:2000.

Case Studies and Publications:
www.appliedseismology.com/geothermal/pubs.aspx



Geophone data streams from monitoring array



Acquisition PC



InSite Data Processing

Leach interface and waveform processing



InSiteDB Remote Database



Microseismic Stakeholders

Data visualisation, further processing and data QA

Full range of services at:
www.appliedseismology.com

Applying Seismology to the Engineered Environment



We specialise in commercial application of microseismic technologies.

Broad spectrum of microseismic processing services.

Cutting-edge development of microseismic technologies along entire data path.

Leading hardware-independent microseismic processing software package, InSite.

Standard and advanced software tools for do-it-yourself processing.

Software release and support system providing latest technology developments.

Fully-featured microseismic training courses.

Advanced database technologies for networking remote microseismic stakeholders.

Geophysics team for provision of complete processing service solution.

Microseismic project management, array design, data hosting and integrated processing systems.

Real-time capture of microseismic events from geophone data streams.

Processing and feedback of real-time results.

Full post-processing options and Enhanced Microseismics program.

Quality assurance of third party microseismic processing results.



A range of projects and data sets are available to demonstrate the capabilities of InSite for applications across different industries.

Download the InSite demo at:
www.appliedseismology.com/demo.aspx



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