

# References



Recent references in applying novel seismic monitoring methods include:

## Reservoir-induced seismicity:

- KTB superdeep continental deep borehole
- Groß-Schönebeck, Germany (Geothermal)
- Berlin-Feld, El Salvador (Geothermal)
- The Geysers, USA (Geothermal)

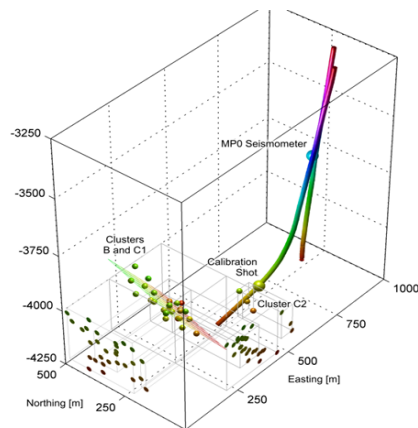
## Gas leakage detection (gas storage, EOR):

- Michigan Basin, USA
- Pembina Cardium, Alberta/Canada
- CO<sub>2</sub> Storage, Ketzin/Germany

## Mining-induced seismicity (production):

- Mponeng Gold Mine, South Africa
- Rudna Copper Mine, Poland
- Pottash Mine, Germany

**‘Ask for a custom tailored concept that meets the requirement of your challenge.’**



Frac-monitoring with a single three-component borehole geophone

# Our team



The fastloc GmbH combines experienced industry consultants and leading applied scientists.

The key persons behind fastloc GmbH are:



Prof. **Georg Dresen**  
Geologist  
Professor of Geology  
Expertise in rock mechanics, fracture mechanics and geology



Prof. **Marco Bohnhoff**  
Geophysicist  
Professor of Experimental and Borehole Seismology  
Expertise in microseismic monitoring and reservoir seismomechanics



Dr. **Grzegorz Kwiatek**  
Geophysicist  
Senior Research Scientist  
Expertise in mining and borehole seismology and seismic source analysis

**fastloc** collaborates with geomecon GmbH, offering advanced geomechanical and fracture mechanical modelling and simulation solutions:



# Contact



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- **reservoir monitoring solutions**
- **seismic data acquisition and processing**
- **leakage detection**
- **geomechanical analysis**

# About us



**fastloc** provides solutions for seismic monitoring and imaging, stress analysis and reservoir mechanics.

Our expertise covers seismic services using micro-seismic monitoring combined with geomechanics.

We offer integrated services combining development of monitoring concepts for:

- short-term (stimulation, hydraulic fracturing)
- long-term (production, injection, storage) applications.

Our services cover the whole range of field operations (monitoring network design, data acquisition, and advanced analyses of seismic data). This includes the use of borehole and surface seismic networks.

**fastloc** combines leading scientists with academic and industry background in the fields of seismology, rock mechanics and reservoir engineering with more than 20 years of experience.

**‘Integration of high precision localisation and geomechanical analysis will deliver a comprehensive system understanding’**



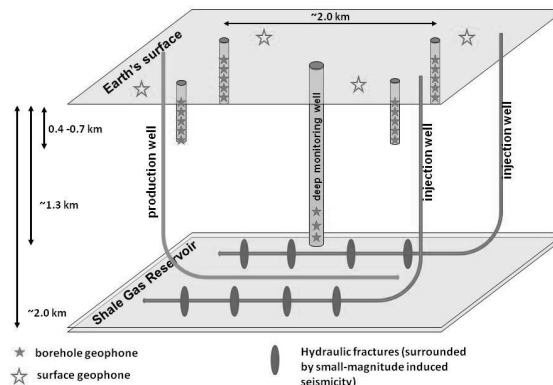
# Services



We provide near real-time microseismic monitoring and leakage detection with fully automated high-precision relative relocation and seismic hazard estimation.

**fastloc** services include:

- development of seismic monitoring concepts and coordination of monitoring campaigns (turn-key)
- near-real time onsite seismic monitoring analysis
- remote data storage and analysis for long-term monitoring
- advanced geomechanical interpretation
- experts’ advice and review



Exemplary seismic network layout for monitoring of multi-stage hydraulic fracturing.

# The Advantages



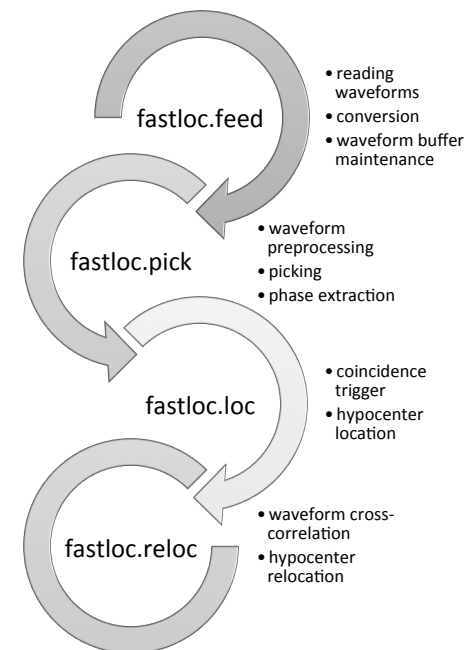
- out-of-one hand solutions
- integrated seismic monitoring
- geomechanical interpretation
- novel wellbore leakage detection concepts
- novel near real-time relocation analysis

# Software



Our analysis software package is specially designed for reservoir applications. The key features of **fastloc’s** in-house development are:

- near real-time hypocenter determination, including relocation and source attributes assessment
- up to 10-times higher hypocentre precision determination using fully automated double-difference relocation
- low latency (four independent processing threads responsible for waveform reading and picking, location and relocation)
- flexible modular architecture and high performance
- data storage using relational database
- plug-in option for traffic-light system



Flow-chart of **fastloc’s** processing scheme