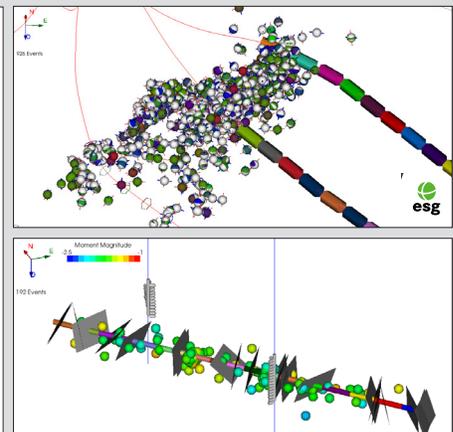
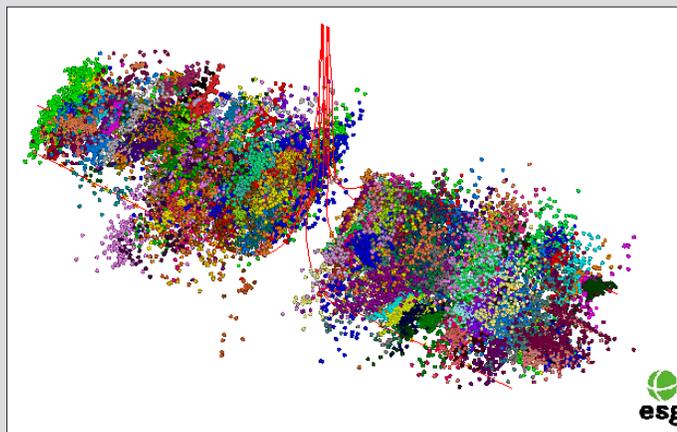


# Microseismic Monitoring: Hydraulic Fracture Stimulations

## Monitor hydraulic fractures to:

- Map fracture operations in real-time
- Optimize injection strategies and staging
- Describe discrete fracture networks (DFN)
- Gain insight into frac effectiveness and reservoir characteristics
- Calculate Stimulated Reservoir Volume (SRV)
- Calibrate reservoir models

As an independent provider of complete microseismic solutions for hydraulic fracturing, ESG provides a full suite of services from array design and feasibility through to microseismic acquisition and analysis.



# Real-time Microseismic Hydraulic Fracture Monitoring Services

## Optimizing your fracture completions

At ESG we believe in an integrated microseismic solution that takes into account engineering and geological information to create a more comprehensive understanding of stimulation effectiveness. Integrating our geophysical processing capabilities with engineering parameters can help completions engineers modify their treatments on-the-fly and make decisions to optimize current or future stimulations. Combined with geological data, we can help you evaluate fracture barriers, monitor for growth out-of-zone and observe interaction with existing or reactivated structures.

## Details of ESG's fracture monitoring services include:

- Wireline acquisition of microseismic fracture data using 16-levels of state-of-the-art OYO Geospace tools or a hybrid approach integrating near-surface and downhole.
- Innovative multi-well acquisition using a whip-array configuration increases detection ranges and eliminates need for dedicated monitoring wells.
- On-site real-time geophysical processing of microseismic data.
- Rapid turn-around for geophysical analysis reports.
- Options for advanced multi-well, post-acquisition analysis including patent-pending seismic moment tensor (SMT) analysis of failure mechanisms.

## Advantages of an integrated microseismic solution:

**Enhanced understanding of fracture behaviour:** Integration of engineering, geological and geophysical information to paint a picture of what is occurring in the reservoir.

**Increased monitoring range:** Innovative hybrid solutions combine near-surface and downhole acquisition to capture larger magnitude regional seismicity as well as small magnitude seismicity associated with fracture stimulations.

**More accurate microseismic results:** With ESG geophysicists on-site, microseismic data can be examined in real-time, to calculate and image fracture dimensions and azimuth.

**Improved decision making:** Use microseismic and engineering information to make informed decisions and on-the-fly changes to optimize the treatment.

**Advanced interpretation:** Calculation of Stimulated Reservoir Volume (SRV), fracture intensity and complexity, enhanced fluid flow and Seismic Moment Tensor Inversion (SMTI).

To learn more about ESG's monitoring solutions, visit [www.esgsolutions.com](http://www.esgsolutions.com) or contact:

### Corporate Headquarters

20 Hyperion Court  
Kingston, ON, Canada, K7K 7K2

tel: +1.613.548.8287

email: [sales@esgsolutions.com](mailto:sales@esgsolutions.com)

[www.esgsolutions.com](http://www.esgsolutions.com)

### Australia

9 Halsbury Ave,  
Kingswood, SA 5062

tel: +61 (0)423 153 122

email: [martin@ausgeos.com.au](mailto:martin@ausgeos.com.au)