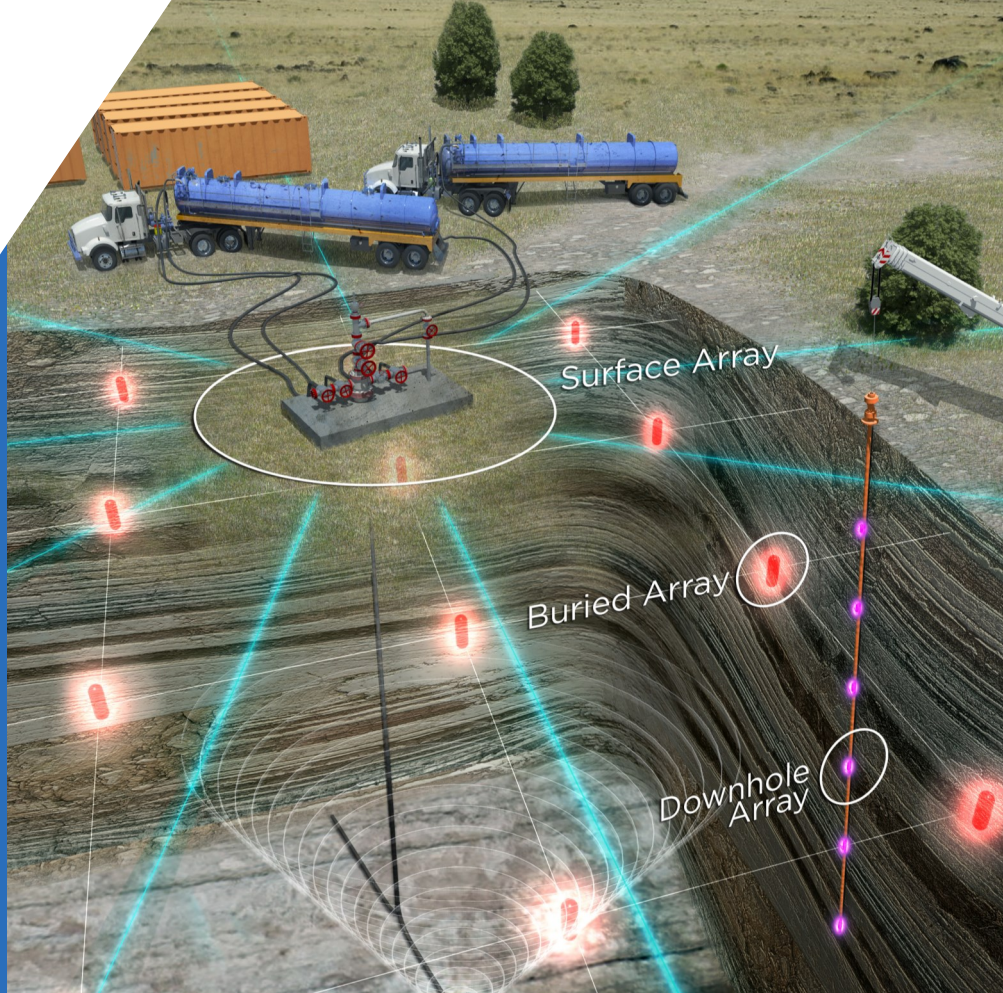


Trusted Data Acquisition

Why MicroSeismic? With over 28,000 stages monitored, over 50 BuriedArray® installations, and work spanning 18 countries, MicroSeismic, Inc. has proven the successful application of real-time surface, near-surface, and downhole microseismic monitoring for unconventional exploration across the world.

Our commitment to safety, vast experience, state-of-the-art products and services, and outstanding customer service make MicroSeismic, Inc. the leader in microseismic data acquisition for unconventional exploration and development.



How We Acquire

We acquire microseismic data by using customizable geophone array configurations for vast or sparse areas of the surface, subsurface, and downhole for single or multiple wells and pads (or a combination). Our arrays have the capability to monitor operations for hydraulic fracturing, induced seismicity, life-of-field, and fluid or steam injection monitoring. Each array has the flexibility to accommodate all types of terrain.

Surface Monitoring | FracStar®

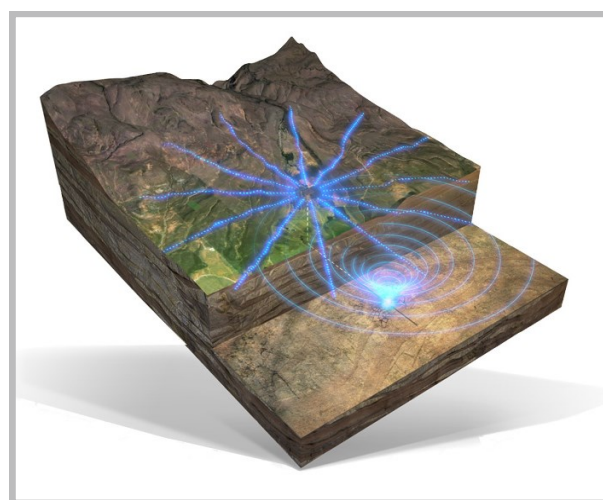
MicroSeismic's FracStar data acquisition service uses a temporary radial surface geophone array to effectively monitor long laterals and pad drilling over large geographic areas. Each array is customized for the operator's specific area of interest, ensuring the highest quality dataset is obtained.

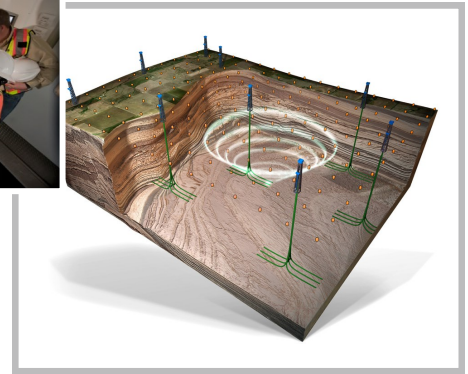
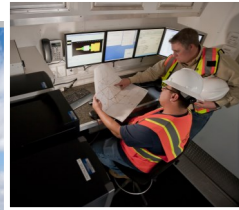
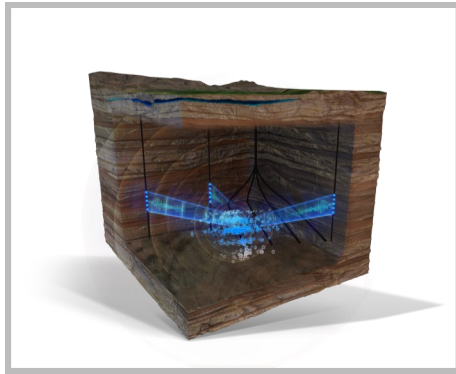
Benefits

- » Consistent and accurate event location over entire monitored area
- » Customizable to location and customer objectives
- » Real-time processing available
- » Rapid array deployment with minimal surface and environmental disturbance during acquisition

Array Design

- » 10–12 arms arranged radially around the wellbore, covering 5–15 square miles
- » Thousands of geophones can be spaced across the stations (6 geophones/station)
- » Recorded locally or transmitted wirelessly





Downhole Monitoring

MicroSeismic acquires downhole microseismic data with a string of geophones located in a monitor well proximal to the well being treated. Capabilities include single-well monitoring, multiple-well monitoring, combined FracStar surface and downhole monitoring, distance-separated array monitoring, and high-resolution or high-fold array monitoring.

Benefits

- » No surface permitting necessary
- » Temporary deployment
- » Real-time processing available
- » Lowest cost single-well monitoring solution

Array Design

- » 60 levels of 3C digital downhole sensor tools with variable inter-level spacing
- » Tractorable sensor arrays
- » Complimentary service offered with surface monitoring

Subsurface Monitoring | BuriedArray®

MicroSeismic's BuriedArray data acquisition system deploys a permanent array of geophone strings installed in the near-surface, and can monitor more than 500 square miles. The BuriedArray can monitor completions of multiple pads, ongoing production, and future refracture projects.

Benefits

- » Most economical method to monitor multiple wells
- » Consistent and accurate event location over entire monitored area
- » Significantly reduced surface noise
- » Real-time processing available
- » Life-of-field and refracture monitoring

Array Design

- » Multi-level combinations of 1C and 3C geophones
- » 2–8 stations per square mile
- » Permanent shallow burial of geophones
- » Powered by battery, solar, and wind sources
- » Recorded locally or transmitted wirelessly

	FracStar®	BuriedArray®	Downhole
Monitoring well location bias	No	No	Yes
Focal mechanism detection	Yes	Yes	Requires 2+ monitor wells
Well site access required	No	No	Yes
Uncertainty	Superior X & Y Good Z	Superior X & Y Good Z	Superior Z* Good X & Y
Velocity error	Resilient	Resilient	Sensitive
Deployment	Temporary	Permanent	Temporary
Cost	Best option for single pad	Lowest per well cost for multiple pads	Lowest single-well cost
Full lateral coverage	Yes	Yes	No

* within monitoring radius