



LandTech-FS Seismometer

Ultra Sensitive Seismometer for Hydraulic Fracking



LandTech is the only company which manufactures its own equipment particularly designed for Passive Seismic monitoring. The *LT-FS* ultra sensitive seismic sensor is the only surface sensor in the market today which can record microseismic events up to $-2R$ from many Km down during hydraulic fracking of a reservoir.

The sensor body has been designed in order to house twin or quad geophones strings for each axis. The orientation follows the 3-axis principle. This sensor has minimum outer diameter 50mm allowing it to be installed into small diameter shallow (a few meter) holes, reducing the cost of installation.

The sensor houses OMNI-2400 geophones. Using single geophone element per axis, the electronic noise floor becomes a limiting factor for this type of acquisition. Increasing the gain and minimizing the noise floor of the sensor gives us the ability to record even smaller events.

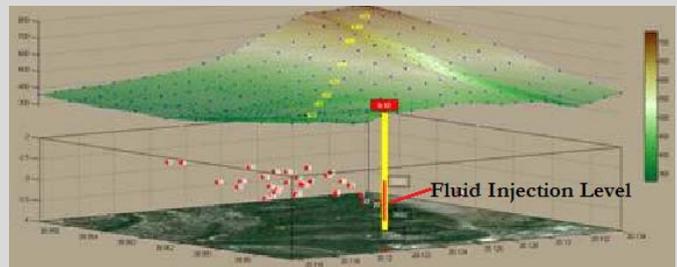
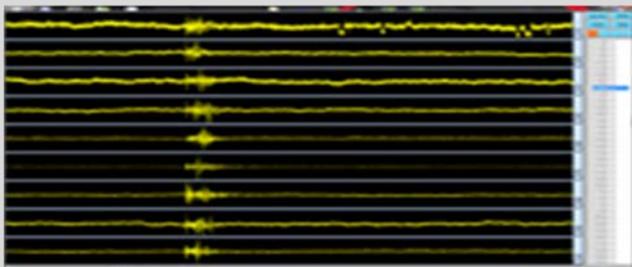
Efforts were concentrated on minimizing the electronic noise floor, increasing the down hole gain, and increasing the sensor sensitivity. This target has been achieved adding more geophones to the down hole sensor connected in series. Three different model types of sensor have been manufactured with the following design characteristic:

The signal conditioner circuit is fully protected against over voltage, opposite power supply polarity and lightning

	Sensor Model FS100	Sensor Model FS200	Sensor Model FS400
Geophones per axis	1	2	4
Sensitivity	52 V/m/sec	104 V/m/sec	208 V/m/sec
Input noise	275 nV	160 nV	102 nV
Coil resistance	2400 Ω	2400 Ω	2400 Ω
Total Resistance	2400 Ω	4800 Ω	9600 Ω
Damping	0.57	0.57	0.57
Minimum recording signal	5.2 nm/sec	2.6 nm/sec	1.3 nm/sec

inductive currents. Also, it is always entered in power down mode when becomes inactive in order to reduce the power consumption of the system.

An example from a hydraulic fracking of a gas reservoir in SE Albania is presented below. The event shown has a magnitude of $-1R$ and originated at a depth of 4.5Km.



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