

Seismic surveys utilize seismic waves that propagate through the subsurface. Changes in waveform can be indicative of changes in the subsurface such as lithology or geologic structure. Seismic measurements are applicable for various uses including geologic, geotechnical and engineering.

Seismic refraction

Seismic refraction method is based on the measurement of the time required for seismic waves to travel from an artificial energy source to a linear array of receivers (geophones). Seismic energy is provided by a source such as: hammer and plate, shotgun, small explosive charge.

The seismic impulses propagate through the ground until they are refracted at the interfaces between subsurface layers with different elastic and density properties.

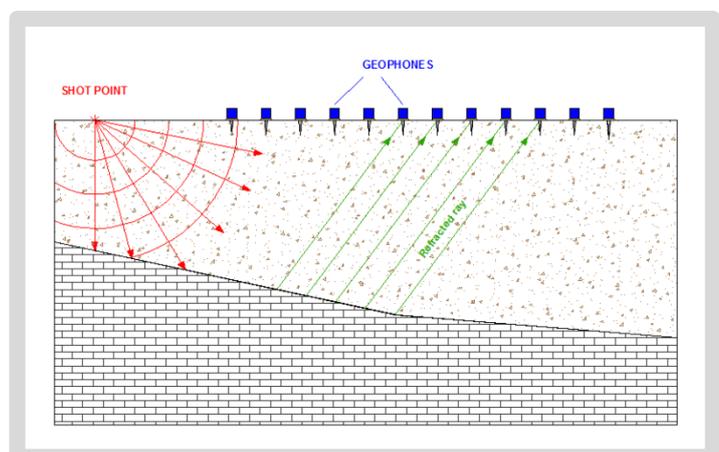
Measuring the first arrival times of the refracted signals, it is possible to compute the seismic waves velocities. By analysing the compression (V_p) and shear waves (V_s) velocities, it is possible to produce two-dimensional cross-sections of the subsurface that provide information on the depth of the refractors and on the material properties.



APPLICATIONS

Common applications of the method include:

- ✓ stratigraphy
- ✓ layer geometry
- ✓ mapping the top of bedrock
- ✓ detecting fracture zones
- ✓ mapping faults
- ✓ rock rippability
- ✓ seismic classification



EQUIPMENT

SEISMOGRAPH "GEODE"

Channels	24
Bandwidth	1.75 Hz to 20 kHz
Dynamic range	144 dB
Stacking trigger accuracy	1/32 of sample interval
Distortion	0.0005%
Noise floor	0.20 μ V
Sample interval	0.02 ms to 16 ms
Power	12 V

GEOPHONES

Vertical	14 Hz
Horizontal	14 Hz

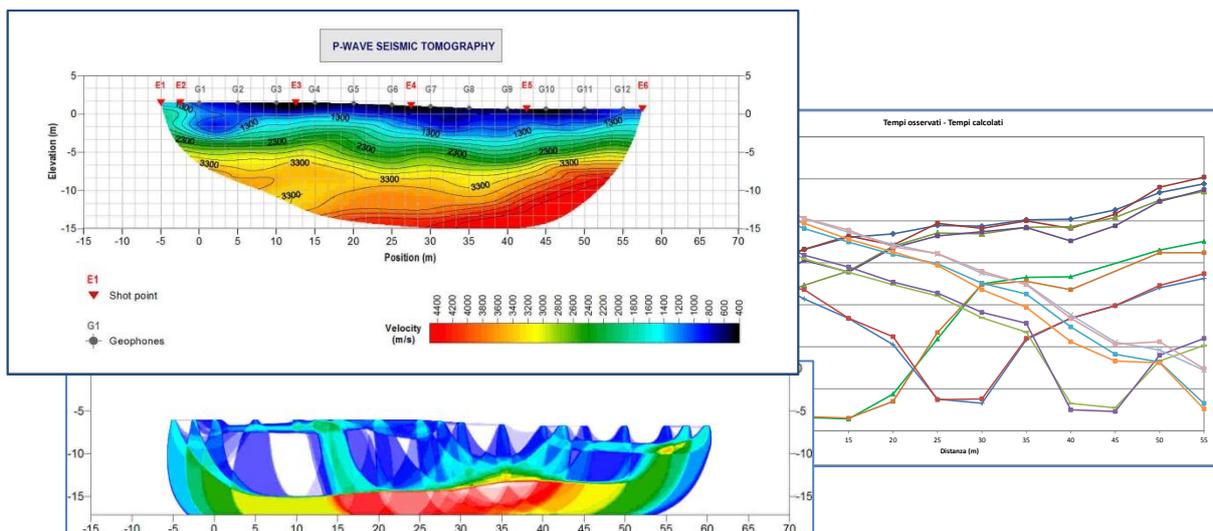
ENERGY SOURCES

Hammer	8 kg and striker plate
Shotgun	



DATA PROCESSING

Seismic refraction data can be interpreted in several ways: the slope-intercept method, the plus-minus method and time-delay method or the tomography techniques.



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