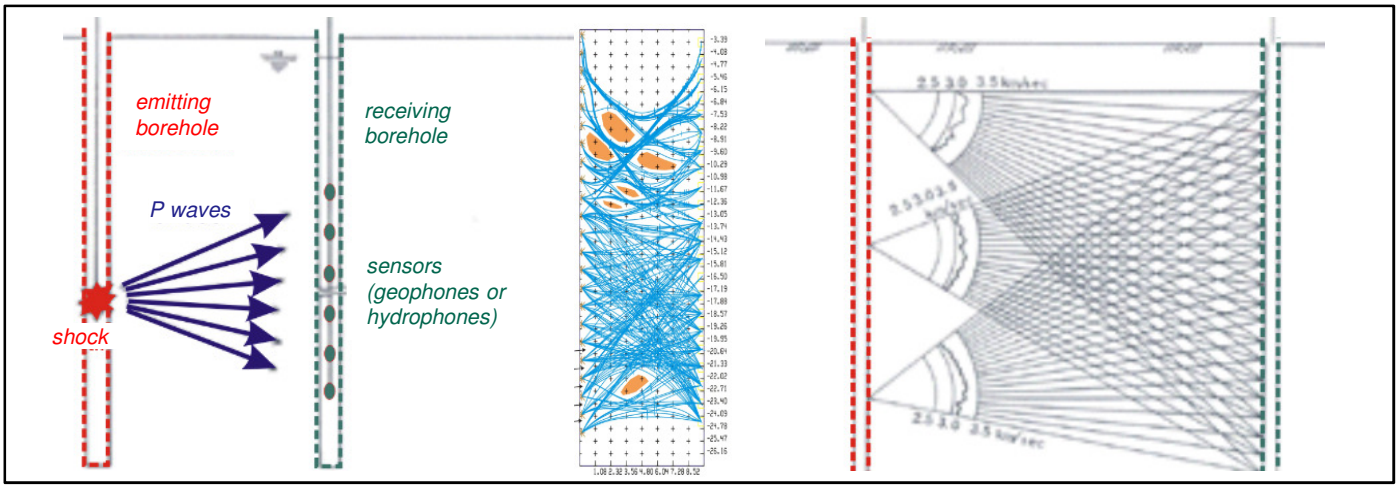
SOLDATA GEOPHYSIC

BOREHOLE SEISMIC TOMOGRAPHY

AGAP sheet 92.1 SIS 23



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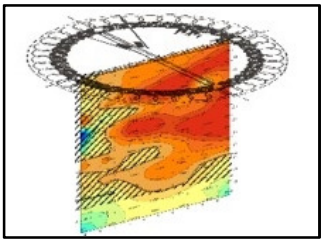

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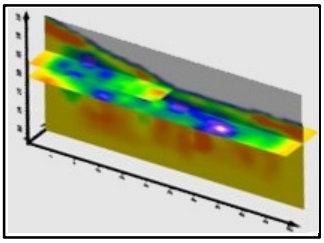

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Borehole seismic tomography enables the definition of the quality of ground through an analysis of variations in the velocity of seismic shock waves. An area of ground is imaged, which allows the reconstruction of a model of this internal area.

Applications

- Structural analysis, control of foundations
- Inspections and reconnaissance for engineering structures, dams, tunnels, etc.
- Geological survey, fracturation zones
- Detection of voids, cavities
- Evaluation of the elastic properties of the ground
- Estimation of the permeability, porosity and resistance of the ground

The method consists of creating a shock at a particular point, using a means such as explosive, air-gun, hammer, etc., and then measuring the arrival time of the elastic waves. The stiffest or most compact materials have very high speeds. This method can estimate the elastic properties of the investigated ground. It is implemented in a borehole either by placing the seismic shots on the surface and taking the measurement in the hole at a varying depth ('top-down' method), or by placing the seismic shots in the hole and taking the measurement at the surface ('bottom-up' method). It can also be carried out between two holes, with the seismic shots in one and the sensors in the other.

The pick of first arrival times of seismic waves P and/or S is performed with SeisImager v3.14 (OYO Corporation) and WinSism v14 (W_Geosoft) software.

The results give seismic wave propagation velocities in the form of a section and allow contrasts between areas of different compacity and alteration to be highlighted. Geotechnical reconnaissance boreholes allow a correlation between the seismic velocities and materials. Recommendations can then be made regarding the situation investigated.

ISO 9001 BUREAU VERITAS Certification

Legend

1. Schematic diagram of principle with the paths of seismic rays
2. Results from foundation control
3. Results from geological analysis, unstable areas

Key figures

- Distance and depth of investigation from 0m to 100m depending on the site geology and the seismic source
- The unit used for seismic velocity is metres / second (*m/s*) or kilometres / second (*km/s*)
- This method achieves an accuracy ≤ 10%

SDG Equipment

- Sismograph (Geometrics / 24 channels)
- Multiconnector cables with receivers spaced 1 to 10m
- Seismic source: mass, dropped weight, explosives, air-gun