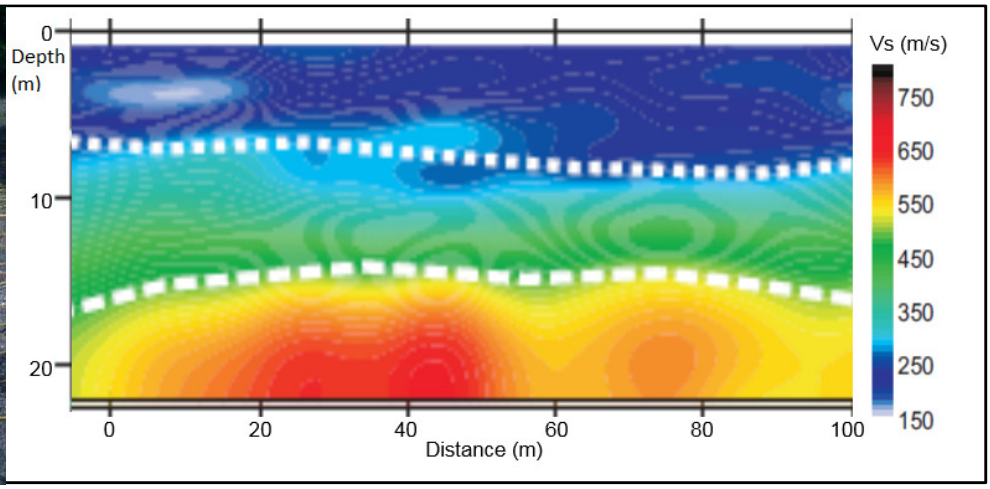
MASW
Multichannel Analysis of Surface Waves

AGAP Approval of Quality: MASW



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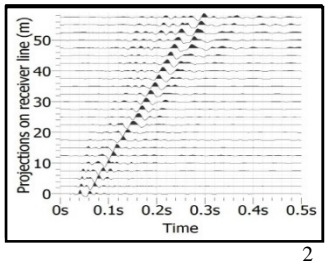

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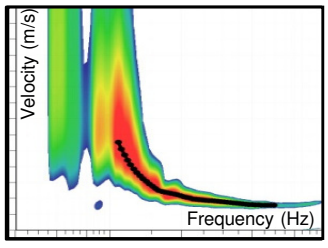

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Multichannel Analysis of Surface Waves (MASW) is a non-destructive seismic method for evaluating shear wave velocity (Vs), itself linked to the shear modulus (G).

Applications

- Geological studies: estimation of bedrock depth
- Seismic risk: estimation of Vs30
- Analysis of liquefaction potential
- Determination of dynamic modules (in association with seismic refraction)

This method relies on the analysis of the dispersion of surface waves, that is to say the variation of their propagation velocity according to their vibration frequency. This is directly related to the change of Vs with depth, which can be estimated by inversion.

A seismic cable, with regularly spaced sensors, is installed along the length of the profile to record signals generated by a sledgehammer or an accelerated weight drop seismic source. The recording time is long enough to contain all of the surface waves, which are both the slowest and the most energetic waves. The device can be attached to a streamer and towed by a vehicle to obtain a 2D section of Vs (MASW 2D).

The processing is performed using Geopsy software (ISTerre Grenoble) for 1D MASW profiles or SurfSeis software (Kansas Geological Survey) for MASW 2D profiles. This software interpolates all the vertical Vs profiles obtained for each of the positions of the device to represent the results in two dimensions.

At the end of the study, variations can be provided of Vs with depth (MASW 1D) and along the auscultated section (MASW 2D). By calibrating the results with geotechnical survey data, the seismic boundaries between layers of distinctly different seismic velocity properties can also be determined.

By combining the analysis of surface waves (Vs measurements) with seismic refraction (Vp measurements), and from estimated values of the density of the different materials, it is possible to also estimate the dynamic modules: shear modulus and Young's modulus.

ISO 9001 BUREAU VERITAS Certification

Legend

1. The acquisition of a mini-profile of MASW and an example of 2D MASW results
2. Seismogram
3. Scatter diagram (velocity-frequency)

Key figures

- Length of device : L=30 to 120m
- Lateral resolution (MASW 2D) : L/2
- Investigation depth : 10 to 30m (approx. L/2 to L/3, also depends on the site geology)

SDG equipment

- 24 sensors 4.5 Hz
- Digitiser (Geode or SmartSeis)
- Seismic source: mass + plate or accelarated weight drop
- 1 seismic cable 24 tracks