SOUTHERN GEOSCIENCE CONSULTANTS

PASSIVE SEISMIC (HVSR) PROCESSING AND VISUALISATION

MAKING HVSR DATA PROCESSING MORE EFFECTIVE

The recent uptake in passive seismic technology has opened the door for improved mapping of bedrock and basement surface and its structural complexities and erosional relicts. Southern Geoscience Consultants has developed a processing and visualisation tool designed to efficiently handle passive seismic data from all common instruments.

While software packages that are supplied by instrument manufacturers include the necessary tools for processing individual station traces, they are less effective at processing large datasets. The software and procedures designed by SGC improve all steps of a project stream, from editing and processing to visualisation and interpretation.

SGC's software allows for the effective editing and processing of large datasets by handling multiple stations simultaneously. Our software allows for the rapid creation of grid and stacked plot sections to aid identification and tracking of resonant frequency features on plots of the Horizontal to Vertical Spectral Ratio (HVSR).

PROCESSING FLOW

1
PREPARATION

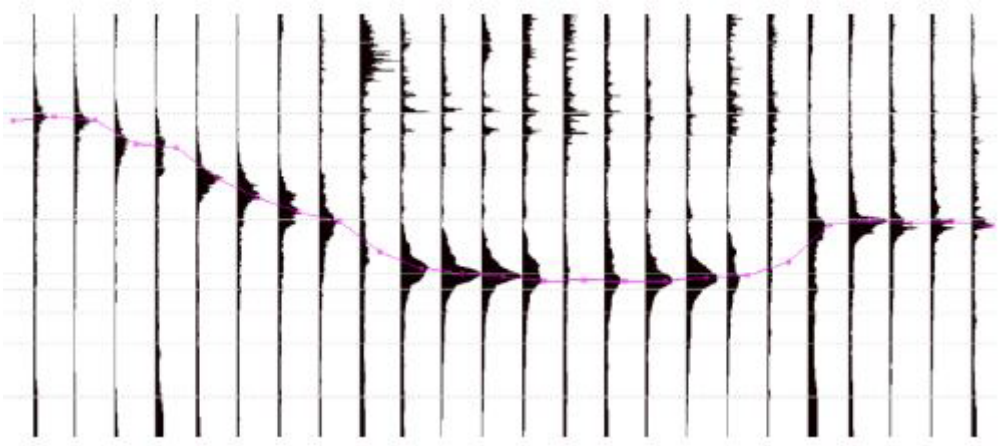
• Database setup (passive seismic data grouped by profile and a master GPS file)

2
EDITING

• Easy browsing through recorded passive seismic time series.
• Noisy data segments can be automatically (or manually) cut from time series with help of statistical information.
• Adding GPS positions to assemble station data into profiles.

3
PROCESSING

• Computing Fourier amplitude spectra and HVSR ratios.
• Spectrum visualisation, review, and optional smoothing.



4
VISUALISATION

• Display HVSR spectra along a single profile as a vertical stack.
• Creating of gridded sections with various.
• Vertical stacks and gridded sections can be displayed using linear/log and frequency/depth scaling options.
• At any stage, it is possible to return to the editing phase to further clean up time series as desired.

5
INTERPRETATION

• A primary horizon based on the dominant resonance frequency (*F*0) can be automatically generated and then edited.
• Our software allows for the tracing and editing of additional resonance features as desired.
• Stacked plots, grids, and sections can be used to create 2D or 3D models of sediment thickness or bedrock depth. This information can be used to isolate bedrock or basin gravity responses.

6
EXPORT

• A summary of essential trace information and interpreted results can be saved as CSV files for further processing.
• Vertical stacks and gridded images can be exported in various formats.