

Rayfract® Seismic Refraction/Borehole Tomography software

Intelligent Resources Inc.

Subsurface velocity structure imaging for geotechnical engineering and exploration

Rayfract® software allows reliable imaging of subsurface velocity with modeling of propagation of seismic first break energy. Import the seismic data and define the 2D profile geometry. Pick or import first breaks. Run our Smooth inversion method to objectively image velocity structure even with extreme topography and strong lateral velocity variation. No assignment of traces to refractors required. Flexible smoothing options.

Get laterally averaged 1D starting models from the travel time data with our DeltatV (improved Wiechert-Herglotz) & XTV methods. These methods give a good initial fit between modeled and picked times even with local velocity inversions.

Refine the starting model with WET Wavepath Eikonal Traveltime inversion aka Fresnel Volume Tomography. While conventional ray tracing models just one ray per first break WET models multiple signal propagation paths contributing to one first break. Our Eikonal solver explicitly models diffraction besides refraction and transmission of seismic waves.

Rayfract® supports any 2D recording geometry including roll-along seismic reflection lines. Joint inversion of surface-refraction and borehole-recorded shots. Crosshole and multi-offset VSP surveys. Shallow marine refraction interpretation.

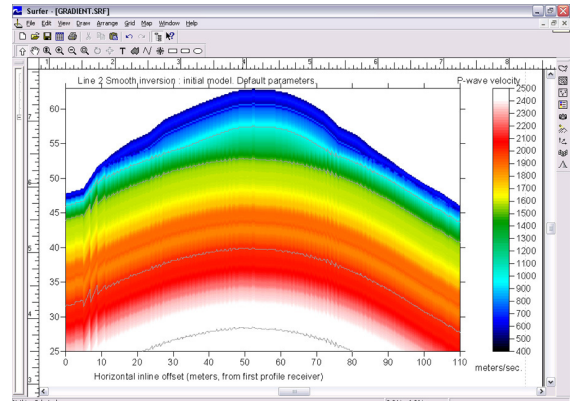
Use our layer-based Plus-Minus, Wavefront and CMP intercept-time refraction methods in case of layered subsurface geology. Assign traces to refractors interactively or automatically. Refine layered starting model with 2D WET inversion.

- Requires Golden Software Surfer® version 9 to 18
- Microsoft Windows® 7, Windows® 8 and Windows® 10, both 32-bit and 64-bit
- 360 traces per shot, 1000 shots per profile database
- 999 traces per shot for Pro license
- Define your own irregular receiver spread types
- Flexible .HDR batch import of shots
- SEG-2 import GEOMETRICS, ABEM, DMT, OYO, SEISMIC SOURCE, SEISTRONIX, PASI, M.A.E., SARA DOREMI etc.
- SEG-Y import PROMAX, SEISMIC UNIX, SPW etc.
- Import ASCII, Interpex GREMIX, OYO SEISREFA, Rimrock PIK, EarthFX VIEWSEIS, W_GeoSoft WINSISM, OPTIM LLC SEISOPT, Geometrics SEISIMAGER, GeoTomCG files with first break times and geometry
- Use overlapping receiver spreads to simulate one long spread. Use line-internal offset shots for depth penetration
- Build your own model with Surfer®. Synthesize traveltimes by forward modeling propagation with Rayfract®
- Interpret P-wave and S-wave data for same line and map dynamic Poisson's ratio with Surfer® Grid Math
- Downhole VSP, Walkaway VSP & crosshole surveys
- Min. / max. sample rate of 1 microsecond / 1 second
- Max. 20,000 samples per trace
- Handle Surfer® grid files with up to 640,000 nodes, up to 100,000,000 nodes with Pro license
- Flexible trace display, shot stacking and frequency filtering
- Automatic & interactive first break picking
- Semi-automatic & interactive mapping of traces to refractors
- Import/export picks & geometry from/to ASCII files
- Uses multiple CPU cores : 4 for Standard, 16 for Pro license
- Pro license for long lines recorded with streamer. Pro uses up to 1 TB RAM. Standard license uses up to 4 GB RAM.
- Robust multi-scale tomography. WET velocity constraints.
- Checkerboard test grid generation for Pro license
- Add one borehole line to main refraction or borehole line for joint inversion. Add up to 4 borehole lines with Pro license.

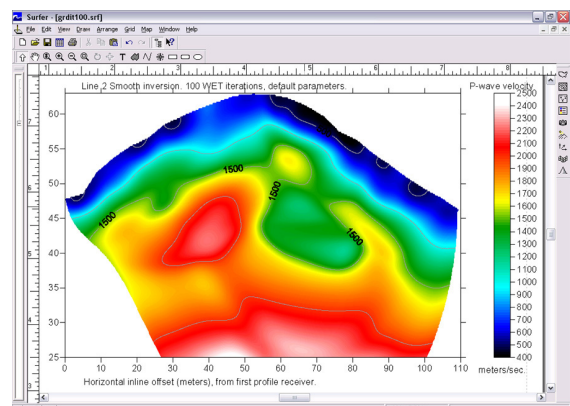
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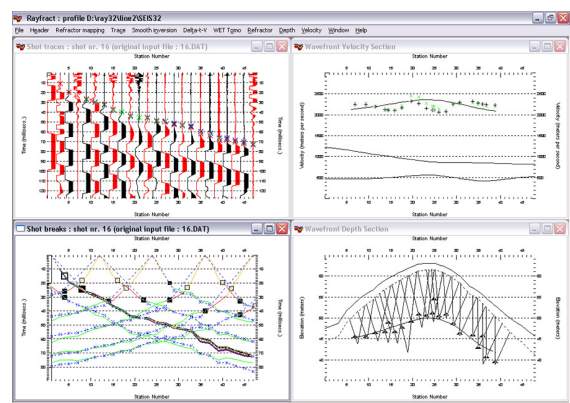
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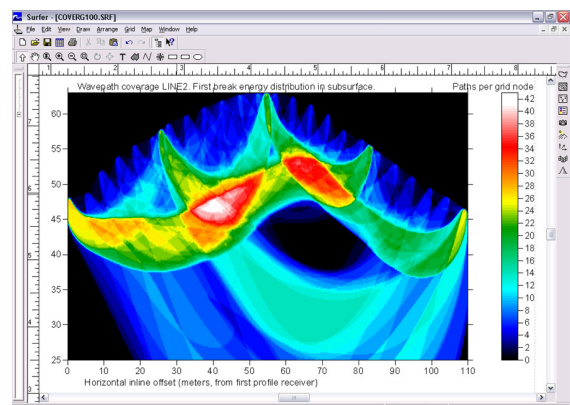
1D-gradient starting model : horizontally averaged DeltatV



Final WET inversion output, after 100 WET iterations



Conventional Wavefront interpretation. Note diving waves.



WET subsurface coverage with first break energy