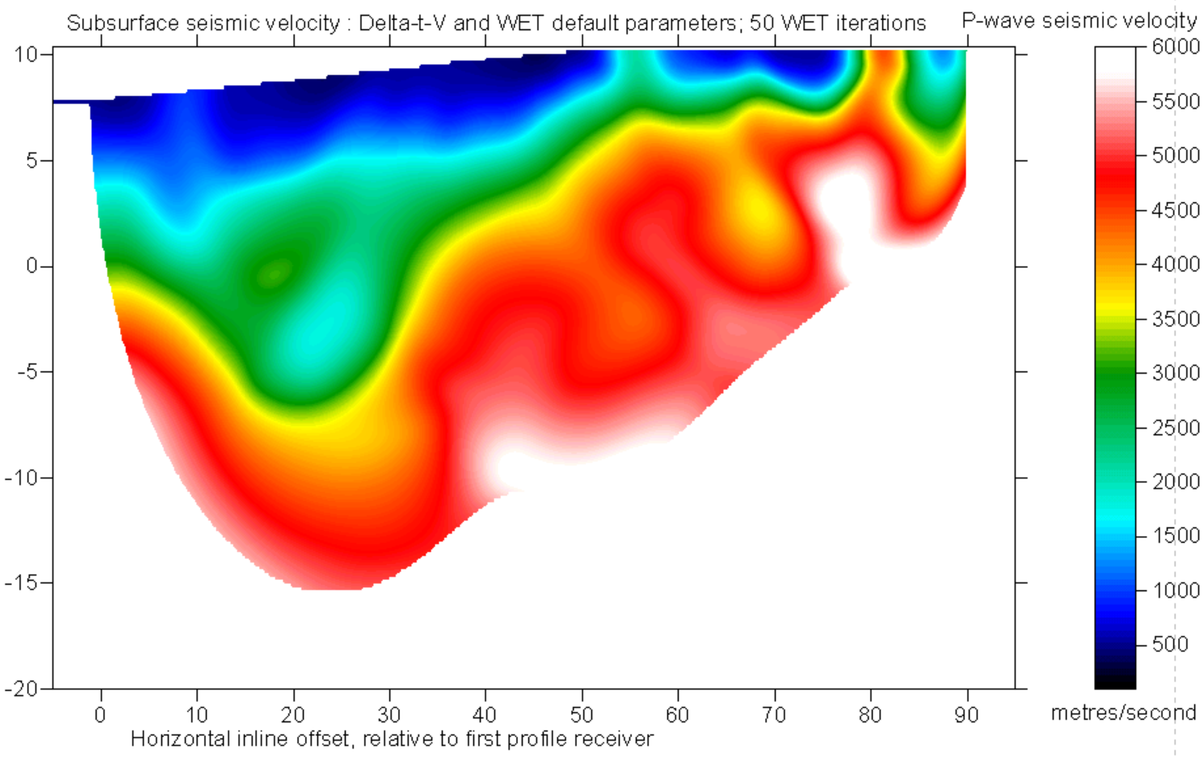
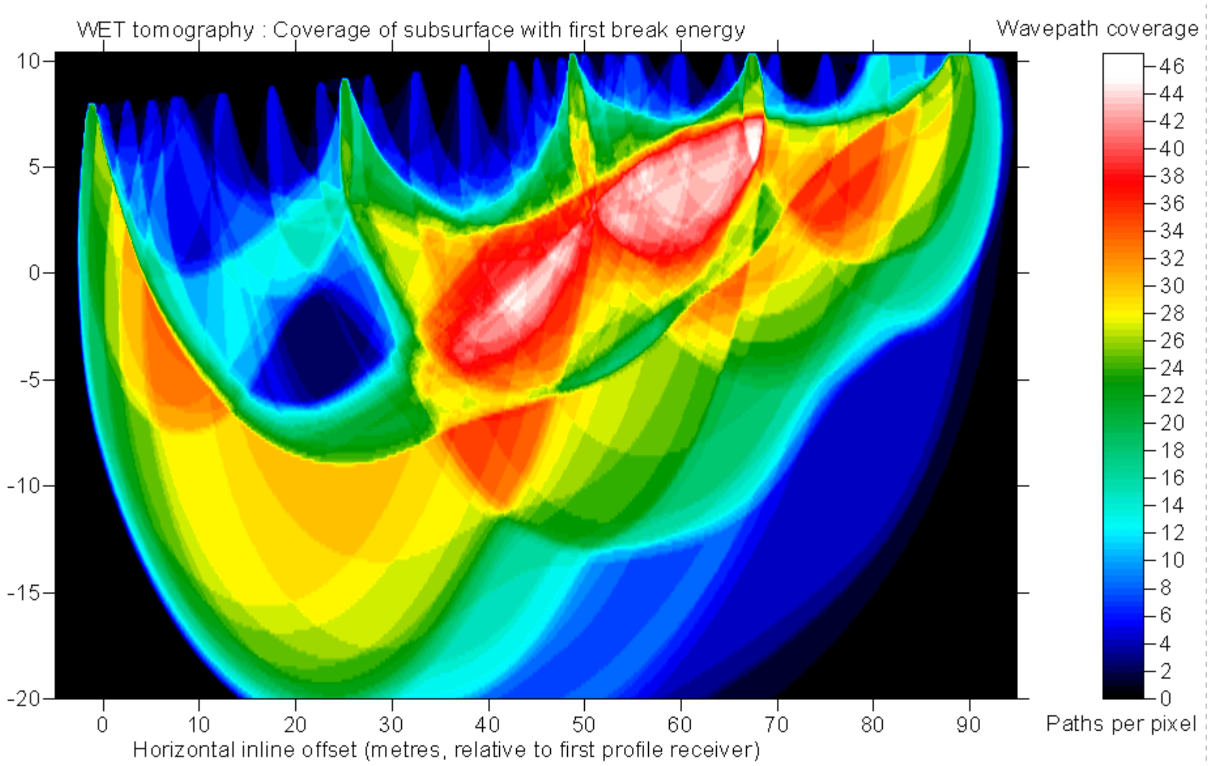
Delta-t-V inversion and subsequent WET tomography done for test line 26 as sent by Tomas Lehtimaki (9 shots into 24 irregularly spaced receivers), by Intelligent Resources Inc. February 12th 2003, with our Rayfract™ Seismic Refraction Tomography software :

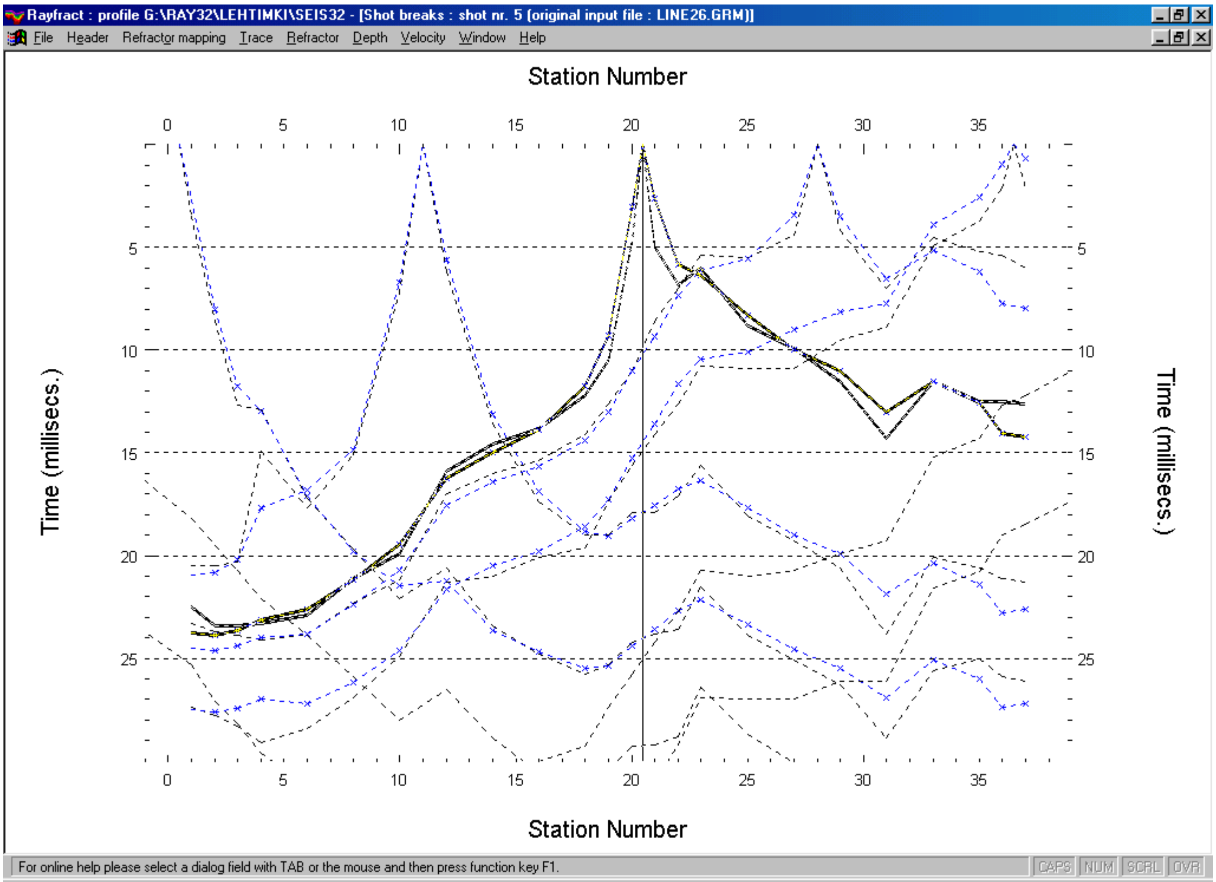




The shot spacing is a bit too wide; just 5 shots are usable for tomography. 10 or more are recommended for reliable Delta-t-V and WET interpretations. Far offset shots which are located further than two receiver spacings (5 metres in this case) from the nearest receiver cannot be used for WET tomography.

Note the diffraction of seismic energy, occurring around the low velocity anomaly located at horizontal inline offset of 20 metres, and at an elevation of approximately –4 metres.

Here we show the fit between picked (black) and modeled (blue) traveltime curves, as obtained by forward modelling the first break propagation through above model :

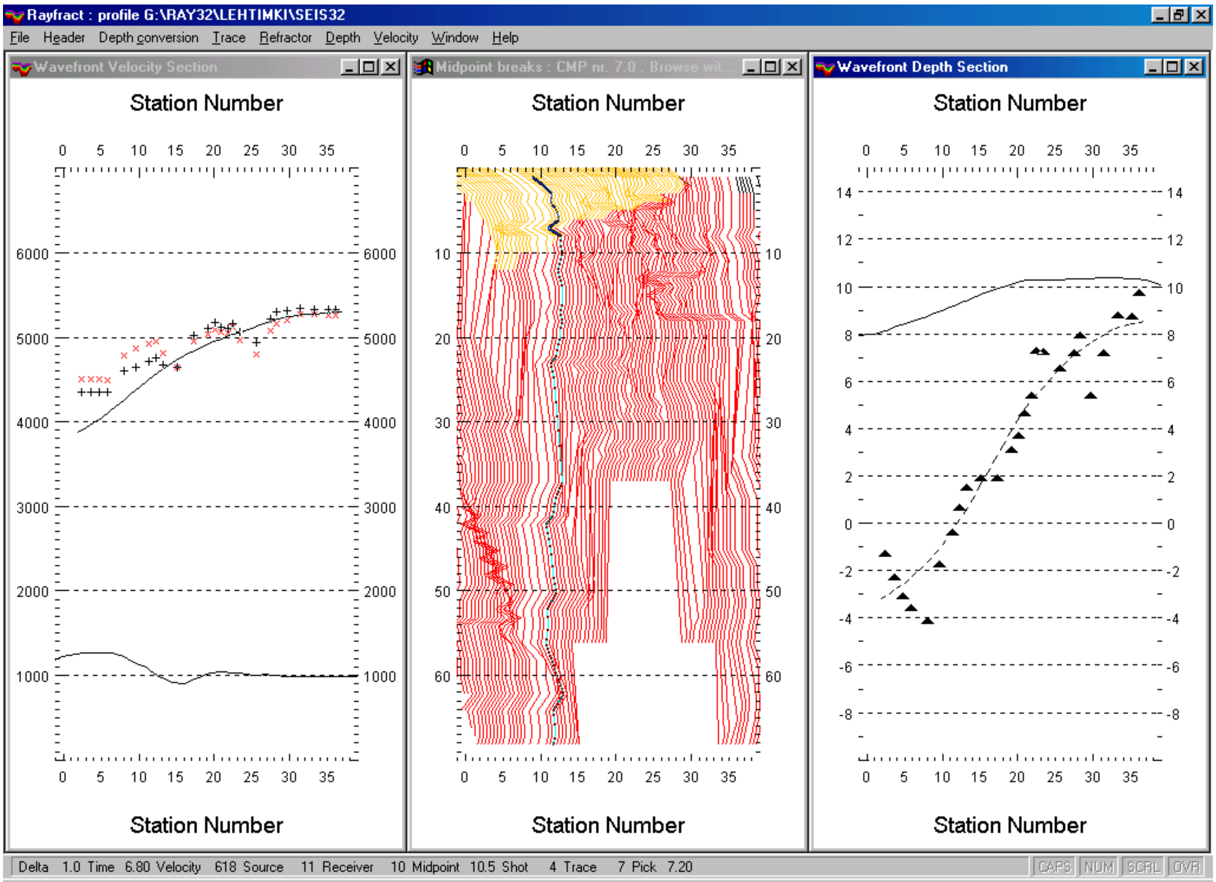


As a means of quality control, we also interpreted the first breaks with our Wavefront method. First breaks were mapped semi – automatically to overburden and basement in the "Midpoint breaks" display. The maximum overburden velocity was specified as 1,500 metres/second.

On the following page, we reproduce the "Midpoint breaks" display (center), as well as the resulting Wavefront velocity (left) and Wavefront depth sections (right). Note the good agreement between WET and Wavefront output.

Conventional seismic refraction interpretation methods such as the Wavefront method (as described by E. Brueckl) typically give too shallow basement depths, since maximum basement velocities occurring at a certain depth below the basement top only are mapped to the "top" of the basement.

The Wavefront method can be regarded as an optimized GRM method, with laterally varying and automatically estimated receiver separation i.e. "XY distance.



The significant thickening of the overburden towards the left edge of the profile can clearly be recognized in the "Midpoint breaks" display, even before carrying out any inversion. This display is solely based on first breaks, sorted by CMP common midpoint and stacked over a few adjacent CMP's (stack width of 25). First breaks are mapped to refractors based on "instantaneous" velocity.

The first breaks and recording geometry which above interpretations are based on are available on our ftp server, as file line26.grm which is included in

http://rayfract.com/tutorials/LINE26.ZIP .

We needed to define a new Receiver spread type, for 24 receivers and with a "Receiver separations" string of "3*1,7*2,5*1,6*2,2*1", via File|New Spread Type... . This spread type was then specified during import of the line26.grm input file (File|Import Data...), in combination with a "Receiver spacing" of 2.5 metres (as specified in Header|Profile).

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