

Geotomographie GmbH line B8-B9 showing sub-bottom river crossing, with Smooth inversion 3.10 :

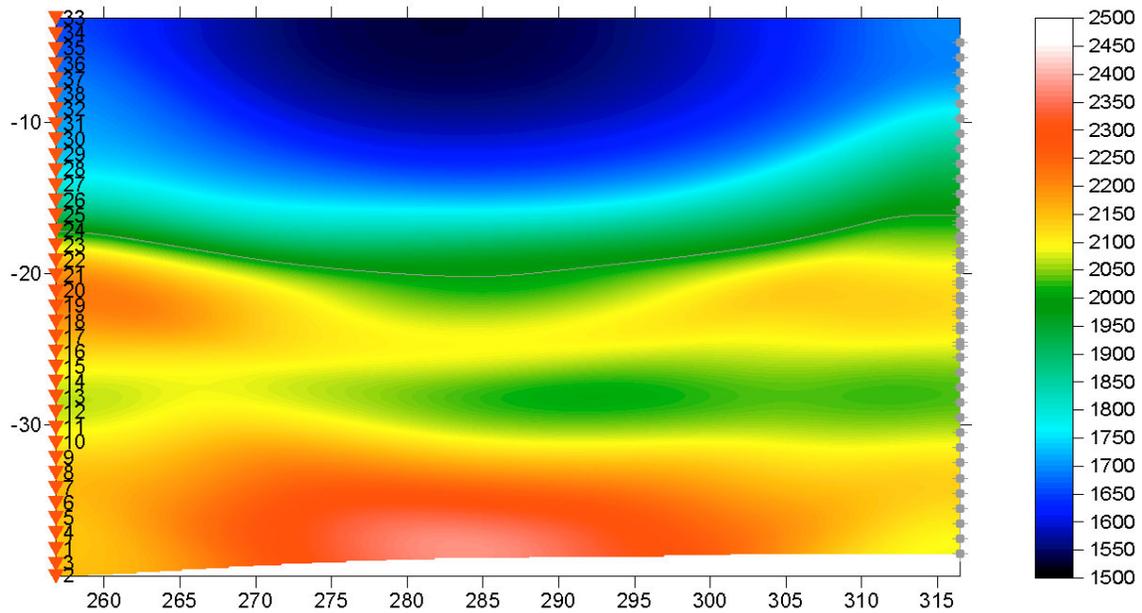


Fig. 1 : Smooth inversion with constant-velocity initial model, default WET parameters, 200 WET iterations. Horizontal axis is horizontal distance in m, vertical axis elevation in m, velocity shown in m/s .

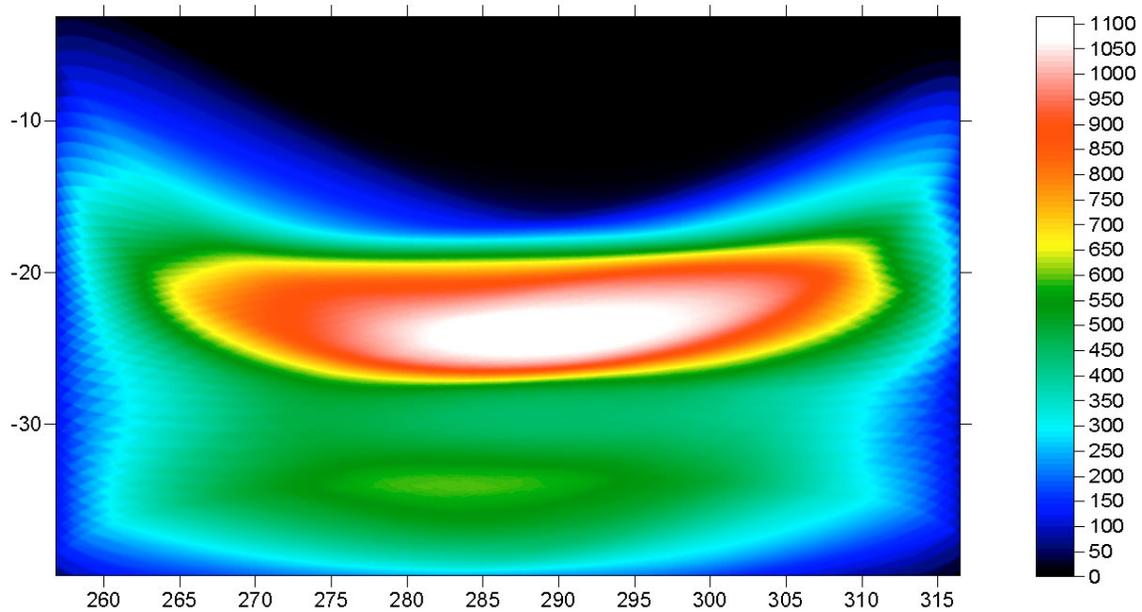


Fig. 2 : Coverage of subsurface with first break energy and wave paths, for tomogram shown in Fig. 1 . Horizontal axis is horizontal distance in m, vertical axis elevation in m, coverage in paths/grid cell.

P-waves generated with a sparker source in the left borehole (shot spacing 1m) were recorded with a 24 receiver hydrophone string (receiver spacing 1m) in the right borehole. The receiver string was vertically shifted to record a second set of shots, with a station offset of 0.25m relative to its first position. Both boreholes are located in the river bed.

Note in Fig. 2 how most of the first break energy is critically refracted at the bottom of the river, at elevation of about -22m. Fig. 1 shows from top to bottom : water, saturated sand, silt, silt stone, sand stone and silt stone layers.

To invert the data please

- create a new profile database named B8B9 with a *Station spacing* of 0.25m. See our manual at <http://rayfract.com/help/manual.pdf> , chapter 1.1 . Specify *Line type* Borehole spread/line .
- download the GeoTomCG .3DD survey file from <http://rayfract.com/tutorials/b8b9.zip>
- copy B8B9.ZIP into \RAY32\B8B9\INPUT, unzip to obtain B8-B9.3DD input file
- import the first breaks and geometry data as described in our manual, chapter 1.2. Specify *Import data type* Tweeton GeoTomCG .3DD, and *Input directory* \RAY32\B8B9\INPUT. Leave *Default spread type* at 10: 360 channels. Leave all other import parameters at their default settings.
- click on *Import shots* and then *Read* to import all crosshole shots. Leave all parameters at shown values.
- review traveltimes with *Refractor\Shot breaks* as usual. See our manual, chapter 1.3.
- select *Smooth invert\WET with constant velocity initial borehole model* to invert the data. Confirm prompts.
- select *WET Tomo\Interactive WET tomography...* and set *Number of WET tomography iterations* to 200 .
- click on *Start tomography processing* and confirm prompts.

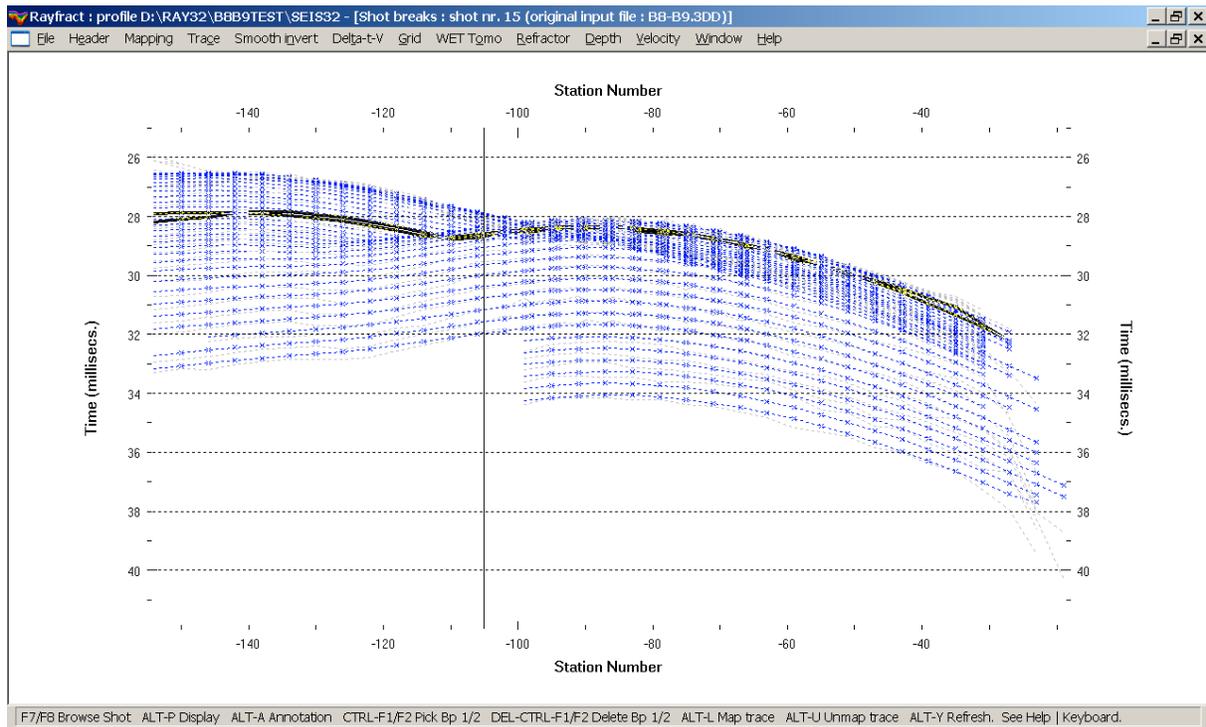


Fig. 3 : Match between picked (gray) and modeled (blue) first breaks after 200 WET iterations, for tomogram shown in Fig. 1. Station number -154 is bottom most receiver position, in right borehole. RMS error of signed misfit (modeled time – picked time) is 0.219 ms .

Note in Fig. 3 how the picked time increases with station number and elevation. Later picks correspond to a decreased P-wave velocity, with decreasing depth below river surface (at elevation 0m).

We thank Dr. Thomas Fechner at our global reseller Geotomographie GmbH, for making available this data set and background information.