

Interpretation of 6 shots into 12 channels, sent by Milko Rivera at Guyana Goldfields Inc., with Rayfract® version 3.20 :

To invert the data, start up Rayfract® via desktop icon. Select *File|New Profile...* . Set *File name* to RIVERAL8 and click *Save button*. Specify *Station spacing* of 10 m in *Header|Profile* (Fig. 1).

Unzip archive [riveral8.zip](#) in directory \RAY32\RIVERAL8\INPUT . Select *File|Import Data...* and specify *Import data type* SEG-2. Click *button Select* and select one of the .DAT files in \RAY32\RIVERAL8\INPUT (Fig. 2).

Click *button Import shots*. Specify *Shot pos.* 0.5, 1, 3, 6, 9 and 12 for shots 1 to 6. Leave *Layout start* at 1.0. Click *button Read* to import each of these shots into the profile database.

Select *File|Update header data|Update Station Coordinates...* and COORDS.COR in \RAY32\RIVERAL8\INPUT directory.

Select *File|Update header data|Update First Breaks...* and BREAKS.LST contained in \RAY32\RIVERAL8\INPUT directory.

Select *Trace|Shot gather*. Zoom time axis with F1. Zoom trace amplitude with CTRL+F1. Browse shots with F7/F8 (Fig. 3 and Fig. 4). Toggle trace fill mode with CTRL+F3.

Apply a *band-pass frequency filter* to better recognize the first breaks (Fig. 10).

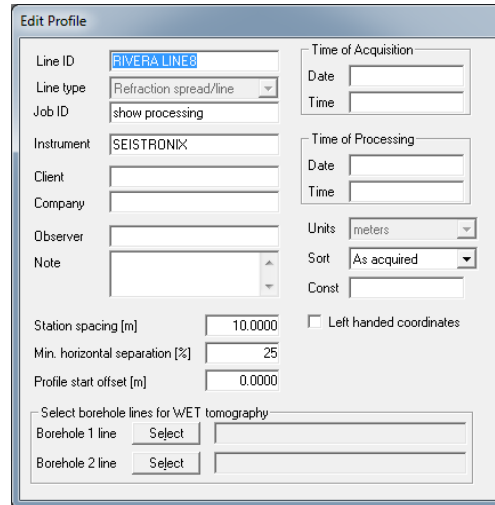


Fig. 1 : *Header|Profile*, edit profile header data

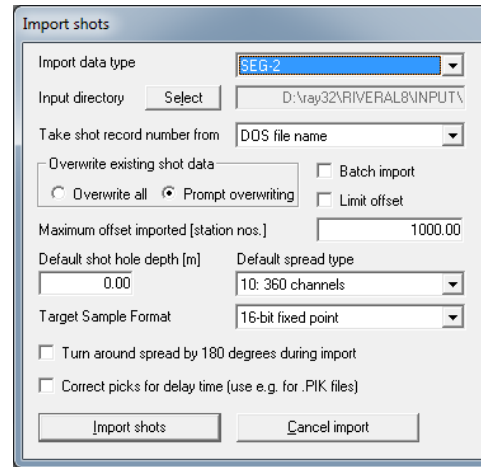


Fig. 2 : *File|Import Shots...* dialog

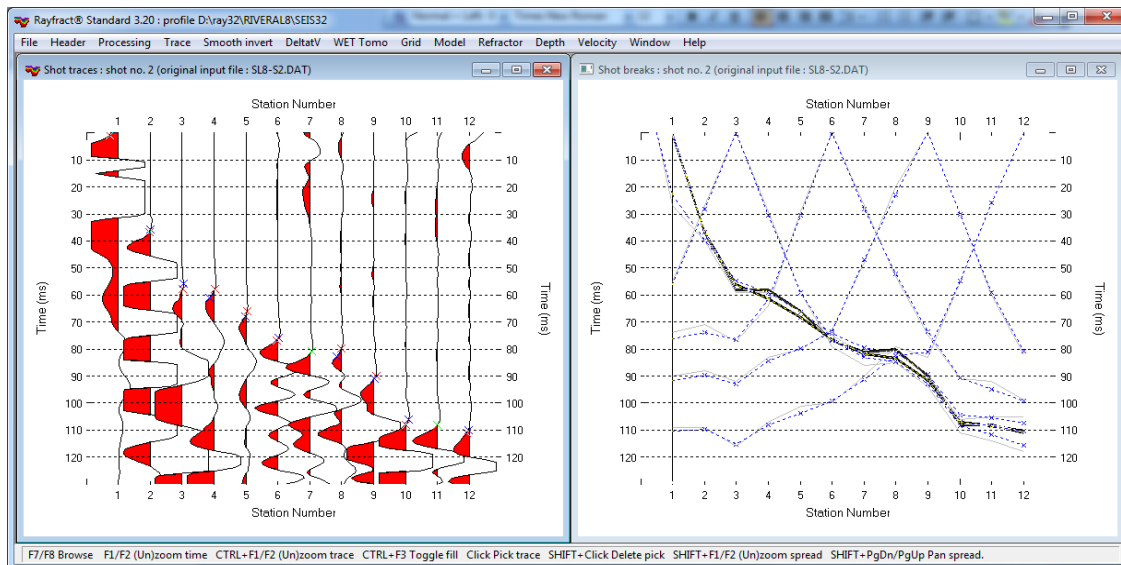


Fig. 3 : first break picking in *Trace|Shot gather* (left), shot no. 2. Red crosses are picked times, blue are modeled picks. Traveltime curves in *Refractor|Shot breaks* (right). Grey curves are picked times, dashed blue are modeled times.

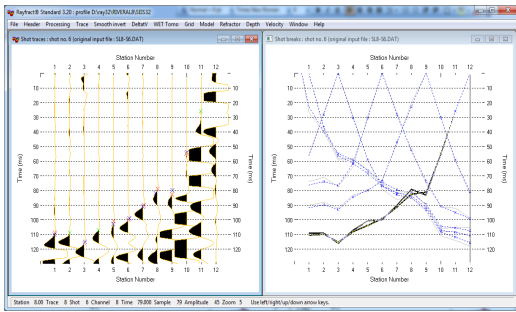


Fig. 4 : First breaks for shot no. 6, see Fig. 3

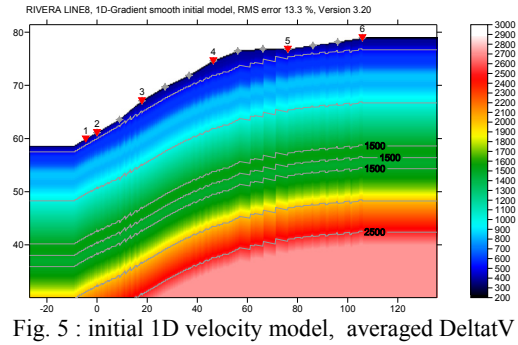


Fig. 5 : initial 1D velocity model, averaged DeltatV

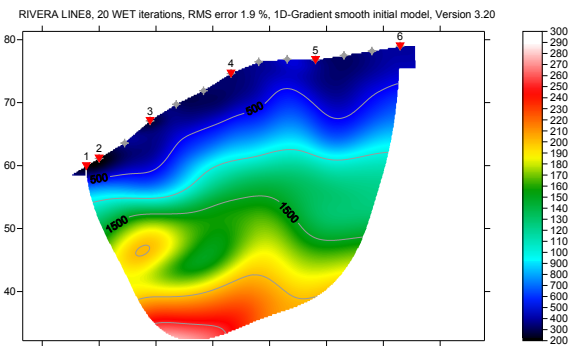


Fig. 6 : Smooth inversion, default WET settings, 20 WET iterations, wavewidth 11%

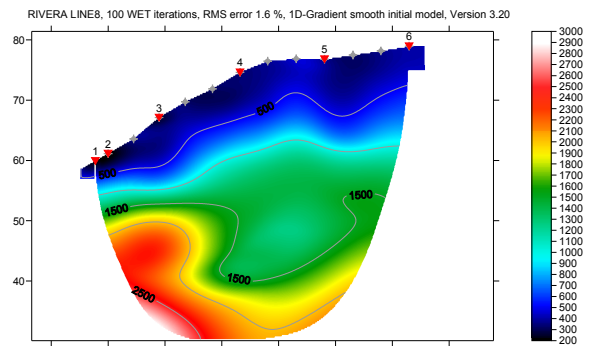


Fig. 8 : 100 WET iterations, wavewidth 11%

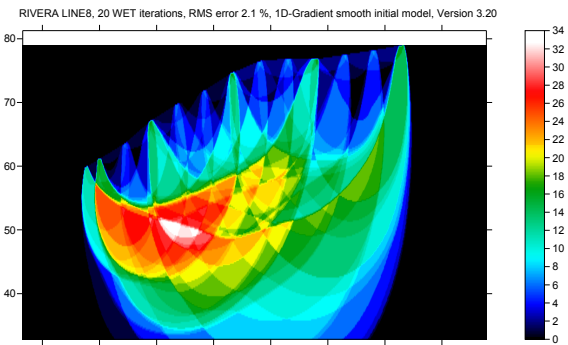


Fig. 7 : WET wavepath coverage plot. Coverage of subsurface with first break energy. WET settings as in Fig. 6 above.

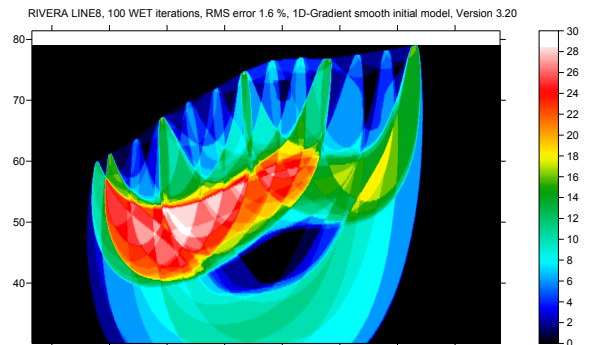


Fig. 9 : WET wavepath coverage plot. Coverage of subsurface with first break energy. WET settings as in Fig. 8 above.

To obtain above figures :

- run *Smooth invert|WET with 1D-gradient initial model*, to obtain Fig. 5, 6 and 7
- select *WET Tomo|Interactive WET tomography...*
- set *Number of WET tomography iterations* to 100
- click button *Edit grid file generation*
- set *Store each nth iteration only* to 20
- click buttons *Accept parameters* and *Start tomography processing* to obtain Fig. 8 and 9

Note the step-shaped basement depression at bottom of Fig. 8, after 100 WET iterations. This is not yet visible in Fig. 6 after just 20 WET iterations, due to incomplete **removal of horizontal layering artefacts of the 1D initial model** (Fig.5). We recommend using at least 24 receivers instead of just 12 receivers per spread, for more reliable interpretation. Or use [overlapping receiver spreads](#) for recording of shots.

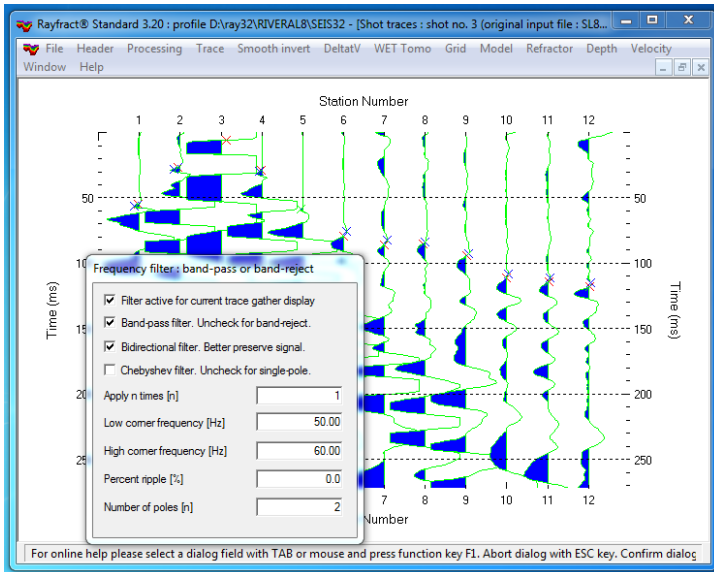


Fig. 10 : band-pass frequency filtering in *Trace|Shot gather*, shot no. 3. Press SHIFT+Q to show band-pass dialog.

To **quality-check your first breaks with the travelttime reciprocity principle**, use *Trace|Offset gather* (Fig. 11). Browse common-offset sorted trace gathers with F7/F8. The common offset is displayed in the title bar, in meters. According to the reciprocity principle, **seismic first break times, rays and wave paths are identical when swapping source and receiver positions, for each recorded trace**. So in Fig. 11, traces with same common offset and common midpoint (station number) should have the same first break pick time, according to the laws of physics.

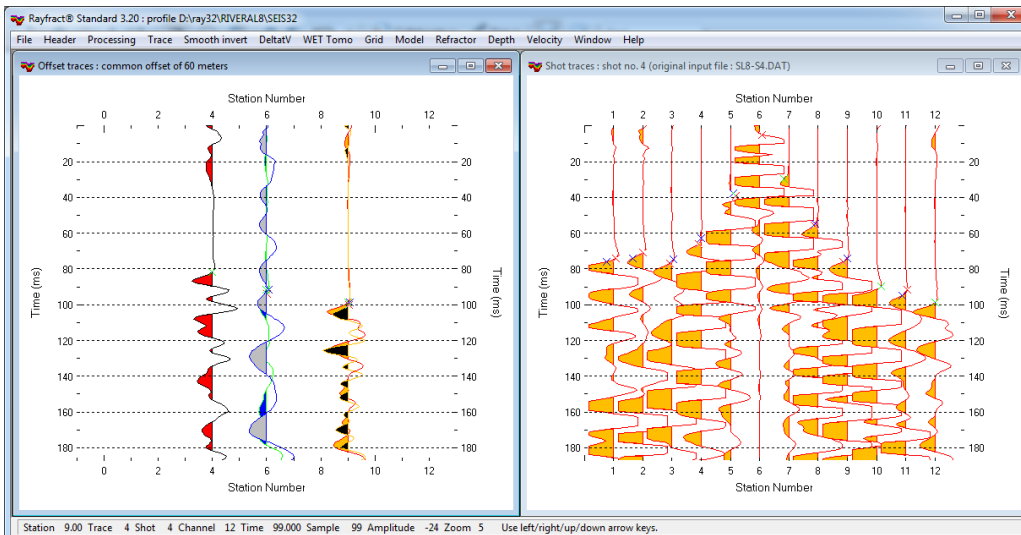


Fig. 11 : *Trace|Offset gather*, offset 60m (left). *Trace|Shot gather*, shot no. 4 (right). Browse traces with arrow-left and arrow-right keys. Trace attributes are displayed in status bar, at bottom of screen. Channel #12 of shot #4 (99 ms, yellow) has almost same time as channel #6 of shot #6 (100 ms, black), so these two picks regard the reciprocity principle.