Sinalunga 2018 Rayfract® Workshop
By
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&
Intelligent Resources Inc.

Presenters :

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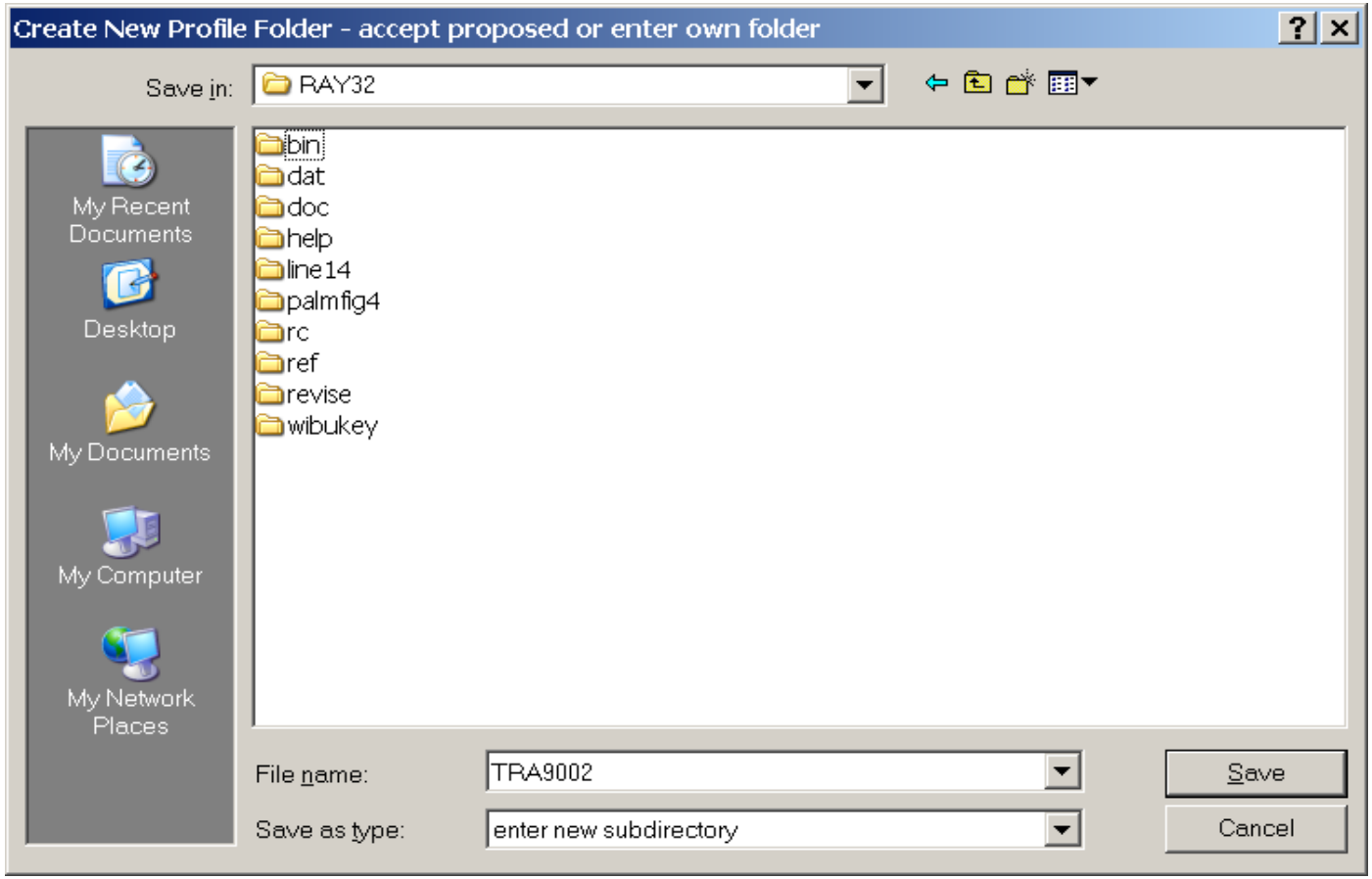
Siegfried Rohdewald

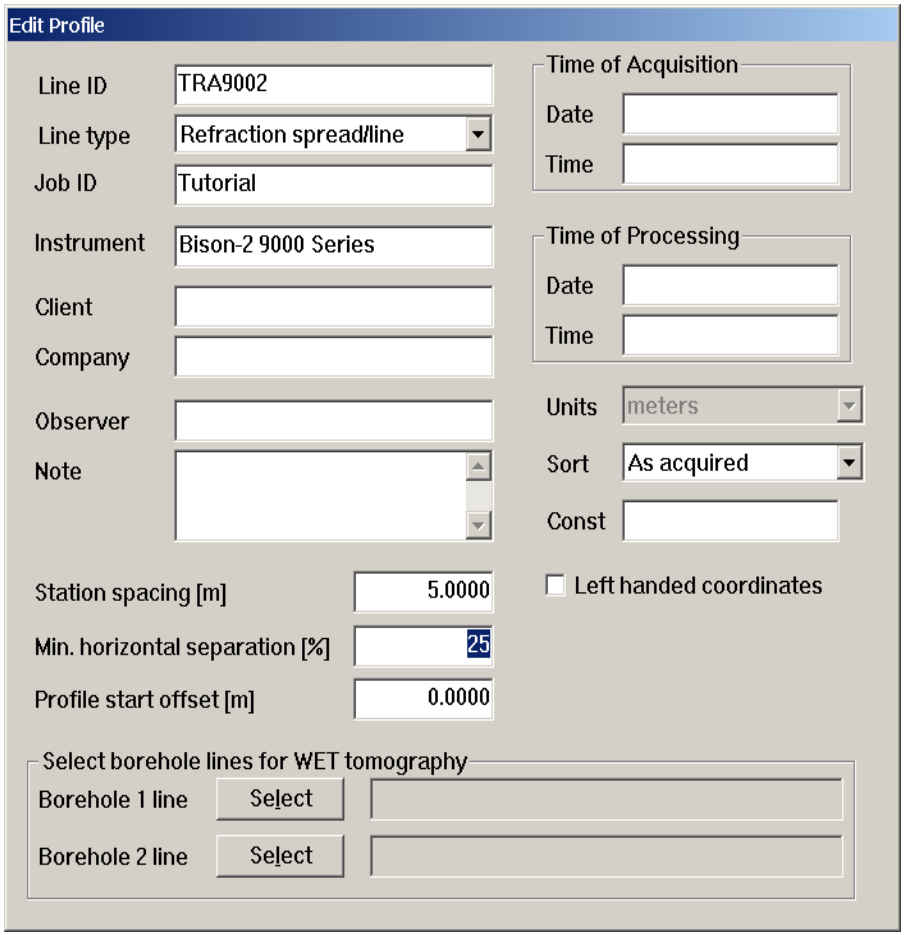
Tutorial for Val de Travers line TRA9002 : vary starting model

Create new profile



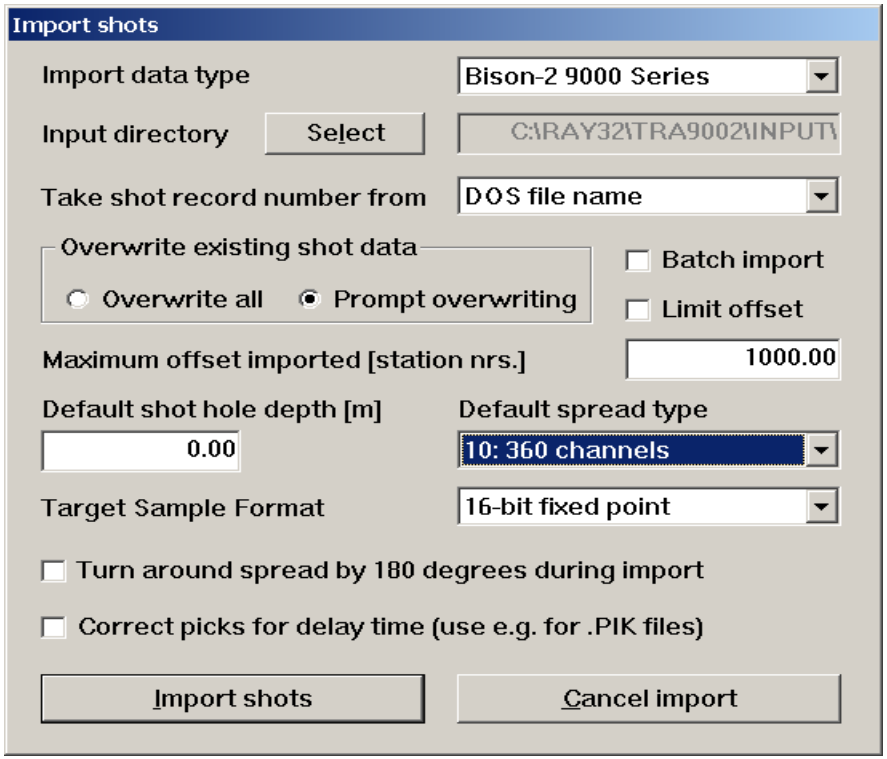
1 Start up Rayfract software with *desktop icon* or *Start menu*
2 Select *File|New Profile…*
3 Set *File name* to TRA9002 and click *Save*

Fill in profile header



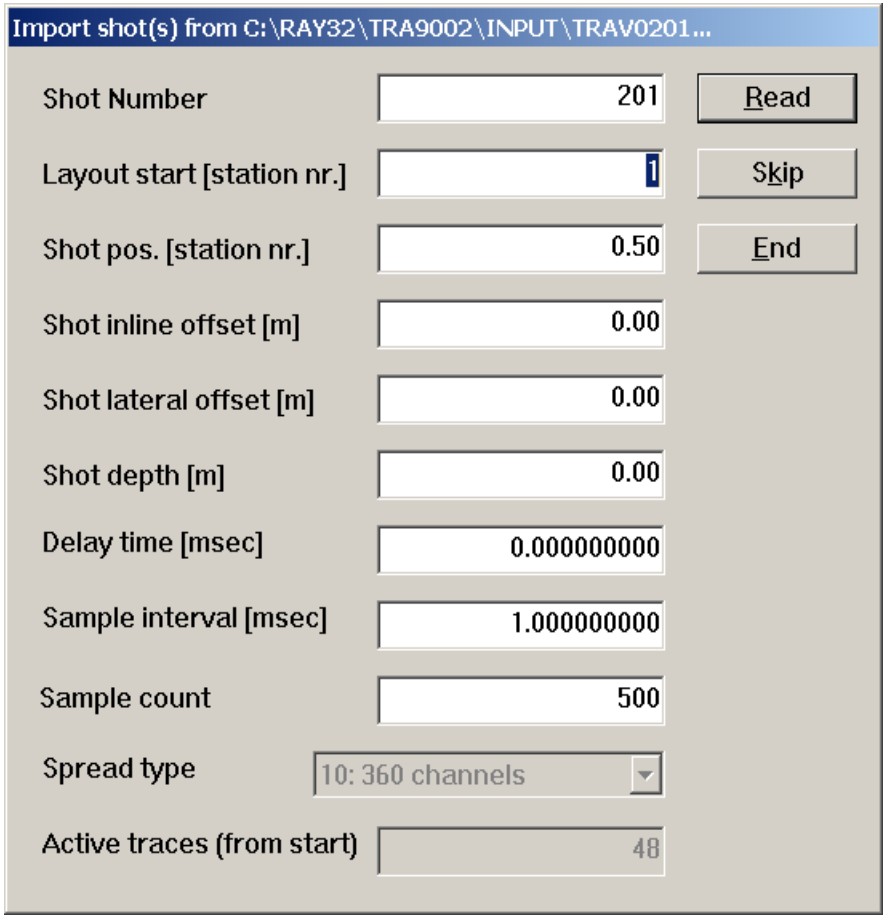
1 Select *Header|Profile…*
2 Set *Line ID* to TRA9002 and *Job ID* to Tutorial
3 Set *Instrument* to Bison-2 9000 and *Station spacing* to 5m
4 Hit ENTER, and confirm the prompt

Seismic data import



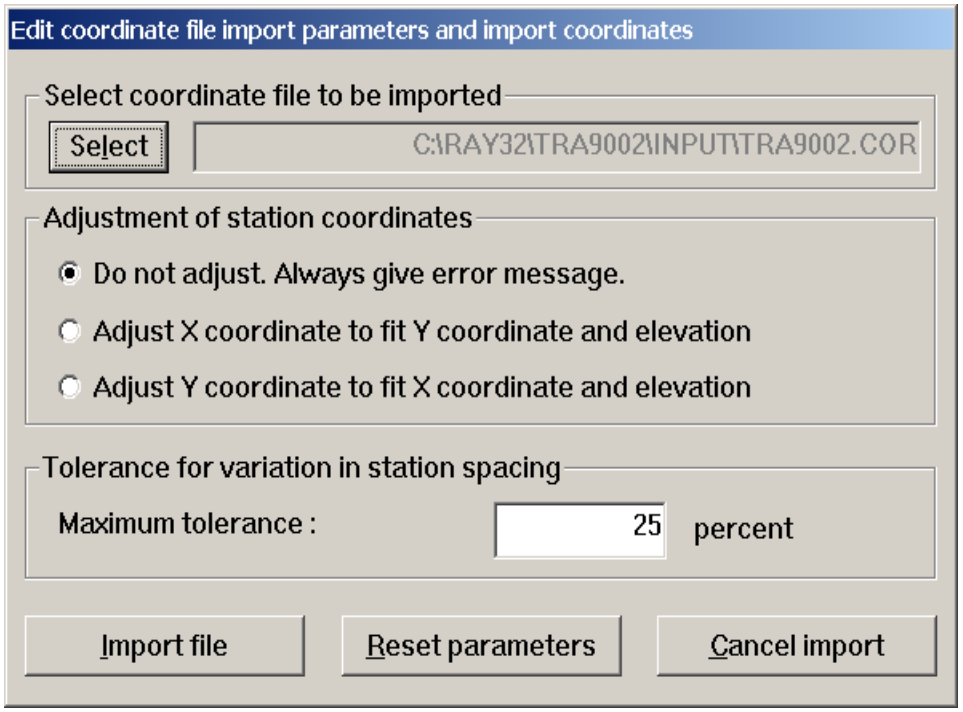
1. Copy files from \RAY32\TUTORIAL with Windows Explorer, or unzip http://rayfract.com/tutorials/TRA9002.ZIP to \RAY32\TRA9002\INPUT
2. Select *File*|*Import Data…* for *Import shots dialog*, see above
3. Set *Import data type* to Bison-2 9000 Series
4. Click *Select button*, select file TRAV0201 in \RAY32\TRA9002\INPUT
5. Click on *Open*, *Import shots*, and confirm the prompt

Import each shot



Click on *Read* for all shots shown in *Import Shot dialog*, see above.
Don’t change *Layout start* and *Shot pos*., these are correct already

Update geometry and first breaks



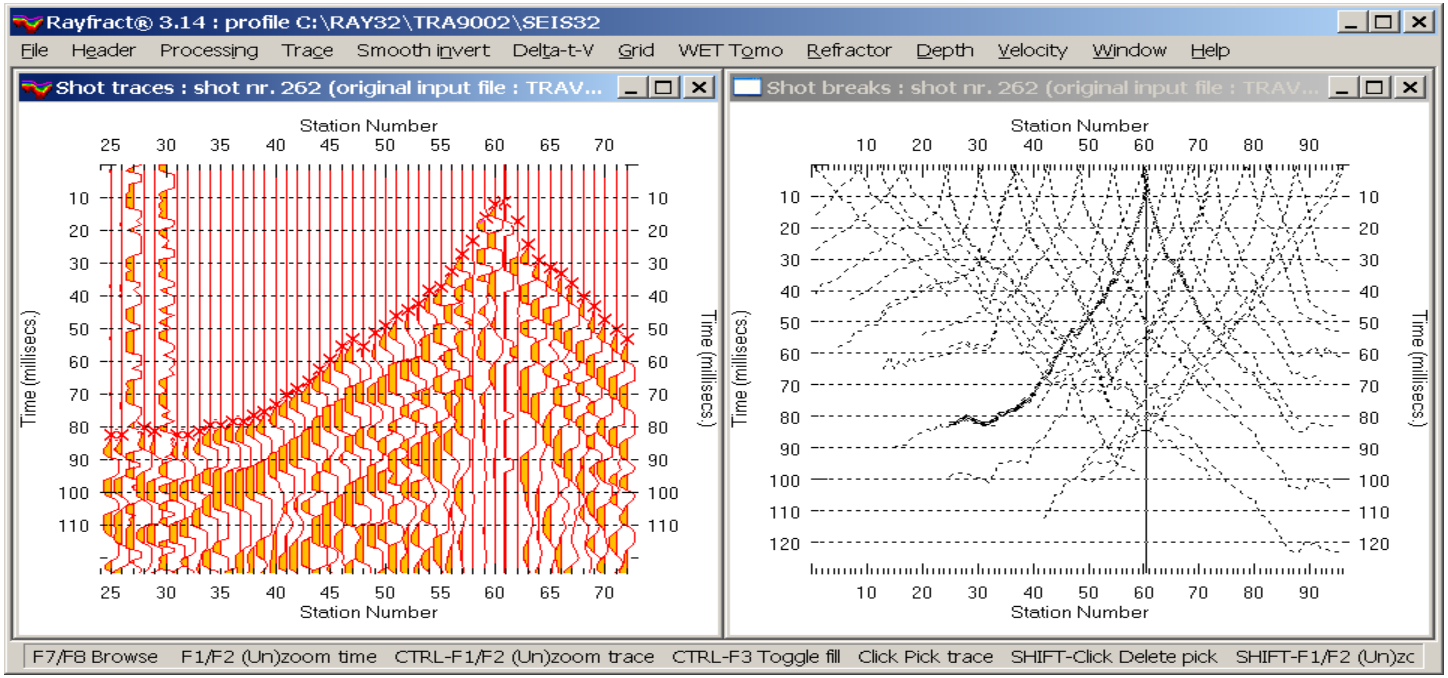
1 Select *File*|*Update header data*|*Update Station Coordinates…*

2 Click on *Select* and \RAY32\TRA9002\INPUT\TRA9002.COR

3 Click on *Open*, *Import File* and confirm the prompt

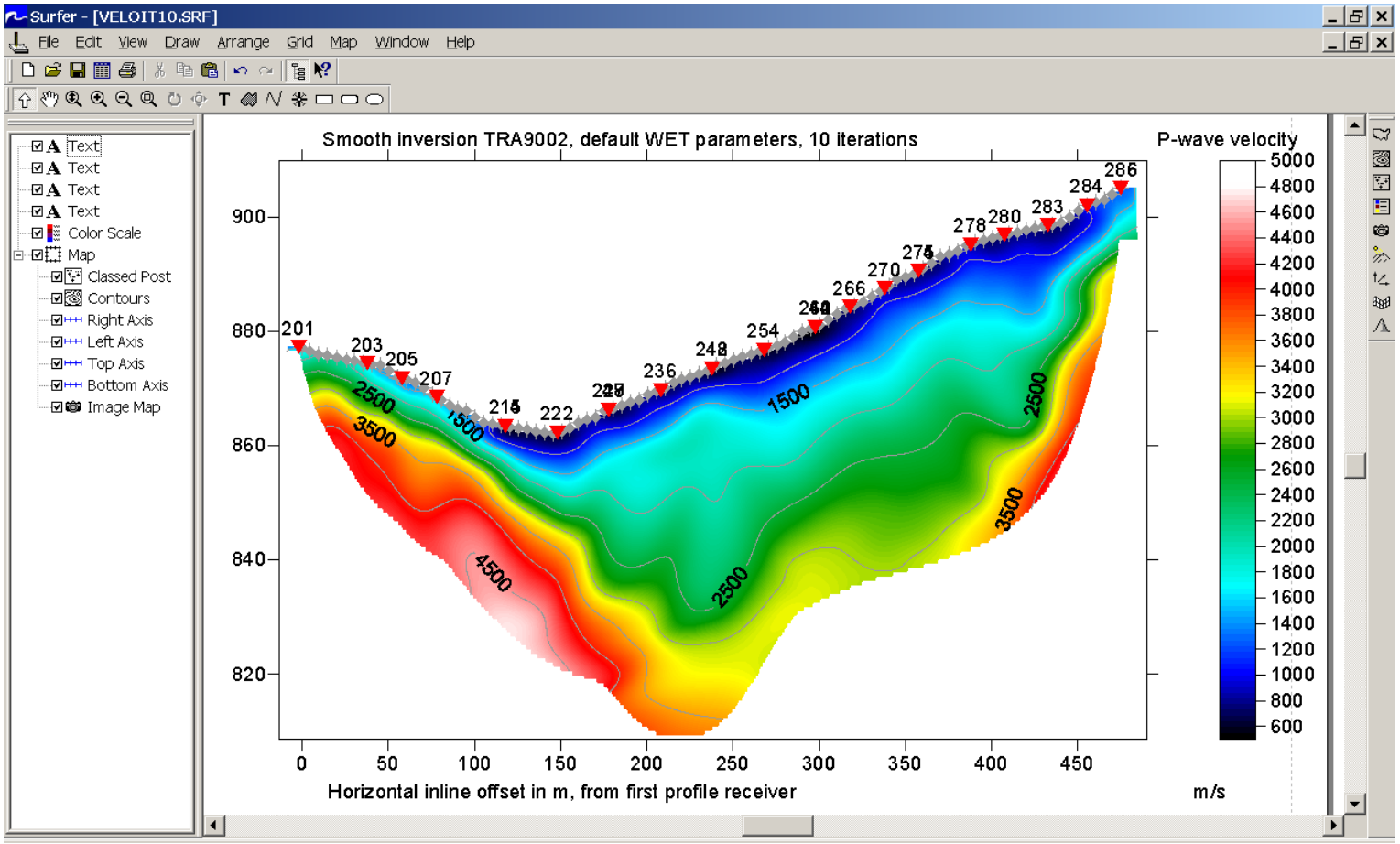
4 Select *File*|*Update header data*|*Update First Breaks* and \RAY32\TRA9002\INPUT\TRA9002.LST and click *Open*

View and repick traces, display traveltime curves



1 Select *Trace*|*Shot gather* and *Window*|*Tile.* Browse shots with F7/F8
2 Click on *Shot breaks window* and press ALT-P
3 Set *Maximum time* to 130 msecs. and hit ENTER
4 Click on *Shot traces window* and press F1 twice to zoom time
5 CTRL-F1 twice to zoom amplitude, CTRL-F3 twice to toggle trace fill mode
6 Select *Processing*|*Color traces* and *Processing*|*Color trace outline*
7 Use up/down/left/right arrow keys to navigate along and between traces
8 Zoom spread with SHIFT-F1. Pan zoomed sections with SHIFT-PgDn/PgUp
9 Optionally repick trace with left mouse key or space bar, delete first break with ALT-DEL or SHIFT-left mouse key. Press ALT-Y to redisplay traveltime curves

Smooth inversion of first breaks

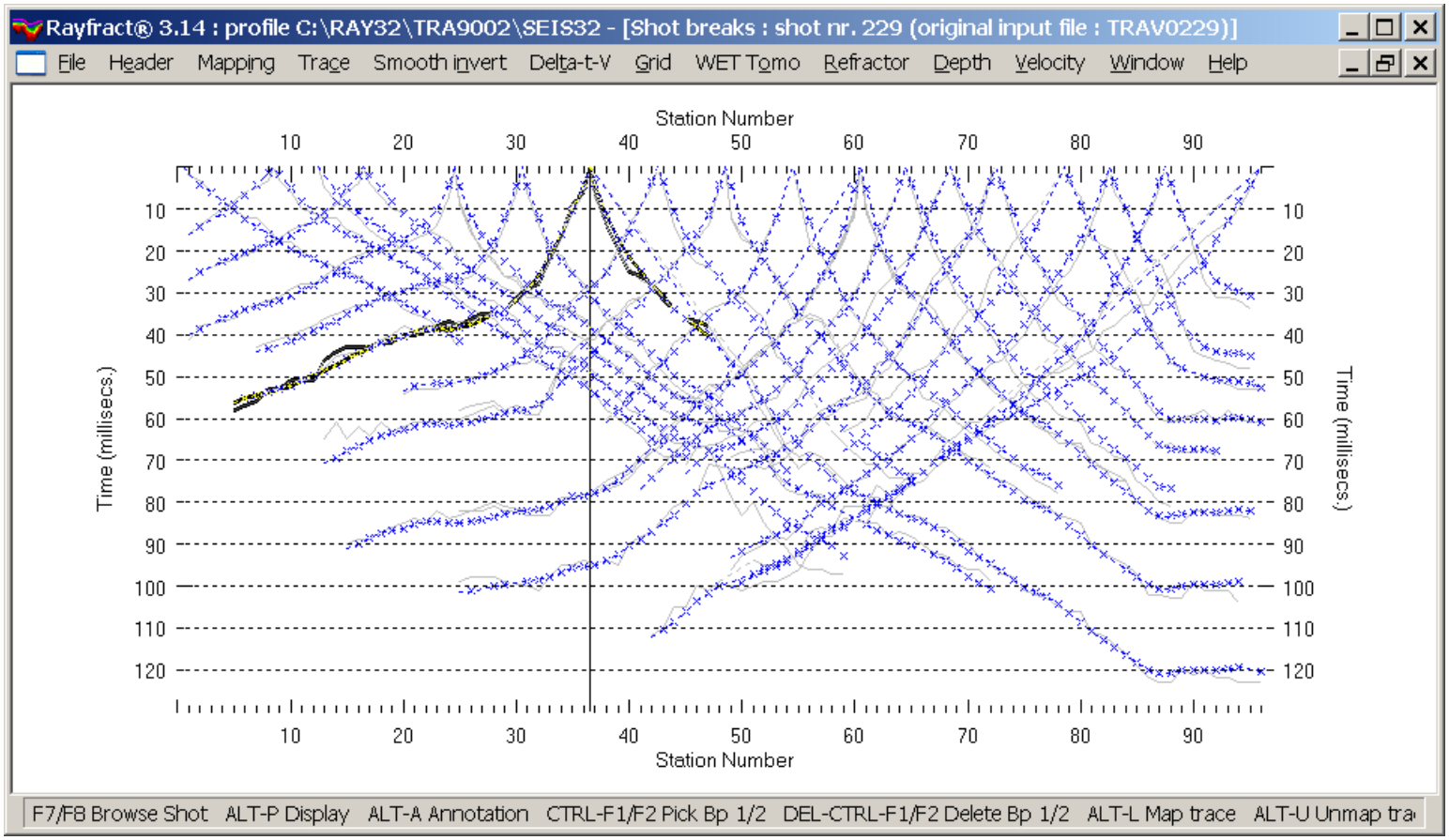


1 Select *Smooth invert|WET with 1D gradient initial model*

2 Once the 1D gradient model is shown in Surfer™, click on *Rayfract icon* at bottom of screen, to continue. Confirm following prompts

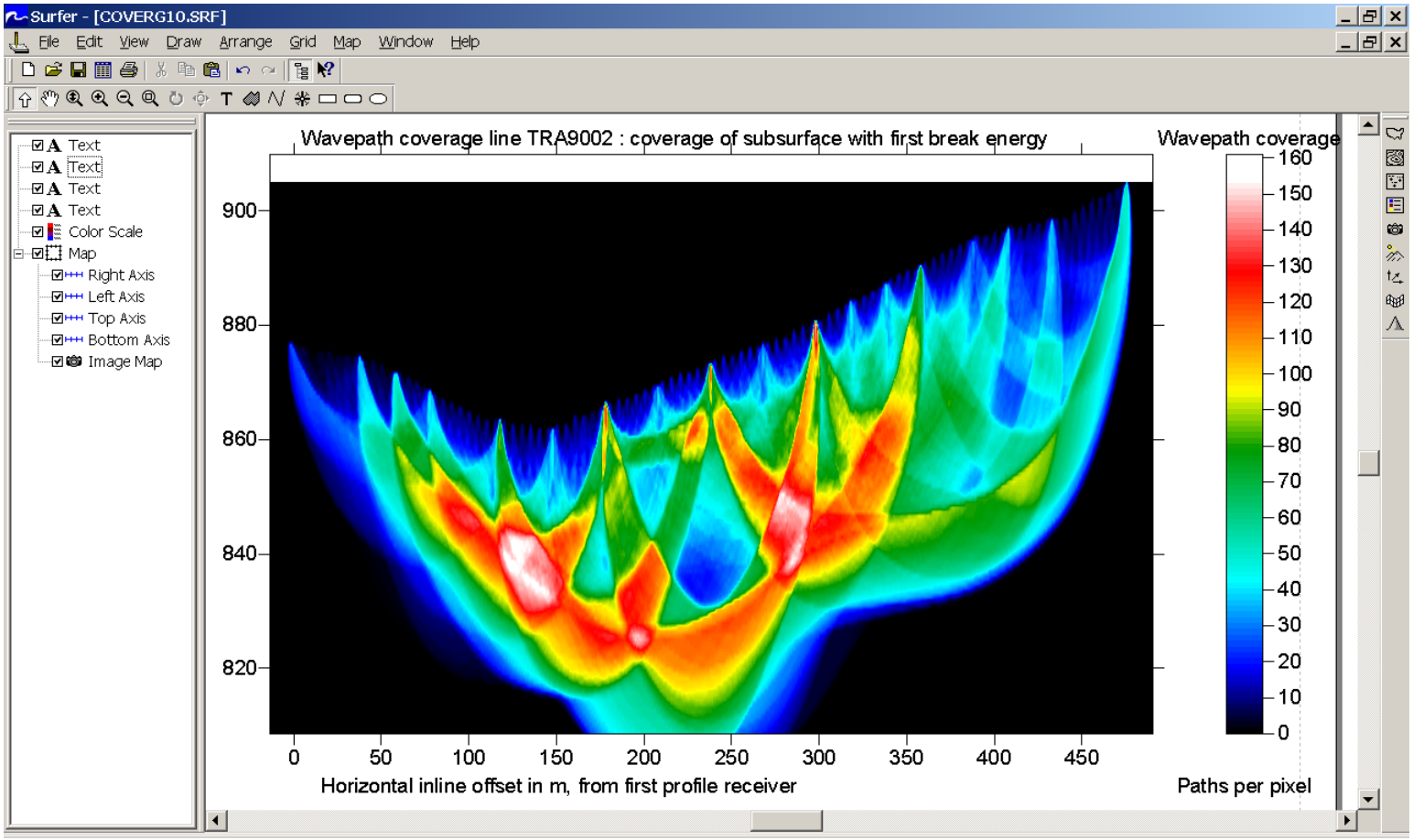
3 Click on *Surfer icon* and add text legends with Surfer *Draw|Text*

Display modeled picks and traveltime curves



1 Click on *Rayfract icon* at bottom of screen
2 Select *Refractor*|*Shot breaks* to view picked and modeled (blue) times
3 Press F7/F8 keys to browse through shot-sorted traveltime curve
4 Use *Mapping*|*Gray picked traveltime curves* to toggle curve pen style

Display WET wavepath coverage

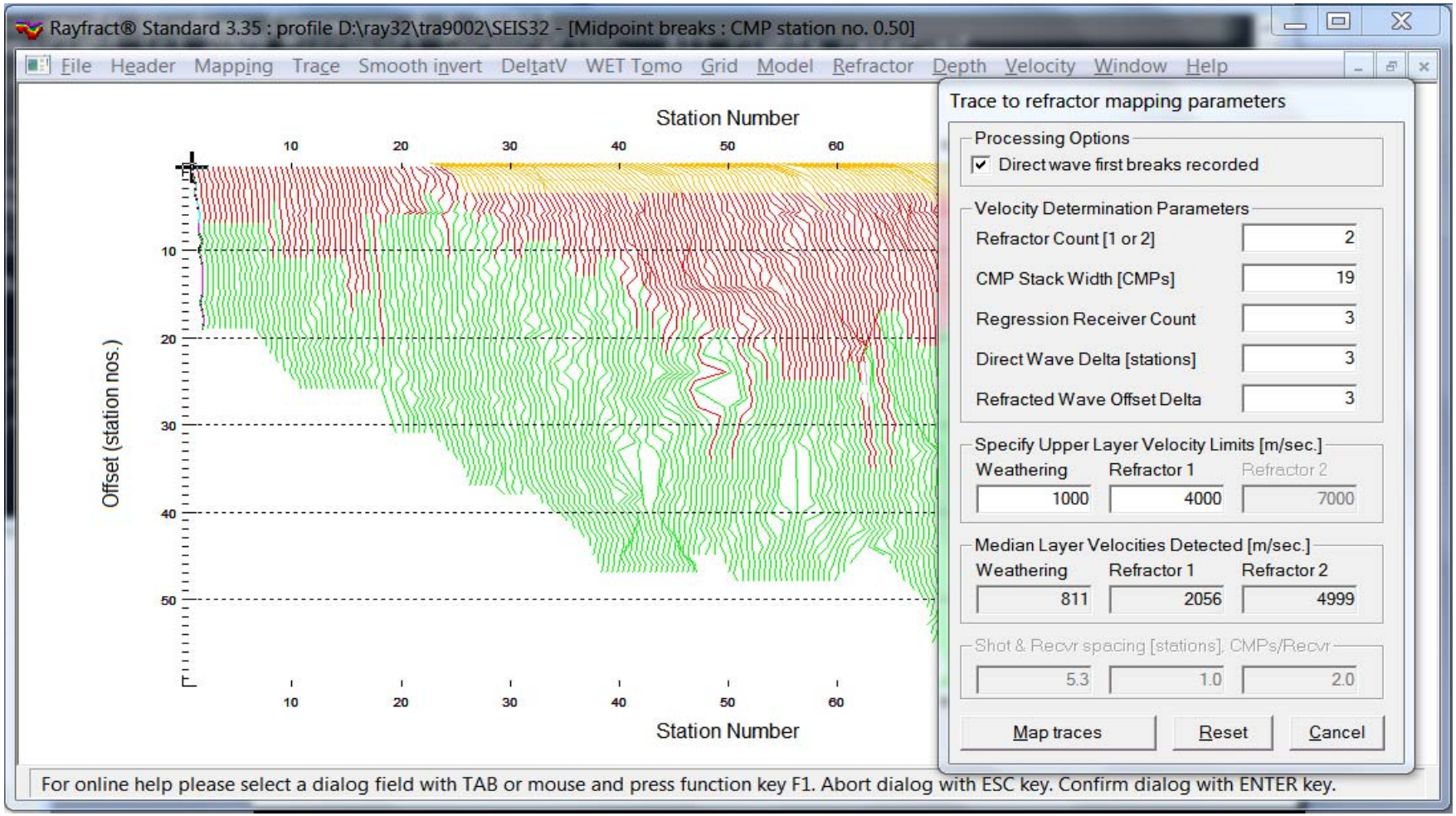


1 Click on *Surfer icon* at bottom of screen

2 Use CTRL-TAB to cycle between WET tomogram, wavepath coverage plot and 1D gradient initial model

3 Add text legends as shown above, with Surfer *Draw|Text* command

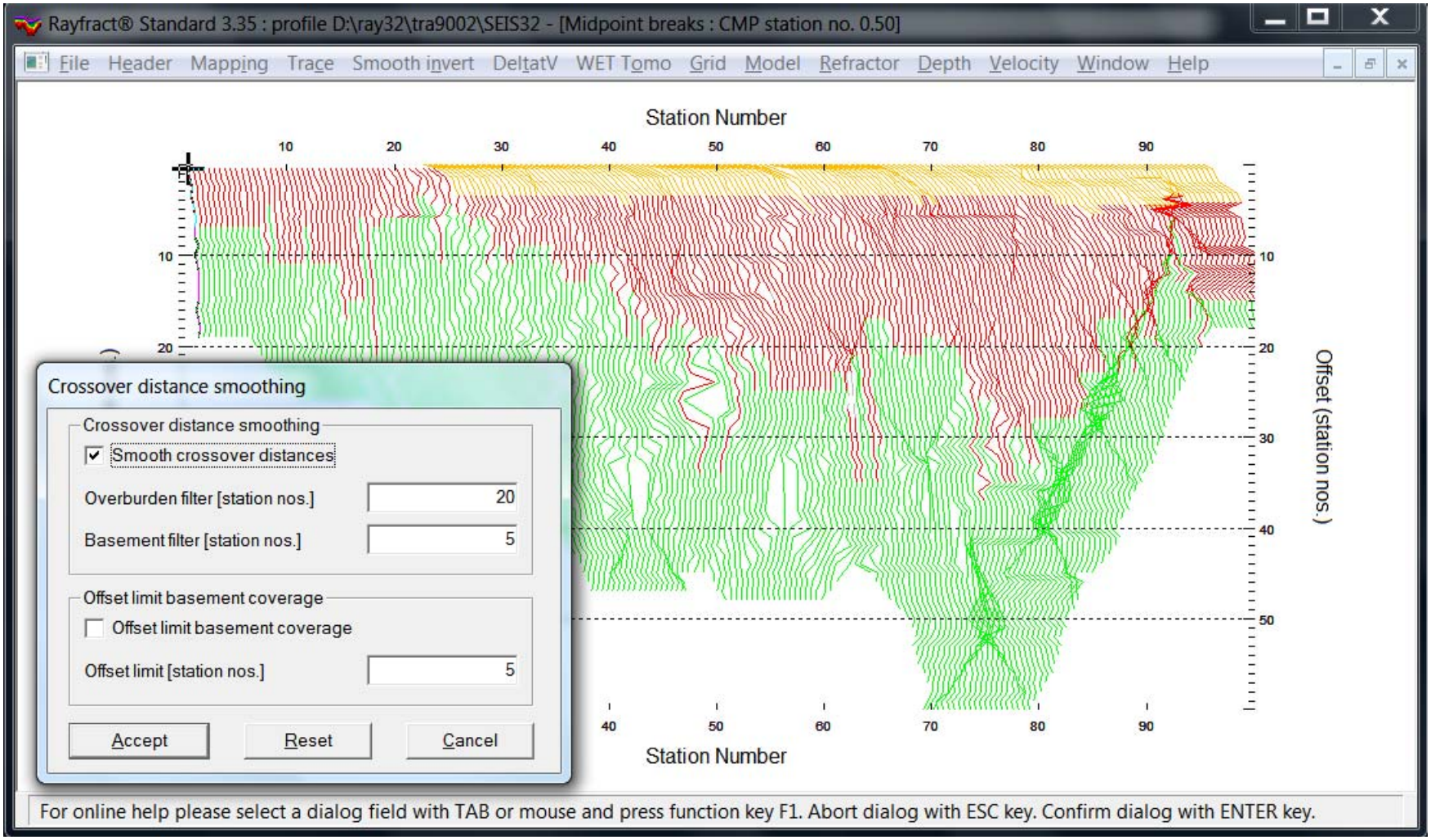
Map traces to refractors in Midpoint breaks



1 Select *Refractor|Midpoint breaks.* Zoom/Unzoom dip : CTRL+F1/CTRL+F2

2 Press ALT+M for mapping dialog. Edit as above. Click *Map traces button*.

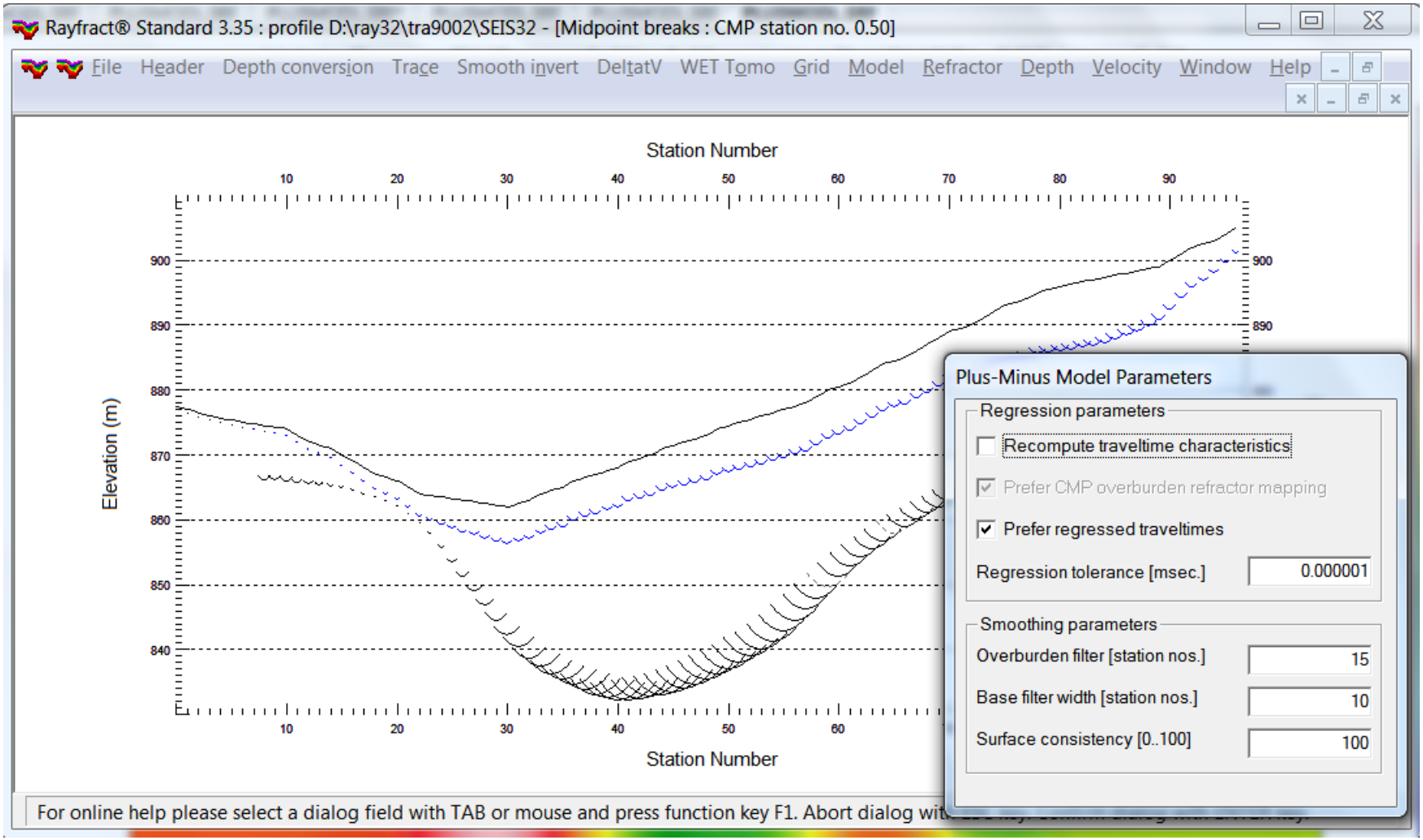
Smooth crossover distance



1 Press ALT+G to show Crossover distance smoothing dialog

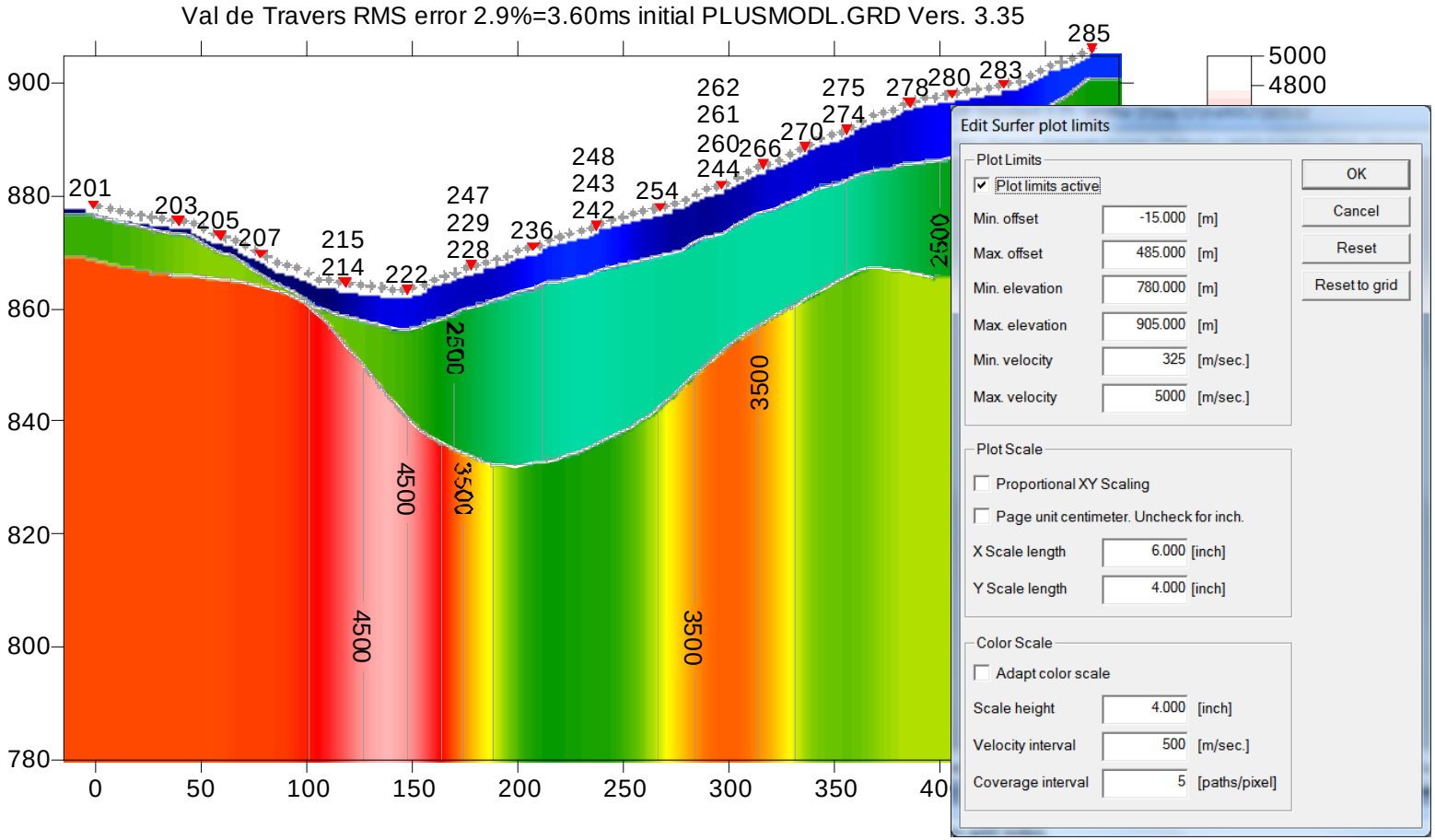
2 Set *Overburden filter* to 20. Set *Basement filter* to 5. Click *Accept button*.

Create Plus-Minus starting model



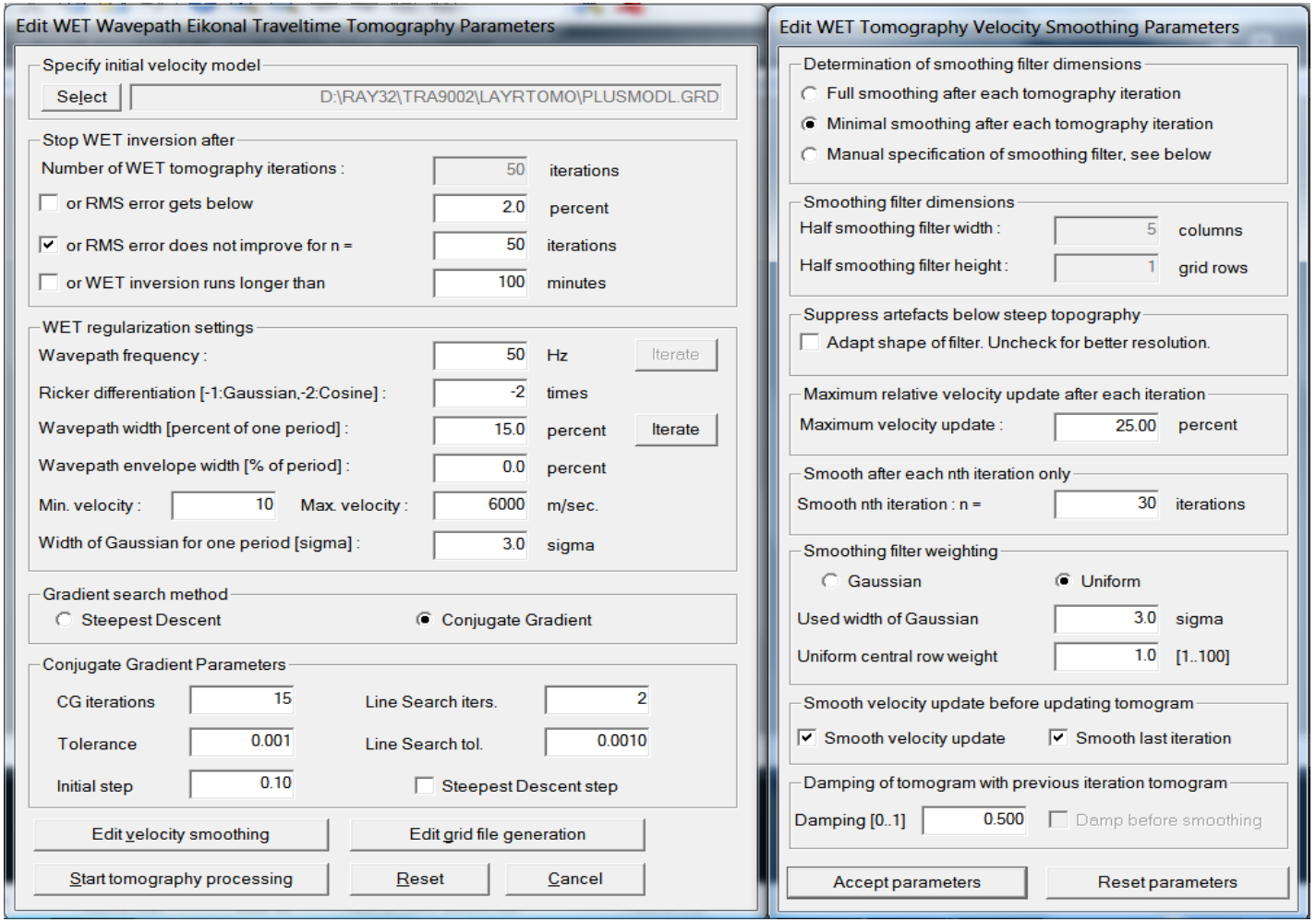
1 Select *Depth|Plus-Minus*. In prompt *Continue with WET* click *No button*.
2 Press ALT+M for *Model Parameters dialog*.
3 Set *Overburden filter* to 15. Set *Base filter width* to 10. Hit ENTER key.

Display Plus-Minus model in Surfer



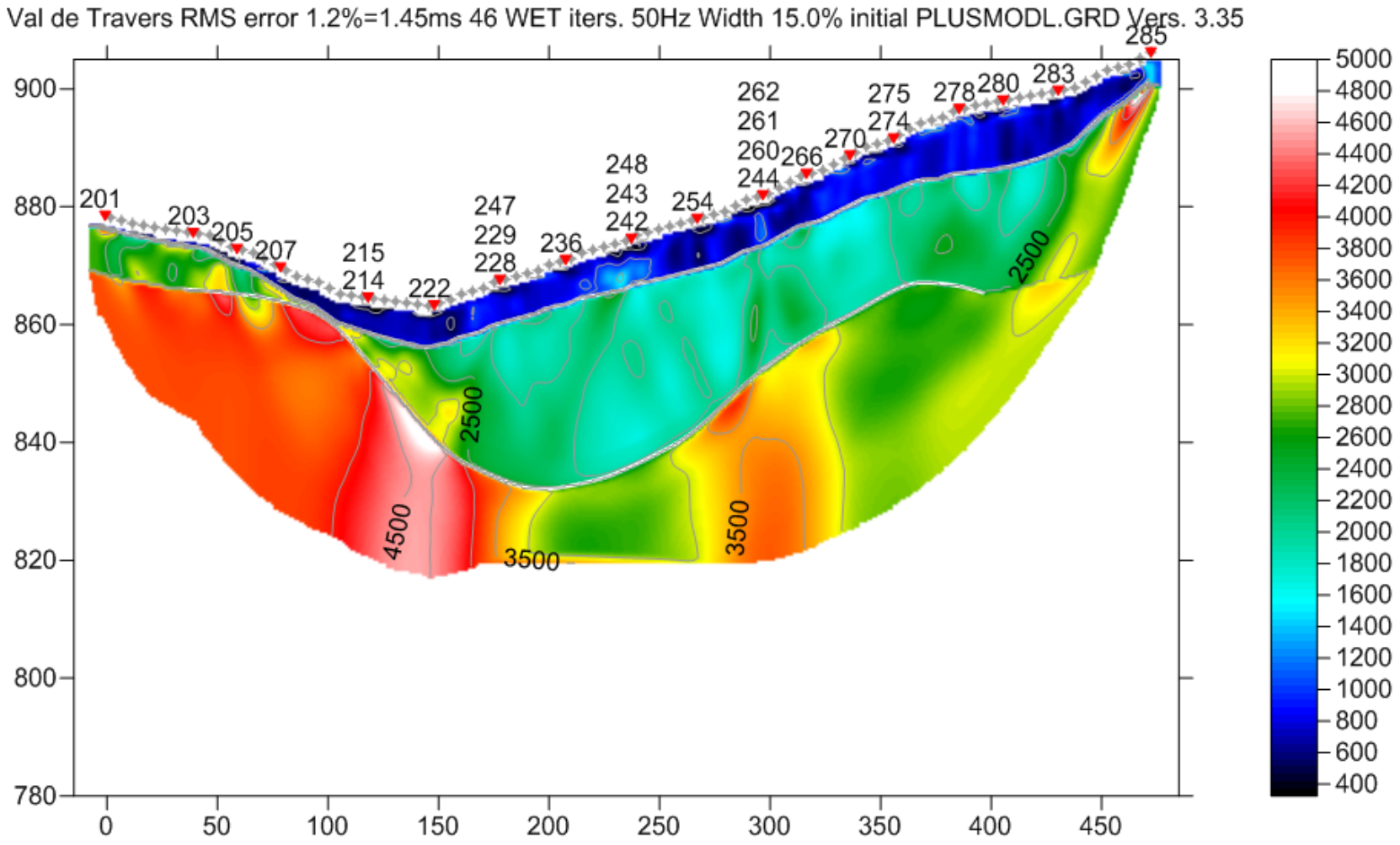
1 Select *Grid|Surfer plot Limits*. Click *Reset to grid button*.
2 Select C:\RAY32\TRA9002\LAYRTOMO\PLUSMODL.GRD. Click *Open*.
3 Edit grid limits as above. Set *Min/Max velocity* to 325/5000 m/sec. Click *OK*.
4 Check *Grid|Stack shot labels*. Uncheck *Grid|Label receiver stations*.
5 Select *Grid|Image and Contour velocity and coverage grids*.
6 Select C:\RAY32\TRA9002\LAYRTOMO\PLUSMODL.GRD. Click *Open*.

Run WET with Plus-Minus starting model

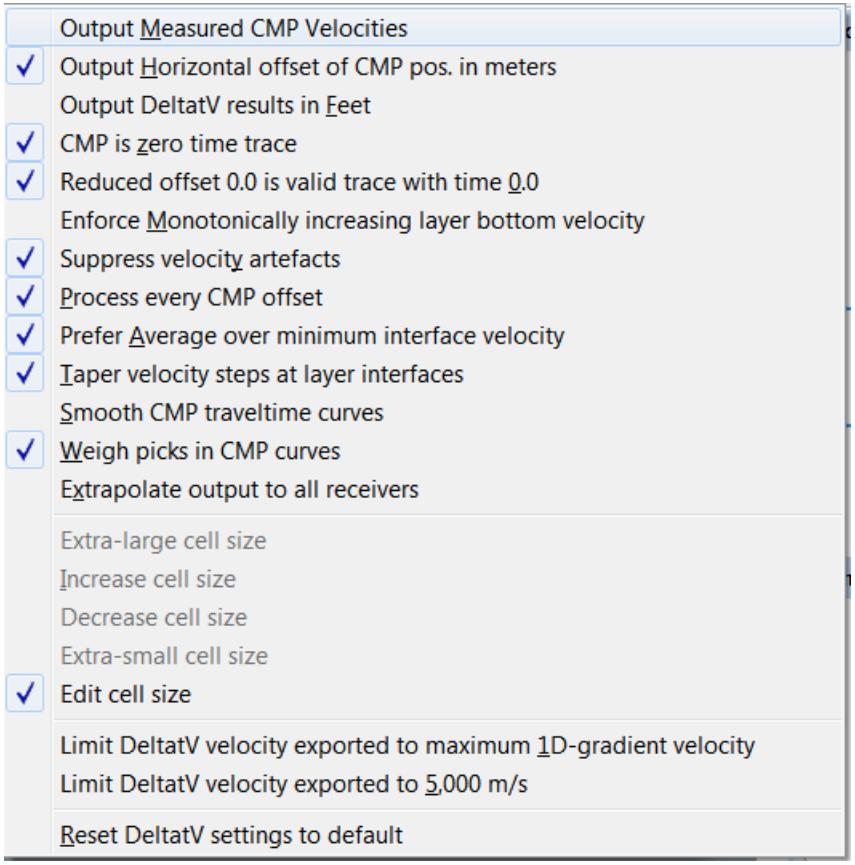


1. Check *WET Tomo|WET tomography Settings|Blank|Blank after last iteration*
2. Uncheck all other blanking flags in *WET Tomo|WET tomography Settings|Blank*
3. Select *WET Tomo|Interactive WET tomography*. Select …\PLUSMODL.GRD.
4. Fill in as above. Click button *Edit velocity smoothing*. Fill in as above at right.
5. Click *Accept parameters* and *Start tomography processing*.

View WET with Plus-Minus starting model

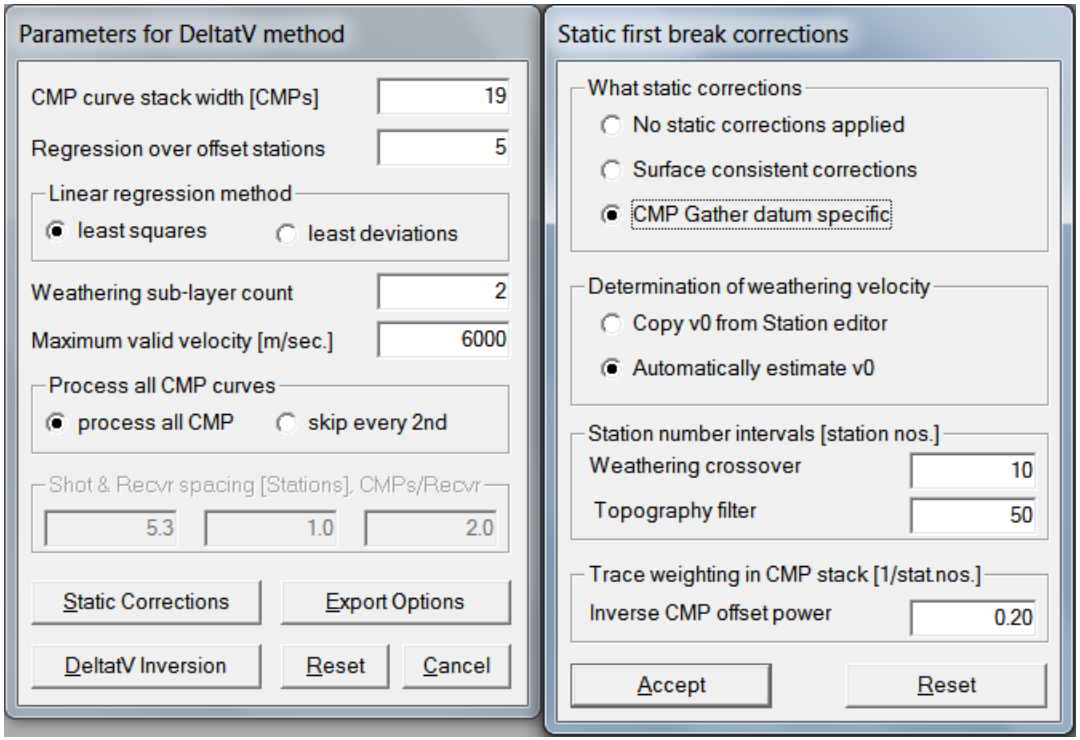


Configure DeltatV Settings



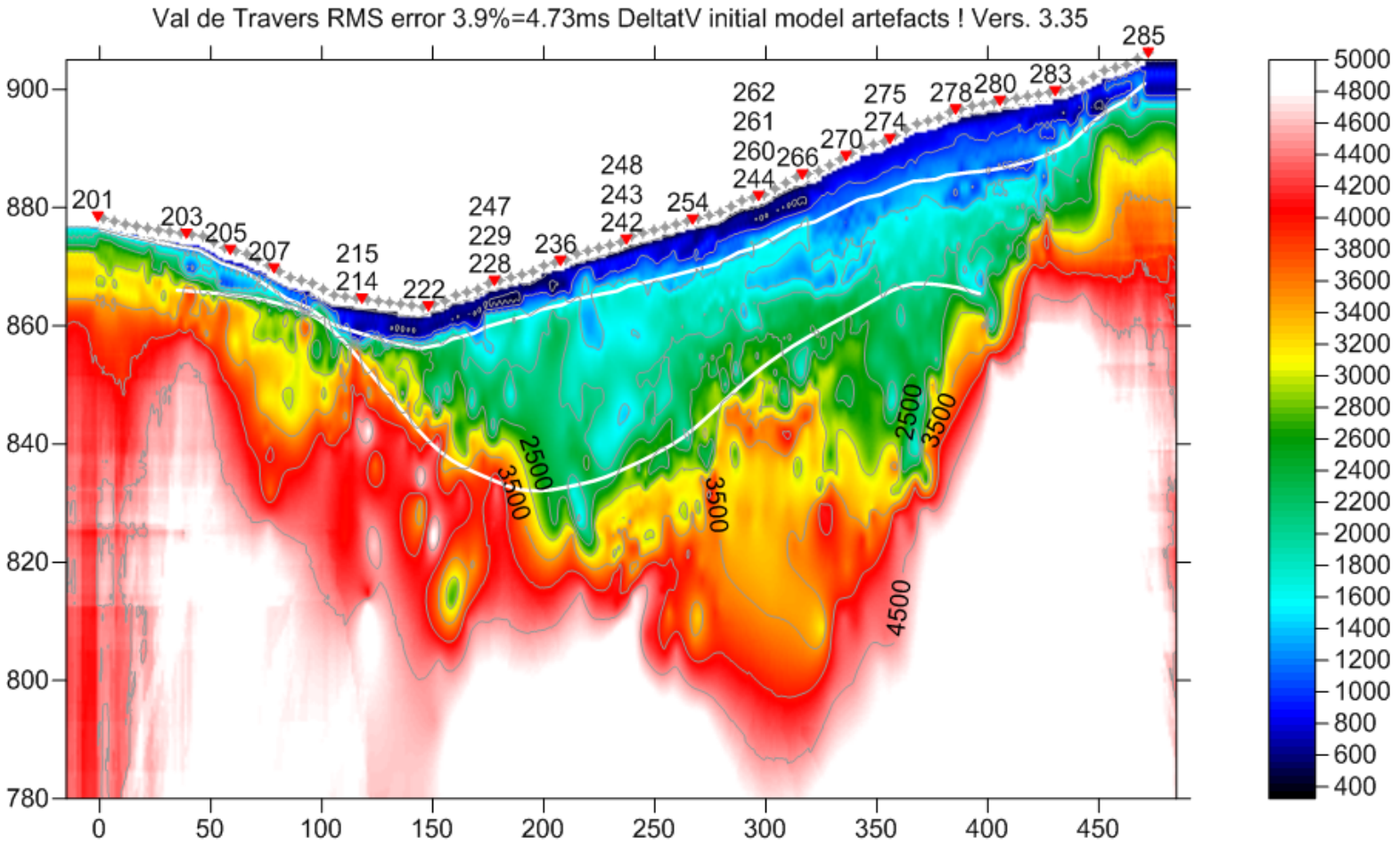
1 Set options in *DeltatV|DeltatV Settings* as above
2 Check *Process every CMP offset* to get better vertical resolution
3 Check *Taper velocity steps at layer interfaces* to get better vertical resolution

Run interactive DeltatV method



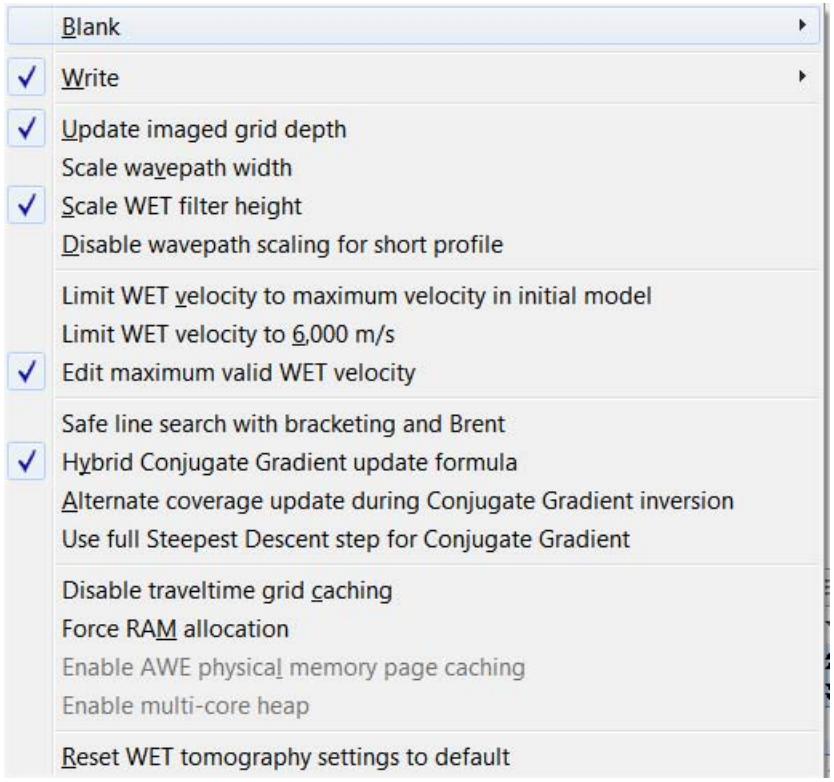
1 Select *DeltatV|XTV parameters*. Click *Gradient model* & *Accept* buttons.
2 Select *DeltatV|Interactive DeltatV (CMP Velocity vs. Depth).* Confirm prompt.
3 Edit parameters as above. Click *Static Corrections*. Edit as above at right.
4 Click *button DeltatV inversion*.
5 In dialog *Save DeltatV output* click Folder icon&set folder name to DeltatVXTV
6 Enter DeltatVSep15 subdirectory by double-clicking it
7 Set *File name* to DeltatVXTV and click *Save button*. Confirm prompt.

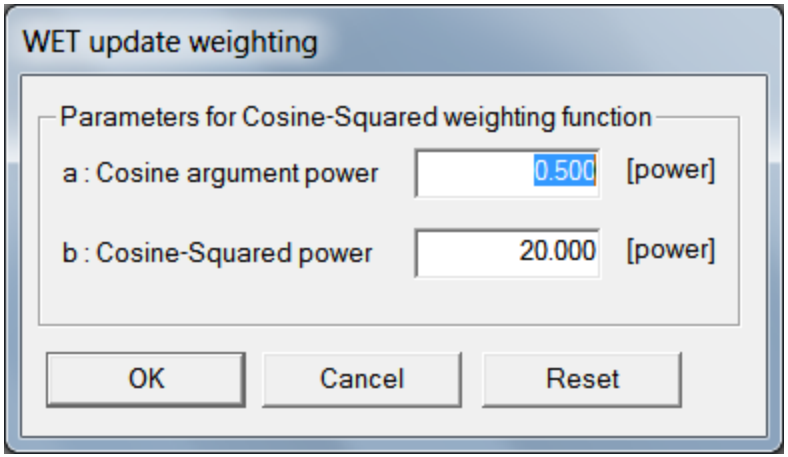
View DeltatV starting model in Surfer



1 Select *Model|Forward model traveltimes...* & DeltatVXTV\DeltatVXTV.GRD
2 Select *Grid|Image and contour* & DeltatVXTV\DeltatVXTV.GRD
3 Click *Surfer icon* in Windows taskbar to view DeltatV+XTV output as above

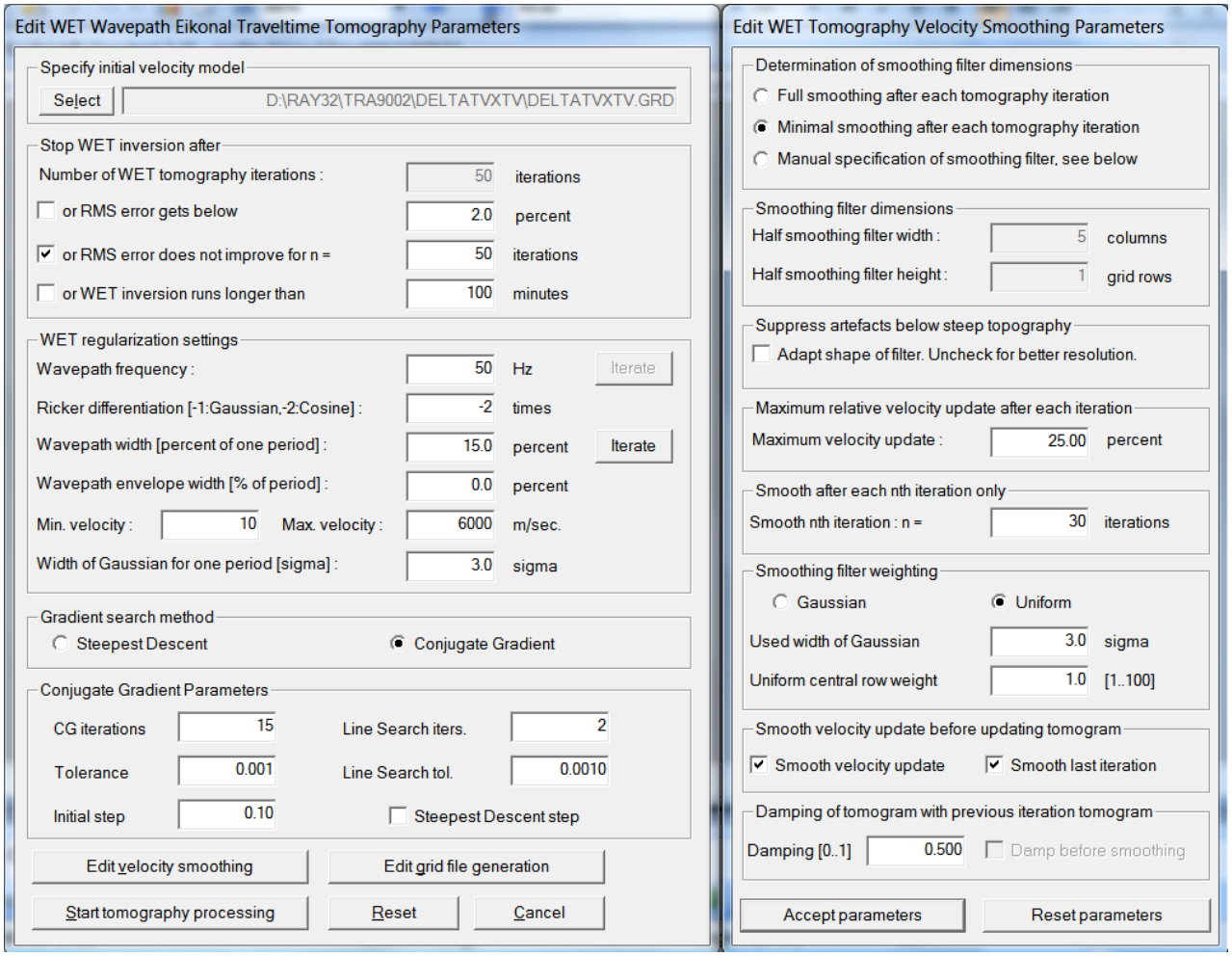
Edit WET settings and update weighting





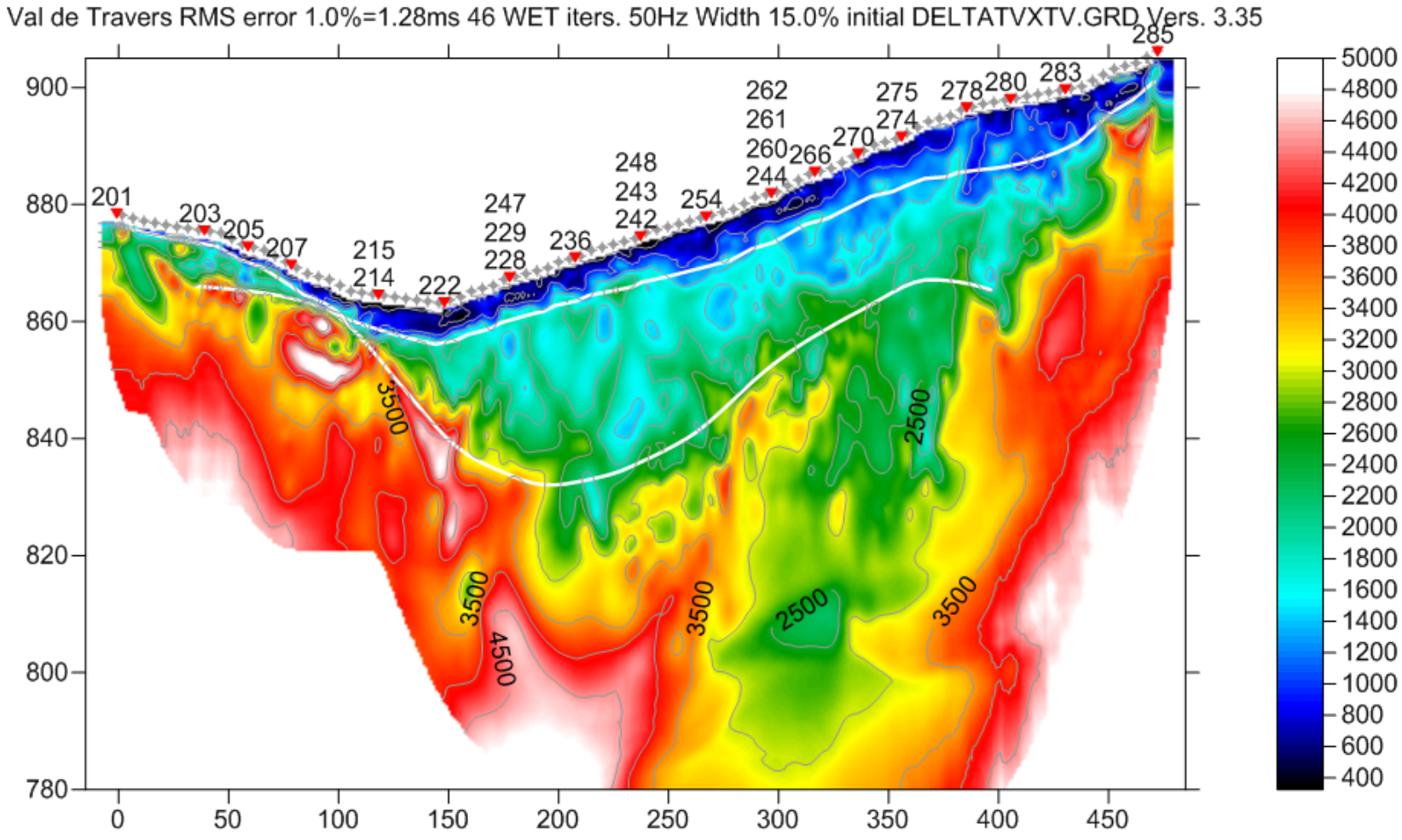
1 Check/uncheck options in *WET Tomo*|*WET tomography Settings* as above
2 Select *WET Tomo*|*WET Update weighting*. Edit as above and click *OK*.

Edit WET with DeltatV starting model

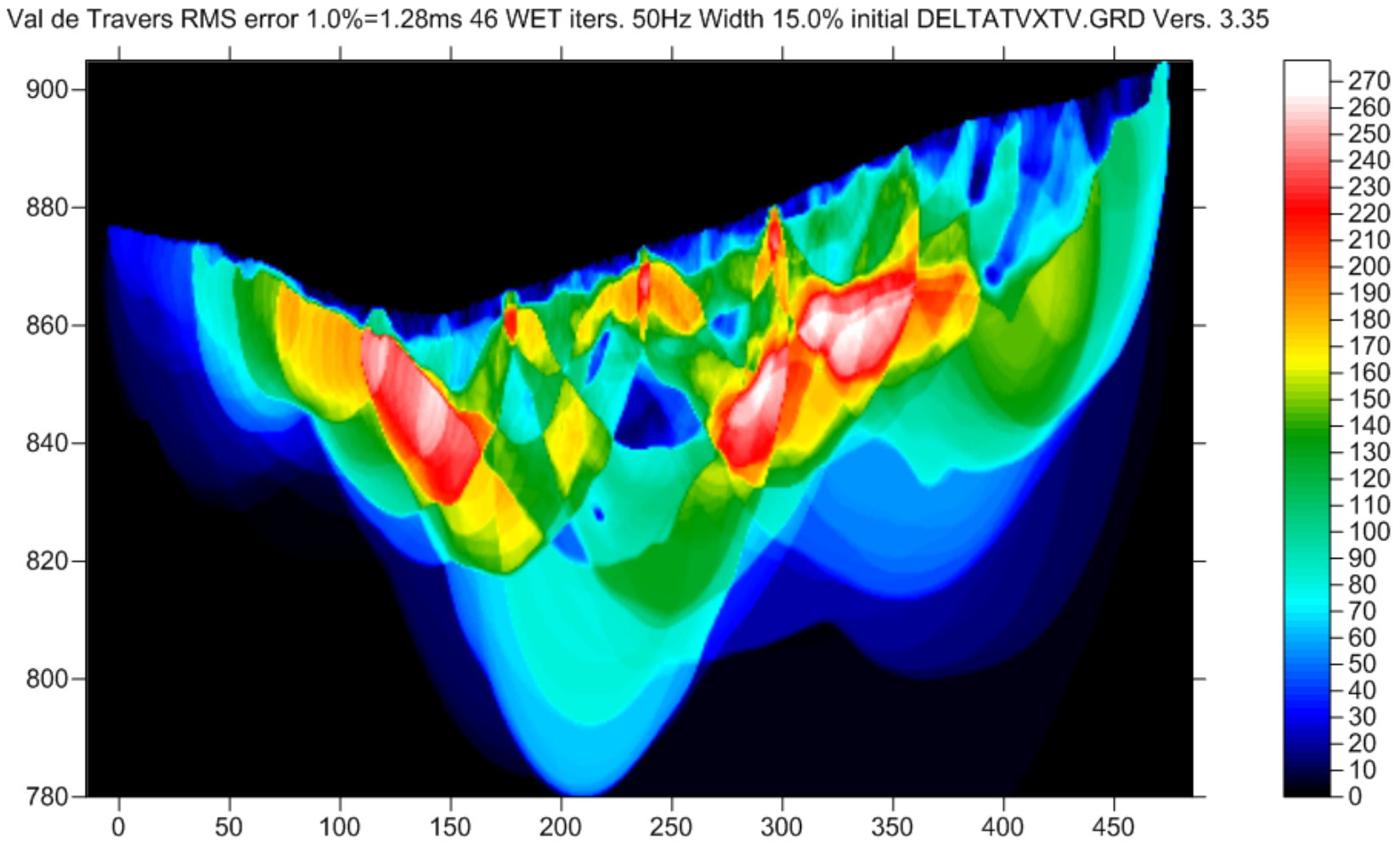


1 Select *WET Tomo|Interactive WET tomography & DeltatVXTV\DeltatVXTV.GRD*
2 Edit main WET dialog as above. Click *Edit velocity smoothing* & edit as above right.
3 Click *Start tomography processing* & wait until WET output is shown in Surfer

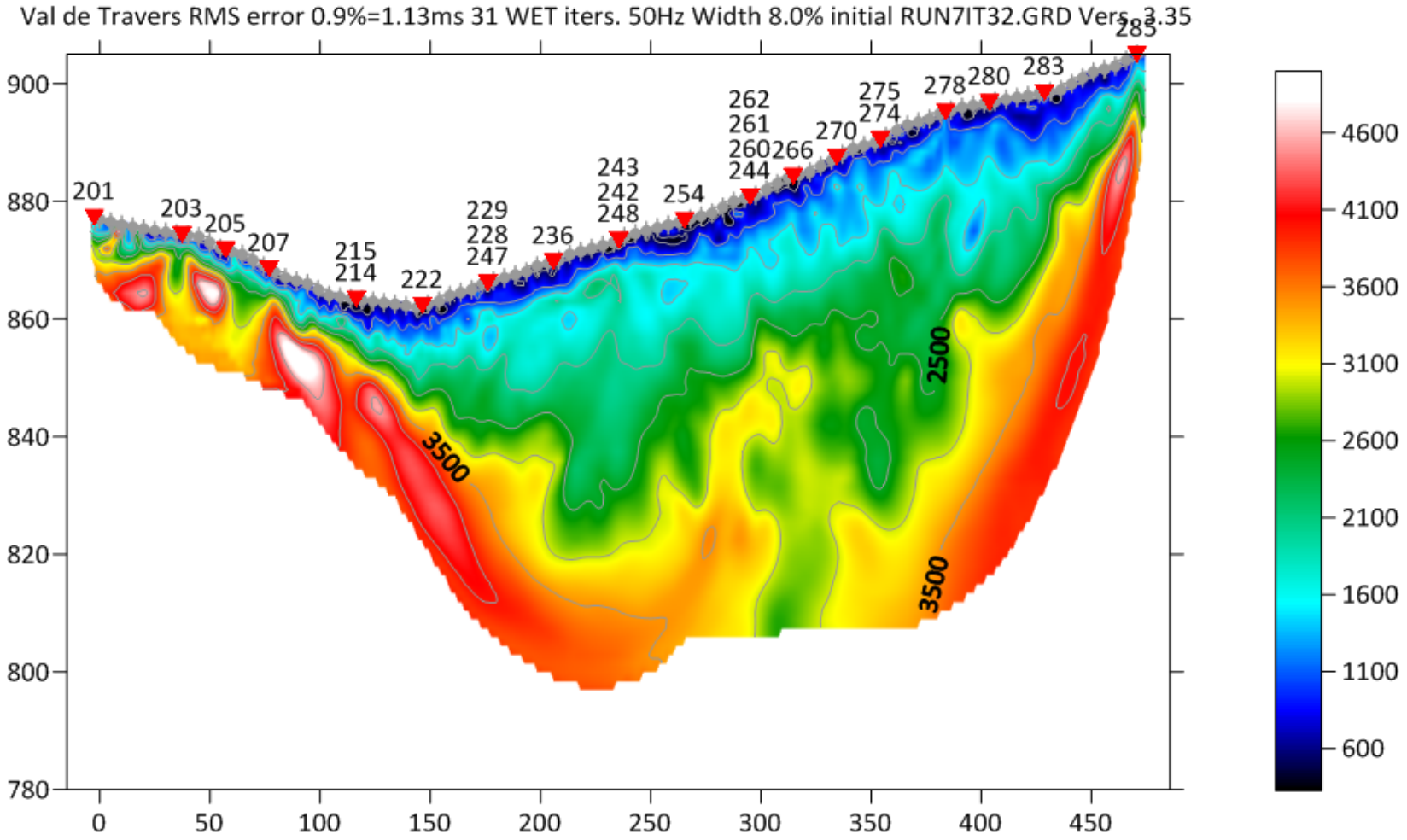
View WET with DeltatV starting model



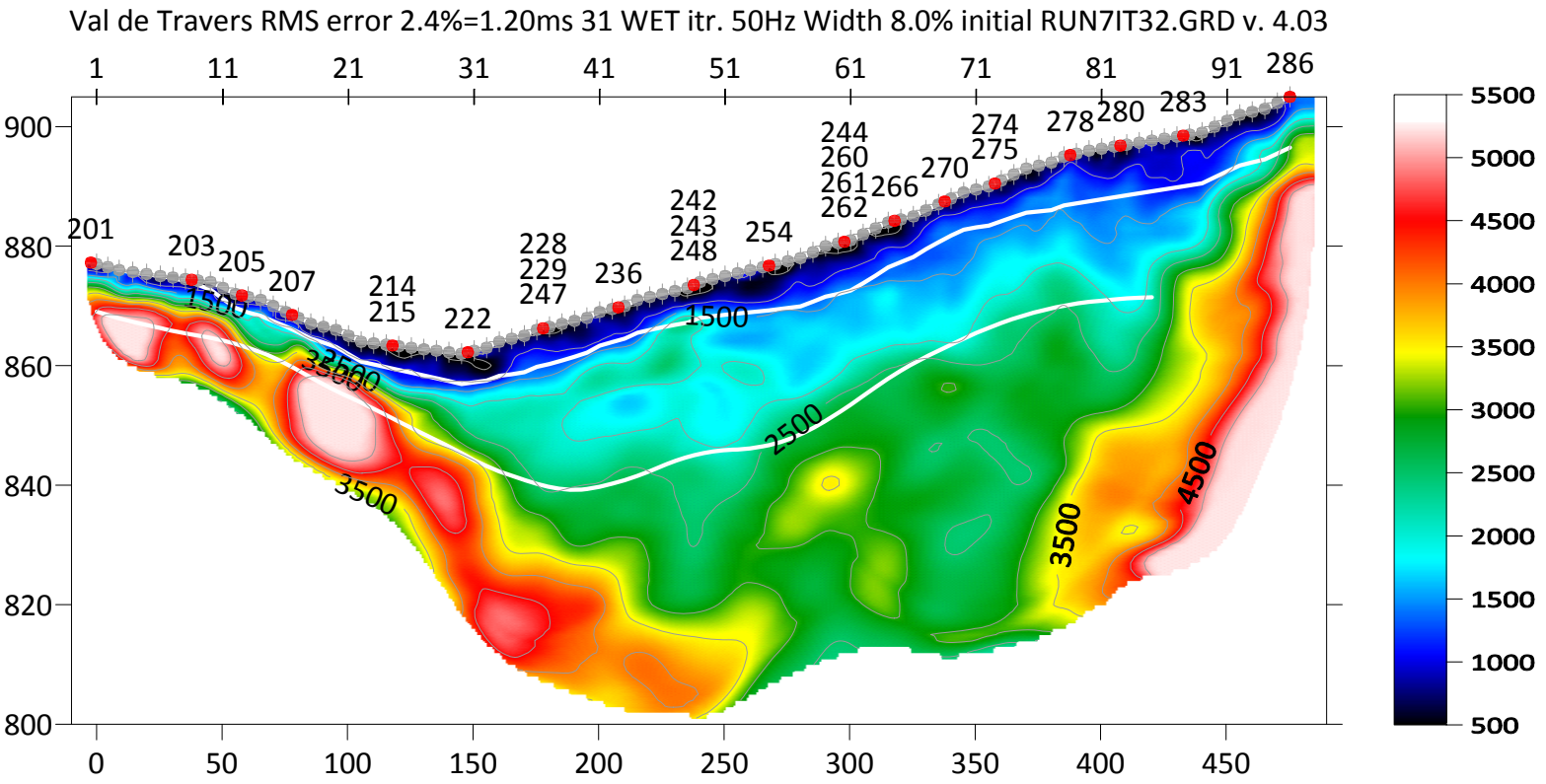
View WET with DeltatV coverage plot



Multirun Conjugate-Gradient WET with DeltatV starting model



Multiscale CG WET, DeltatV starting model & WDVS @250Hz (Wavelength-Dependent Velocity Smoothing, Zelt & Chen 2016)



We show 10th WET run of multiscale WET inversion. WDVS was enabled at 250Hz. We used minimal WET smoothing and WET damping 0.2.

Here is the .rar archive with 10 WET runs
Here is the .rar archive with seis32.* profile database files