

## Multirun WET NGU P1-1 model : Steepest Descent & Cosine-Squared weighting version 3.35 :

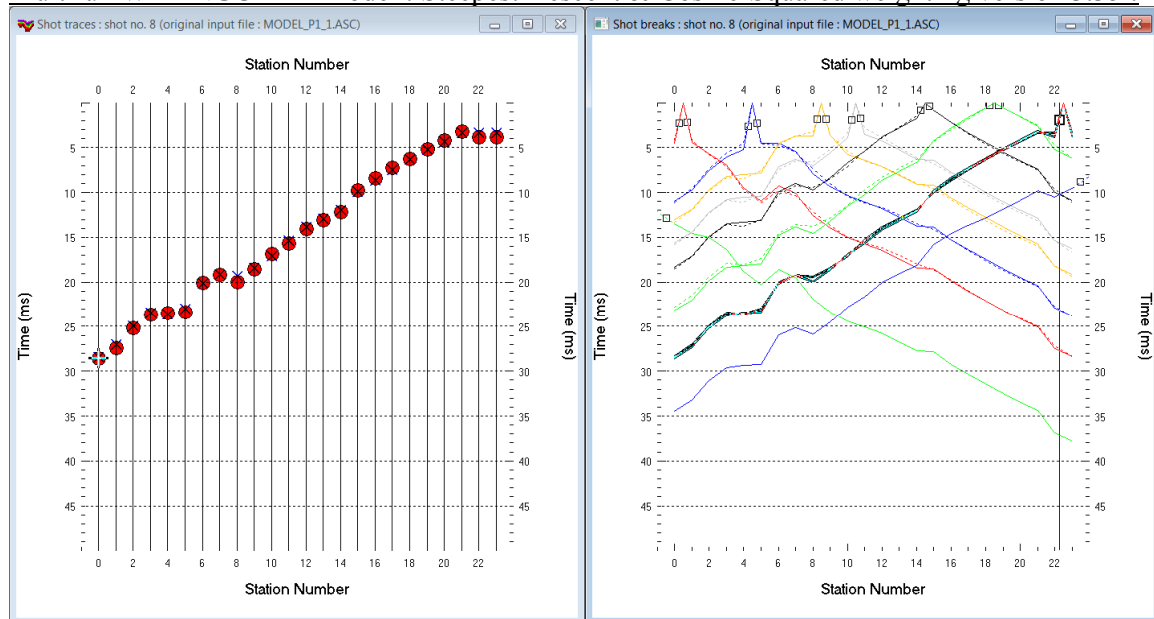


Fig. 1 : left : *Trace|Shot gather*, right : *Refractor|Shot breaks*. Shows fit between picked times (solid colored curves, red circles) and modeled times (dashed colored curves, blue crosses) obtained for multirun WET output shown in Fig. 9

- *File|New Profile...*, set *File name* to **NGUP1\_1** and click *Save* button
- in *Header|Profile...* set *Line type* to **Refraction spread/line**. Set *Station spacing* to 5.0 m.
- check box *Force grid cell size* and set *Cell size[m]* to 0.5m. See Fig. 2.
- unzip [NGUP1\\_1.zip](#) with files **ASCII.ASC**, **COORDS.COR** and **SHOTS.SHO** in directory **C:\RAY32\NGUP1\_1\INPUT**
- select *File|Import Data...* and set *Import data type* to **ASCII column format**. See Fig. 3.
- leave *Default spread type* at **10: 360 channels**
- click *Select* button, navigate into **C:\RAY32\NGUP1\_1\INPUT** and select file **ASCII.ASC**
- set *Default sample count* to 500 to setup the y scale for *Trace|Shot gather* & *Refractor|Shot breaks*
- click *Import shots* button. The *Import shot dialog* is shown for each shot in the **.ASC** file.
- for each shot leave *Layout start* and *Shot pos.* at shown values and click *Read* button
- select *File|Update header data|Update Station Coordinates*
- navigate into directory **C:\RAY32\NGUP1\_1\INPUT**
- select file **COORDS.COR**. Click *Open* button.
- *File|Update header data|Update Shotpoint coordinates* with **SHOTS.SHO**
- select *Trace|Shot gather* and *Window|Tile* to obtain Fig. 1
- uncheck *WET Tomo|WET tomography Settings|Blank no coverage after last iteration*
- uncheck *WET Tomo|WET tomography Settings|Blank below envelope after last iteration*
- check *WET Tomo|WET tomography Settings|Write|Store modeled picks after last iteration only*
- in *Refractor|Shot breaks* pick branch points adjacent to shot points with **CTRL+F1**. See Fig 1.
- press **ALT+L** to map traces to refractors based on your picked branch points
- select *Header|Station* and set *v0* to 500 m/s. Click button *Interpolate coordinates & v0*.
- select *Depth|Plus-Minus* & confirm. When prompted to continue with WET click *No*. See Fig. 11.
- **ALT+M** in *Plus-Minus* depth window. Set *Overburden&Base filter width* to 2 stations. See Fig. 12.
- press **ENTER** to redo *Plus-Minus*. When prompted to continue with WET click *Yes*. See Fig. 11.
- select *Grid|Surfer plot Limits*. Click button *Reset to grid*. Navigate into profile subdirectory **C:\RAY32\NGUP1\_1\LAYRTOMO**. Click on **VELOIT20.GRD** and click *Open*.
- check box *Plot limits active*. Set *Min. elevation* to 50m. Set *Max. elevation* to 100m. See Fig. 4.

- set *Min. velocity* to 500 m/s and *Max. velocity* to 6,000 m/s. Click *OK*.
- check *WET Tomo|WET tomography Settings|Edit maximum valid WET velocity*
- in *WET Tomo|WET velocity update* set *a* to 0.5 and *b* to 10.0. Click *OK*. See Fig. 5.
- set *WET Tomo|Interactive WET tomography|Ricker differentiation* to -2 [Cosine-Squared]
- set *Min. velocity* to 500 & *Max. velocity* to 5,500 m/s. See Fig. 6 (left).
- click button *Edit grid file generation* & set *Store each nth iteration only : n =* to 20. Click *OK*.
- click *Edit velocity smoothing*. Check *Manual specification of smoothing filter*. See Fig. 6 (right).
- set *Half smoothing filter width to 3 columns* & set *Half smoothing filter height to 1 rows*
- uncheck *Automatically adapt shape of rectangular filter matrix*. Set *Smooth nth iteration : n =* to 20 .
- click *Gaussian* button. Set *Used width of Gaussian* to 5.0 sigma. Leave *Damping* at 0.0.
- click *Accept parameters* and *Iterate* & check *WET runs active*. Edit as in Fig. 7 and click *button OK*.
- click *button Start tomography processing* to obtain Fig. 9 & 10.
- for our [multiscale WET](#) inversion see updated [help file](#) chapter *WET tomography processing*

Fig. 2 : Header|Profile

Fig. 3 : File|Import Data

Fig. 4 : Grid|Surfer plot Limits

Fig. 5 : WET Tomo|WET update weighting

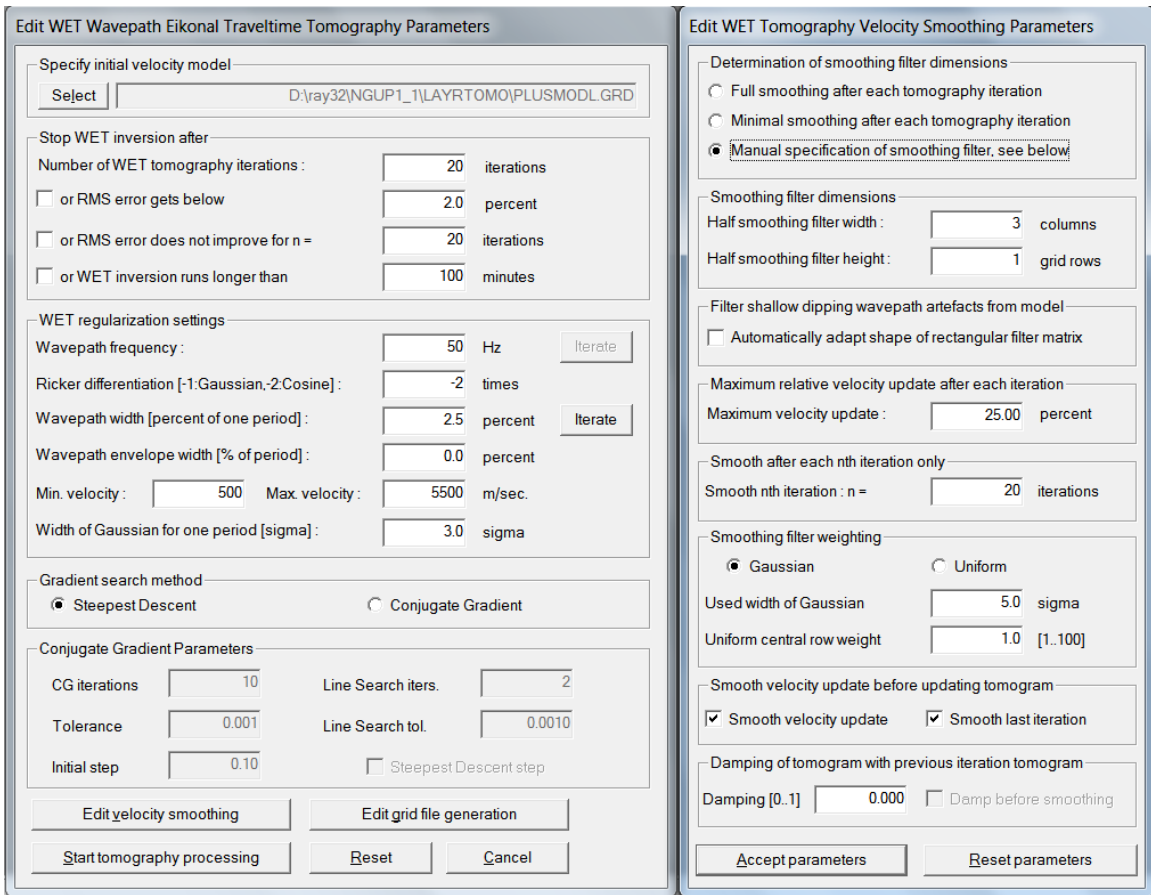


Fig. 6 : left : WET Tomo|Interactive WET tomography.

right : Edit velocity smoothing

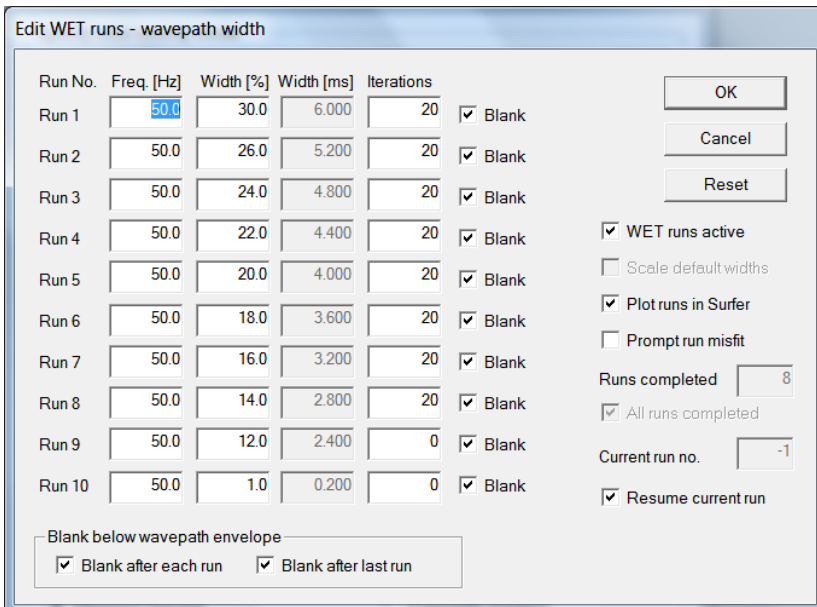


Fig. 7 : WET Tomo|Interactive WET tomography|Iterate lets you edit the multirun WET wavepath width or WET frequency schedule. Also lets you edit the number of WET iterations for each run & blanking after each run.

NGU P1\_1 initial PLUSMODL.GRD Vers. 3.35

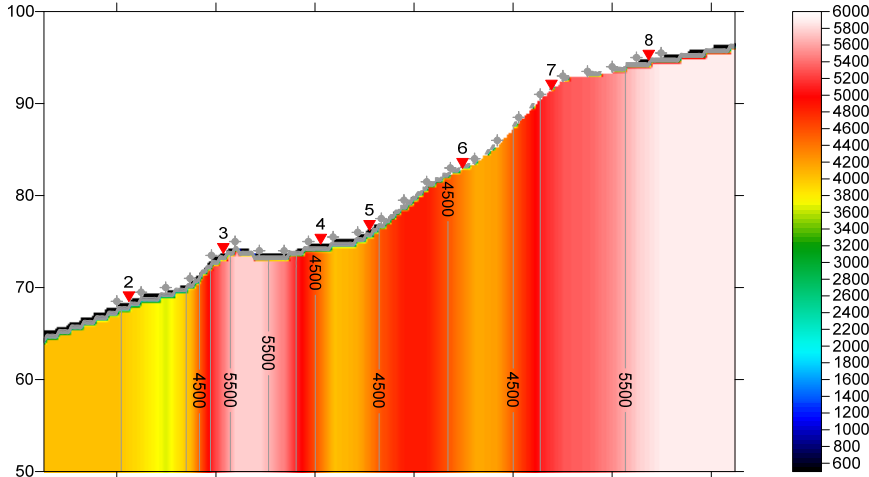


Fig. 8 : Depth|Plus-Minus with Overburden filter & Base filter width = 2 stations. See Fig. 11&12.

NGU P1\_1 RMS error 1.0%=0.28ms 20 WET iters. 50Hz Width 14.0% initial RUN7IT20.GRD Vers. 3.35

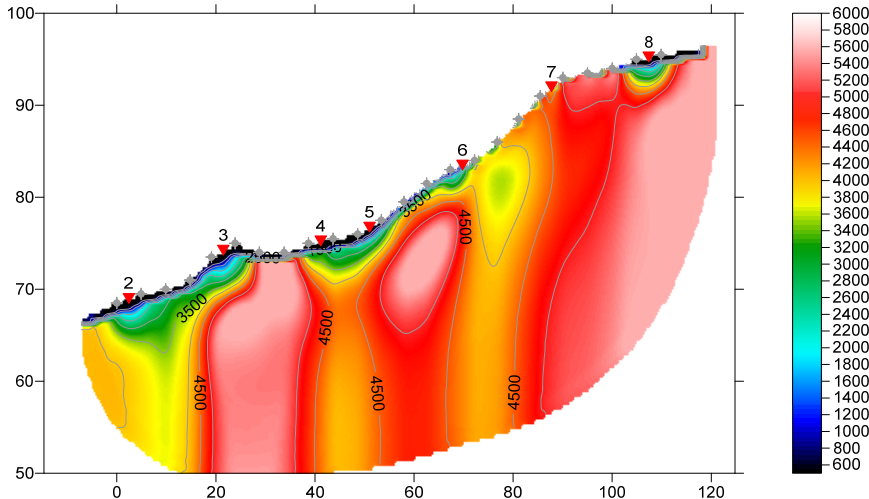


Fig. 9 : Multirun WET showing output of 8<sup>th</sup> run. Starting model for 1<sup>st</sup> run is Fig. 8.

NGU P1\_1 RMS error 1.0%=0.28ms 20 WET iters. 50Hz Width 14.0% initial RUN7IT20.GRD Vers. 3.35

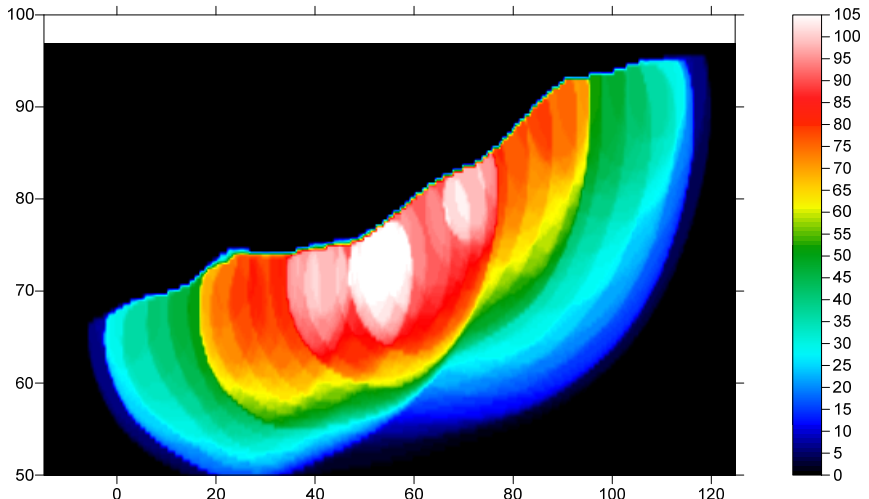


Fig. 10 : Wavepath coverage plot obtained with Fig. 9

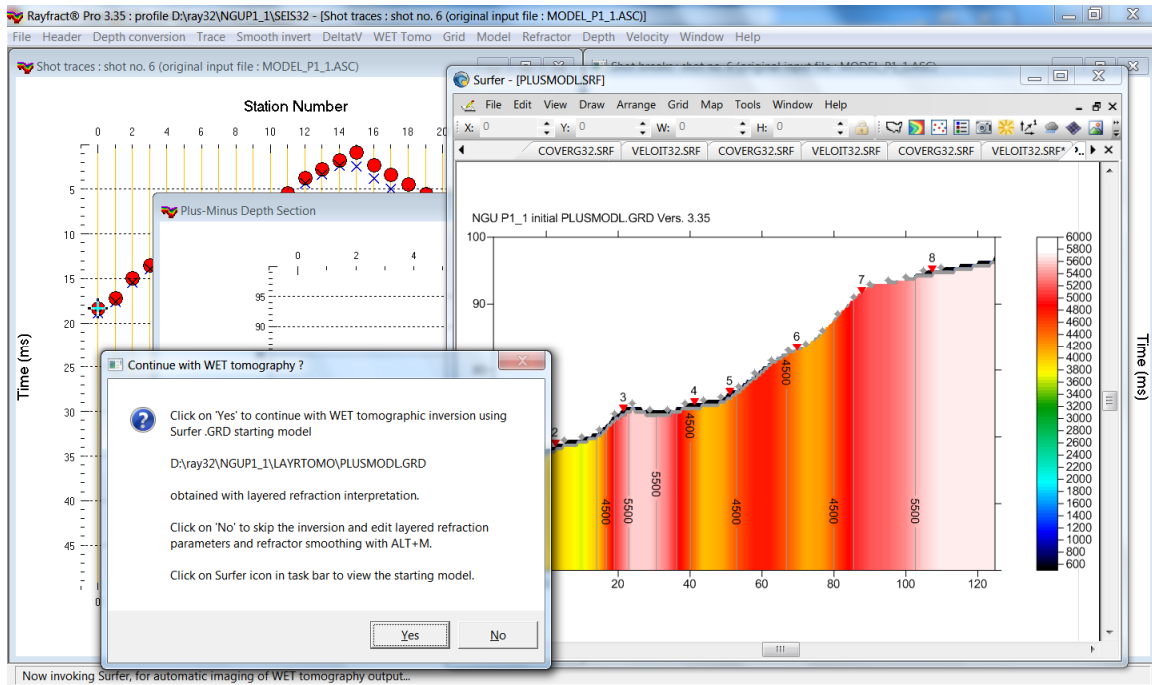


Fig. 11 : *Depth|Plus-Minus*. Click *No* and edit lateral refractor smoothing as in Fig. 12. Click *Yes* to obtain Fig. 9&10.

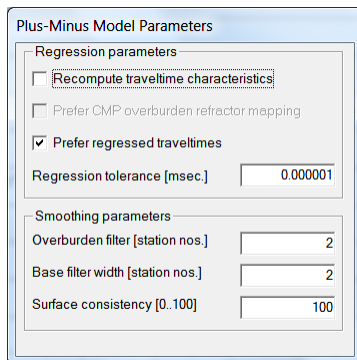


Fig. 12 : press **ALT+M** in *Plus-Minus Depth Section* window. Edit *Overburden filter [station nos.]* and *Base filter width [station nos.]*. Press **ENTER** to recompute *Plus-Minus depth section*. Click *Yes* in prompt to continue with WET. See Fig. 11.

Subdirectories ...[\LAYRTOMO\WETRUN1](#) up to ...[\WETRUN8](#), ...[\INPUT](#) and ...[\seis32\\_Sep17](#) are available in this [RAR archive](#). Open the ...[\WETRUN8\VELOIT20.PAR](#) file e.g. with Windows Notepad editor to review *WET inversion* parameters used.

Use Rayfract® 3.35 command *Grid|Reset DeltatV and WET settings to .PAR file...* with Surfer .GRD file ...[\LAYRTOMO\WETRUN8\VELOIT20.GRD](#) to reset your profile's *DeltatV* and *WET inversion settings* to ...[\LAYRTOMO\WETRUN8\VELOIT20.PAR](#) .

Or quit our software via *File|Exit* and copy all 33 **seis32.\*** database files from directory ...[\seis32\\_Sep17](#) into your **C:\RAY32\NGUP1\_1** directory with Windows Explorer. Now reopen your profile : select *File|Open Profile...* and **C:\RAY32\NGUP1\_1\SEIS32.DBD** .

We copied the shot point elevations from the original .SHO file to shot stations in the .COR file. This prevents interpolation of shot point elevation between adjacent receivers. See our [updated help file](#) chapter *Editing header data* at bottom of paragraph *Elevation specification*.

The NGU report with Fig. 6.1.2 showing *multirun WET inversion* of above synthetic model data is available at [http://www.ngu.no/upload/Publikasjoner/Rapporter/2017/2017\\_025.pdf](http://www.ngu.no/upload/Publikasjoner/Rapporter/2017/2017_025.pdf) . We thank Georgios Tassis at NGU for making available above synthetic data and this report.