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

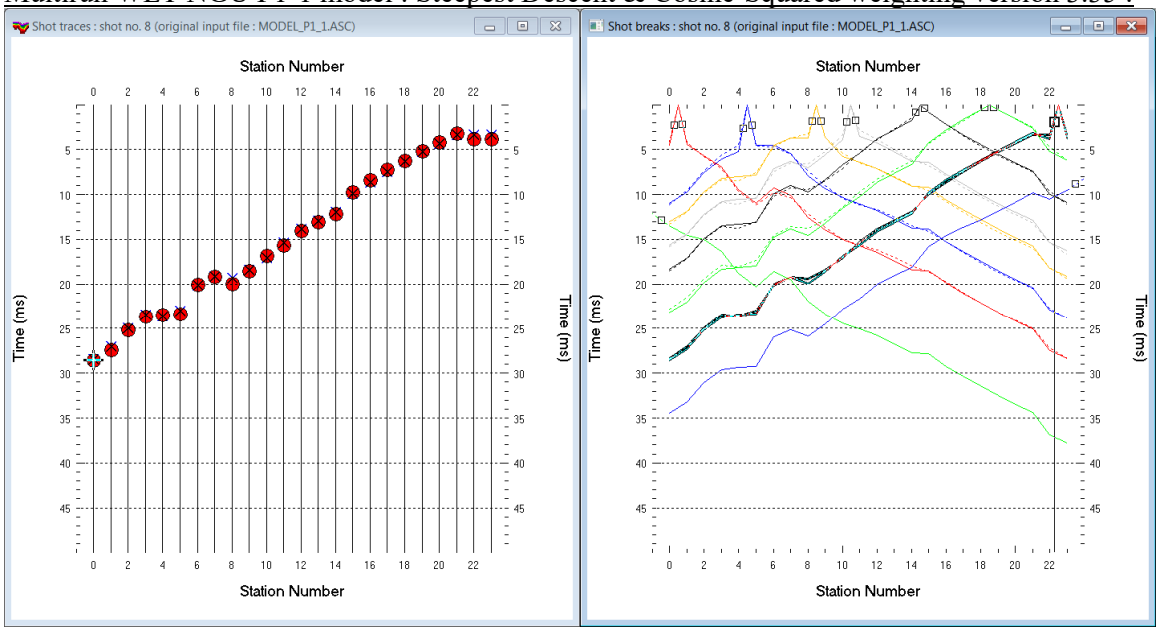

Fig. 1 : left : *Trace|Shot gather*, right : *Refractor|Shot breaks*. Shows fit between picked times (solid colored curves, red circles) and modeled times (dashed colored curves, blue crosses) obtained for multirun WET output shown in Fig. 9

- *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 **`SHOTPTS.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 **`SHOTPTS.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*
- select *Refractor|Shot breaks*. Check ***Mapping|Pick branch points between receivers***.
- uncheck ***Mapping|Automated updating of station V0***
- 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* & click *Reset v0* & set *v0* to 500 m/s. Click *button Interpolate v0 only.*
- select *Depth|Plus-Minus* & confirm. When prompted to continue with WET click *No.* See Fig. 11.
- select *Refractor|Shot breaks* & repeat last 3 bullets to redisplay *Plus-Minus* depth section
- **`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.

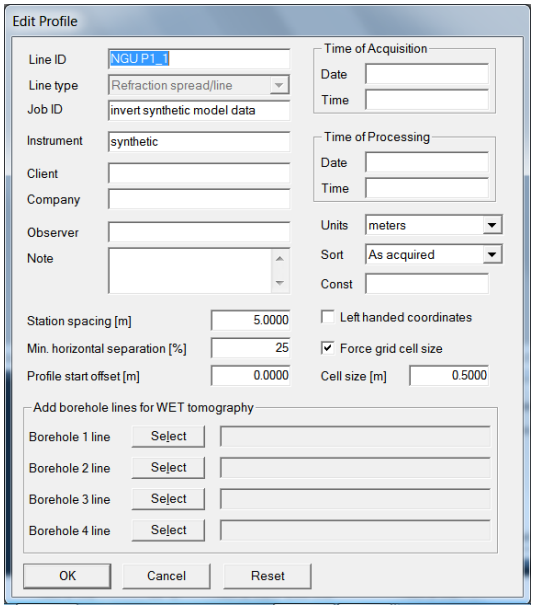

Fig. 2 : *Header|Profile*

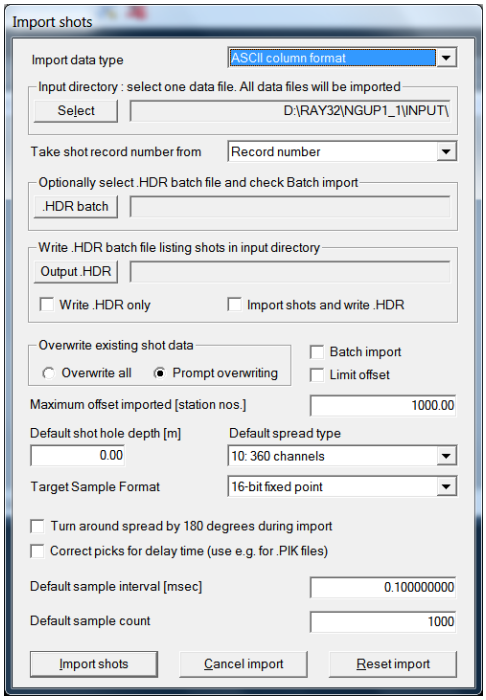

Fig. 3 : *File|Import Data*

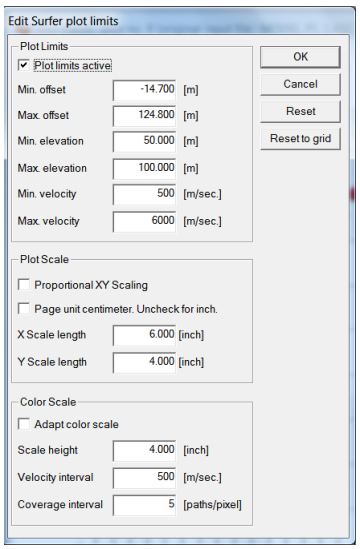

Fig. 4 : *Grid|Surfer plot Limits*

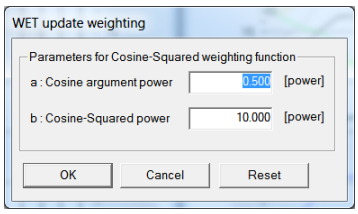

Fig. 5 : *WET Tomo|WET update weighting*

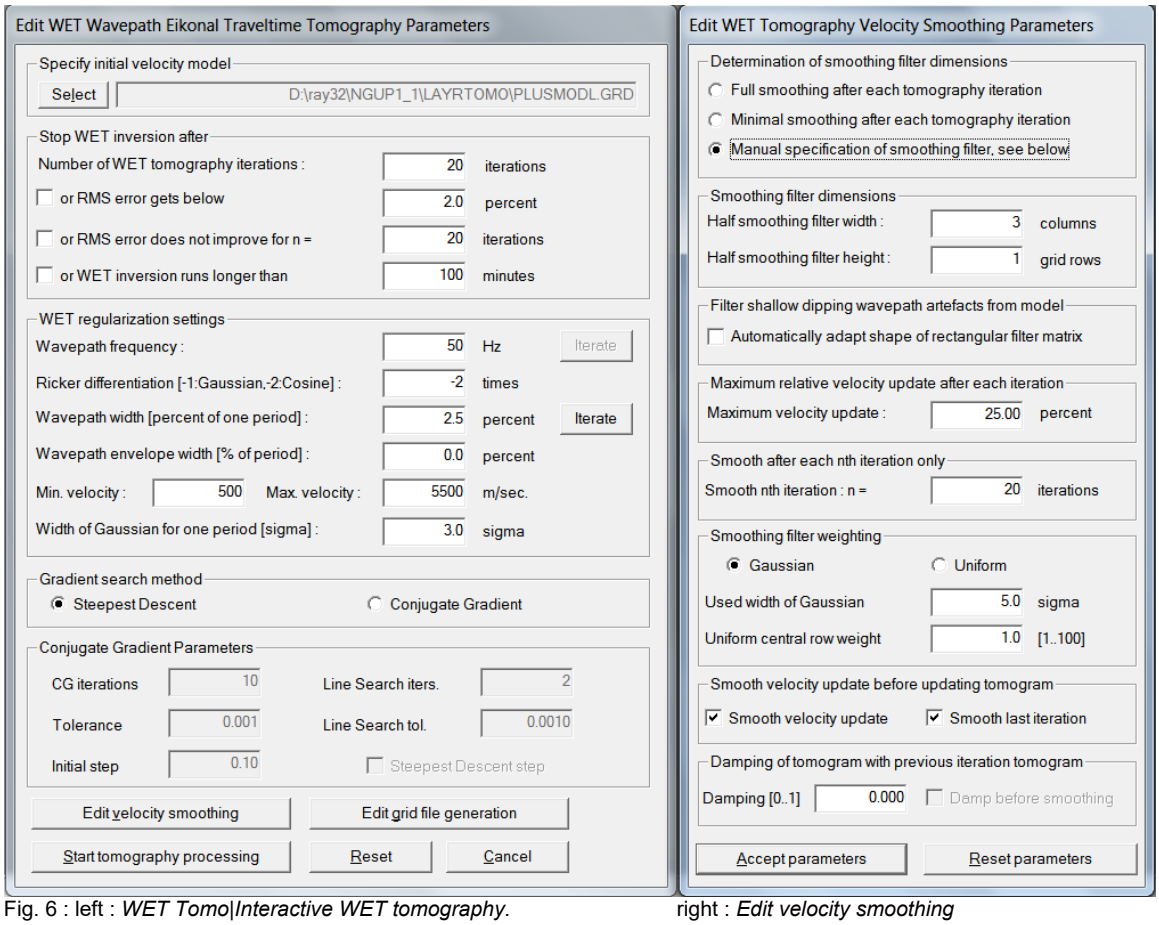

Fig. 6 : left : *WET Tomo|Interactive WET tomography.* right : *Edit velocity smoothing*

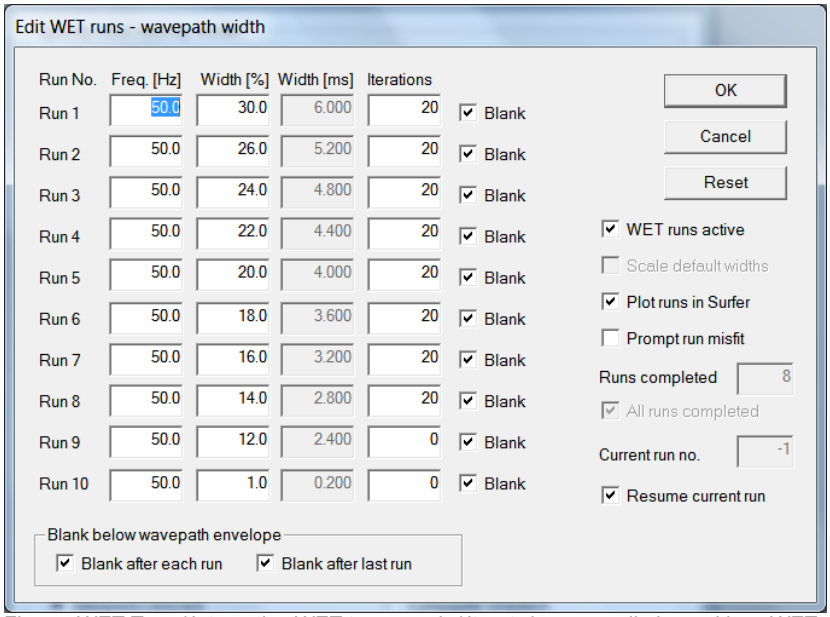

Fig. 7 : *WET Tomo|Interactive WET tomography|Iterate* lets you edit the multirun *WET wavepath width* or *WET frequency* schedule. Also lets you edit the number of WET iterations for each run & blanking after each run.

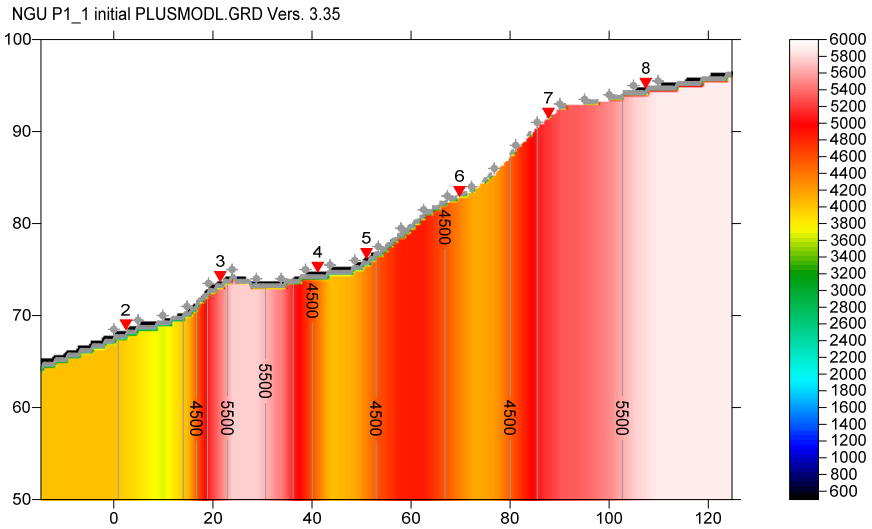

Fig. 8 : *Depth|Plus-Minus* with *Overburden filter & Base filter width* = 2 stations. See Fig. 11&12.

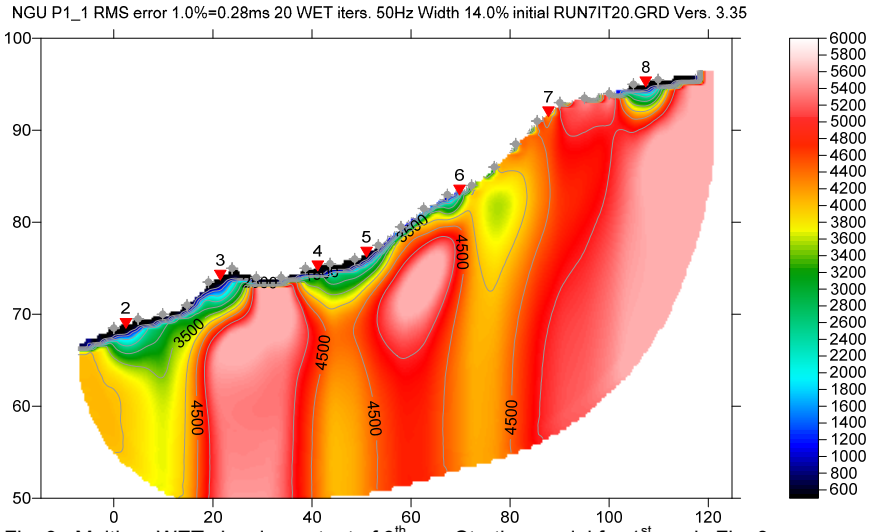

Fig. 9 : Multirun WET showing output of 8th run. Starting model for 1st run is Fig. 8.

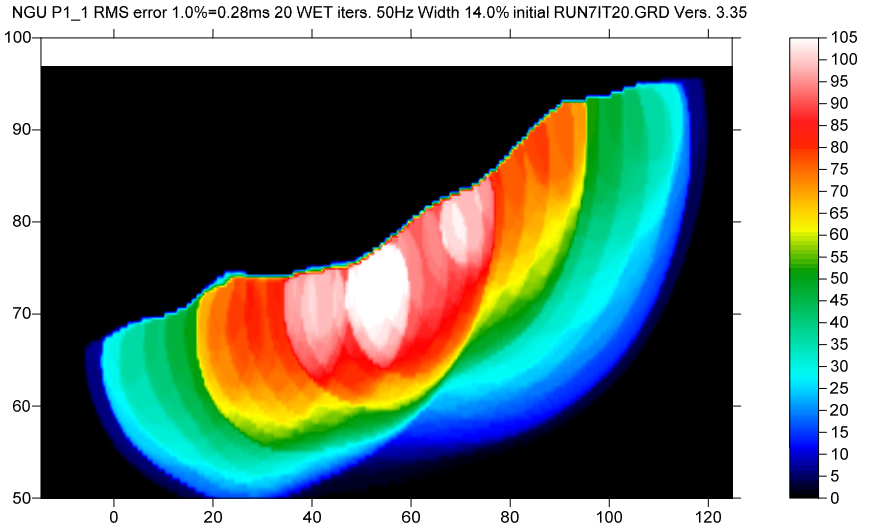

Fig. 10 : Wavepath coverage plot obtained with Fig. 9

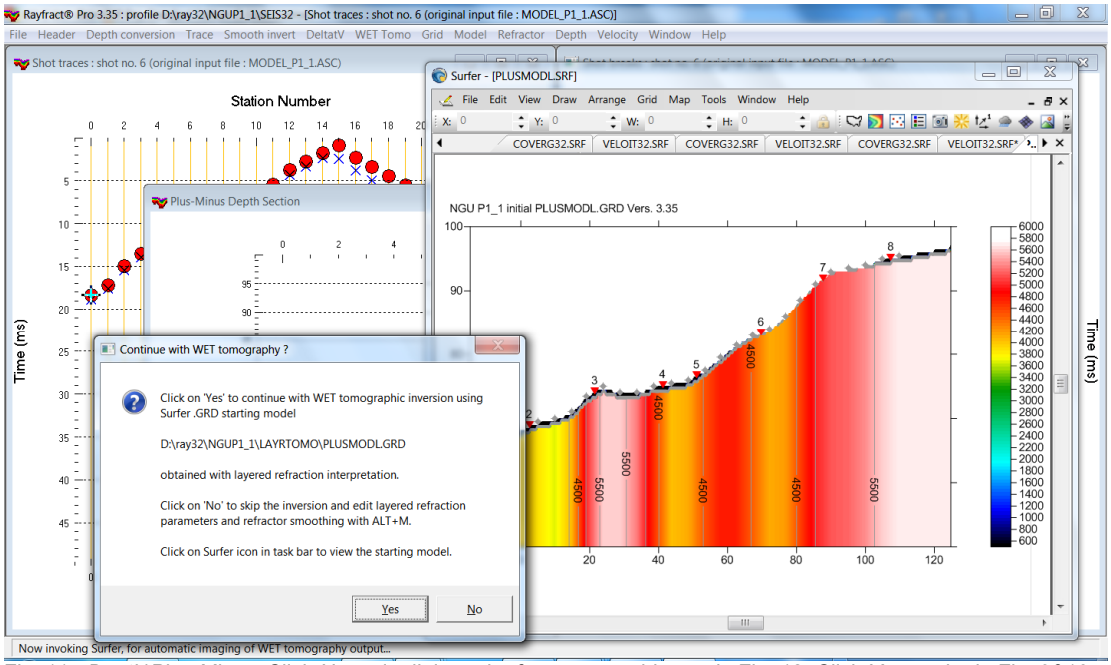

Fig. 11 : *Depth|Plus-Minus*. Click *No* and edit lateral refractor smoothing as in Fig. 12. Click *Yes* to obtain Fig. 9&10.

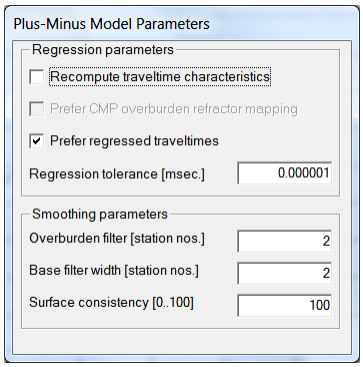

Fig. 12 : press **ALT+M** in *Plus-Minus Depth Section window*. Edit *Overburden filter [station nos.]* and *Base filter width [station nos.]*. Press **ENTER** to recompute *Plus-Minus depth section*. Click *Yes* in prompt to continue with WET. See Fig. 11.

➢ For our ***multiscale WET*** inversion see updated help file chapter ***WET tomography processing*** **.**

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 . We thank Georgios Tassis at NGU for making available above synthetic data and this report.