TRA9002 multiscale Conjugate-Gradient WET inversion with DeltatV starting model using WDVS and showing checkerboard resolution test / Version 4.03 Pro Sep 2022 :

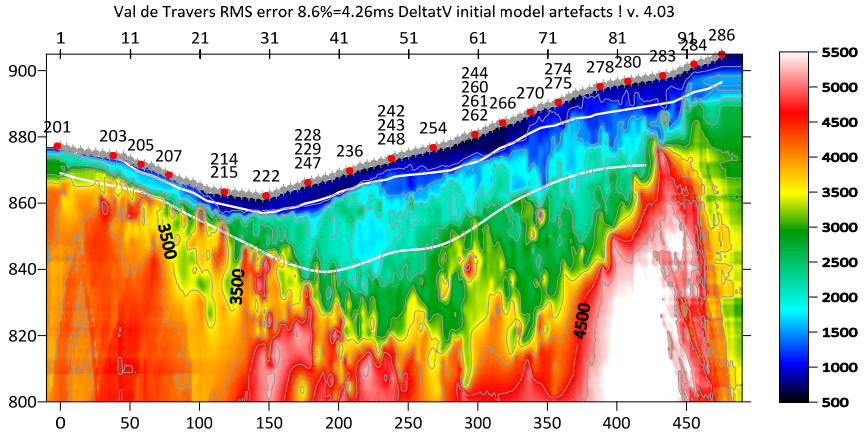

Fig. 1 : Pseudo-2D DeltatV starting model. *Grid cell size* forced to 1.0m in *Header|Profile*. *DeltatV Settings* as in Fig. 15. *XTV Parameters* dialog as in Fig. 17. *Common-offset dip estimation* dialog as in Fig. 18.

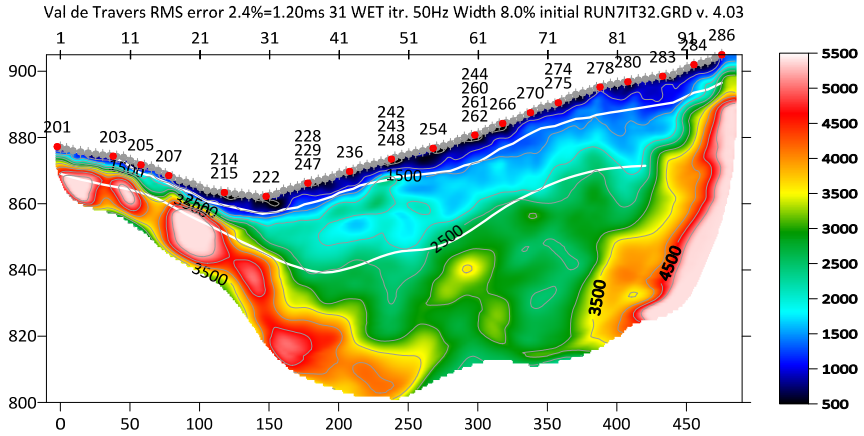

Fig. 2 : multiscale Conjugate-Gradient WET inversion with DeltatV starting model (Fig. 1 / Fig 14 / Fig. 16 / Fig. 19). 8th WET run output shown. WDVS@250Hz (Fig. 13, Zelt and Chen 2016). White lines are Plus-Minus refractors (overburden refractor and basement refractor).

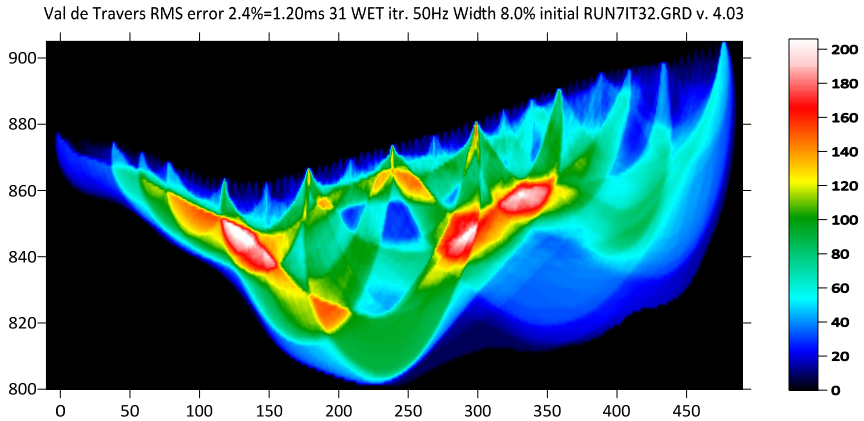

Fig. 3 : WET wavepath coverage plot obtained with Fig. 2. Unit is wavepaths per pixel. Note decreasing wavepath coverage to the right of horizontal offset 275m and below elevation of 850m due to velocity inversion (Fig. 2).

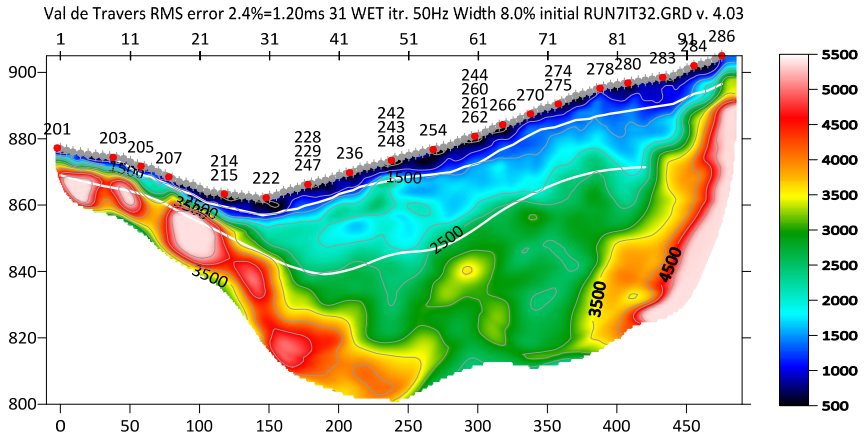

Fig. 4 : multiscale Conjugate-Gradient WET inversion with DeltatV starting model (Fig. 1). 8th WET run output shown. Same as Fig. 2.

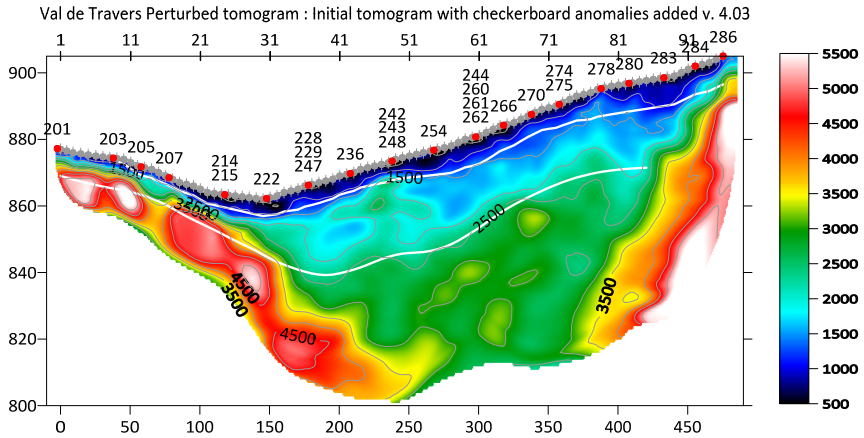

Fig. 5 : Perturbed tomogram. Apply checkerboard with checker size 50m by 50m, checker anomaly 10 percent to initial tomogram (Fig. 2 / Fig. 4; Fig. 12). See Garcia-Ocampo thesis 2017 / their Fig. 3b.

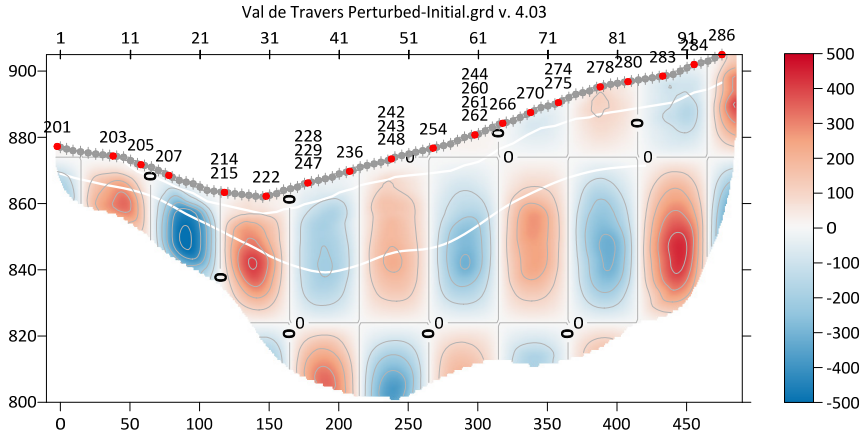

Fig. 6 : True checker anomalies. Perturbed tomogram (Fig. 5) minus initial tomogram (Fig. 2 / Fig. 4). See Garcia-Ocampo thesis 2017 / their Fig. 3b.

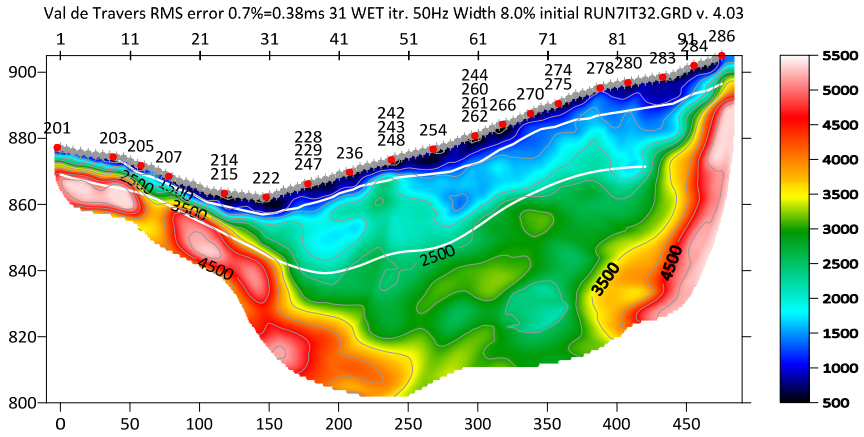

Fig. 7 : inverted tomogram using the synthetic traveltimes forward-modelled over the perturbed tomogram (Fig. 5) with *Model|Model synthetic shots* with WDVS deactivated (Fig. 13). Use starting model Fig. 2 for Multirun Conjugate-Gradient WET inversion (Fig 14 / Fig. 16 / Fig. 19). Ideally should be same as the perturbed tomogram (Fig. 5).

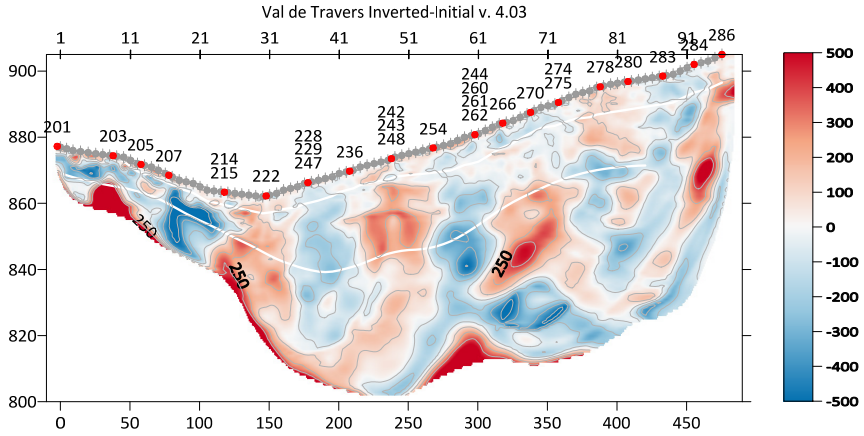

Fig. 8 : Recovered checker anomalies. Inverted tomogram (Fig. 7) minus initial tomogram (Fig. 2). Ideally should be the same as Fig. 6 / Fig. 9. At bottom of tomogram rays and wavepaths are predominantly parallel to each other (Fig. 3.; D. J. White 1989), resulting in decreased resolution and lateral smearing of checker anomalies. Also to the right of horizontal offset 275m the wavepath coverage decreases more suddenly with depth (Fig. 3) below 850m elevation due to ***velocity inversion*** (Fig. 2 / Fig. 5 / Fig. 7), also resulting in decreased resolution and higher uncertainty.

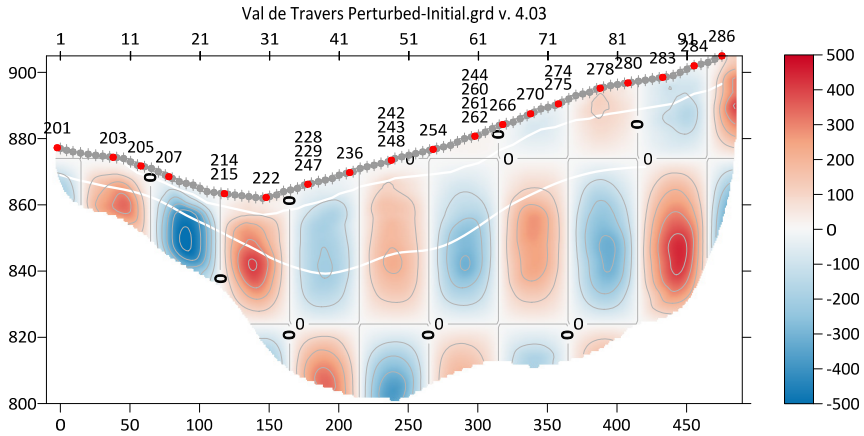

Fig. 9 : True checker anomalies. Perturbed tomogram (Fig. 5) minus initial tomogram (Fig. 2). See Garcia-Ocampo thesis 2017 / their Fig. 3b. Same as Fig. 6.

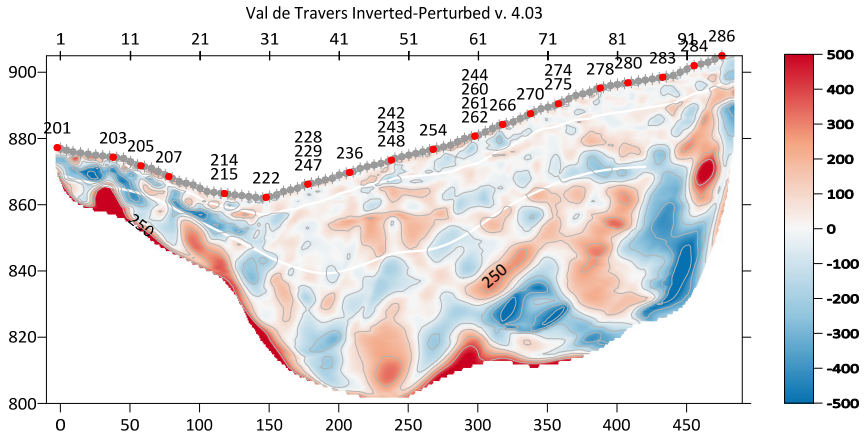

Fig. 10 : inverted tomogram (Fig. 7) minus perturbed tomogram (Fig. 6). See Garcia-Ocampo thesis 2017 / their Fig. 3b. Should ideally be all-zero / no residual anomalies. Note increasing error with increasing depth below topography. At bottom of tomogram rays and wavepaths are predominantly parallel to each other (D. J. White 1989), resulting in decreased resolution and larger errors.

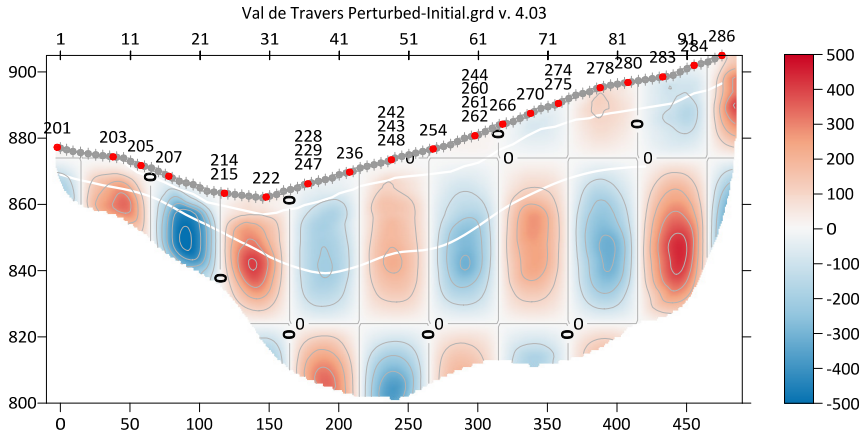

Fig. 11 : True checker anomalies. Perturbed tomogram (Fig. 5) minus initial tomogram (Fig. 2). See Garcia-Ocampo thesis 2017 / their Fig. 3b. Same as Fig. 6.

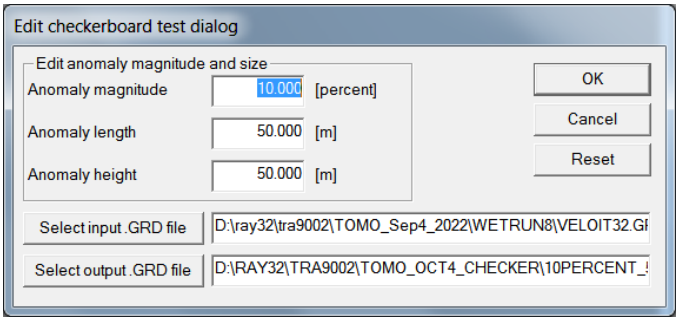

Fig. 12 : *Model|Create Checkerboard grid*. Available with our Pro version only.

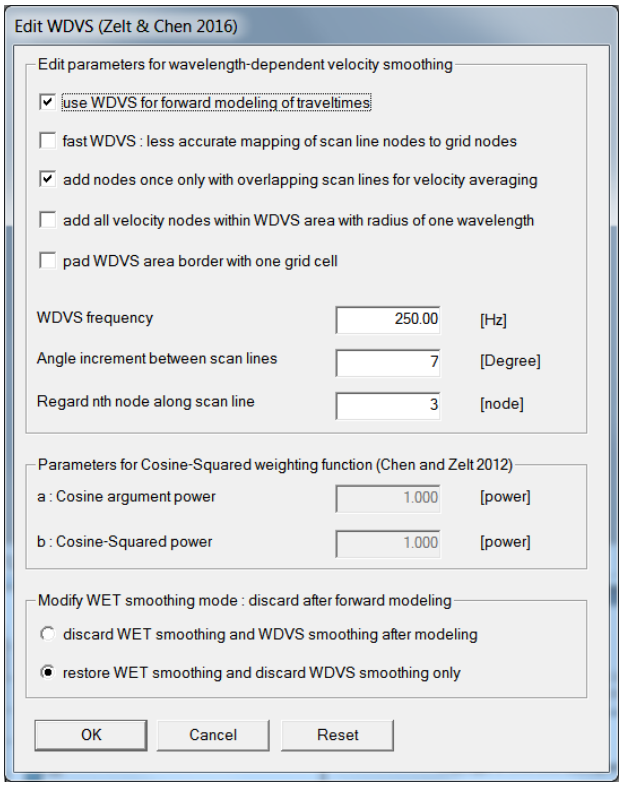

Fig. 13 : *Model|WDVS Smoothing*. Check box ***use WDVS for forward modeling of traveltimes*** for Fig. 2. (initial tomogram). Set ***WDVS frequency*** to 250Hz.

Uncheck this box ***use WDVS for forward modeling of traveltimes*** before forward-modeling synthetic traveltimes over perturbed tomogram (Fig. 5) with ***Model|Model synthetic shots***. Also uncheck this box before next obtaining the inverted tomogram (Fig. 7) based on these synthetic traveltimes using starting model Fig. 2.

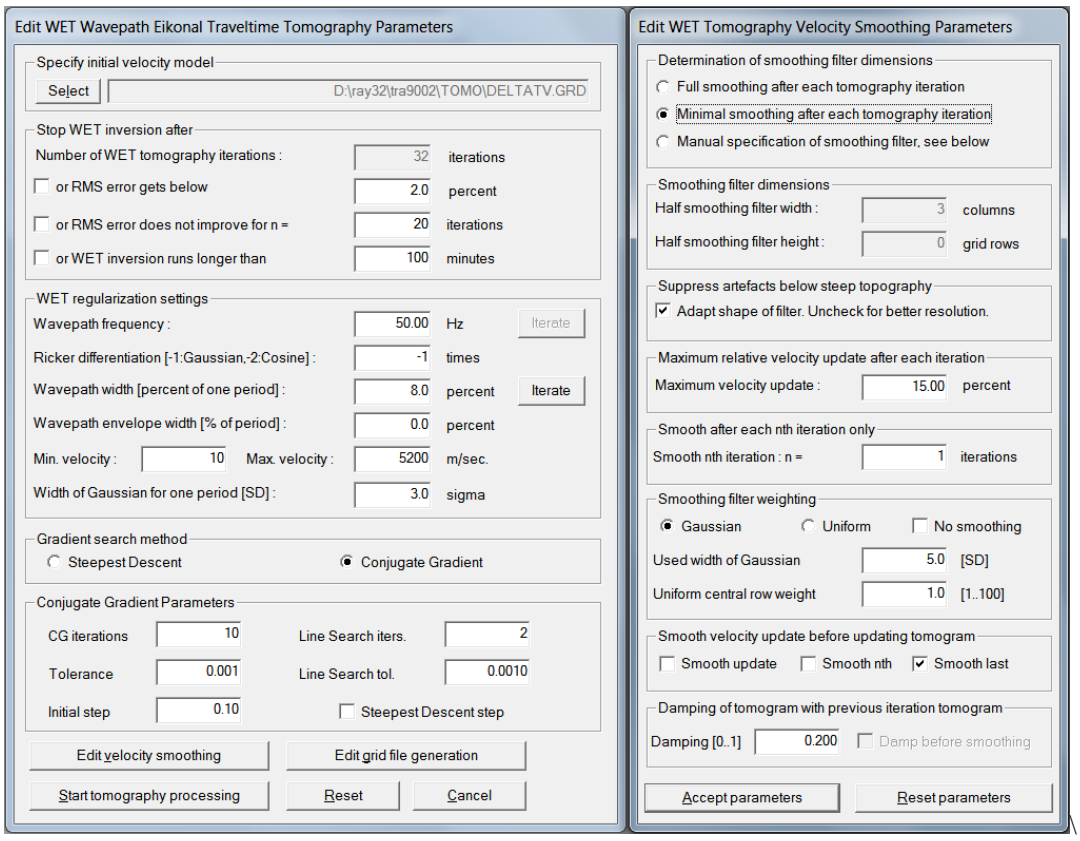

Fig. 14 : *WET Tomo|Interactive WET Tomography* main dialog (left). Edit velocity smoothing (right).

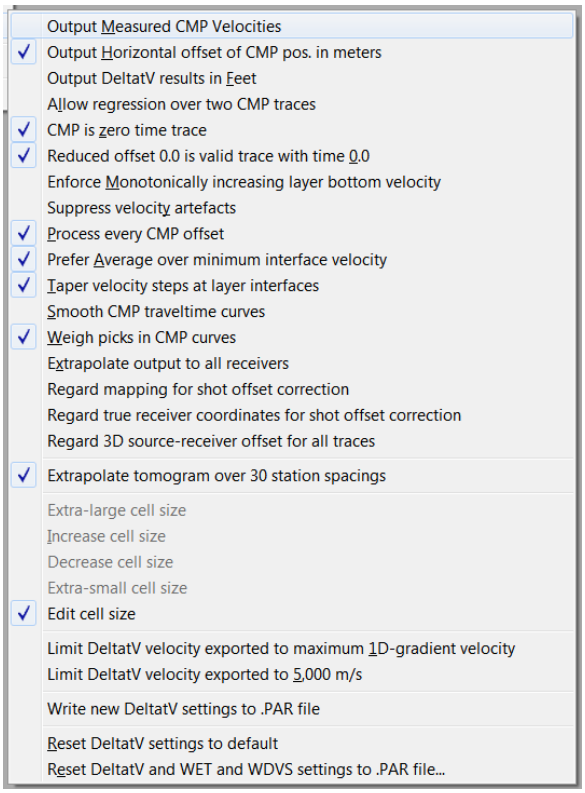

Fig. 15 : *DeltatV|DeltatV Settings*

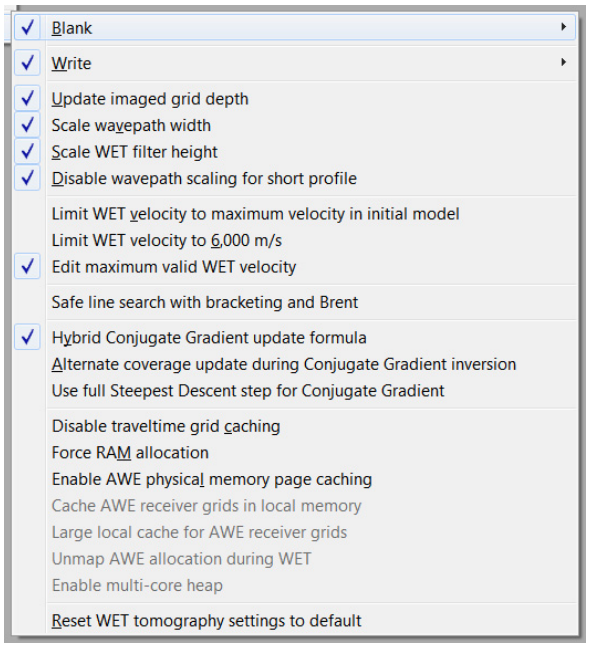

Fig. 16 : *WET Tomo|WET tomography Settings*

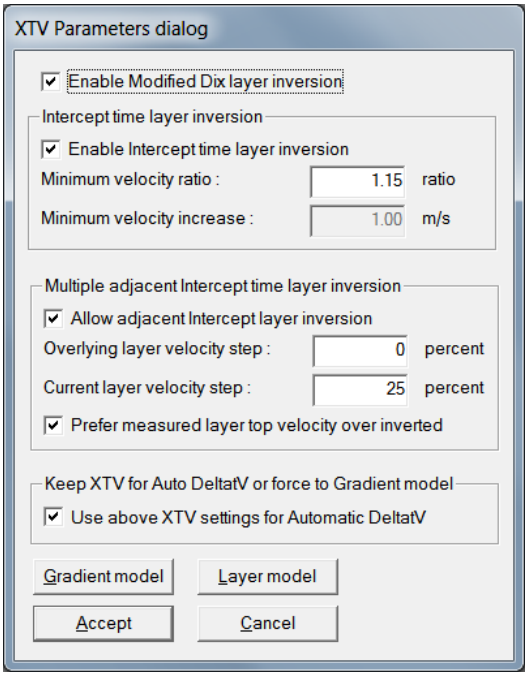

Fig. 17 : *DeltatV|XTV parameters* dialog

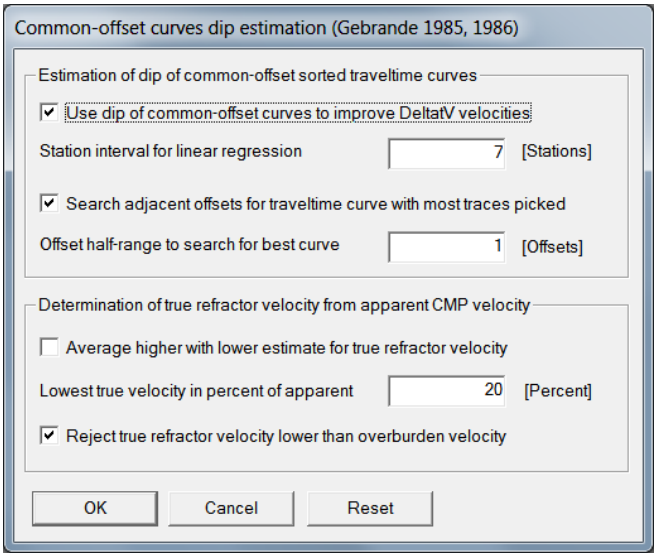

Fig. 18 : *DeltatV|Common-offset dip estimation* dialog. Available with Pro version only.

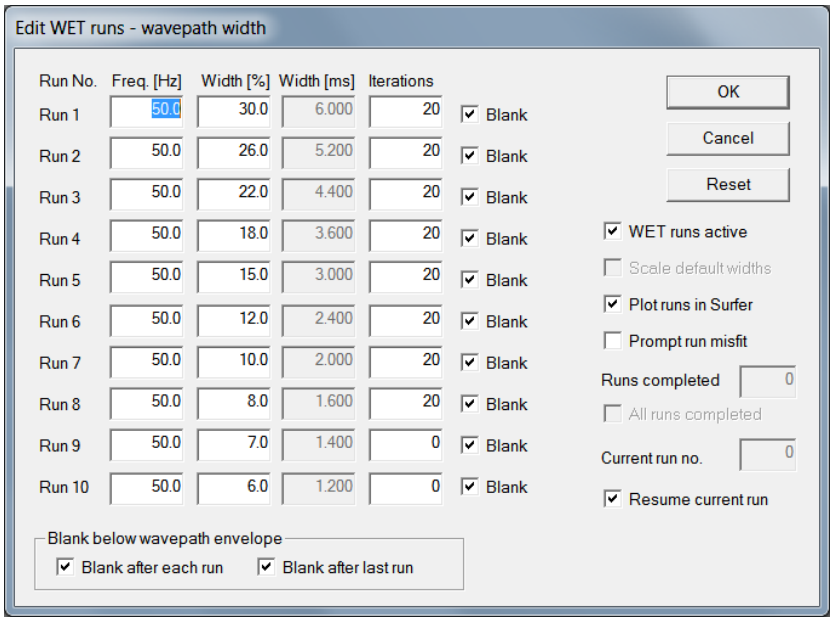

Fig. 19 : *WET Tomo|Interactive WET|Iterate*. Edit WET runs.

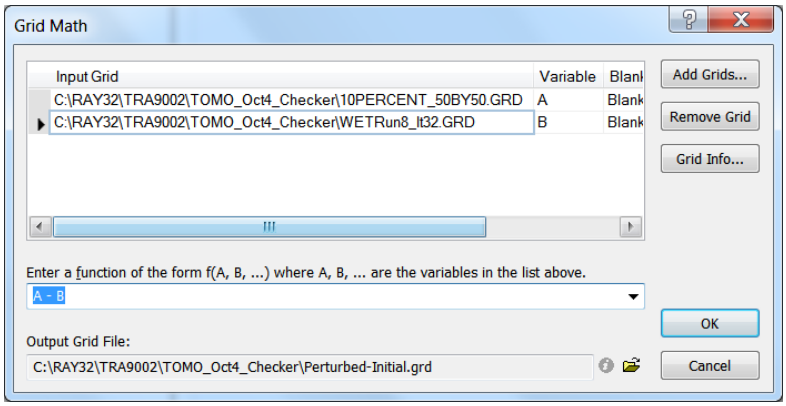

Fig. 20 : Use Surfer Grid Math to subtract grids from each other.

We used Surfer Grid Math to subtract two grids from each other e.g. subtract the initial tomogram **`WETRun8_It32.GRD`** from the perturbed tomogram **`10PERCENT_50BY50.GRD`** (Fig. 20 / Fig 12).

Here is the .rar archive with DeltatV+XTV and multiscale WET inversion files for Fig. 1 and Fig. 2 .
Here is the .rar archive with seis32.* profile database files for Fig. 2 .
Here is the .rar archive with checkerboard grids and multiscale WET inversion files for Fig. 7 .
Here is the .rar archive with seis32.* profile database files for Fig. 7 .

We thank our Swiss client GeoExpert AG for making available above refraction data.