Borehole line LNEC17 : WET inversion for three adjacent boreholes, with receivers in central hole :

- download http://rayfract.com/tutorials/lnec17.zip , unzip in temporary directory
- sort GEOTOMCG.3DD by common receiver, with *File|Export header data|Export Traces to GeoTomCG.3DD ,* to file RESORTED.3DD. See tutorial http://rayfract.com/tutorials/a13r1dm.pdf .
- create new borehole profile LNEC17, *Station spacing* 0.1m, *Line type* Borehole spread/line.
- uncheck *File|Import Data Settings|Adjust profile station spacing*
- create subdirectories INPUT1 and INPUT2 with Windows Explorer, in \RAY32\LNEC17
- copy SS56-67.3DD to \RAY32\LNEC17\INPUT1
- copy RESORTED.3DD to \RAY32\LNEC17\INPUT2
- select *File|Import Data...* Set *Import data type* to *Tweeton GeoTomCG .3DD* .
- select *Input directory* \RAY32\LNEC17\INPUT1, by selecting SS56-67.3DD
- import SS56-67.3DD. Shots are automatically numbered during import, as shot no. 1 to 15.
- reselect *File|Import Data…*
- select input directory \RAY32\LNEC17\INPUT2, by selecting RESORTED.3DD
- import RESORTED.3DD. Renumber shot no. 1 to 16, shot no. 2 to 17 etc. in *Import shot dialog*, before clicking *Read button* .
- select *Refractor|Shot breaks* to review traveltime curves. See Fig. 4 on next page.
- press ALT+P for display parameters. Set *Minimum time [ms]* to 2, *Maximum time [ms]* to 6.5. Hit ENTER. Browse shot sorted curves with F8/F7 function keys.
- browse to traveltime curve for shot no. 10, indicated in Rayfract® title bar.
- select *Header|Receiver*. Browse with F7/F8 to receiver station no. 466.
- correct bad pick for station no. 466 of shot no. 10 : change *First break time* from 3.8 to 2.55. Confirm with ENTER key.
- invert traveltime data with *Smooth invert|WET with constant-velocity initial model* to obtain Fig. 1 :

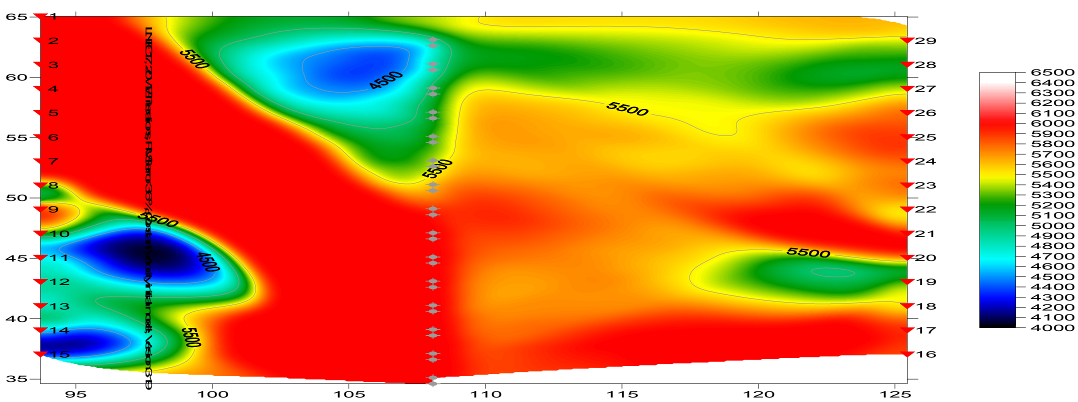

Fig. 1 : Default WET parameters : wavepath width 0.6%, smoothing filter : half width 5, half height 5

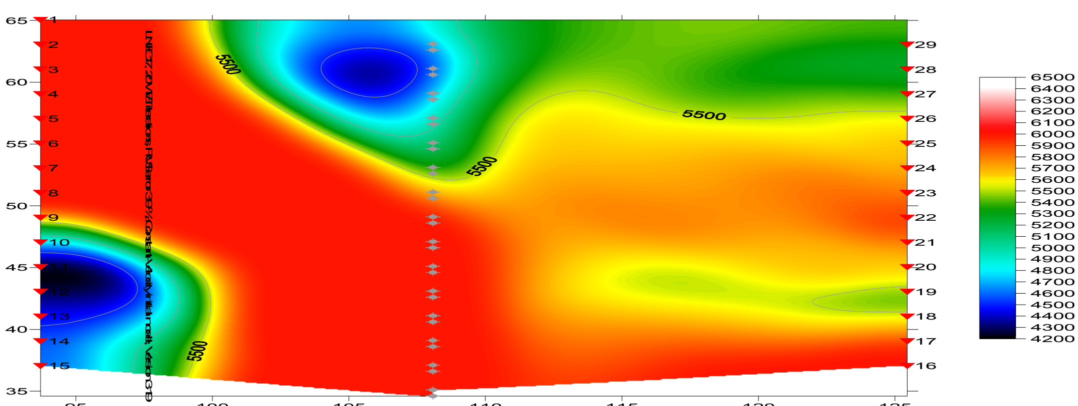

Fig. 2 : WET wavepath width 2%, smoothing filter : half width 12, half height 12. 20 WET iterations.

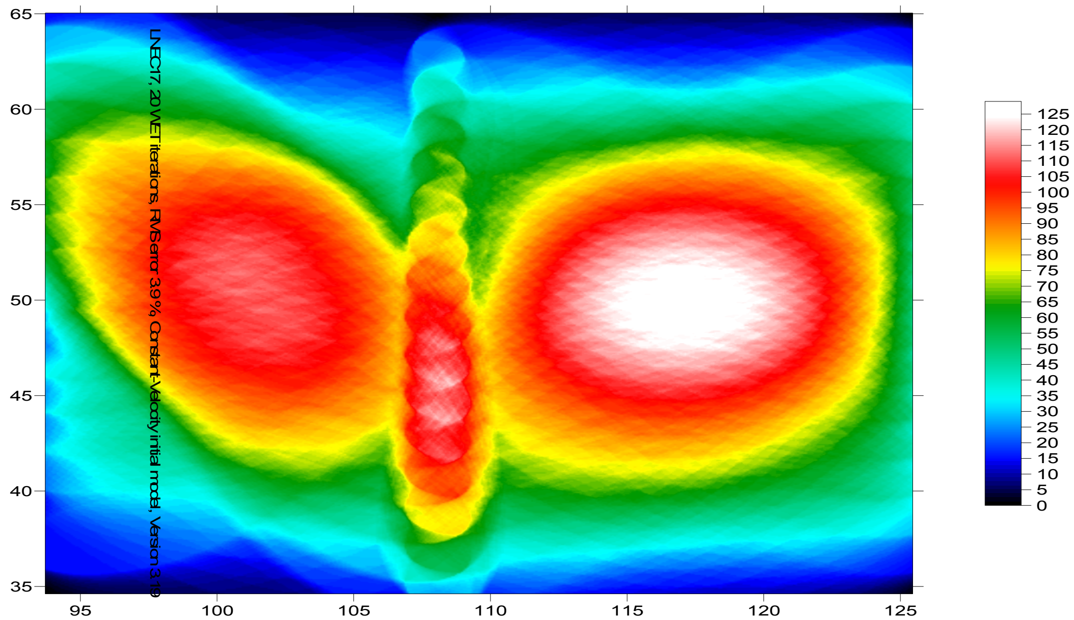

Fig. 3 : WET wavepath coverage plot, obtained with WET tomogram shown in Fig. 2. Note low coverage at bottom-left corner, corresponding to low-velocity anomaly in Fig. 2. Note focusing / bundling of first break energy at central receivers, due to overlap of wave paths.

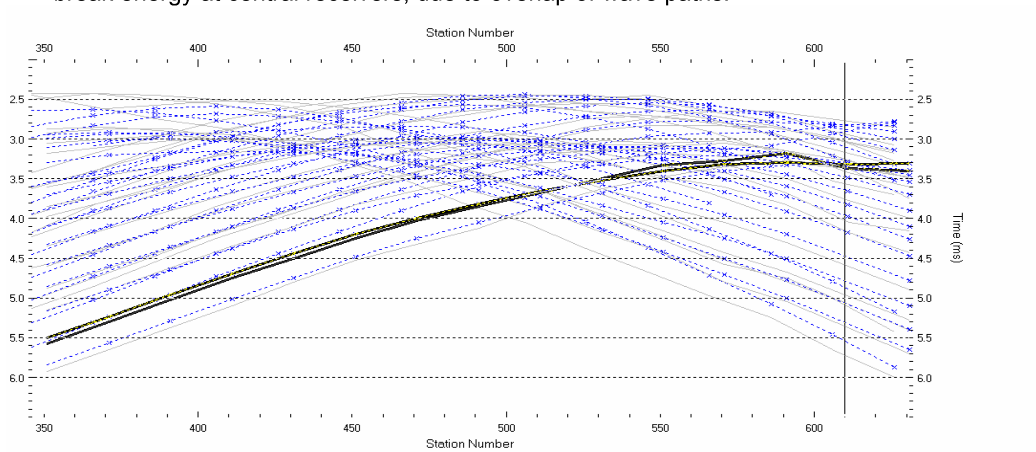

Fig. 4 : match between picked times (grey traveltime curves) and modeled (blue), after 20 WET iterations

- select *WET Tomo|Interactive WET tomography…* and confirm prompt
- click *button Edit velocity smoothing*. Select *Manual specification of smoothing filter*.
- change *Half smoothing filter width* and *Half smoothing filter height* from 5 to 12
- change *Wavepath width* from 0.6% to 2%
- click *buttons Accept parameters* and *Start tomography processing*, to redo WET. Confirm prompts, to obtain Fig. 2 and Fig. 3.

We have shown **imaging of two adjacent crosshole surveys in one tomogram, with all receivers in central borehole**. This first required resorting the traces of one survey by common receiver, as shown in a13r1dm. Imaging two surveys in one tomogram improves the match at the central hole. We thank our client Rogerio Mota at LNEC in Portugal, for permission to use this data set. You may **record downhole shots located at topography, with the receiver spread/hydrophone streamer in central borehole**. Then import these SEG-2 formatted shots into the same profile database, to better constrain WET inversion.