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

Our *Smooth inversion* method assumes that all receivers are positioned in central borehole, and all sources are located in external (left and right) boreholes. If this is not the case, you need to sort traces by common receiver, for such a pair of two adjacent holes. See a13r1dm.pdf .

- download http://rayfract.com/tutorials/lnec17.zip , unzip in temporary directory
- optionally sort GEOTOMCG.3DD by common receiver, with *File|Export header data|Export Traces to GeoTomCG.3DD* … and to file RESORTED.3DD. See 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 from temporary directory to \RAY32\LNEC17\INPUT1
- copy RESORTED.3DD from temporary directory 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.
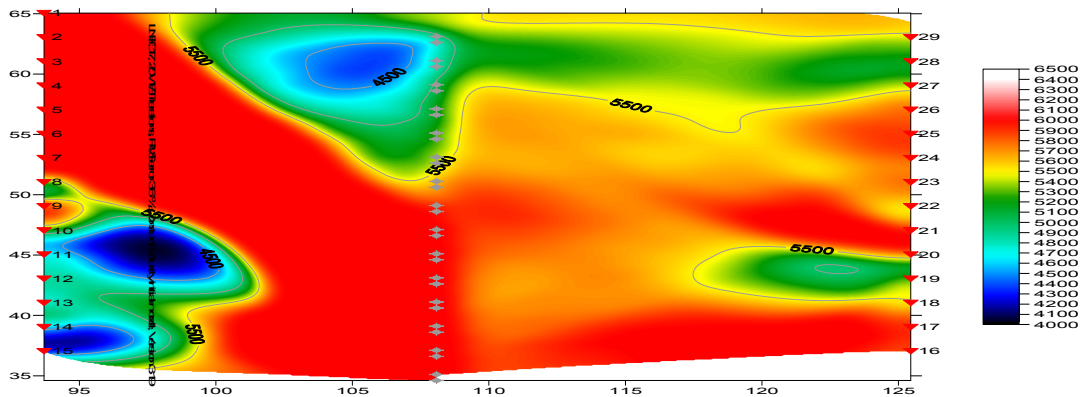- invert traveltime data with *Smooth invert|WET with constant-velocity initial model* to obtain Fig. 1 :

Fig. 1 : Default WET parameters : wavepath width 0.6%, smoothing filter : half width 5, half height 5
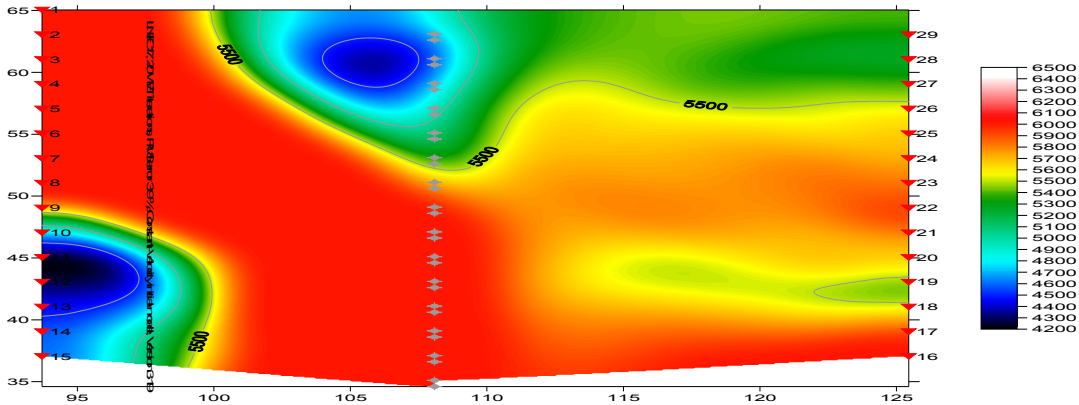
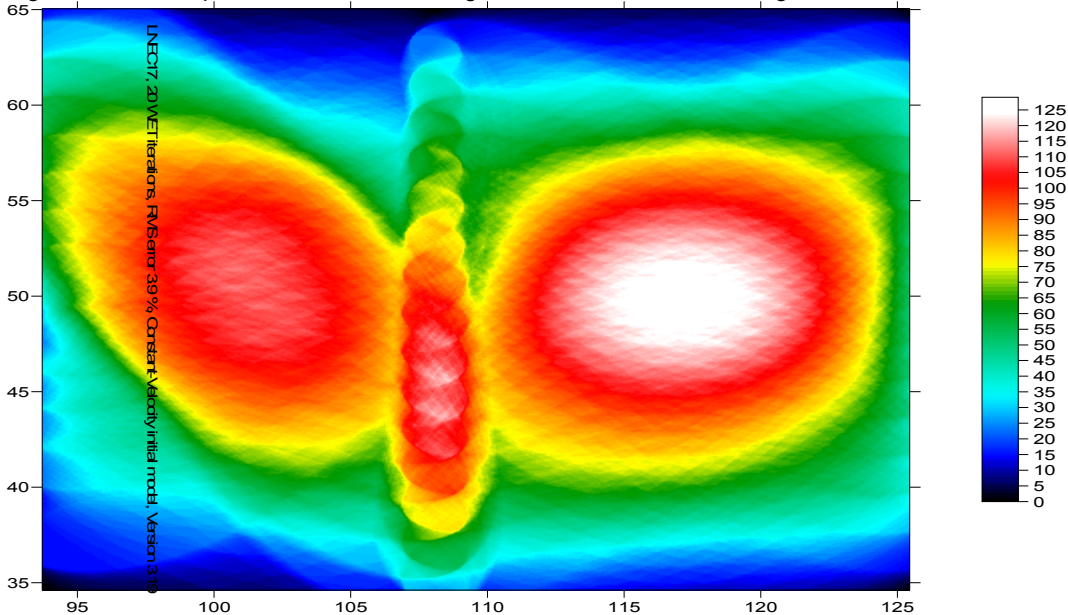Fig. 2 : WET wavepath width 2%, smoothing filter : half width 12, half height 12. 20 WET iterations.

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.
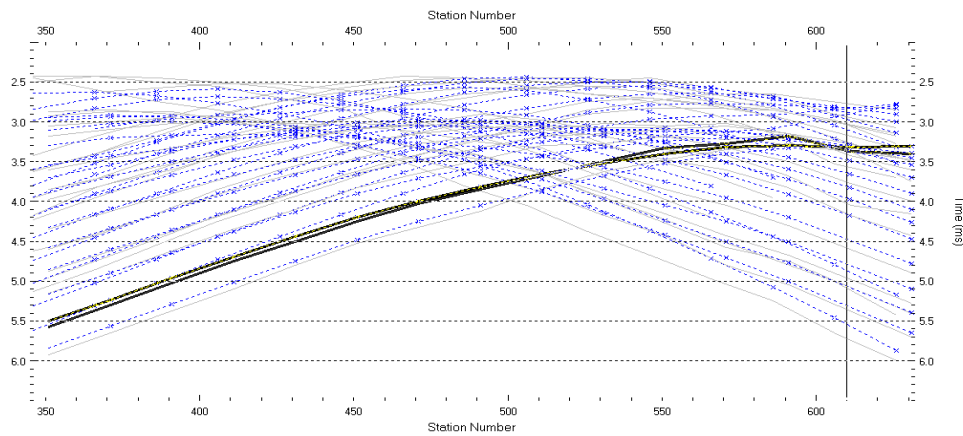

Fig. 4 : match between picked times (grey traveltime curves) and modeled (blue), after 20 WET iterations

- 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
- click *button Accept parameters*
- change *Wavepath width* from 0.6% to 2%
- click *button 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, and all sources in external holes**. This required first 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.