Rayfract™ Tomography processing of I.G.T. line PS1 as recorded in October 2001 :

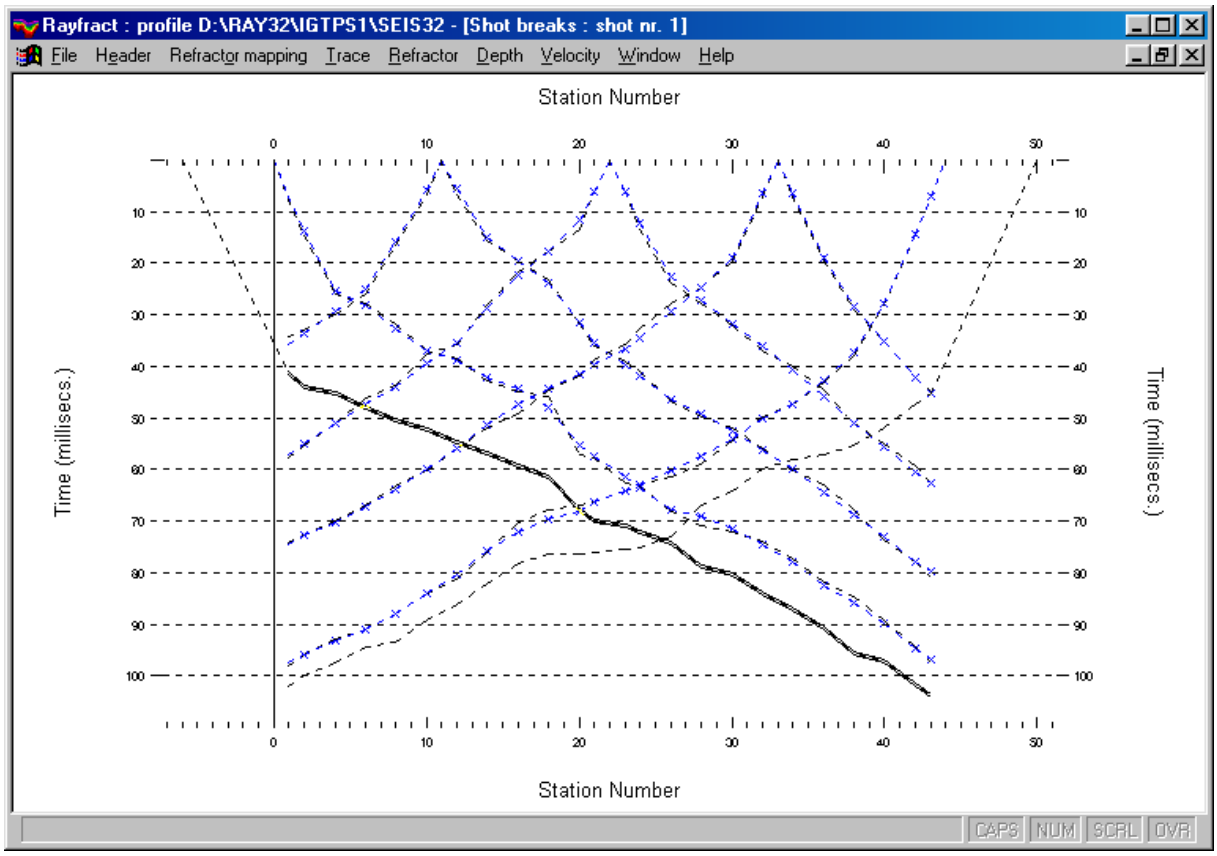
Here we show processing of a low coverage (7 shots into 24 receivers) survey, with our Delta-t-V and WET inversion methods. Please note that we recommend to record at least 10 shots per profile, to obtain reliable interpretations.

Follow these steps as detailed in other tutorials : create a new profile. Set the receiver spacing to 2.5 metres. Import the seven Geometrics .DAT SEG-2 formatted trace data files and update the profile with IGTPS1.GRM Interpex Gremix file, with receiver spread type „12: 24 refract.“. Process the first breaks with our Delta-t-V method, with default parameters. Grid the resulting DELTATV.CSV with Surfer to obtain a DELTATV.GRD initial subsurface velocity model file (500 grid columns vs. 285 grid rows).

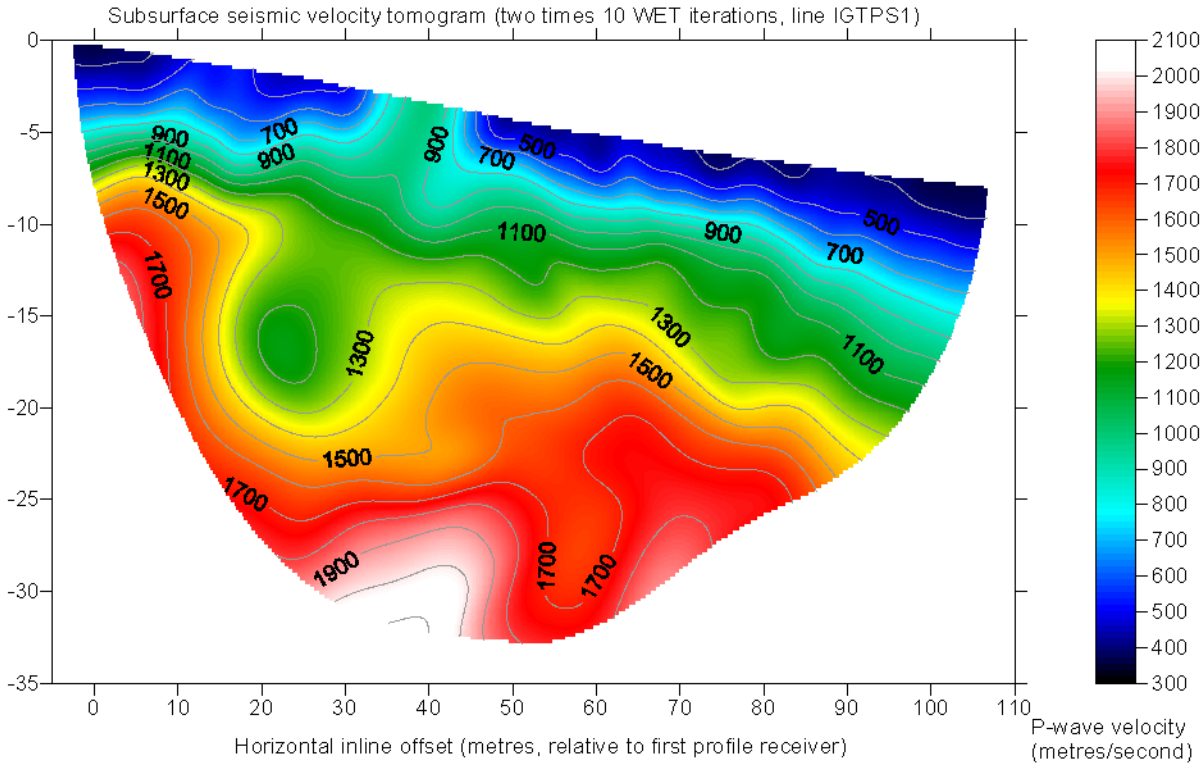
Now select Depth|Tomography processing of traveltimes ... . Then click on button „Select“ and specify the DELTATV.GRD file as generated above. Leave all other processing parameters at their default values. To generate subsurface coverage maps showing the number of ray paths going through each 2D section pixel, click on button „Edit grid file generation“ and enable option „Write section coverage grids after each iteration“. Now click on button „Start tomography processing“.

Once the tomography processing has terminated after 10 iterations and about 5 minutes of processing time (on Pentium III processor at 500 MHz), you may want to refine the output obtained from this first run. To do so, reselect Depth|Tomography processing of traveltimes ... . Now specify the VELOIT10.GRD as obtained from the previous tomography run. Start the second tomography processing run by clicking on button „Start tomography processing“.

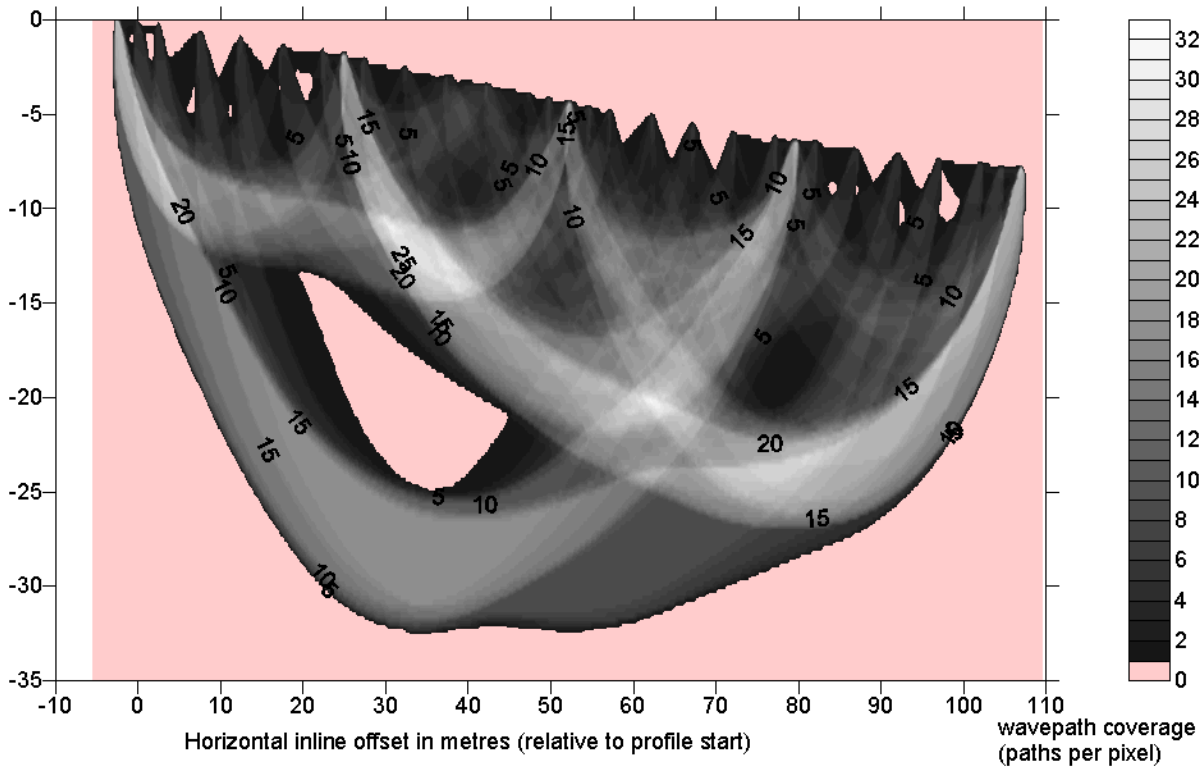
Once the processing terminates, select Refractors|Shot breaks to display picked and synthesized traveltimes together :



Now contour and plot the VELOIT10.GRD file as obtained after two times 10 iterations of the WET tomography processing :



To obtain a 2D vertical subsurface section showing the coverage of each 2D pixel with ray paths, just contour the file COVERG10.GRD. In the Surfer 7 Contour Map Properties dialog, click on tab „Levels“ and then on column header „Level“. Now set parameter „Minimum“ to 0 and „Interval“ to 1. Then click on „OK“. Now double click on the topmost row of column „Fill“ (for level 0) and specify e.g. pink as foreground and background color. Then accept all edited dialogs with „OK“. You will obtain a composite image of all wave paths as shown below (brighter color means higher coverage with first break energy) :



The Geometrics SEG-2 .DAT trace data files and the Interpex Gremix formatted input file IGTPS1.GRM are available for download as archive http://rayfract.com/tutorials/IGTPS1.ZIP . For theoretical background of our new tomography algorithm, see

Wavepath eikonal traveltime inversion: Theory (Gerard T. Schuster and Aksel Quintus-Bosz 1993, GEOPHYSICS VOL. 58 NO. 9 September 1993, P. 1314 – 1323) .

For more information on our Rayfract™ software, please follow the links on our web site http://rayfract.com .