

# Processing and interpretation Refraction line1

## geometry:

24 receiver channels

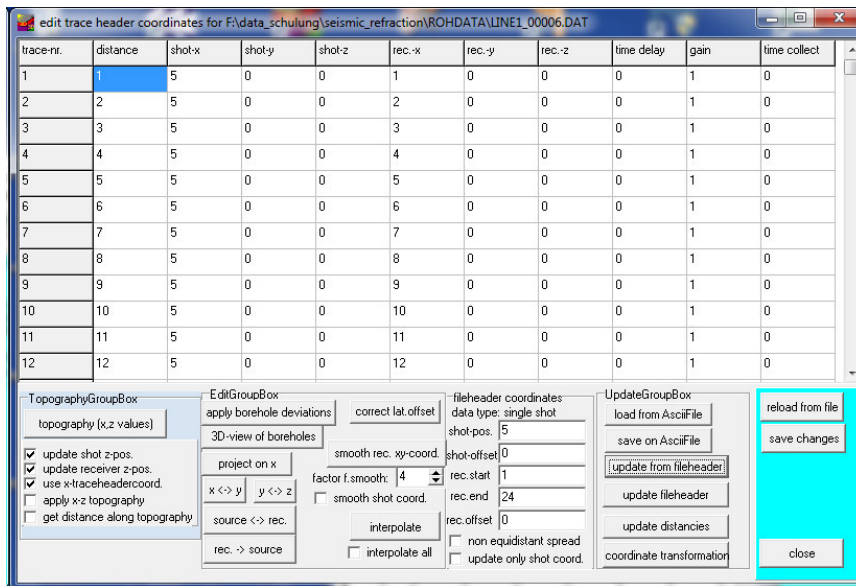
Fixed Line from 1 to 24 m with 1 m increment

26 shots from 0 to 25 m with 1 m increment

## Import:

1. each file separately:

SEG2, no conversion sequence, data type to single shot Update the fileheader coordinates before each import (rec.start to 1, rec. end to 24, shot pos.) and then update the traceheaders from the fileheader within the traceheader tabella

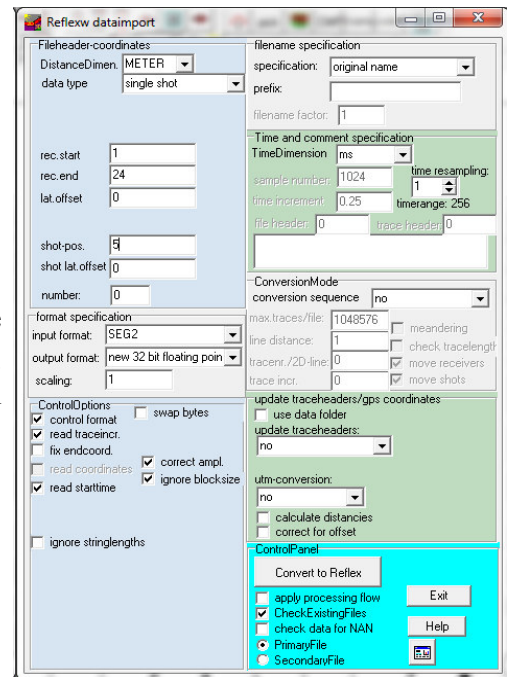


trace-nr.	distance	shot-x	shot-y	shot-z	rec.-x	rec.-y	rec.-z	time delay	gain	time collect
1	1	5	0	0	1	0	0	0	1	0
2	2	5	0	0	2	0	0	0	1	0
3	3	5	0	0	3	0	0	0	1	0
4	4	5	0	0	4	0	0	0	1	0
5	5	5	0	0	5	0	0	0	1	0
6	6	5	0	0	6	0	0	0	1	0
7	7	5	0	0	7	0	0	0	1	0
8	8	5	0	0	8	0	0	0	1	0
9	9	5	0	0	9	0	0	0	1	0
10	10	5	0	0	10	0	0	0	1	0
11	11	5	0	0	11	0	0	0	1	0
12	12	5	0	0	12	0	0	0	1	0

ControlOptions: ☒ control format, ☒ read traceinc, ☒ fix endcoord, ☒ read coordinates, ☒ read starttime, ☐ swap bytes, ☒ correct ampl, ☒ ignore blocksize, ☐ ignore stringlengths

fileheader coordinates: data type: single shot, shot-pos: 5, shot-offset: 0, rec.start: 1, rec.end: 24, rec.offset: 0, non equidistant spread: ☐, update only shot coord: ☐

UpdateGroupBox: load from AsciiFile, save on AsciiFile, (update from fileheader), update fileheader, update distances, coordinate transformation, reload from file, save changes, close



Fileheader-coordinates: DistanceDimen: METER, data type: single shot

filename specification: specification: original name, prefix: , filename factor: 1

Time and comment specification: TimeDimension: ms, sample number: 1024, time resampling: 1, time increment: 0.25, timerange: 256

rec.start: 1, rec.end: 24, lat.offset: 0

shot-pos: 5, shot lat offset: 0, number: 0

format specification: input format: SEG2, output format: new 32 bit floating point, scaling: 1

ConversionMode: conversion sequence: no

max.traces/file: 1048576, line distance: 1, check trace length: ☐, tracenr./2D-line: 0, move receivers: ☒, trace inc.: 0, move shots: ☒

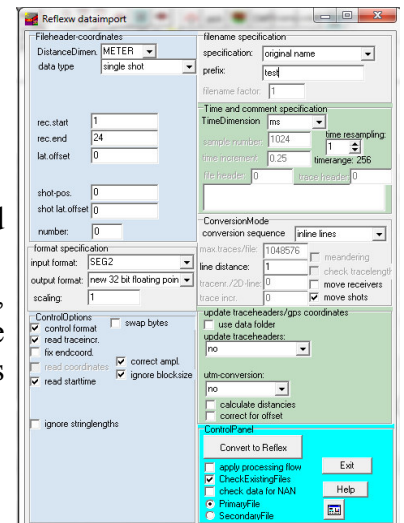
ControlOptions: ☒ control format, ☒ read traceinc, ☒ fix endcoord, ☒ read coordinates, ☒ read starttime, ☐ swap bytes, ☒ correct ampl, ☒ ignore blocksize, ☐ ignore stringlengths

update traceheaders/gps coordinates: ☐ use data folder, update traceheaders: no, utm-conversion: no, calculate distances: ☐, correct for offset: ☐

ControlPanel: Convert to Reflex, apply processing flow, Check Existing Files, check data for NAN, PrimaryFile, SecondaryFile, Exit, Help

2. all files within one step - possible for an easy fixed receiver geometry and equidistant shots

SEG2, fileheader coordinate for the first shot (rec.start to 1, rec. end to 24, shot pos.to 0) conversion sequence inline lines, data type to single shot, line distance to 1 (corresponds to the shot increment), move receivers deactivated, move shots activated, update traceheaders from fileheader Choose all wanted files after having pressed ConvertToReflex Check the geometry after the import



Fileheader-coordinates: DistanceDimen: METER, data type: single shot

filename specification: specification: original name, prefix: rec, filename factor: 1

Time and comment specification: TimeDimension: ms, sample number: 1024, time resampling: 1, time increment: 0.25, timerange: 256

rec.start: 1, rec.end: 24, lat.offset: 0

shot-pos: 0, shot lat offset: 0, number: 0

format specification: input format: SEG2, output format: new 32 bit floating point, scaling: 1

ConversionMode: conversion sequence: inline lines

max.traces/file: 1048576, line distance: 1, check trace length: ☐, tracenr./2D-line: 0, move receivers: ☐, trace inc.: 0, move shots: ☒

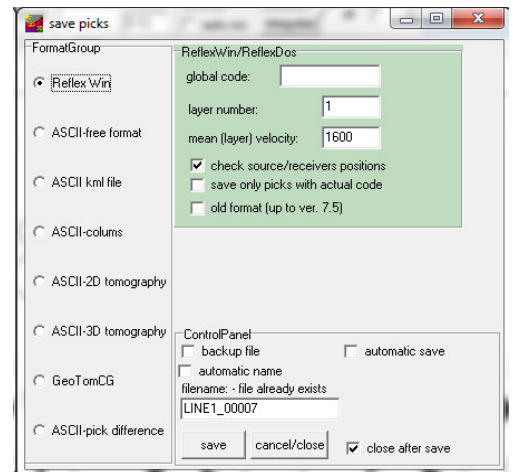
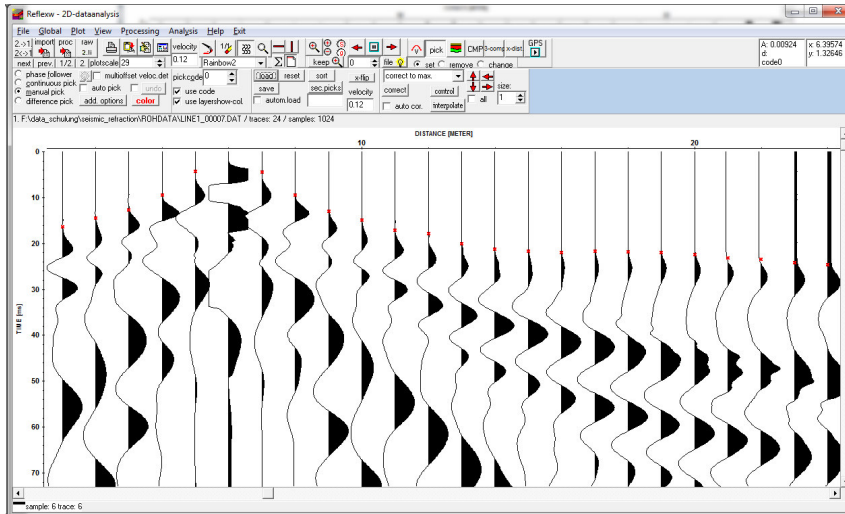
ControlOptions: ☒ control format, ☒ read traceinc, ☒ fix endcoord, ☒ read coordinates, ☒ read starttime, ☐ swap bytes, ☒ correct ampl, ☒ ignore blocksize, ☐ ignore stringlengths

update traceheaders/gps coordinates: ☐ use data folder, update traceheaders: no, utm-conversion: no, calculate distances: ☐, correct for offset: ☐

ControlPanel: Convert to Reflex, apply processing flow, Check Existing Files, check data for NAN, PrimaryFile, SecondaryFile, Exit, Help

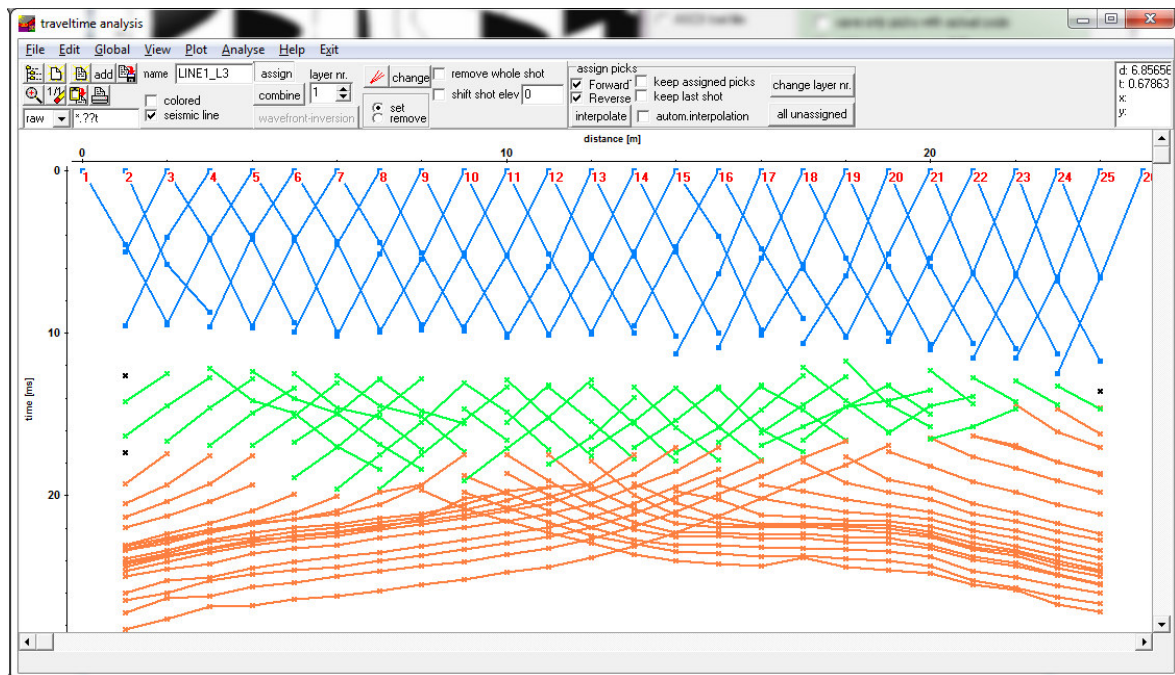
## Picking the first arrivals

Pick the first arrivals for each shot and save them using the Reflex Win format.

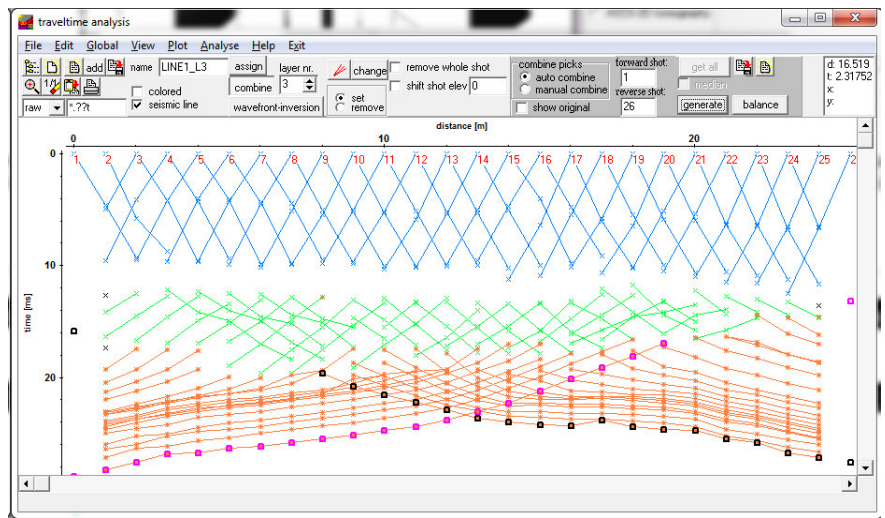


## Wavefront inversion

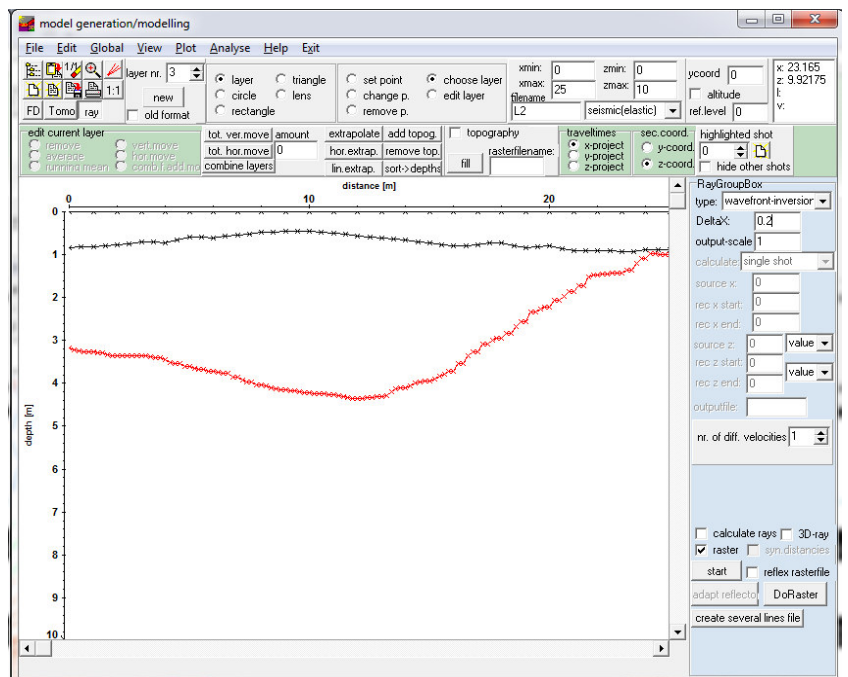
1. Put together the picked traveltimes within the traveltimes analysis menu, insert Shot zero traveltimes -> file LINE1.pck
2. Assign the picks to individual layers (3 layer case) -> file LINE1\_L3.pck



3. Click on combine for the inversion of the 3 layers. For the first layer click directly on wavefront-inversion, for the next ones first a combined forward and reverse traveltimes curve must be generated by entering the forward and reverse shot and clicking on generate



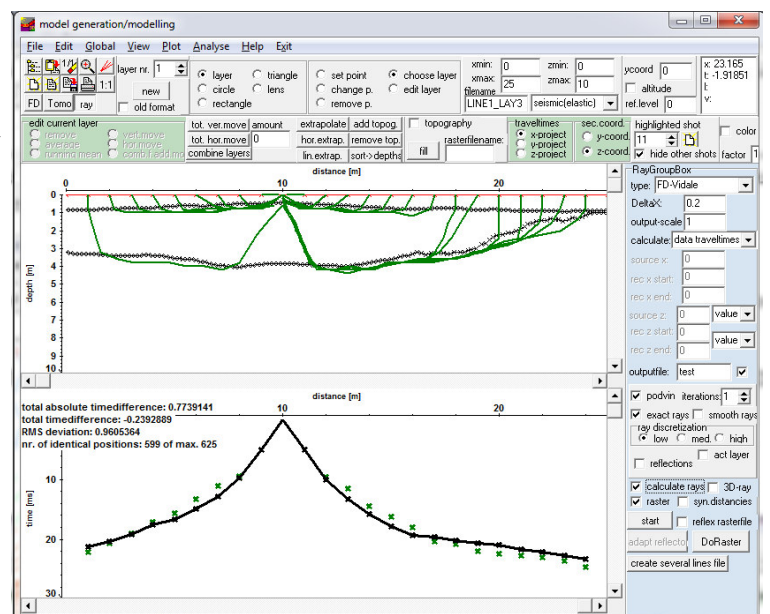
4. Perform wavefront inversion for the 3 layers -> files LINE1\_L1.MOD, LINE1\_L2.MOD, LINE1\_L3.MOD, use a traceincrement of 0.2 m inversion with 1 velocity for the refractors -> files line1\_l1...line1\_l3 inversion with 3 velocities for the refractors -> files line1\_lay1...line1\_lay3



## raytracing check

check the model using raytracing and perform any changes within the model if necessary

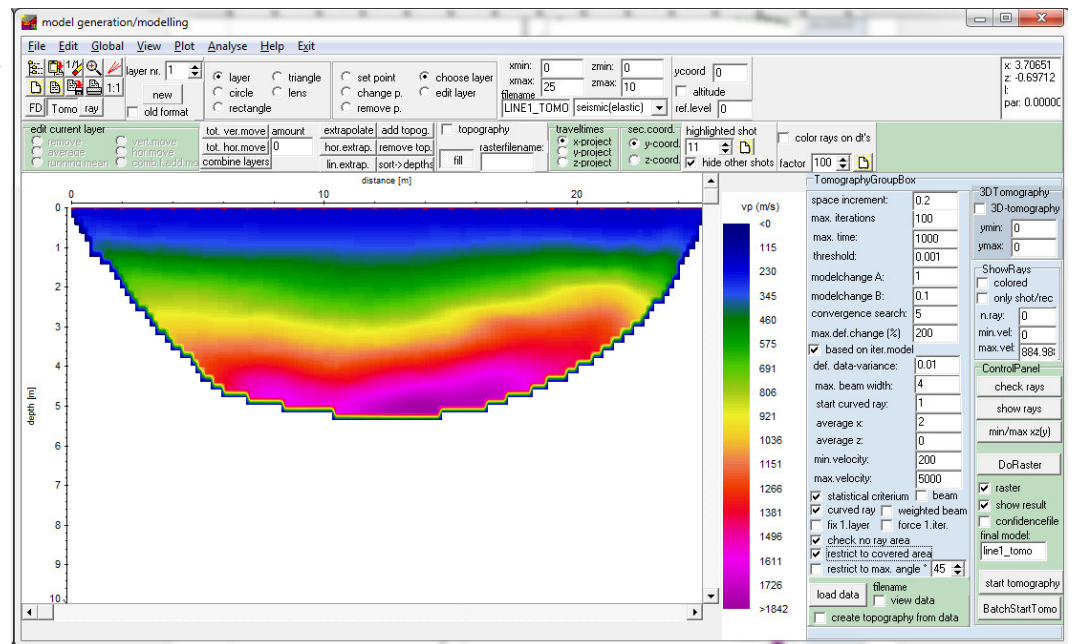
1. Load the data traveltimes
2. Click on ray and type FD-Vidale and calculate set to data traveltimes
3. Perform the raytracing using start





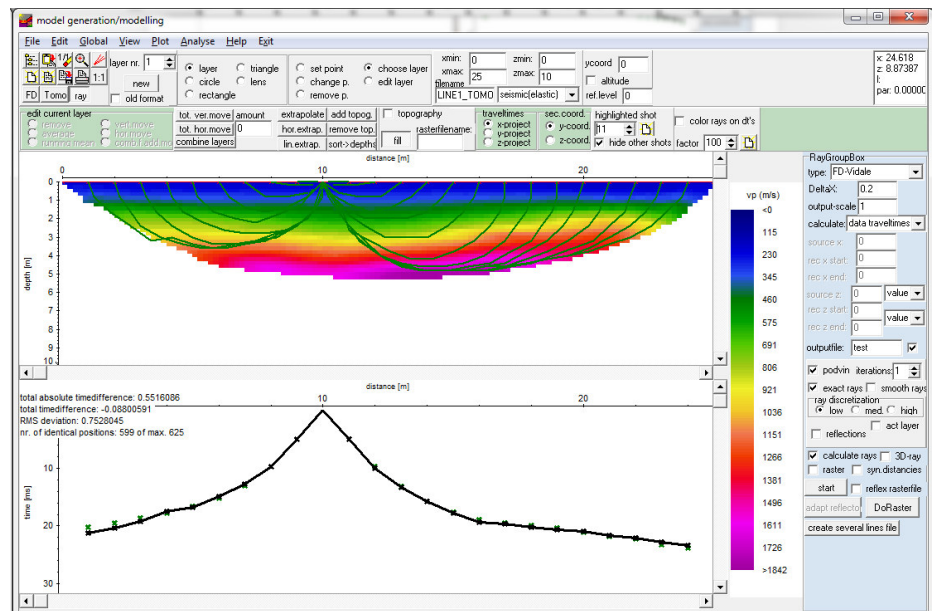
## tomographic inversion

Tomographic inversion based on a simple 1 layer model (filename: line1\_tomo\_start.mod) with a vertical gradient



Again a raytracing check is the most suitable way in order to analyse the result.

For the tomographic result the option raster must be deactivated and the tomographic inversion result will be queried which forms the base for the raytracing.



## topography

include the topography after having done the wavefront inversion.

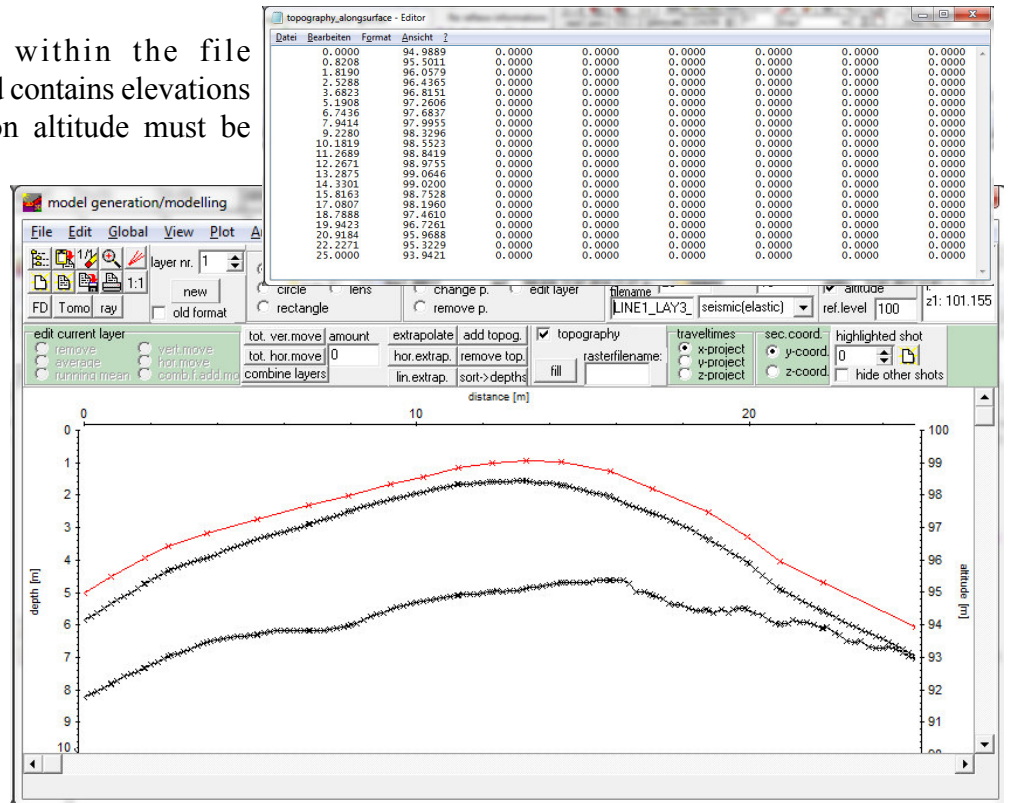
The topography is stored within the file topography\_alongsurface.txt and contains elevations (altitudes). Therefore the option altitude must be activated and a reference level (in this case 100 m) must be entered.

Activate the first layer (upper model border).

Click on import (x,z) within the input of model parameters window for layer 1 (surface layer) and choose the file topography\_alongsurface.txt.

Click on add topog.

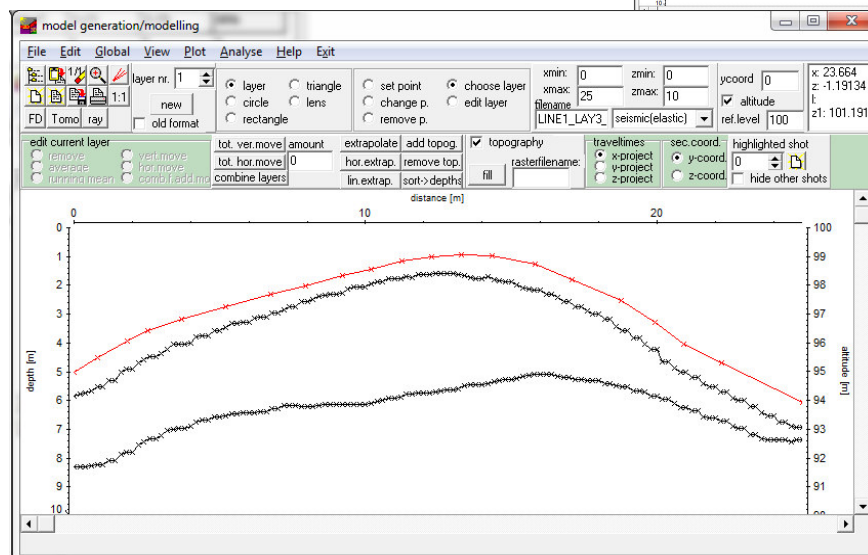
Filename stored under LINE1\_LAY3\_top\_after.MOD



include the topography during the wavefront inversion

Perform the wavefront inversion for the first layer and add the topography for the 1. layer as described above.

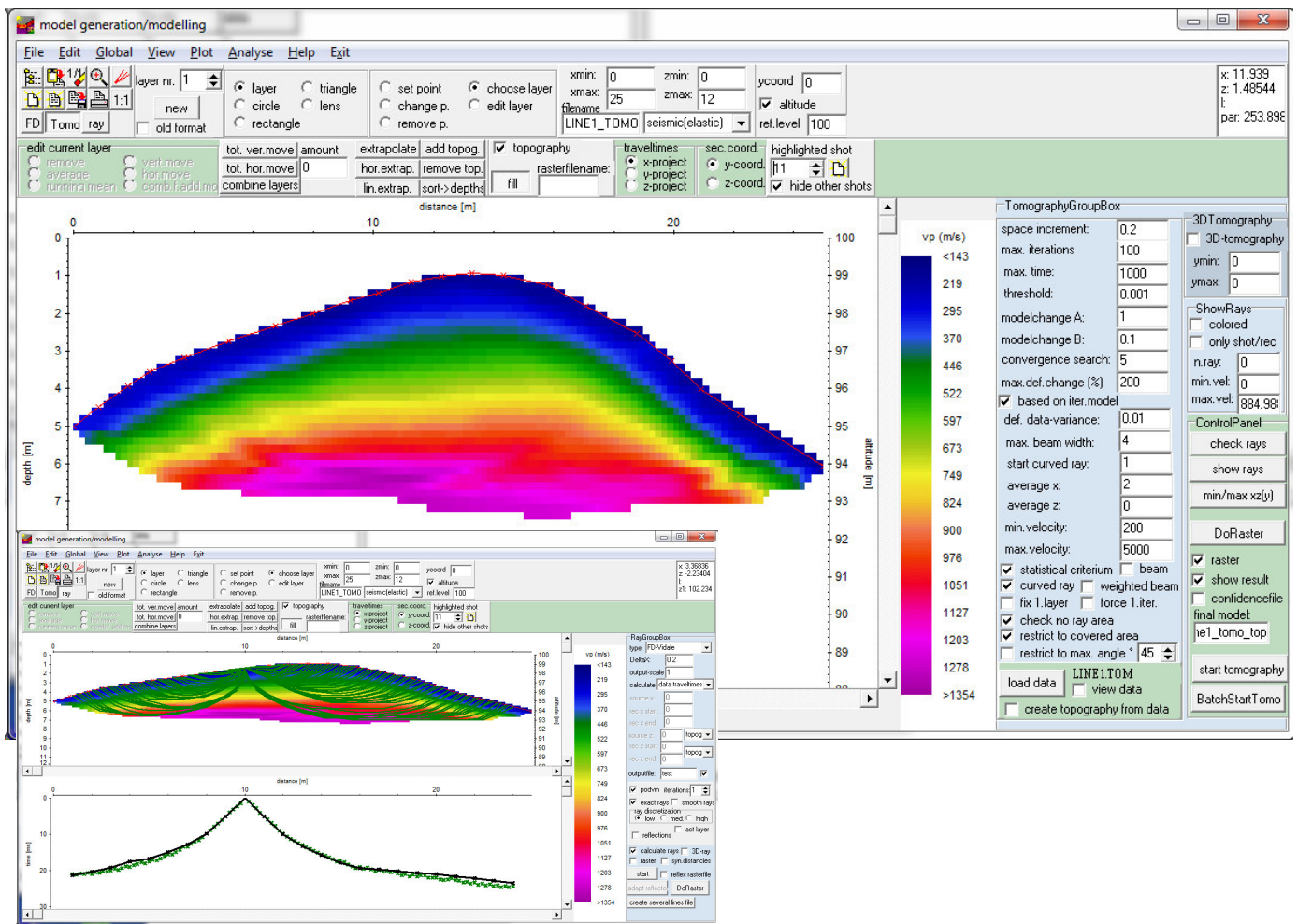
Save the model and perform wavefront inversion for the next 2 layers using the topographically corrected first layer model -> files LINE1\_Lay1\_top.MOD, LINE1\_Lay2\_top.MOD, LINE1\_Lay3\_top.MOD, use a traceincrement of 0.2



m

## tomographic inversion

The tomographic inversion may also be performed based on a topographically corrected start model. Again simply add the topography for the 1. layer as described above and perform the tomography.

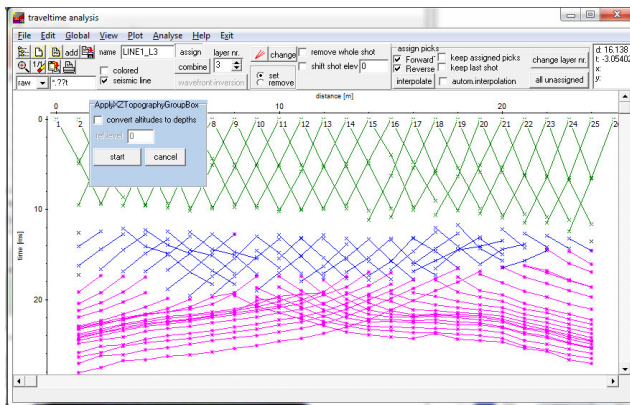


The topographic values do not need to have been stored within the traveltimes. The program automatically moves the shot and receiver position to the topographic surface if it is present.

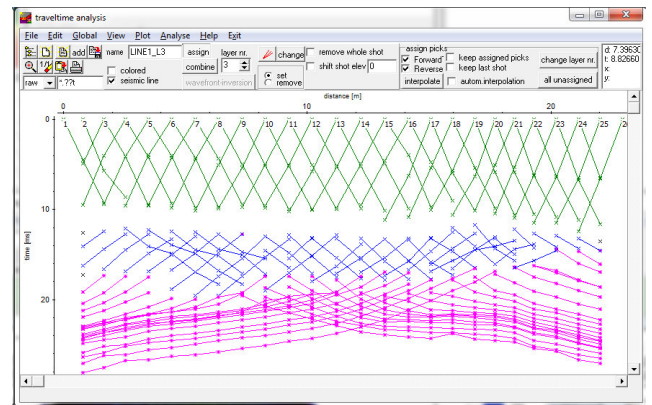


## Strong topography

If a strong topography is present the coordinates measured along the surface do not represent the x-coordinates. In this case a correction must be performed. This is done within the traveltimes analysis menu using the option edit/apply xz-coordinates.



->

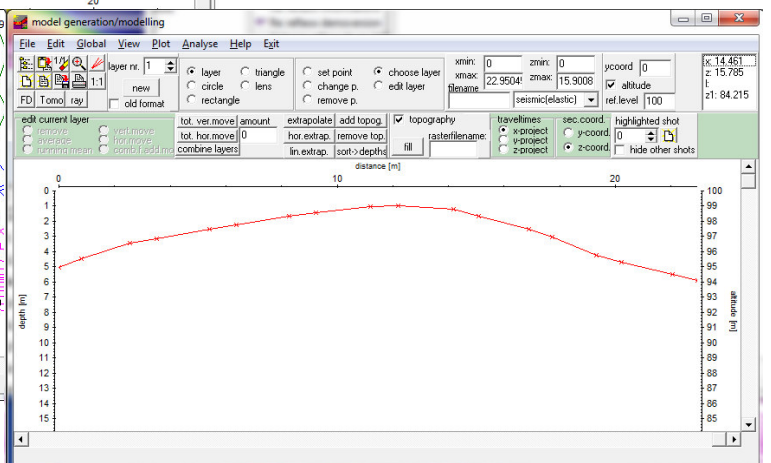
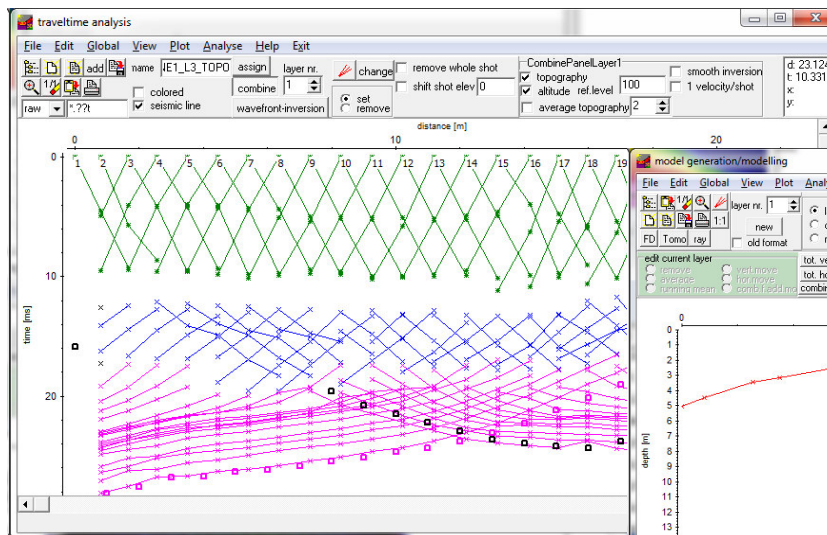


The ASCII-xz-coordinates must contain the true x-coordinates - file topography\_truexz.txt

After having applied this correction the x-axis will be shortened. Now the picks (file Line1\_13\_topo) contain the corrected x-coordinates as well as the z-coordinates.

Datum	Bearbeitet	Format	Ansicht	z
0.0000	94.9889	0.0000	0.0000	0.0000
0.7208	95.5011	0.0000	0.0000	0.0000
1.6190	96.0579	0.0000	0.0000	0.0000
2.2268	96.4365	0.0000	0.0000	0.0000
3.3823	96.8151	0.0000	0.0000	0.0000
4.6908	97.2606	0.0000	0.0000	0.0000
6.1436	97.6837	0.0000	0.0000	0.0000
7.2414	97.9955	0.0000	0.0000	0.0000
8.3280	98.3296	0.0000	0.0000	0.0000
9.1819	98.5523	0.0000	0.0000	0.0000
10.2689	98.8419	0.0000	0.0000	0.0000
11.0071	98.9755	0.0000	0.0000	0.0000
11.9875	99.0646	0.0000	0.0000	0.0000
12.9301	99.0200	0.0000	0.0000	0.0000
14.1163	98.7528	0.0000	0.0000	0.0000
15.3807	98.1960	0.0000	0.0000	0.0000
16.9888	97.4610	0.0000	0.0000	0.0000
18.0423	96.7261	0.0000	0.0000	0.0000
18.9184	95.9688	0.0000	0.0000	0.0000
20.2271	95.3229	0.0000	0.0000	0.0000
23.3000	93.9421	0.0000	0.0000	0.0000

The including of the topography into the wavefront inversion will be done by activating the option topography for the 1. Layer inversion.



Use the same procedure as described above for the inversion of the further layers.

The same holds true for the tomographic inversion.