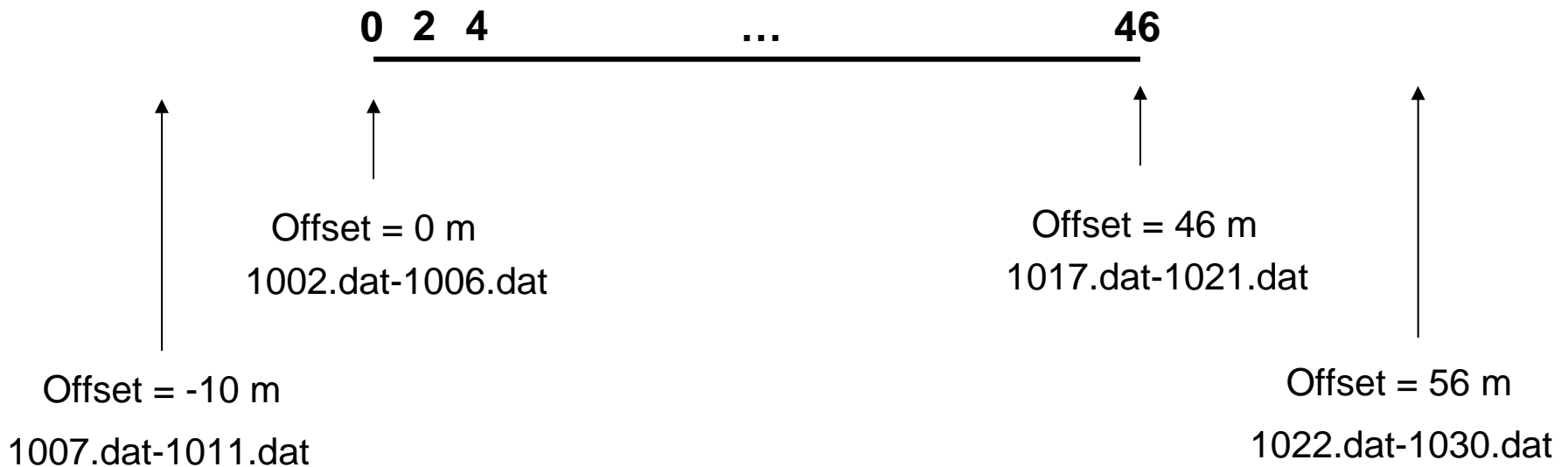


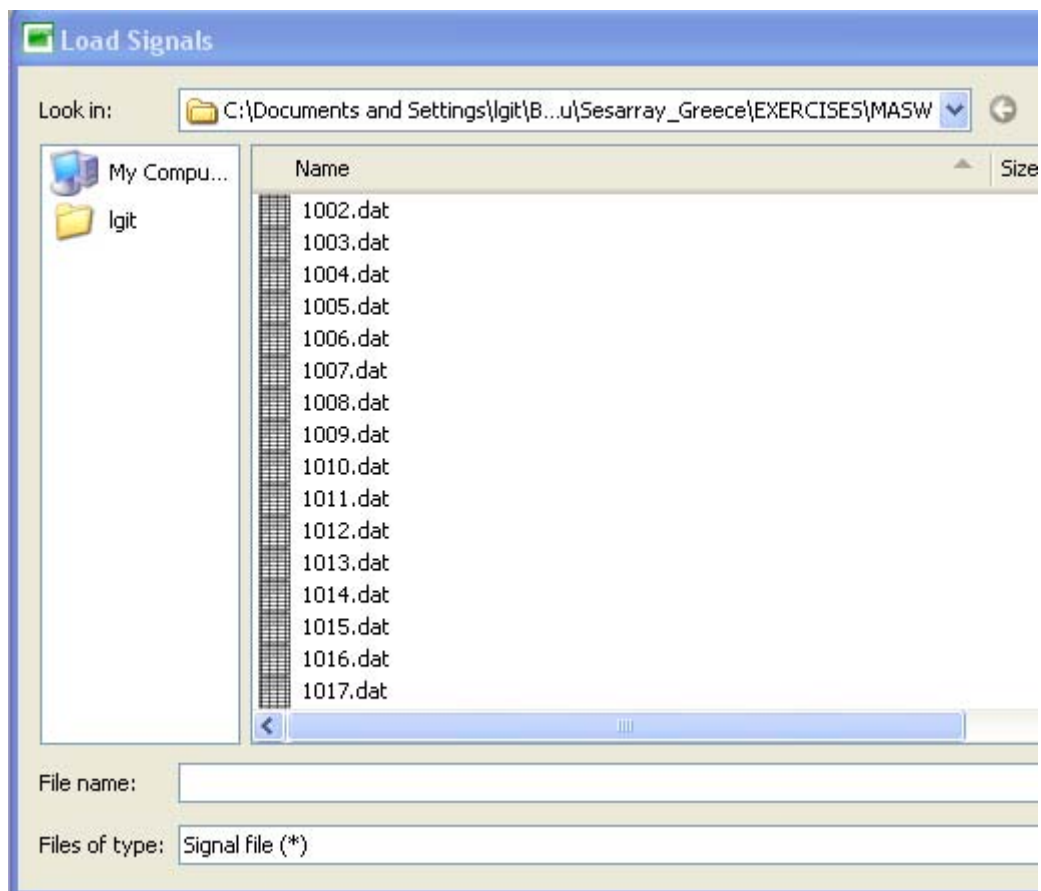
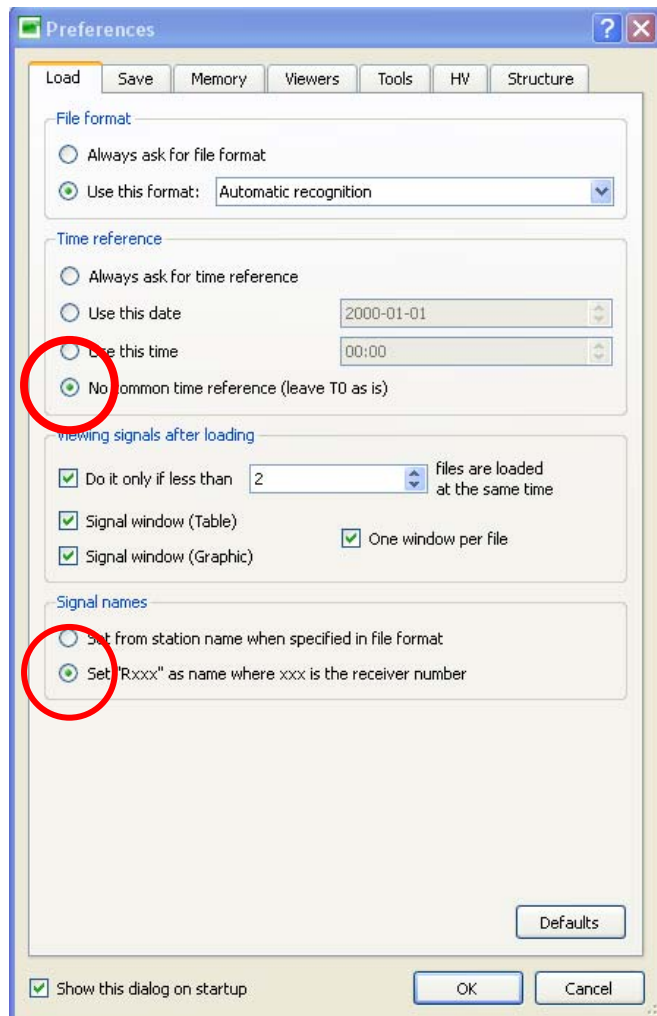
# MASW tutorial

# Presentation of the data

Acquisition system: Geode  
 MarkProducts 4.5 Hz vertical geophones  
 Sampling rate = 4000 Hz  
 Geophones spacing = 2 m



# Loading the files (EXERCISES/MASW)



# Changing the files headers

18	18	1002.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
19	19	1002.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
20	20	1002.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
21	21	1002.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
22	22	1002.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
23	23	1002.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
24	24	1002.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
25	25	1003.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
26	26	1003.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
27	27	1003.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
28	28	1003.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
29	29	1003.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
30	30	1003.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
31	31	1003.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
32	32	1003.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
33	33	1003.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
34	34	1003.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s
35	35	1003.dat	Vertical	03/02/2007 00:00:00	1h20m51.900000s	1h20m55.900000s	1000	0,001	4000	4.000000s

# Changing the files headers

	ID	Name	Component	Time reference	Start time	End time	Sampling frequency	dt	N samples	Duration	Rec x	Rec y	Rec z	Type
16	16	1002.dat	Vertical	03/02/2007 00:00:02	0s	4.000000s	1000	0.001	4000	4.000000s	30	0	0	Waveform
17	17	1002.dat	Vertical	03/02/2007 00:00:02	0s	4.000000s	1000							
18	18	1002.dat	Vertical	03/02/2007 00:00:02	0s	4.000000s	1000							
19	19	1002.dat	Vertical	03/02/2007 00:00:02	0s	4.000000s	1000							
20	20	1002.dat	Vertical	03/02/2007 00:00:02	0s	4.000000s	1000							
21	21	1002.dat	Vertical	03/02/2007 00:00:02	0s	4.000000s	1000							
22	22	1002.dat	Vertical	03/02/2007 00:00:02	0s	4.000000s	1000							
23	23	1002.dat	Vertical	03/02/2007 00:00:02	0s	4.000000s	1000							
24	24	1002.dat	Vertical	03/02/2007 00:00:02	0s	4.000000s	1000							
25	25	1003.dat	Vertical	03/02/2007 00:00:03	0s	4.000000s	1000							
26	26	1003.dat	Vertical	03/02/2007 00:00:03	0s	4.000000s	1000							
27	27	1003.dat	Vertical	03/02/2007 00:00:03	0s	4.000000s	1000							
28	28	1003.dat	Vertical	03/02/2007 00:00:03	0s	4.000000s	1000							
29	29	1003.dat	Vertical	03/02/2007 00:00:03	0s	4.000000s	1000							
30	30	1003.dat	Vertical	03/02/2007 00:00:03	0s	4.000000s	1000							
31	31	1003.dat	Vertical	03/02/2007 00:00:03	0s	4.000000s	1000							
32	32	1003.dat	Vertical	03/02/2007 00:00:03	0s	4.000000s	1000							
33	33	1003.dat	Vertical	03/02/2007 00:00:03	0s	4.000000s	1000							
34	34	1003.dat	Vertical	03/02/2007 00:00:03	0s	4.000000s	1000							
35	35	1003.dat	Vertical	03/02/2007 00:00:03	0s	4.000000s	1000							
36	36	1003.dat	Vertical	03/02/2007 00:00:03	0s	4.000000s	1000							
37	37	1003.dat	Vertical	03/02/2007 00:00:03	0s	4.000000s	1000							

### Set header

The equations must be terminated by ";". They are executed once for all signals of the current viewer. You can use "/" and "/\* ...\*/" like C syntax to comment equations.

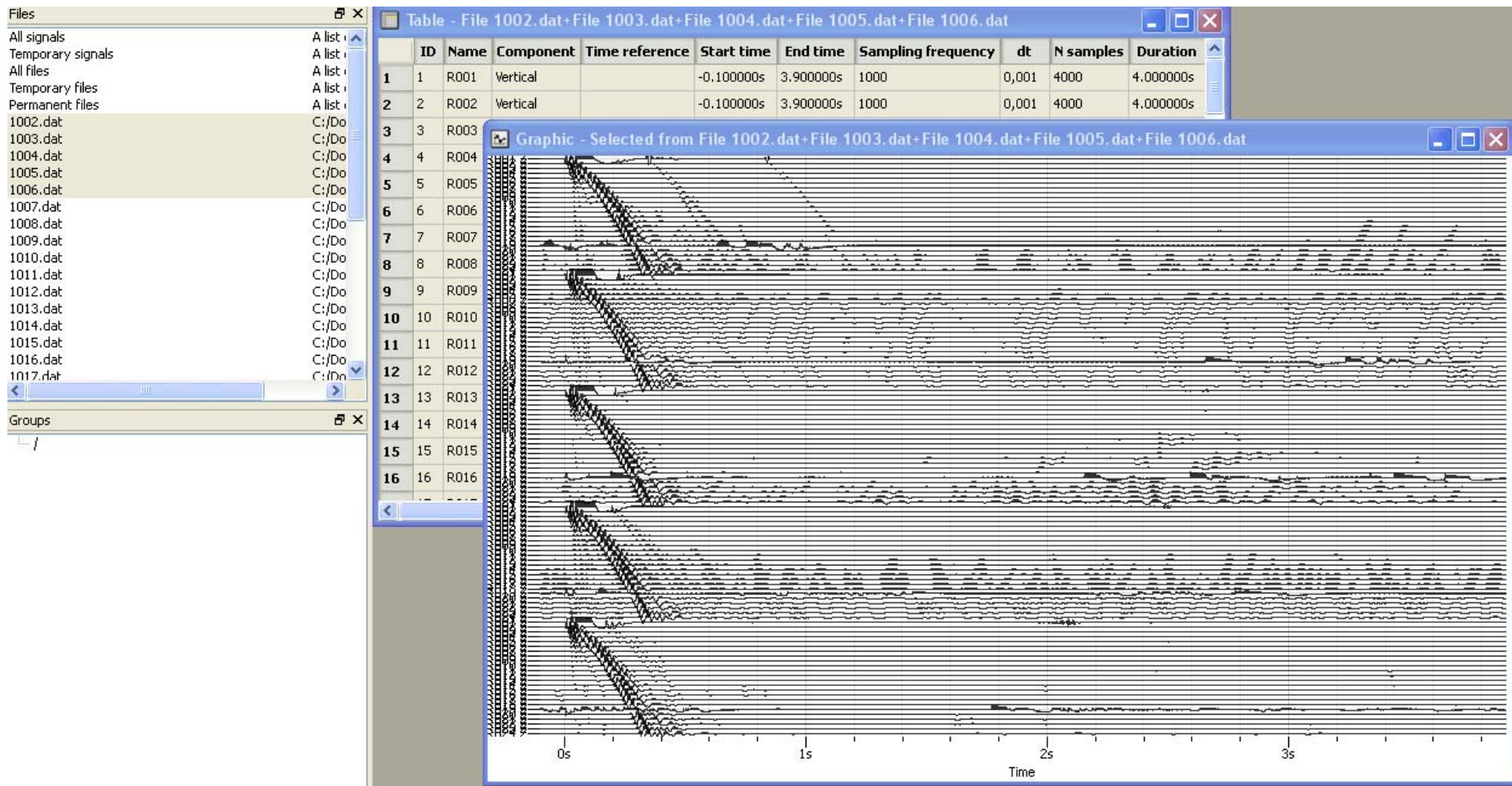
```
s=left(right(FileName,6),2);
TimeReference="03/02/2007 00:00:" + s;
T0=0;
```

Variables AmplitudeUnit Operators =

(3, 6) Functions if( <condition>, <true>, <false> )

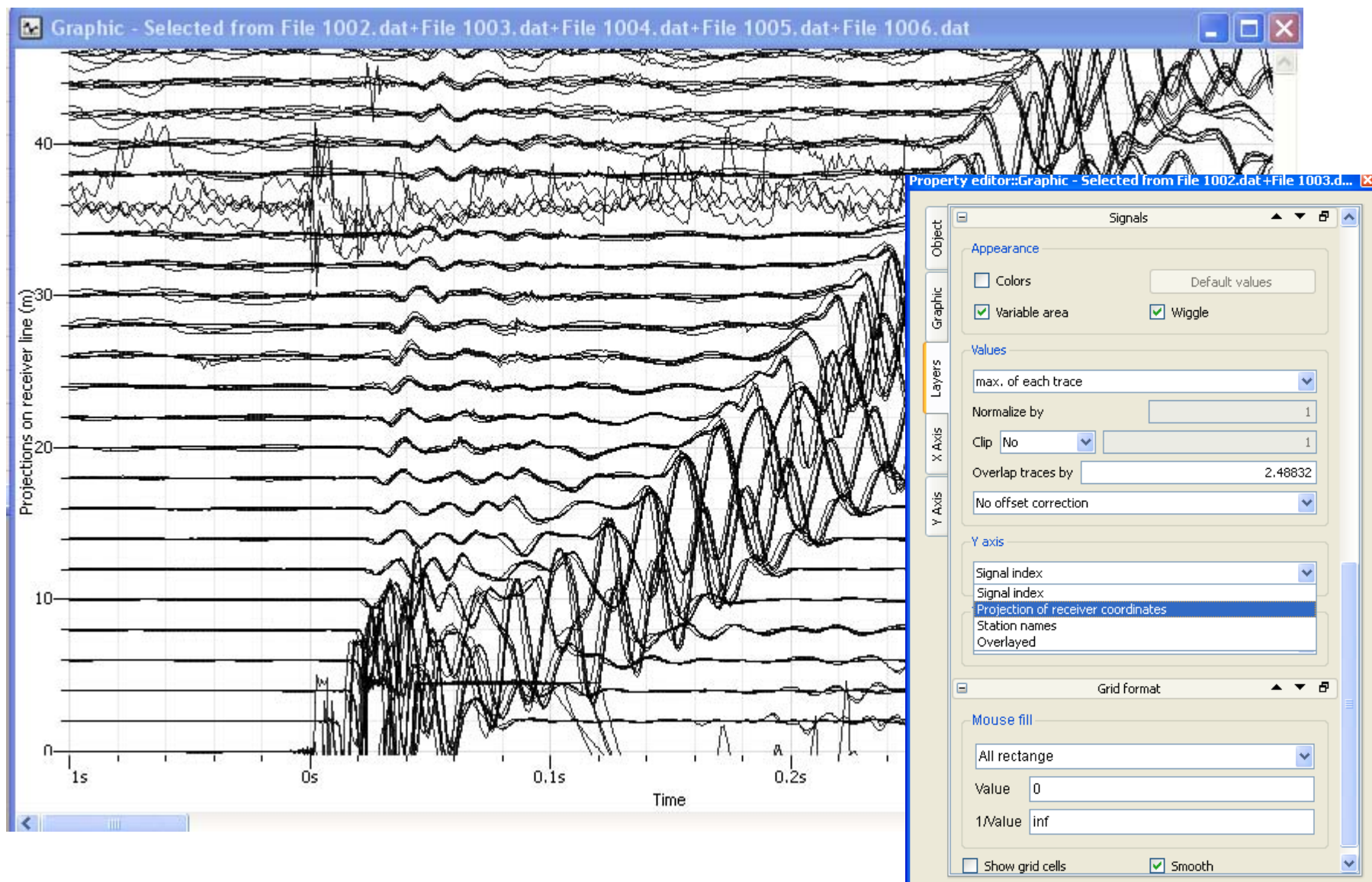
Load Save Apply Close

# Displaying the signals for the 0 m offset shot





# Displaying the signals for the 0 m offset shot



# « Noise reduction » menu for stacking the signals

NR toolbox - Selected from File 1002.dat+File 1...

Adjust T0 Stack

Source-receiver distance

Minimum 10,0 m Maximum 30,0 m

Time range

From T0 -0.1000s

To End 3.9000s

☐ Use only the properties of the first signal

Revert Apply

Highlight None

NR toolbox - Selected from File 1002.dat+File 1...

Adjust T0 Stack

Global time range

From T0 -0.1000s

To End 3.9000s

☐ Use only the properties of the first signal

Signal time range

From T0 -0.1000s

To End 3.9000s

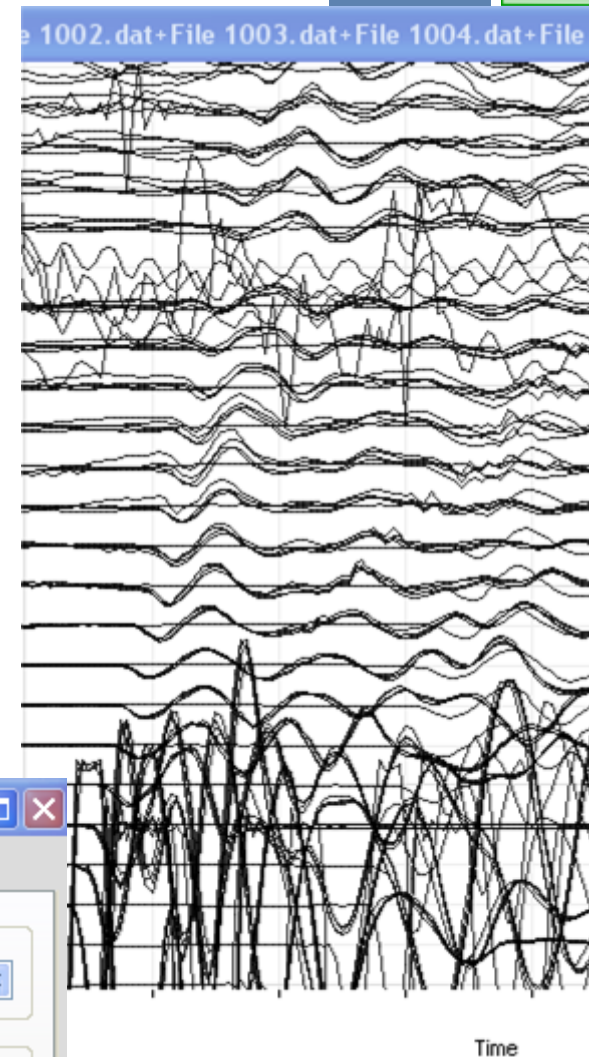
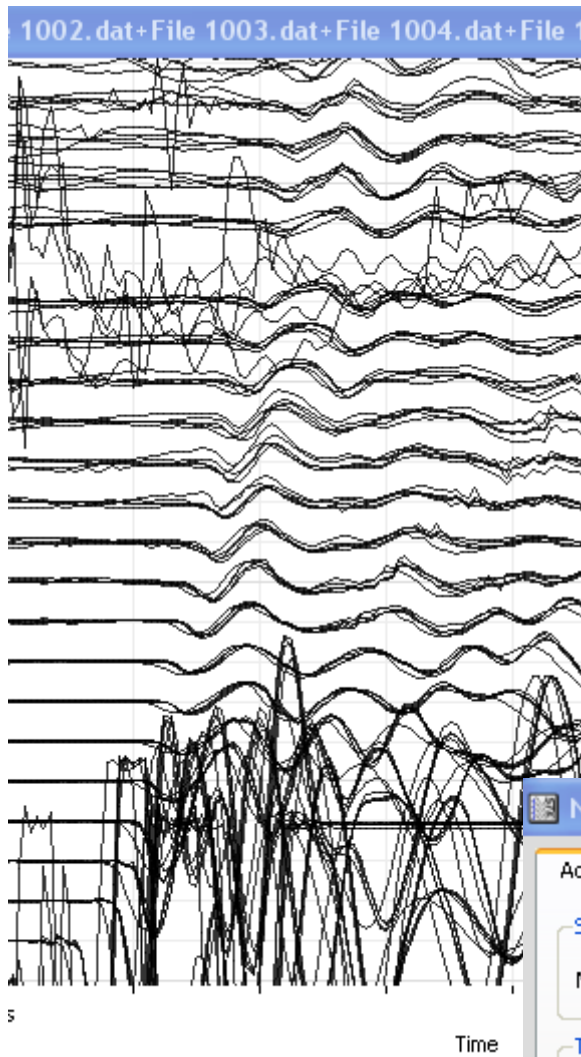
☐ Use only the properties of the first signal

Graphic Uniform Optimize

Highlight None



# Adjusting the time



NR toolbox - Selected from File 1002.dat+File 1...

Adjust T0    Stack

Source-receiver distance

Minimum 6,0 m    Maximum 14,0 m

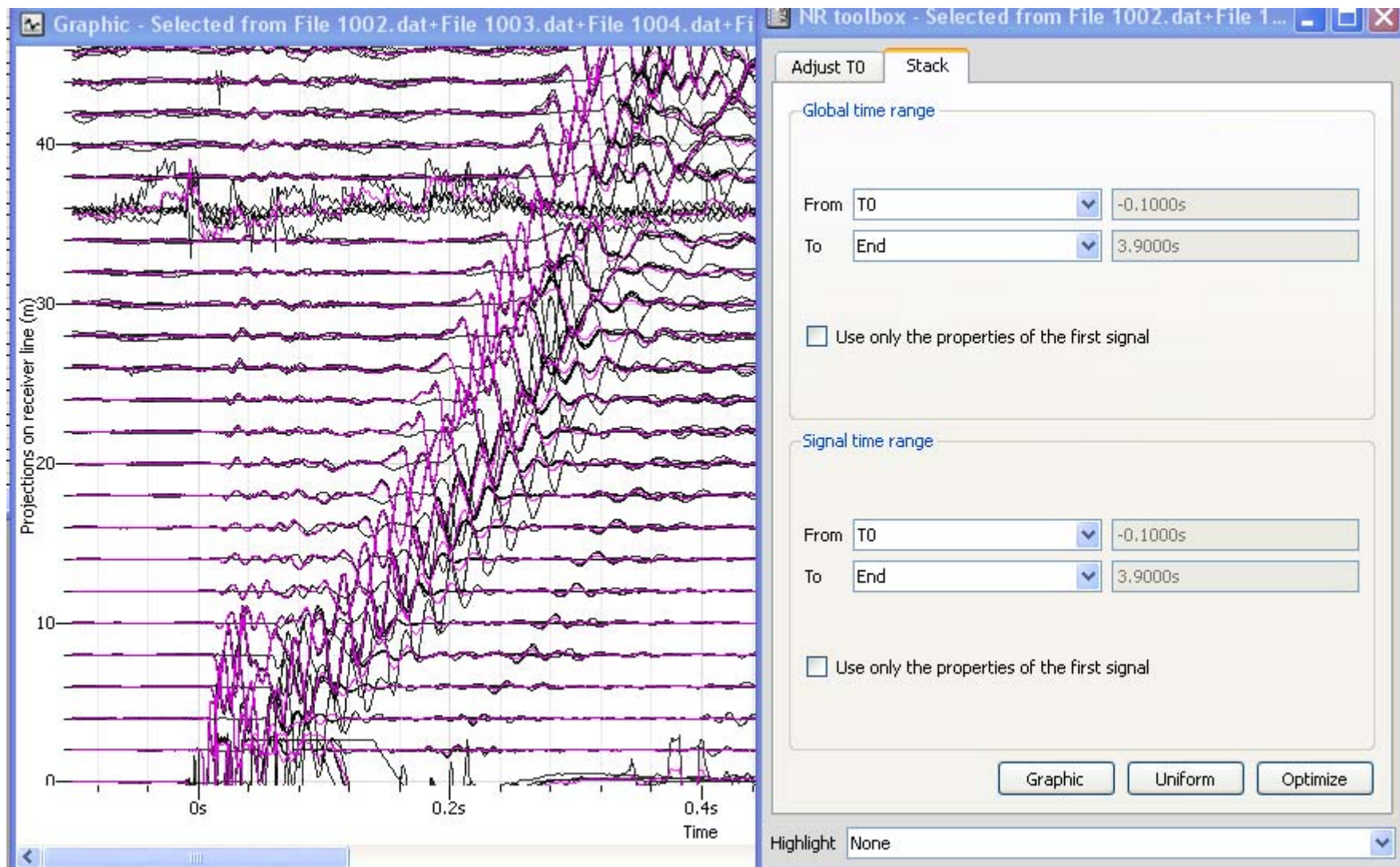
Time range

From this time    0,01

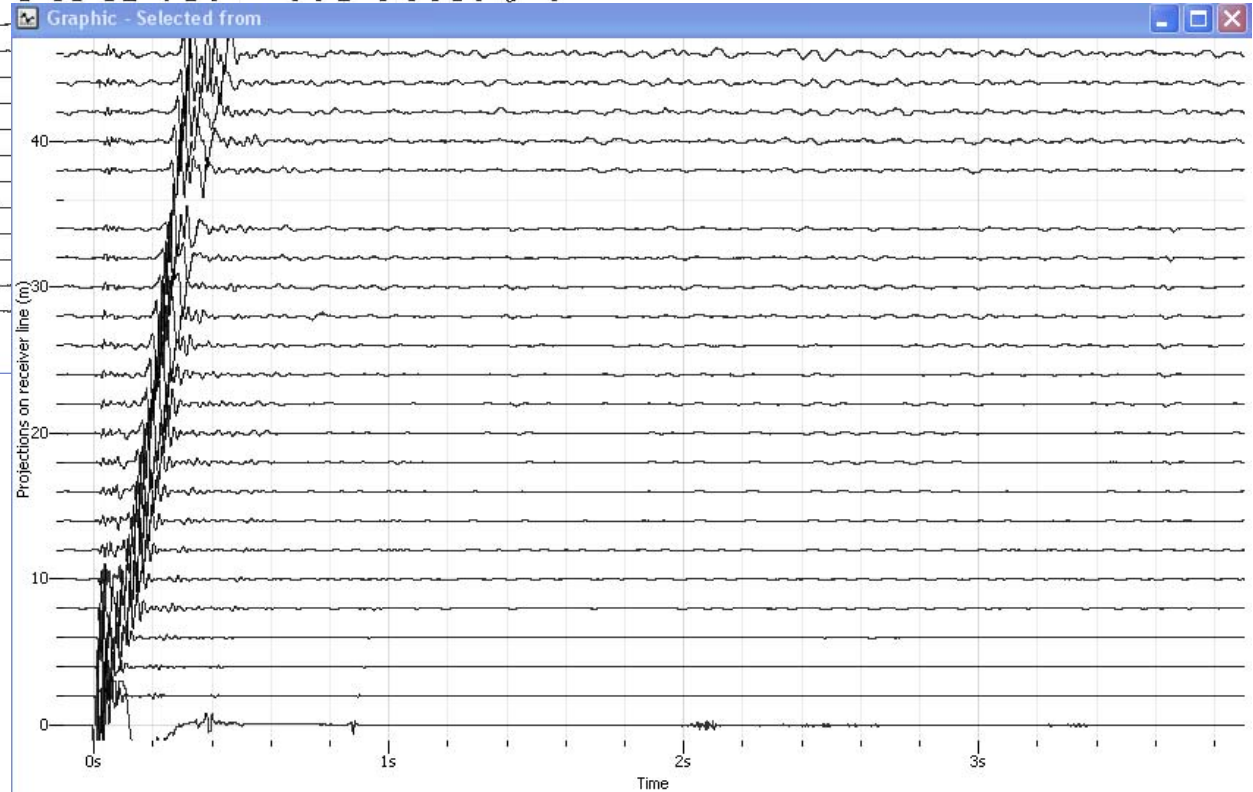
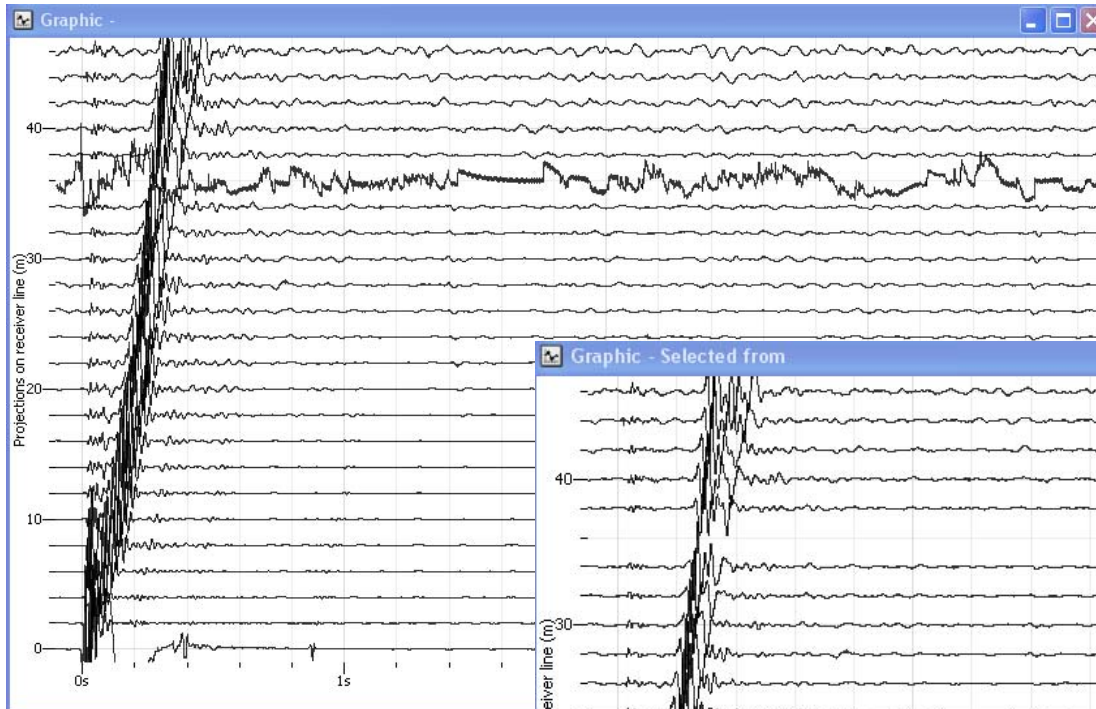
To this time    0,06

☐ Use only the properties of the first signal

# Stacking the signals

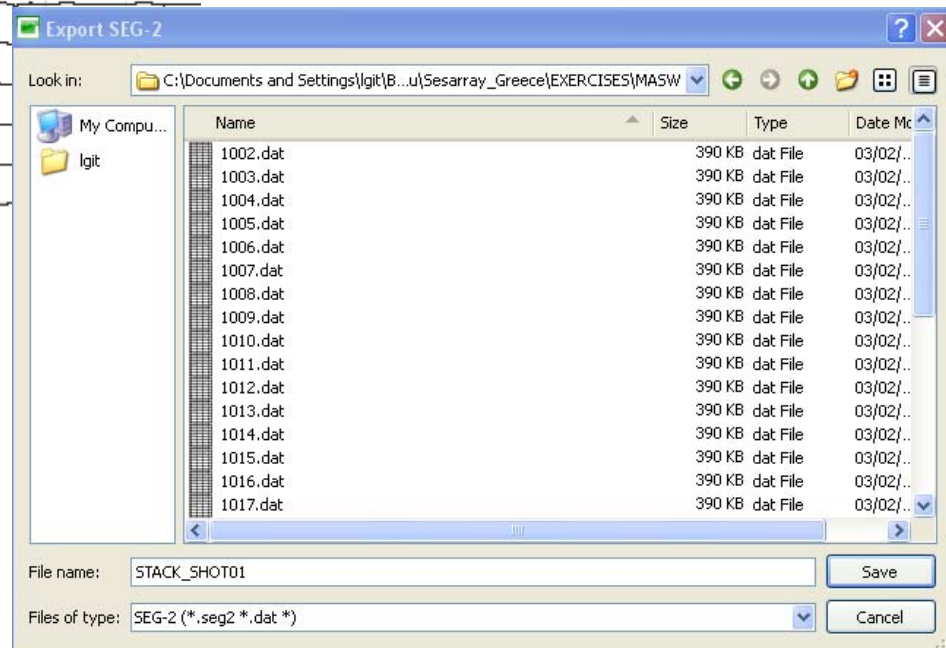
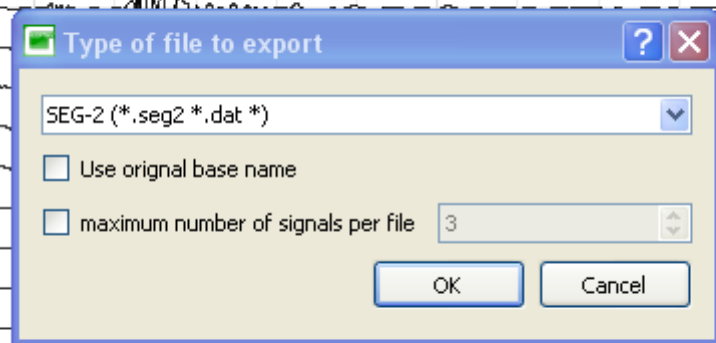
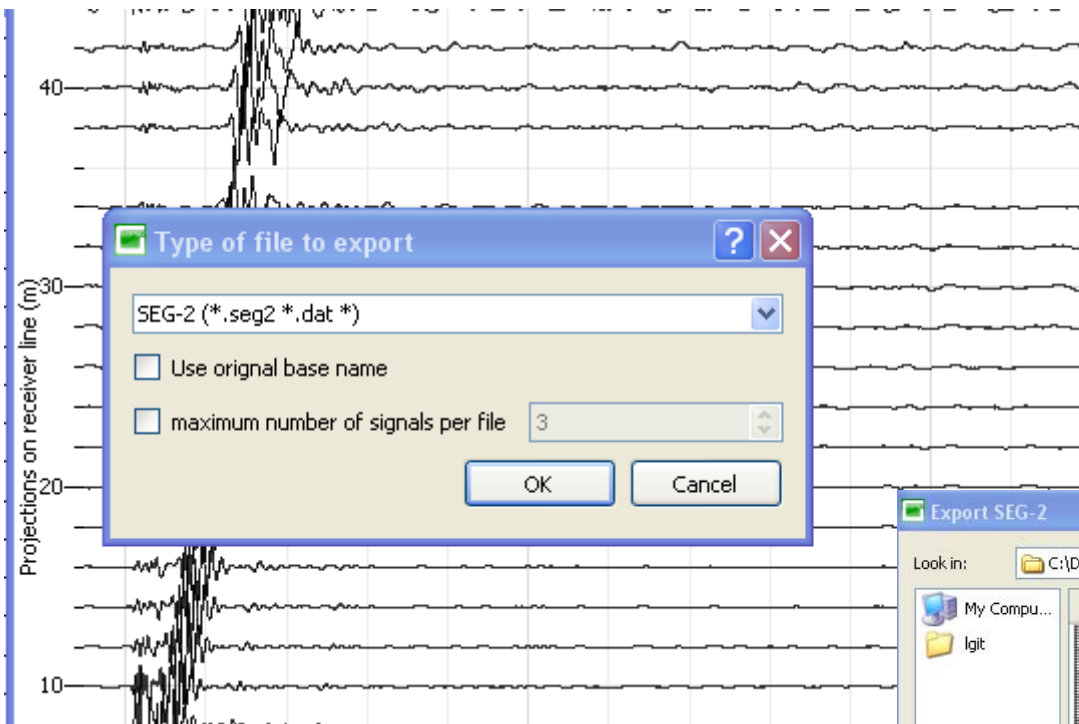


# Remove the channel exhibiting a wrong signal

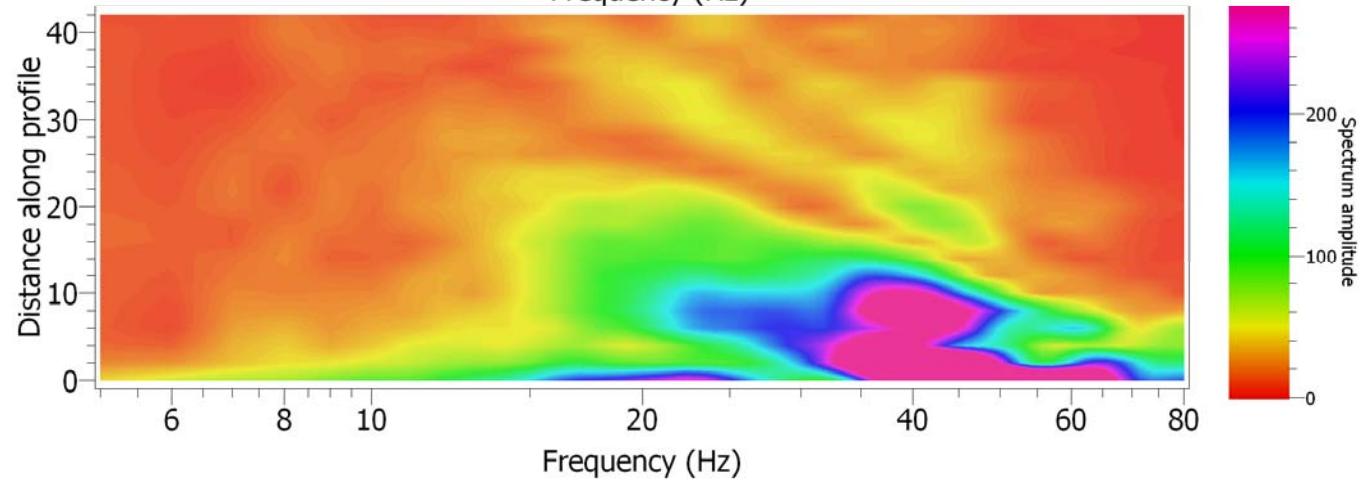
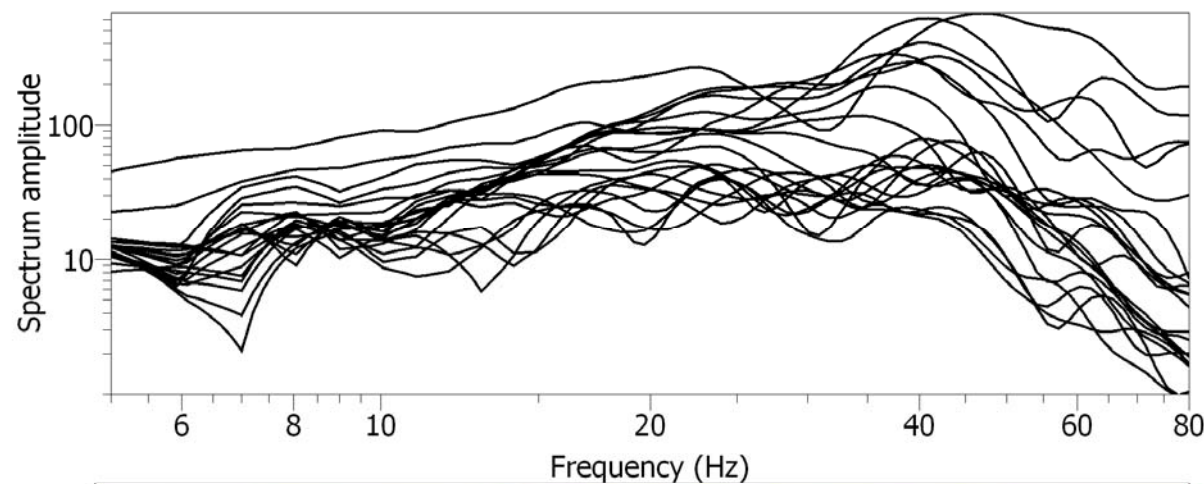
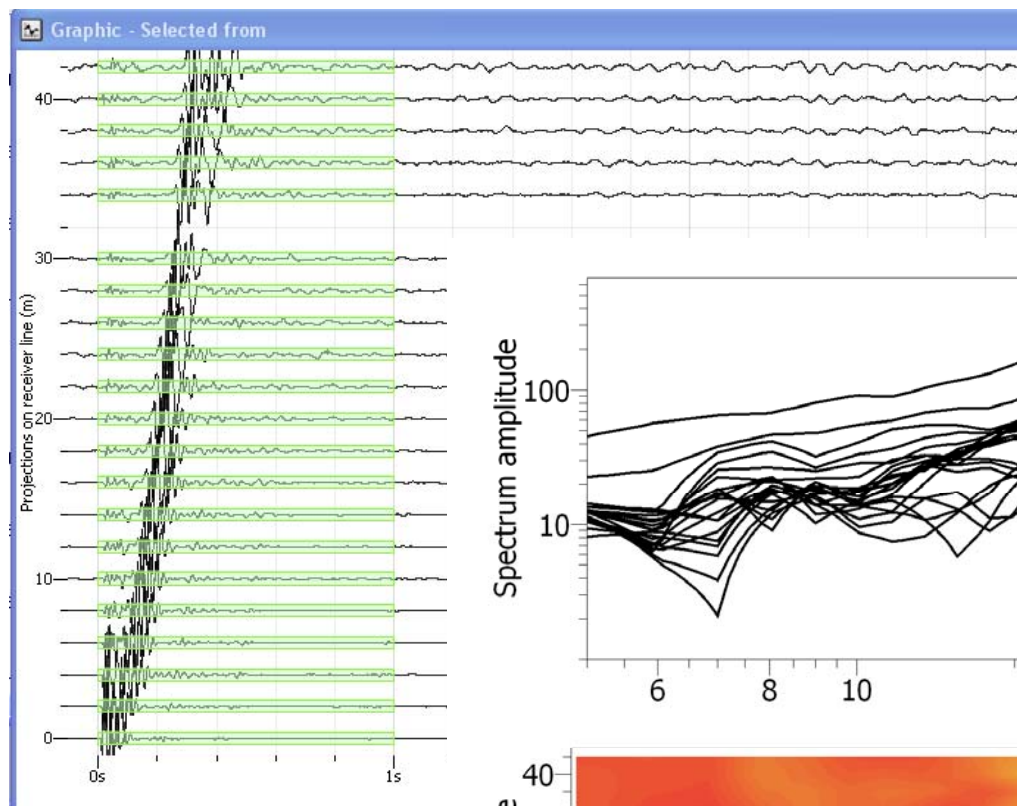




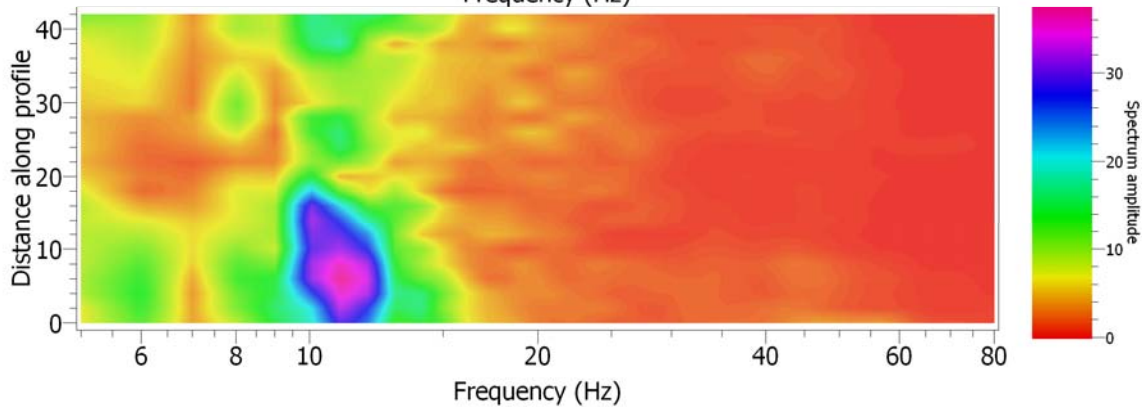
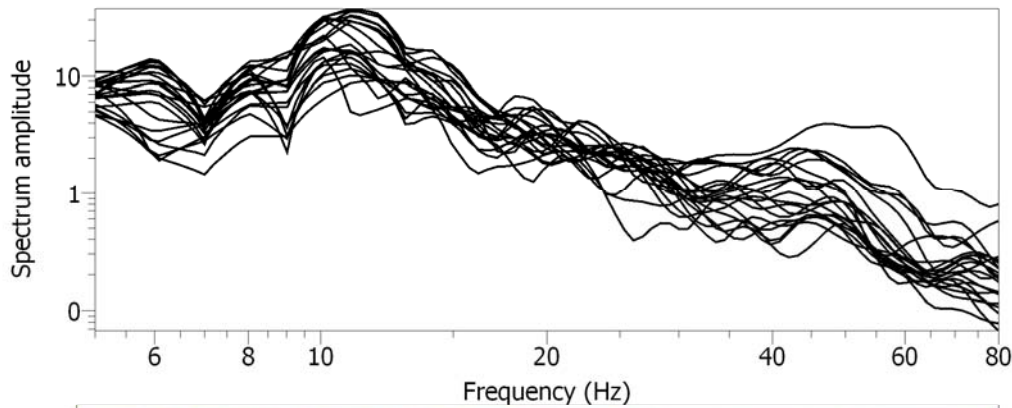
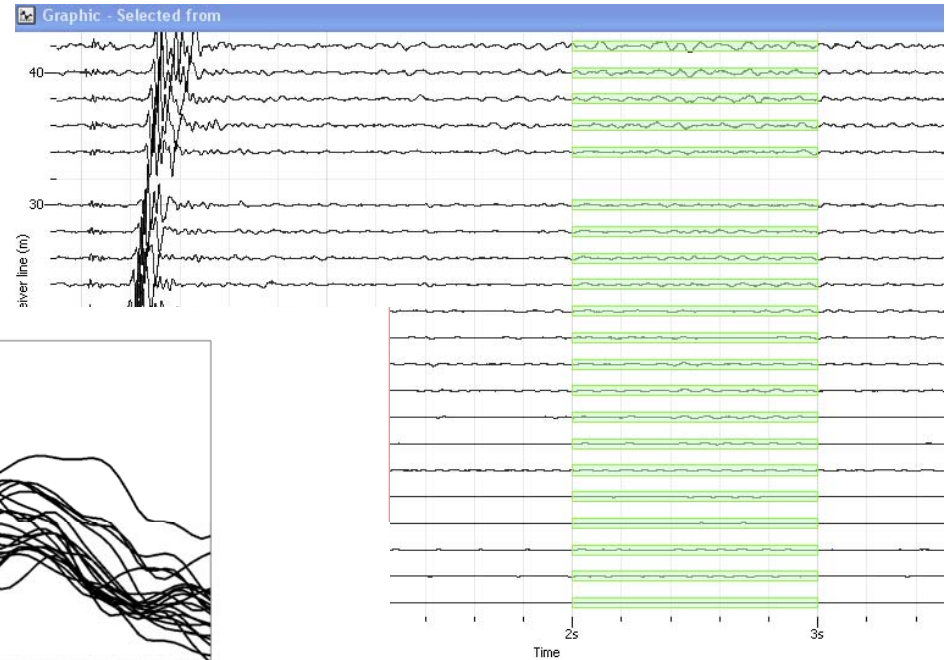
# Export the stacked trace



# Compute the Fourier spectra of the signals

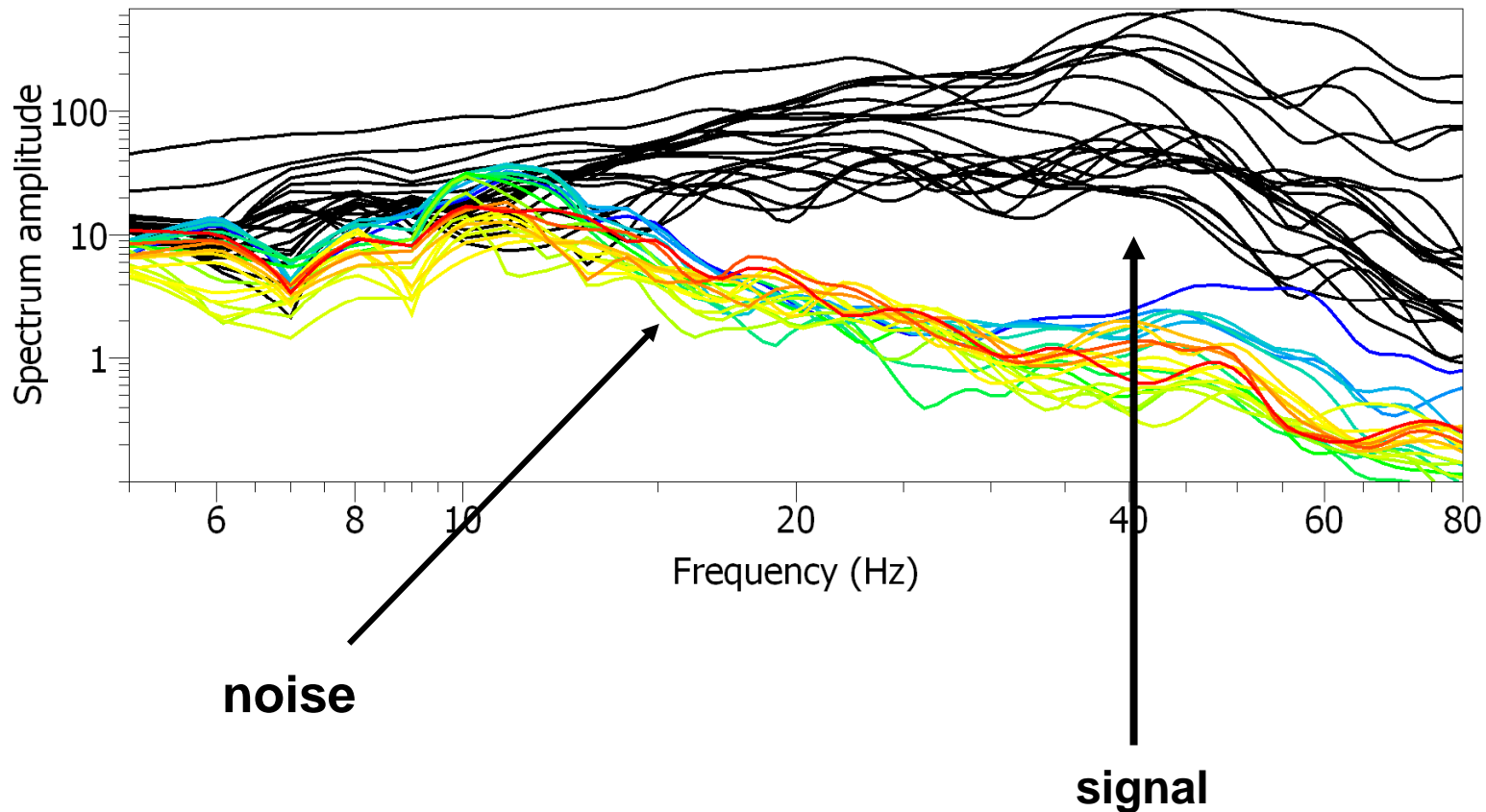


# Compute the Fourier spectra of the noise





# Comparison between the Fourier spectra of the signal and the noise



**=> Interpretation of MASW results above 10-15 Hz ???**

# Open linear fk toolbox

Linear FK toolbox

Pre-processing Processing Output Curves

Time limits

From T0 -0.1000s

To End 3.9000s

Frequency band width (ratio) 0.1

☐ High resolution

☐ Damping factor 0,00100

Load Save Start

Linear FK toolbox

Pre-processing Processing Output Curves

X axis sampling

From 0,50 Hz to 15,00 Hz

Step Log Number of samples 100

Y axis sampling

Slowness

From 0,50000 s/m to 15,00000 s/m

Step Log Number of samples 100

☒ Normalize by absolute power

Load Save Start

Linear FK toolbox

Pre-processing Processing Output Curves

Shot at (0, 0, 0), time=2007-02-03 00:00:02

Load Clear Legend Average

Curve data

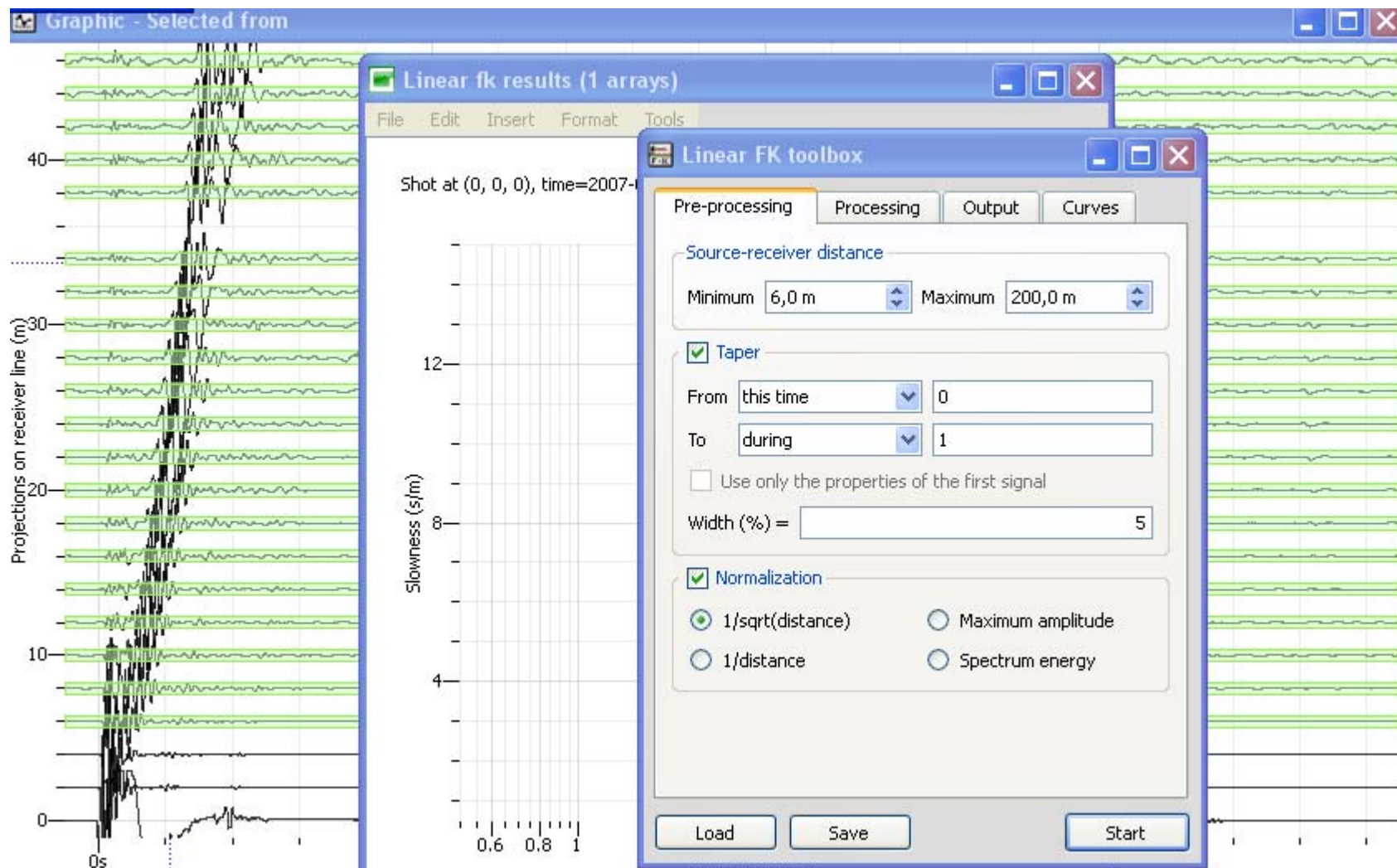
No curve defined

Valid	Frequency (Hz)	Period

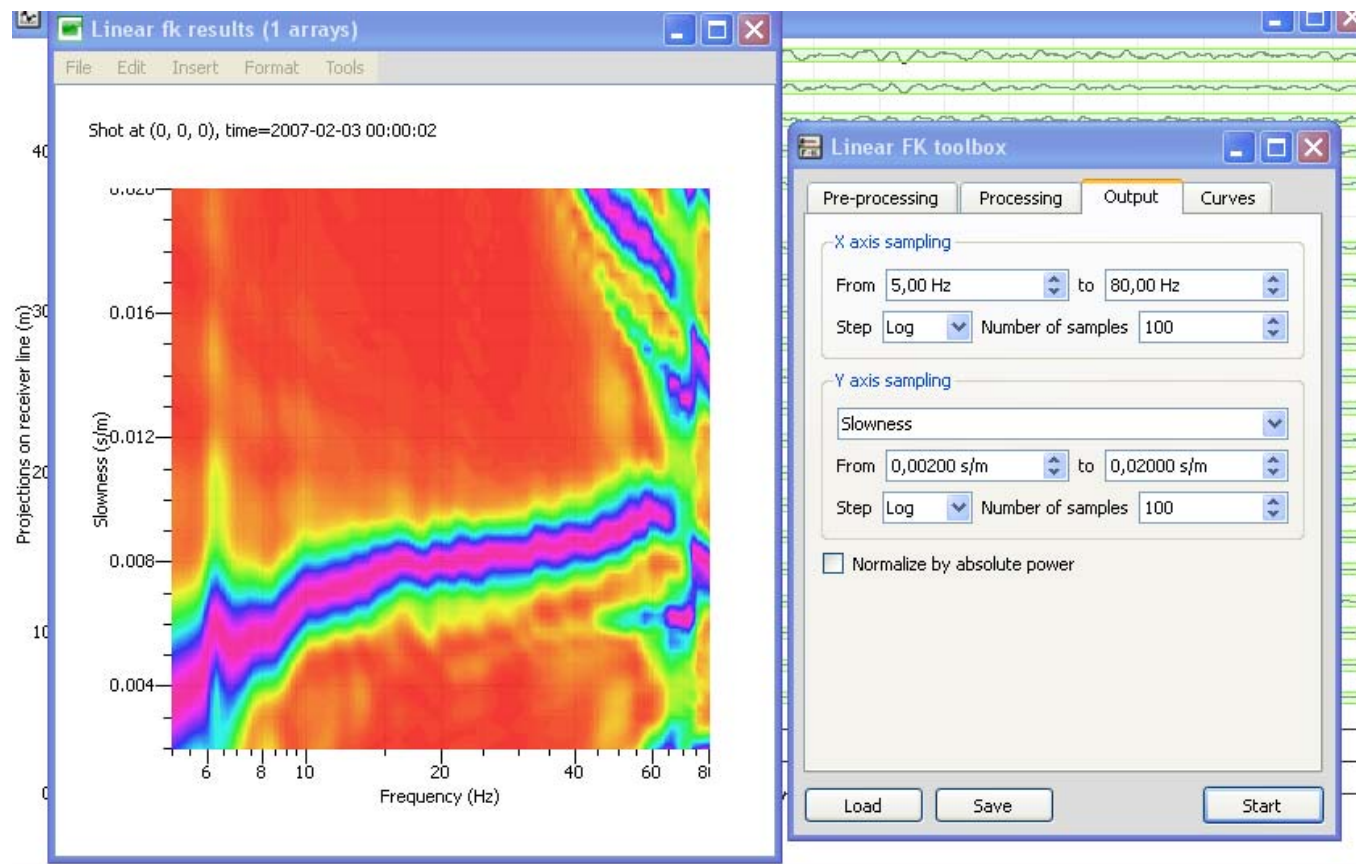
Name  ☐ Visible Actions

Wavelength limit 1,00 m

Load Save Start

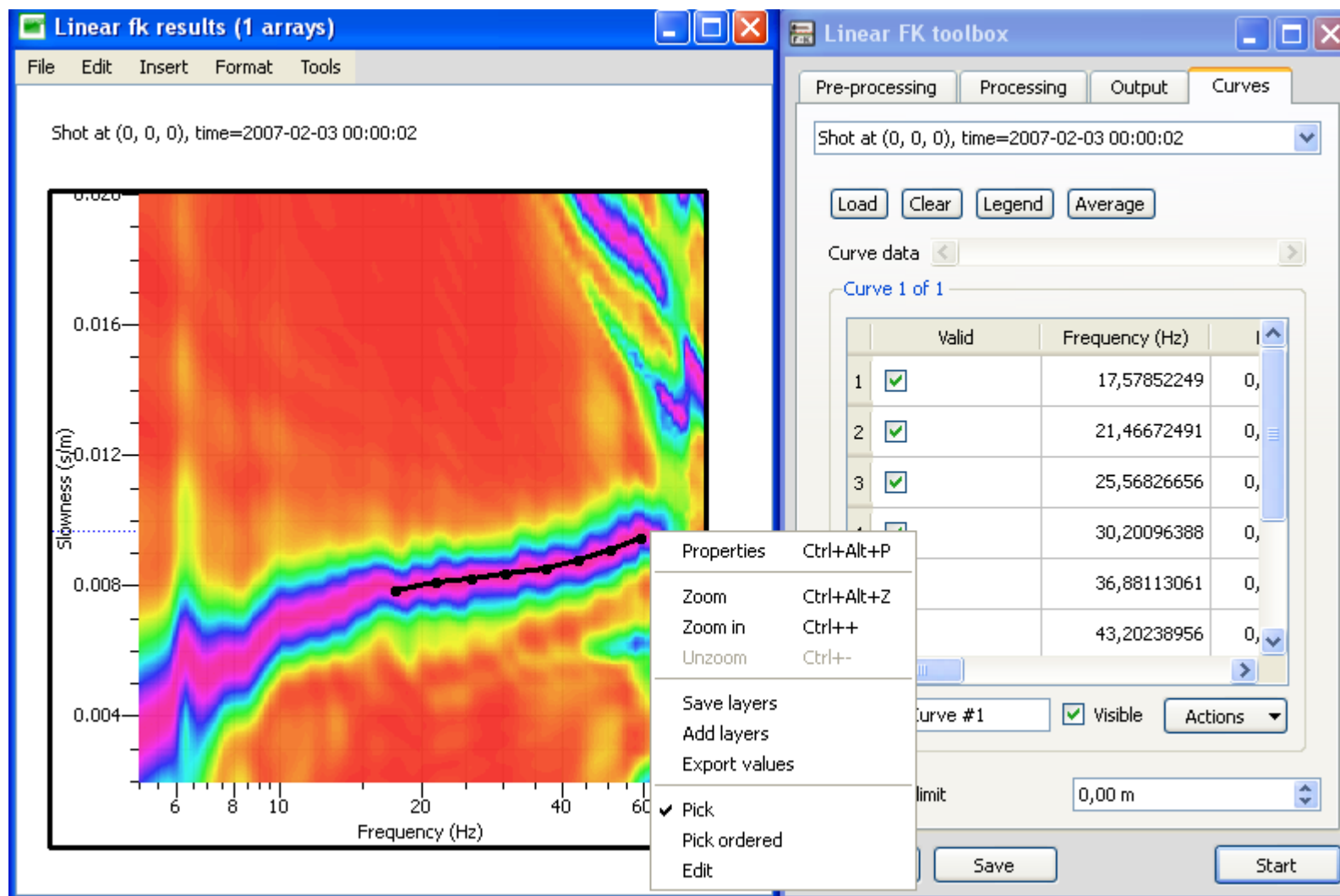


# Compute the FK results disregarding the first geophones

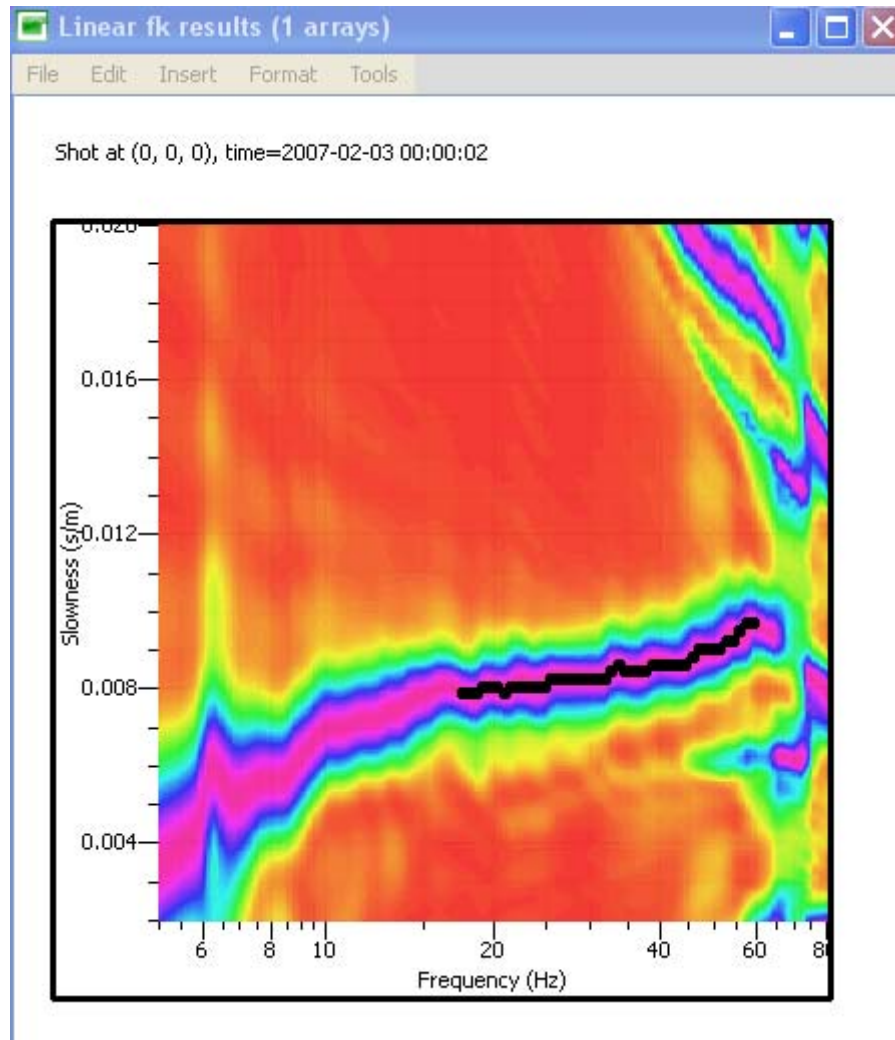


**Play with the « wavelength limit » to test O'Neill and Stockoe criteria**  
**Test the stability of results by removing one to several seismic traces at small offsets**

# Picking the dispersion curve

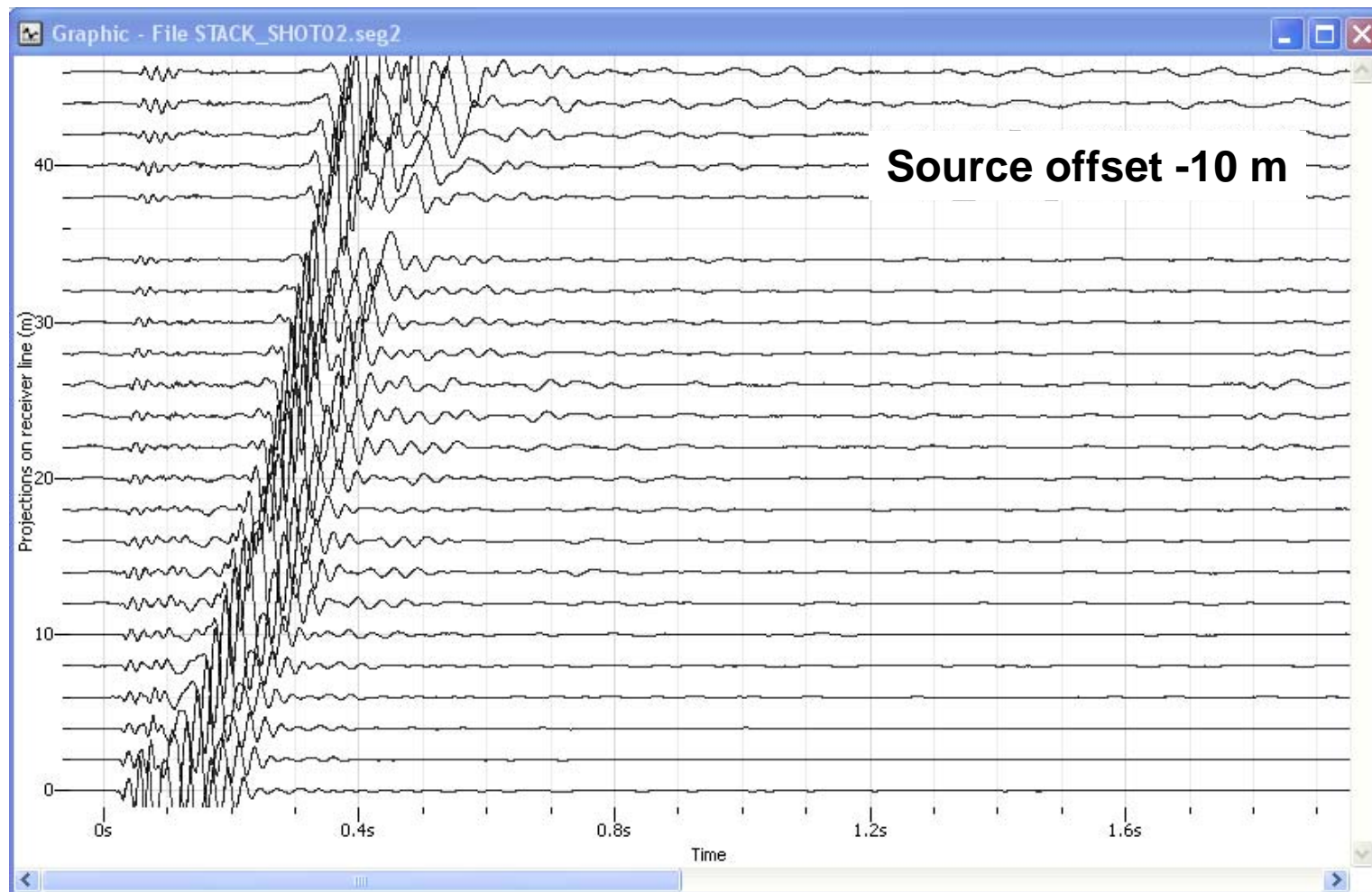


# Adjust the dispersion curve to the maximum energy of the beampower and save the curve





# Do the same exercise for source offset = -10 , 46 and 56 m



# Spectral energy content of the signal and noise time windows for the source offset -10 m

