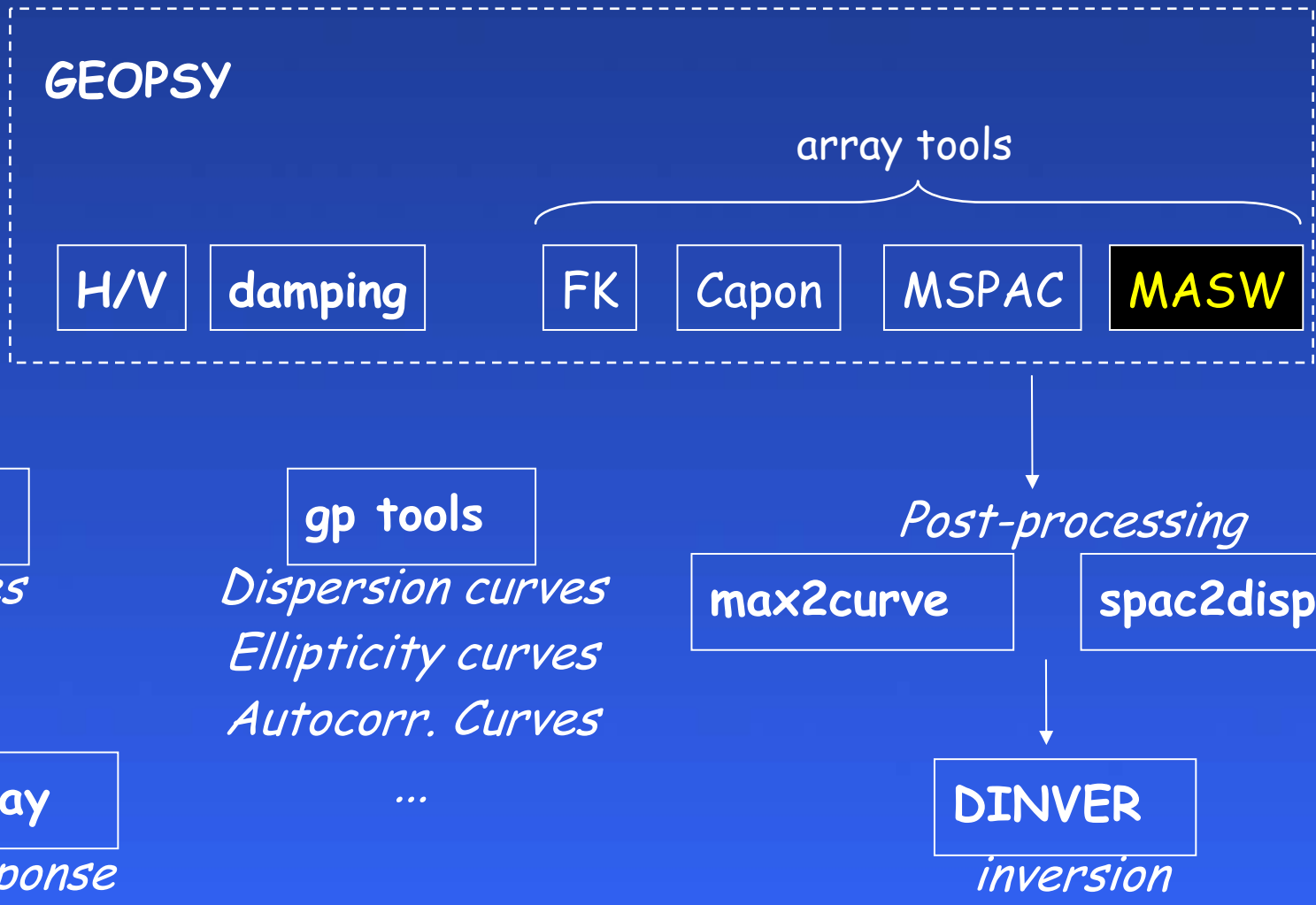
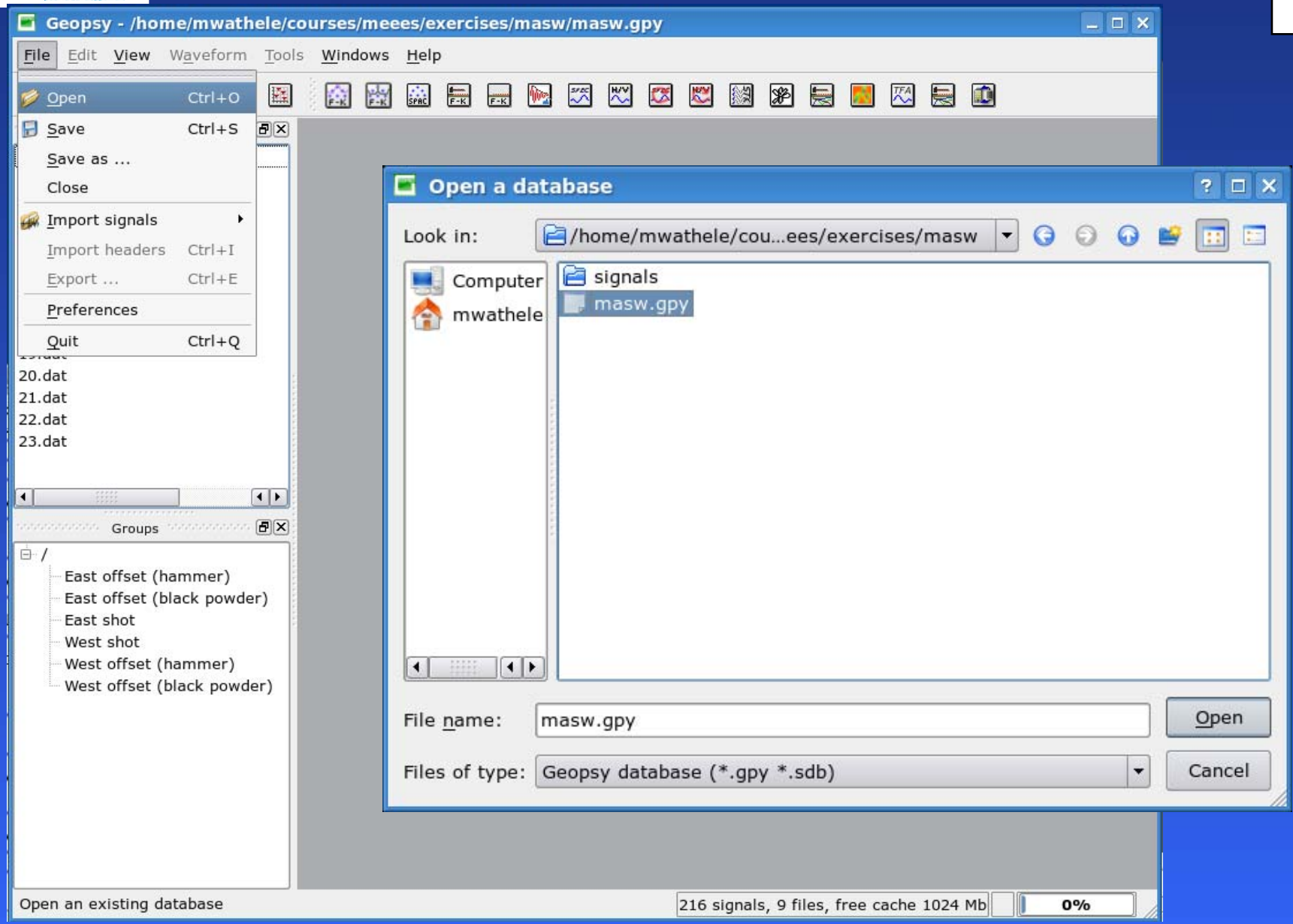
Processing MASW experiments with geopsy

December 6th-12th 2008, Thessaloniki, Greece

SESARRAY PACKAGE

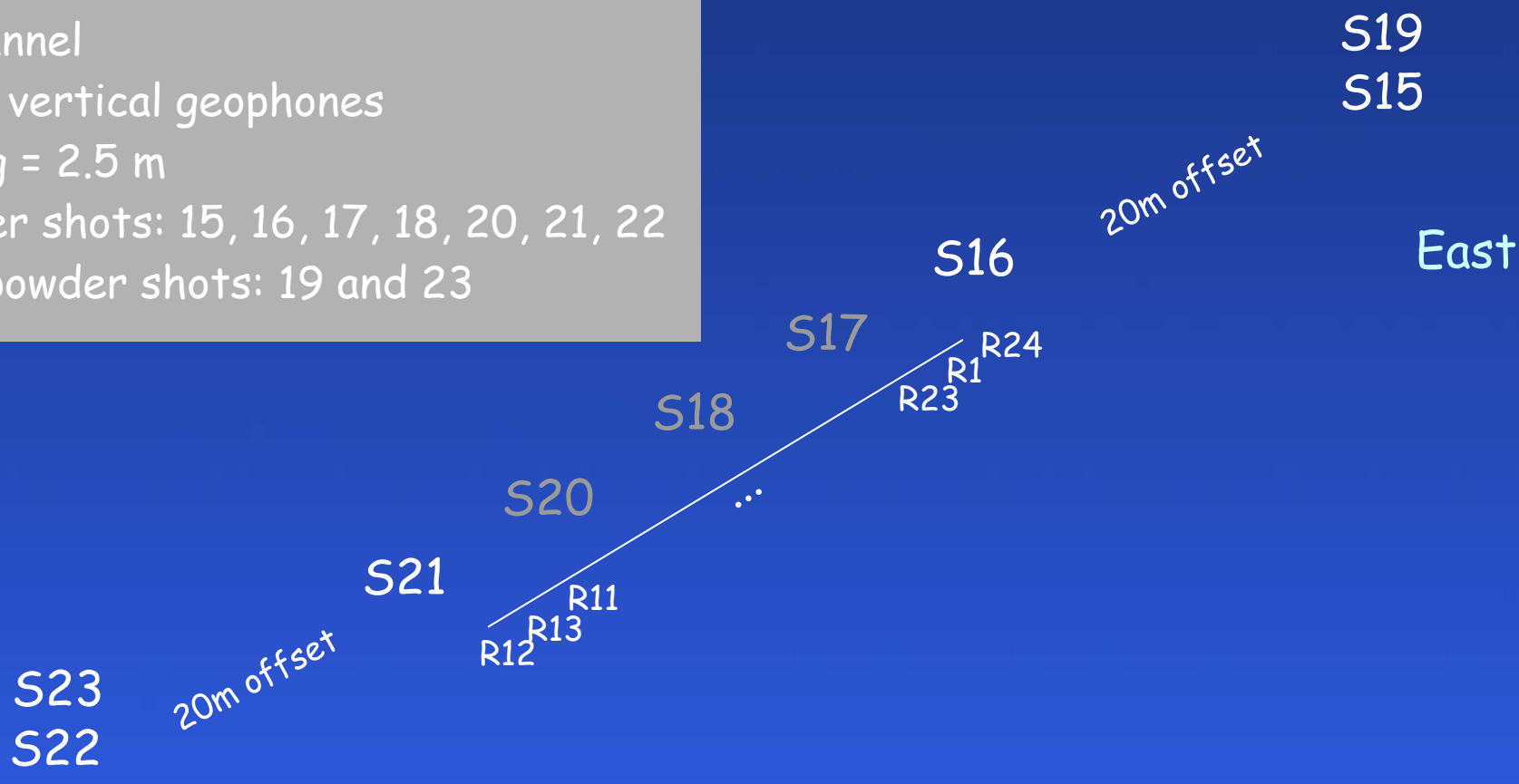


Load Geopsy database containing all signals



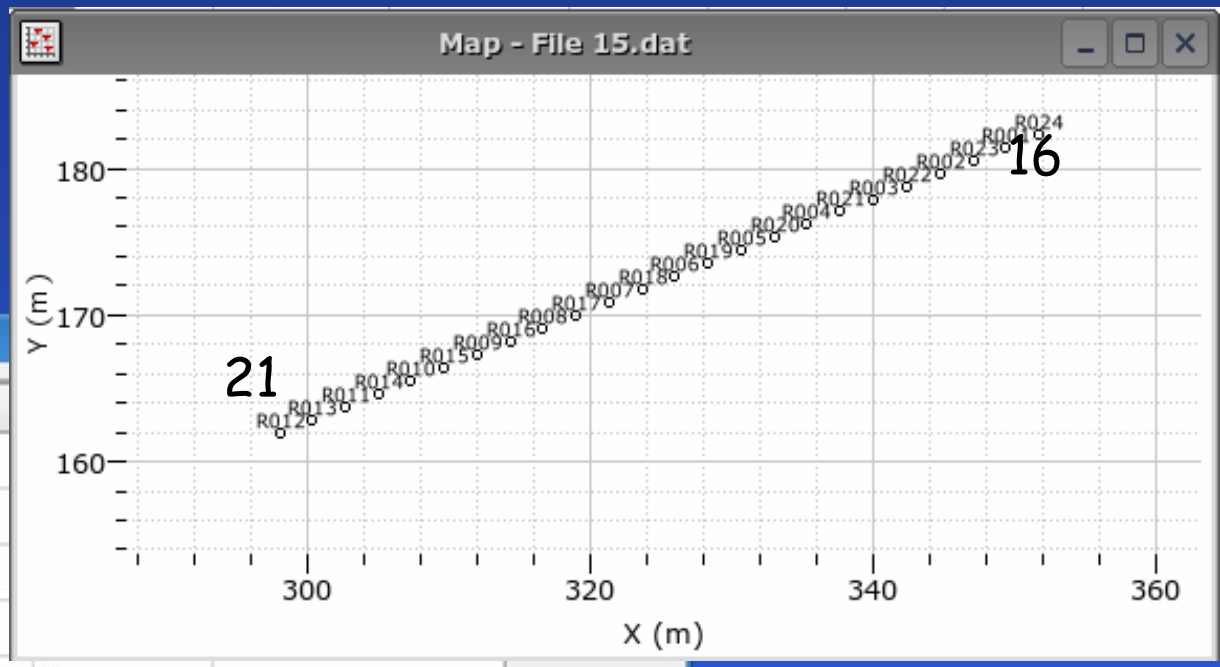
Scheme of the experiment

24-channel
4.5 Hz vertical geophones
spacing = 2.5 m
Hammer shots: 15, 16, 17, 18, 20, 21, 22
Black powder shots: 19 and 23



- Usually MASW combined with refraction
- Shots 17, 18 and 20 are not used here

View coordinates in a map



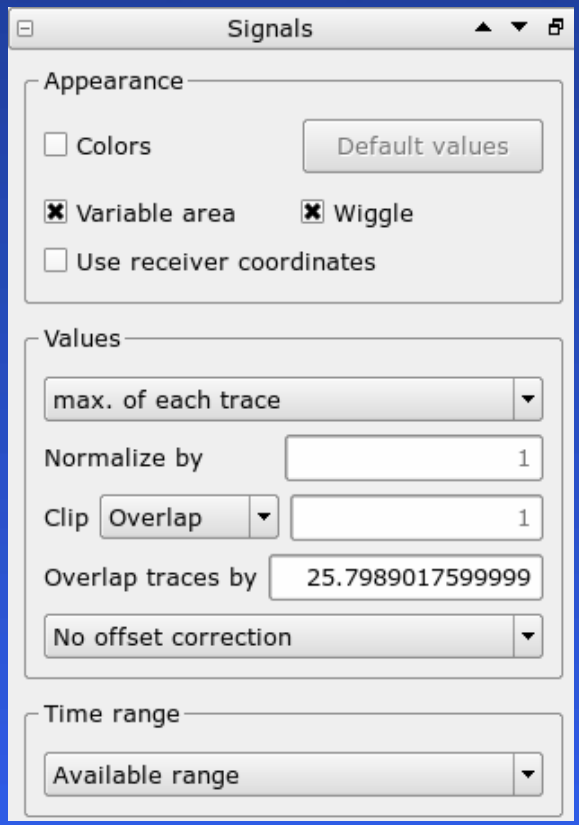
Source coordinates

	Name	X	Y	
1	Shot_15	370.502	189.214	
2	Shot_16	351.752	182.255	
3	Shot_17	340.033	177.906	
4	Shot_18	325.97	172.687	
5	Shot_19	370.502	189.214	0
6	Shot_20	311.972	167.295	0
7	Shot_21	297.98	161.891	0
8	Shot_22	279.322	154.686	0
9	Shot_23	279.322	154.686	0

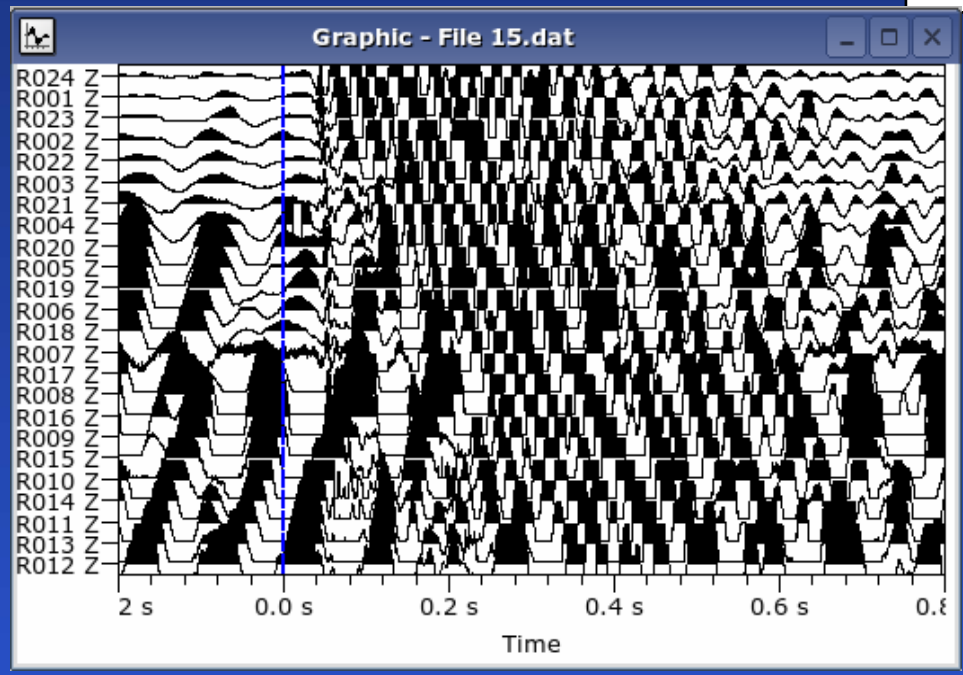
Rel. pos.
Add station
Load
Save
Source name pattern Shot_{Return=left(ShortFileName,length(ShortFileName)-4);}
Apply

Viewing shot signals: parameters and sort

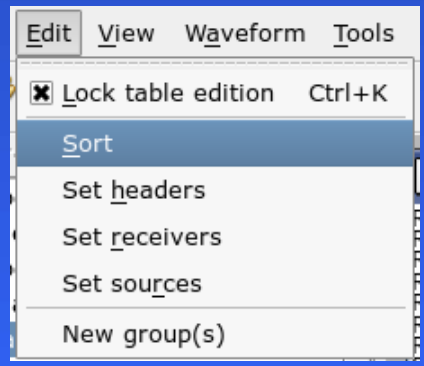
Common parameters to view signals from MASW:



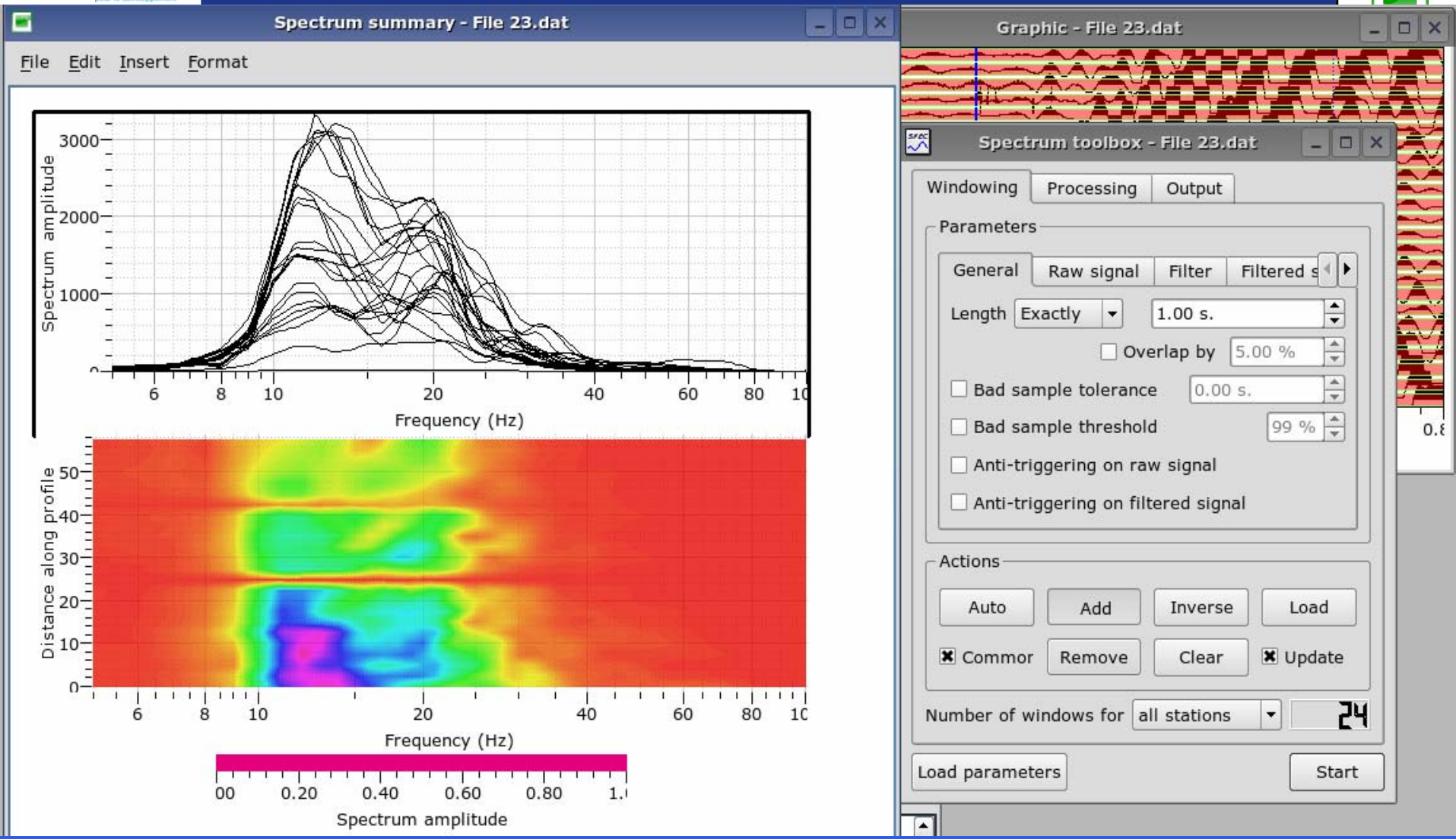
Properties, tab "Layers"



Sort signals by increasing distance to source



Spectrum of recorded signals

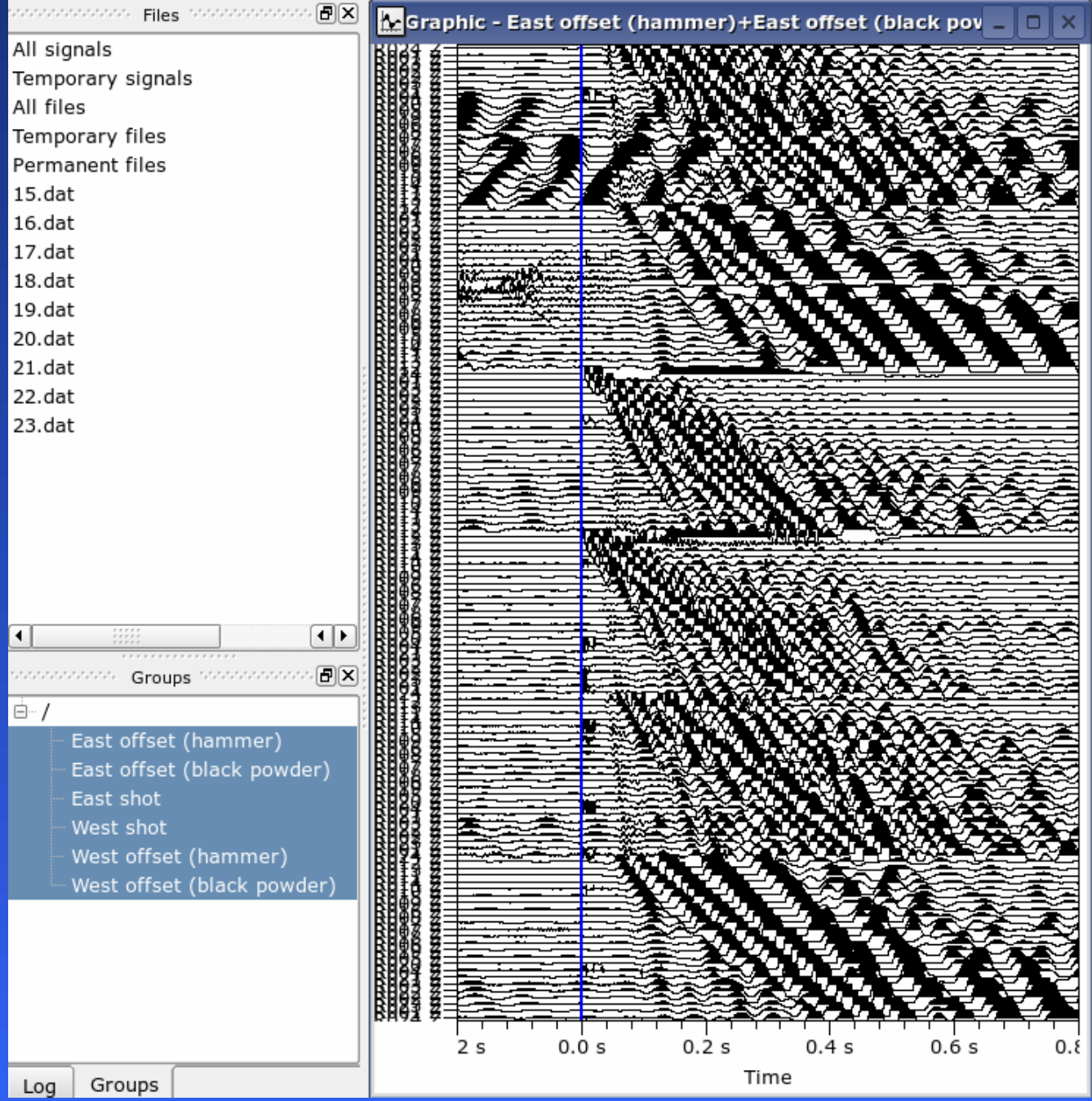


Set output range from 5 Hz to 100 Hz

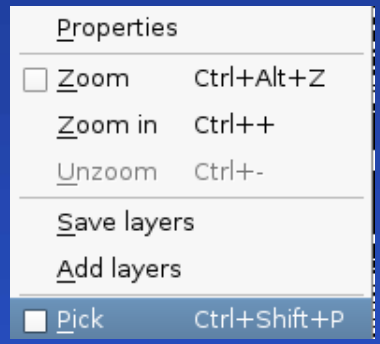
Create a graphic with all shots

Enable zoom along Y axis (Properties, tab "Y Axis")

Ctrl + central mouse button to zoom/unzoom

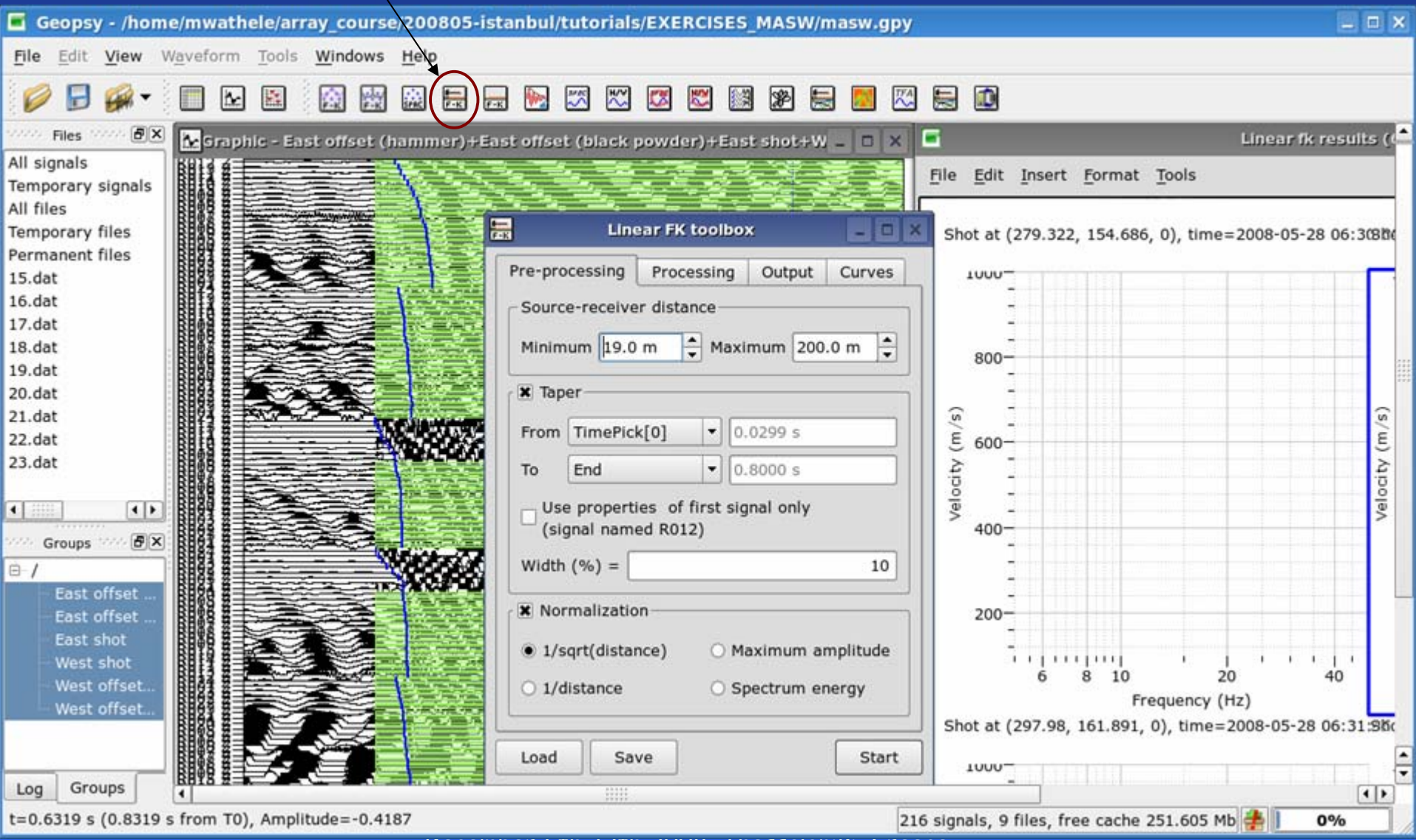


Rough pick of first arrival if not already done after refraction
Left mouse button on graph contents:

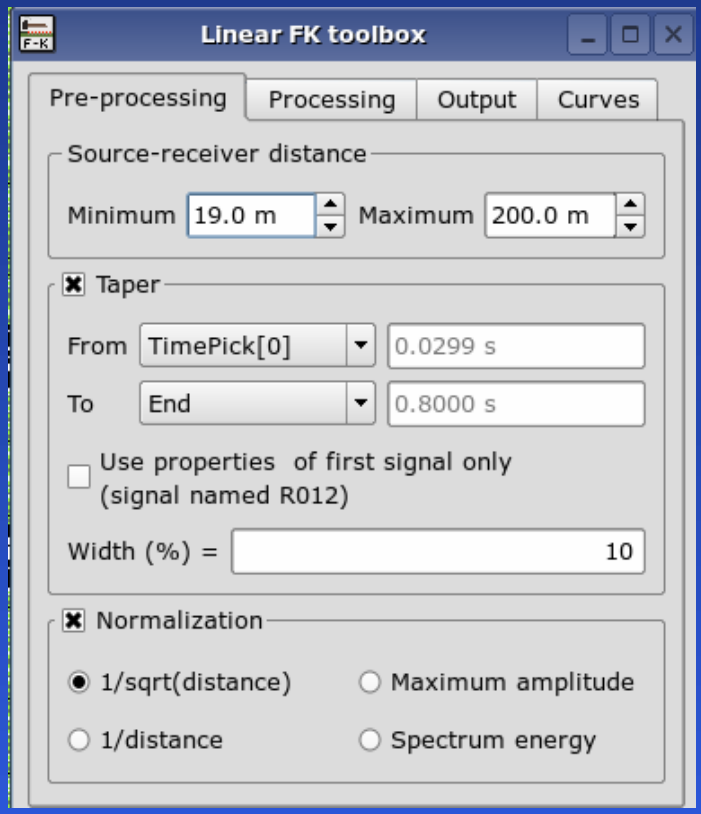


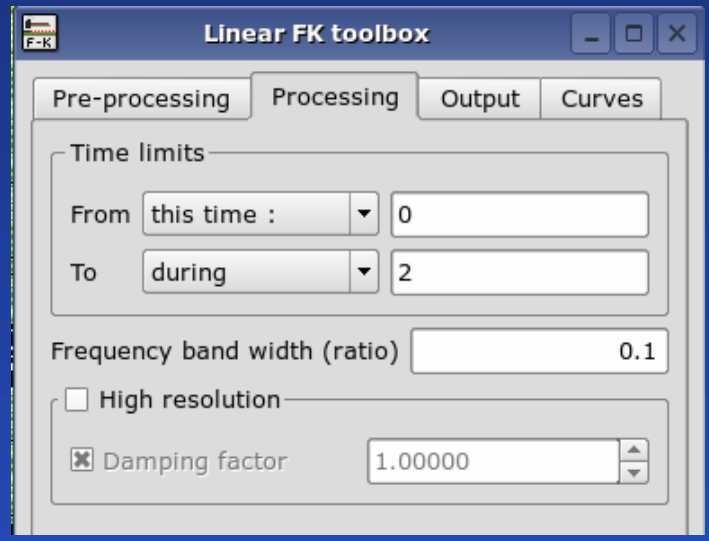
Up, down arrows to change current signal
Ctrl + left mouse button : change current signal and pick
Left, right arrows: change TimePick to pick (from 0 to ...)

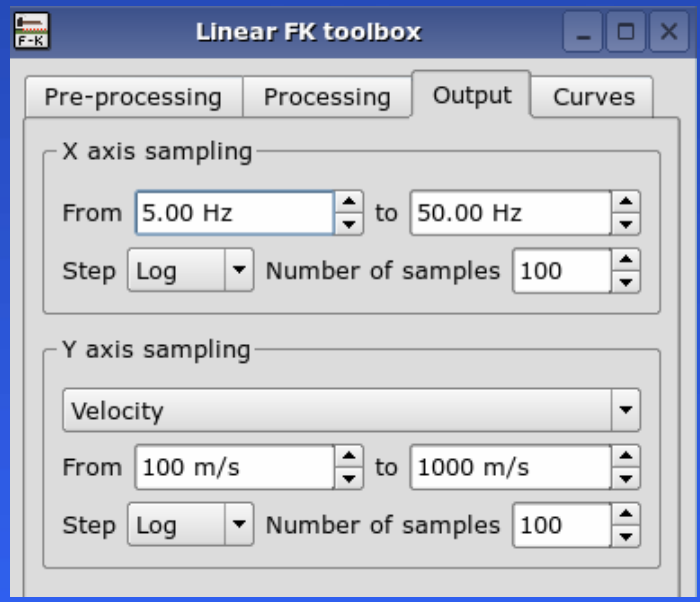
Linear FK tool for active sources



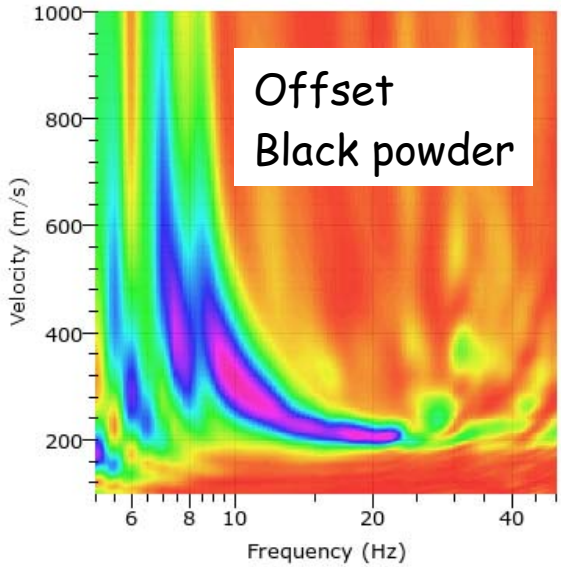
Parameters


Linear FK toolbox
Pre-processing
Processing
Output
Curves
Source-receiver distance
Minimum 19.0 m
Maximum 200.0 m
Taper
From TimePick[0] 0.0299 s
To End 0.8000 s
Use properties of first signal only (signal named R012)
Width (%) = 10
Normalization
1/sqrt(distance)
Maximum amplitude
1/distance
Spectrum energy

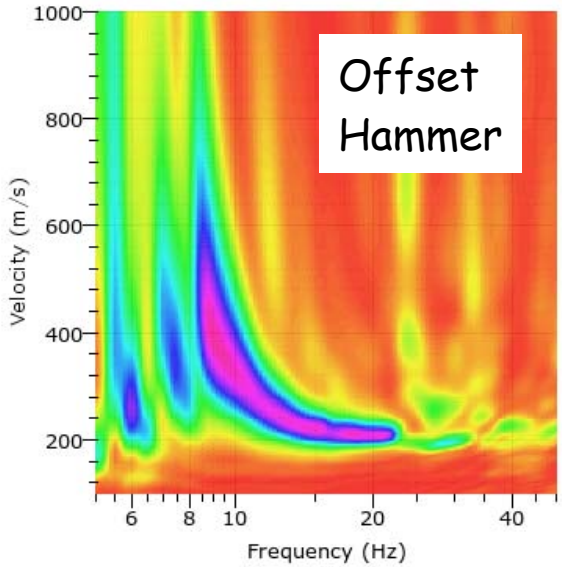

Linear FK toolbox
Pre-processing
Processing
Output
Curves
Time limits
From this time : 0
To during 2
Frequency band width (ratio) 0.1
High resolution
Damping factor 1.00000


Linear FK toolbox
Pre-processing
Processing
Output
Curves
X axis sampling
From 5.00 Hz to 50.00 Hz
Step Log Number of samples 100
Y axis sampling
Velocity
From 100 m/s to 1000 m/s
Step Log Number of samples 100

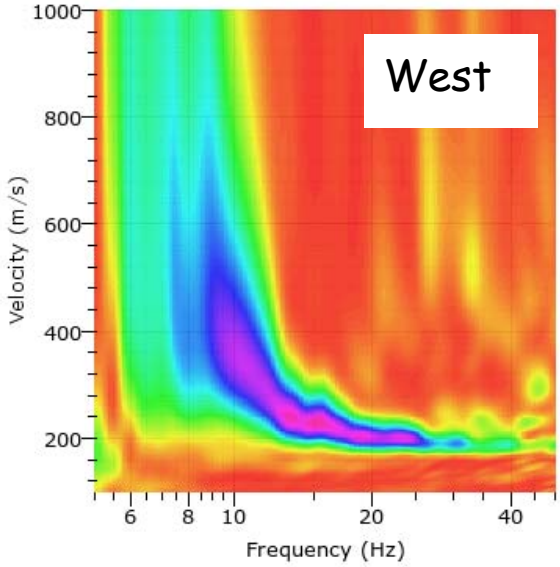
Shot at (279.322, 154.686, 0), time=2008-05-28 06:30:00



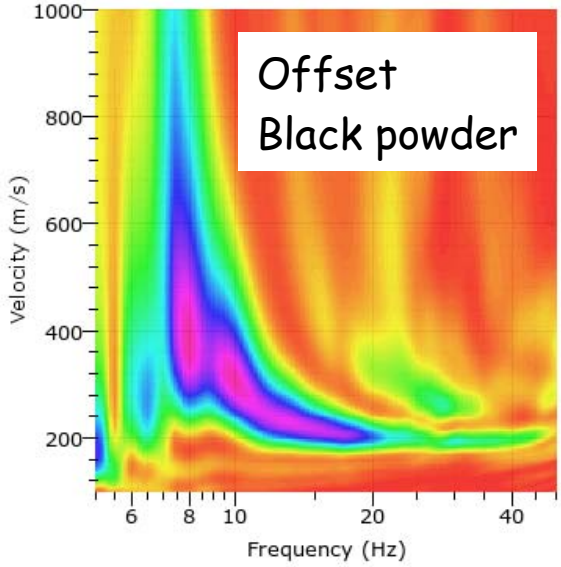
Shot at (279.322, 154.686, 0), time=2008-05-28 06:31:46



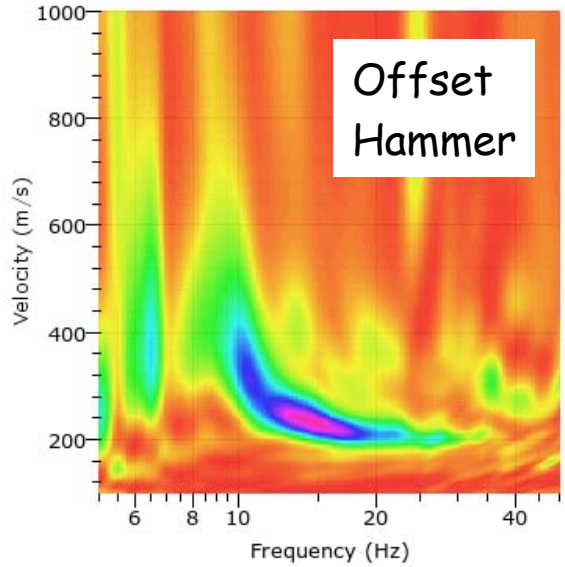
Shot at (297.98, 161.891, 0), time=2008-05-28 06:31:46



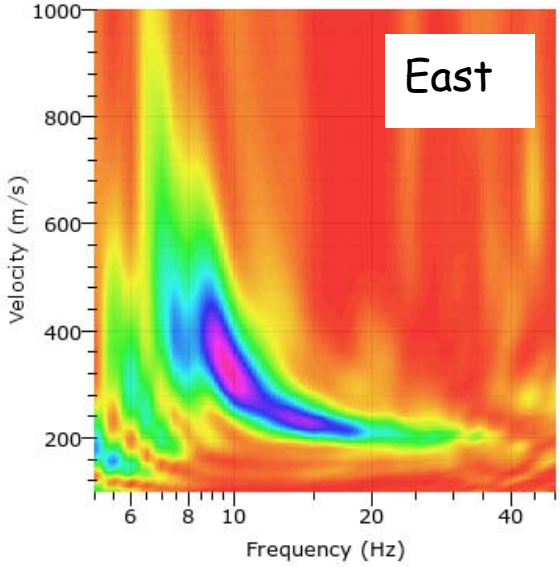
Shot at (351.752, 182.255, 0), time=2008-05-28 06:31:46



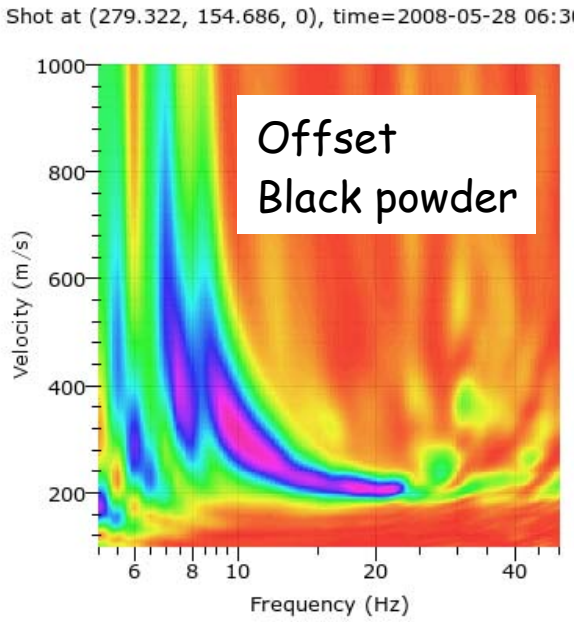
Shot at (370.502, 189.214, 0), time=2008-05-28 06:30:00

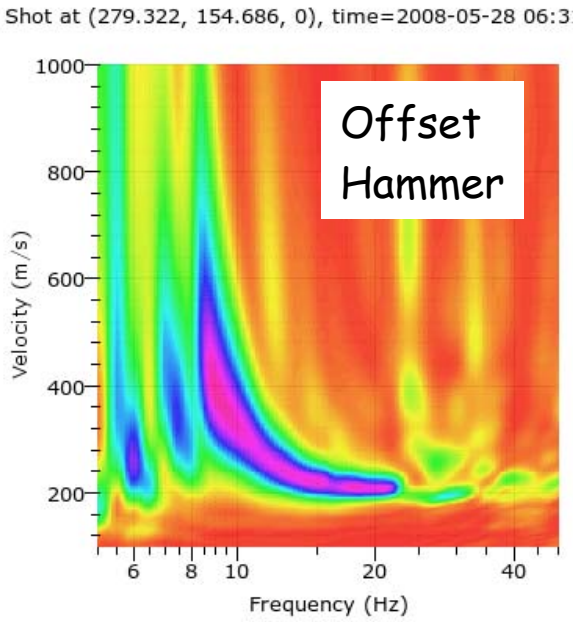


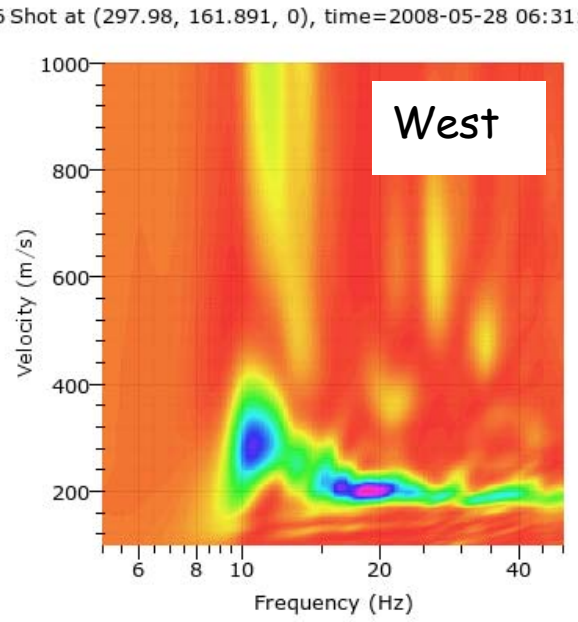
Shot at (370.502, 189.214, 0), time=2008-05-28 06:31:46

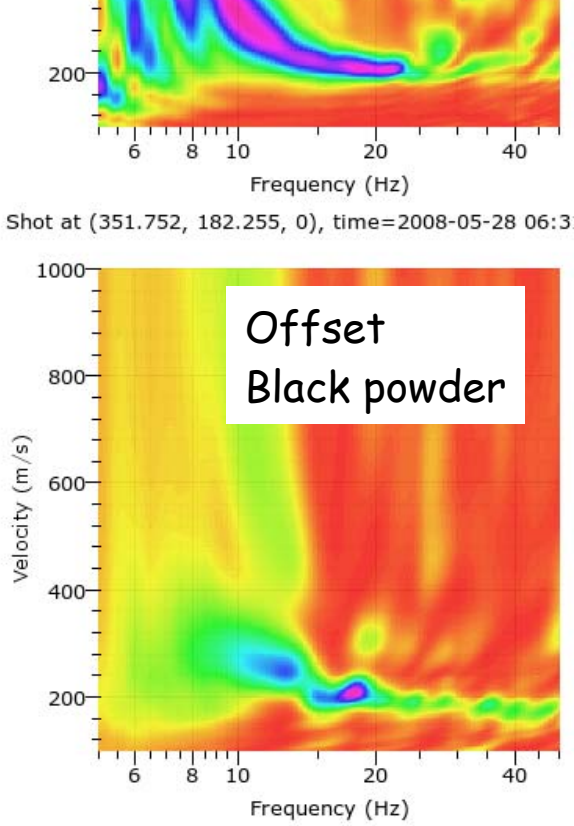


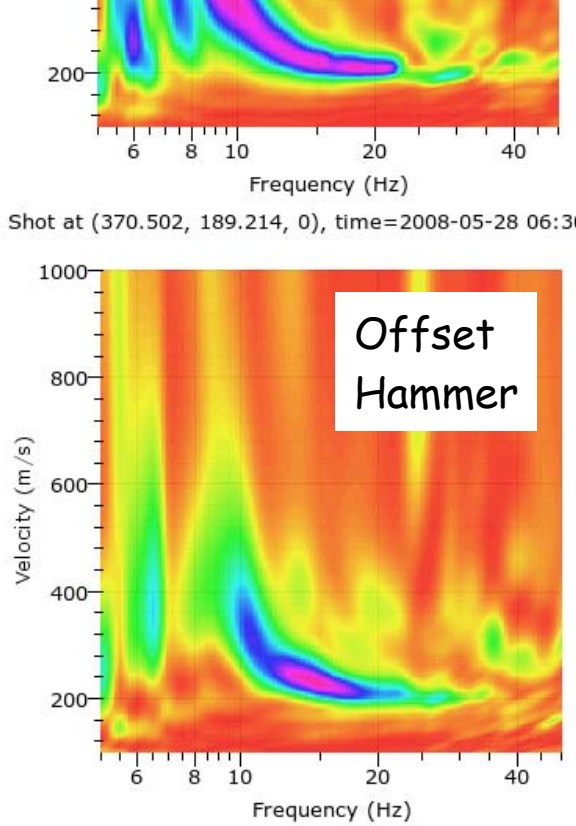
Change the minimal soure-to-distance

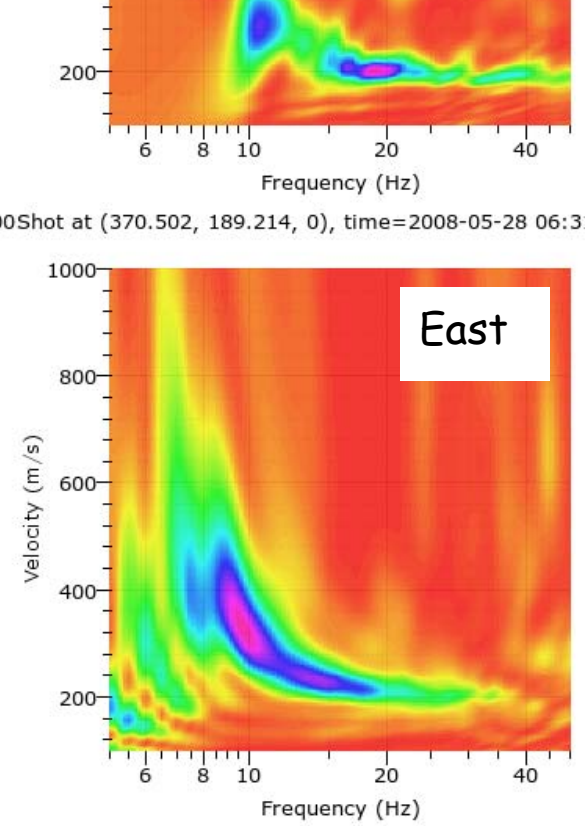


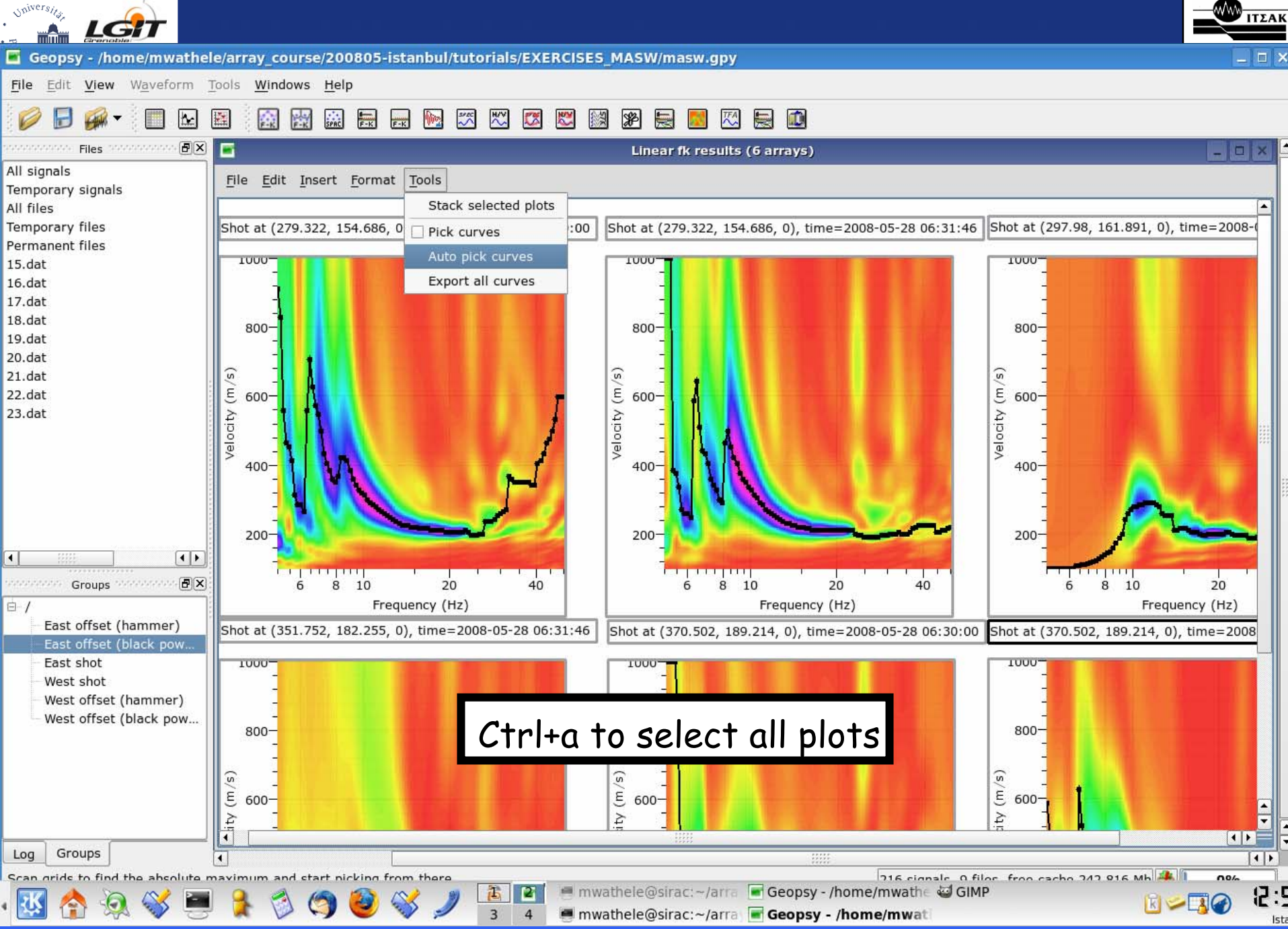




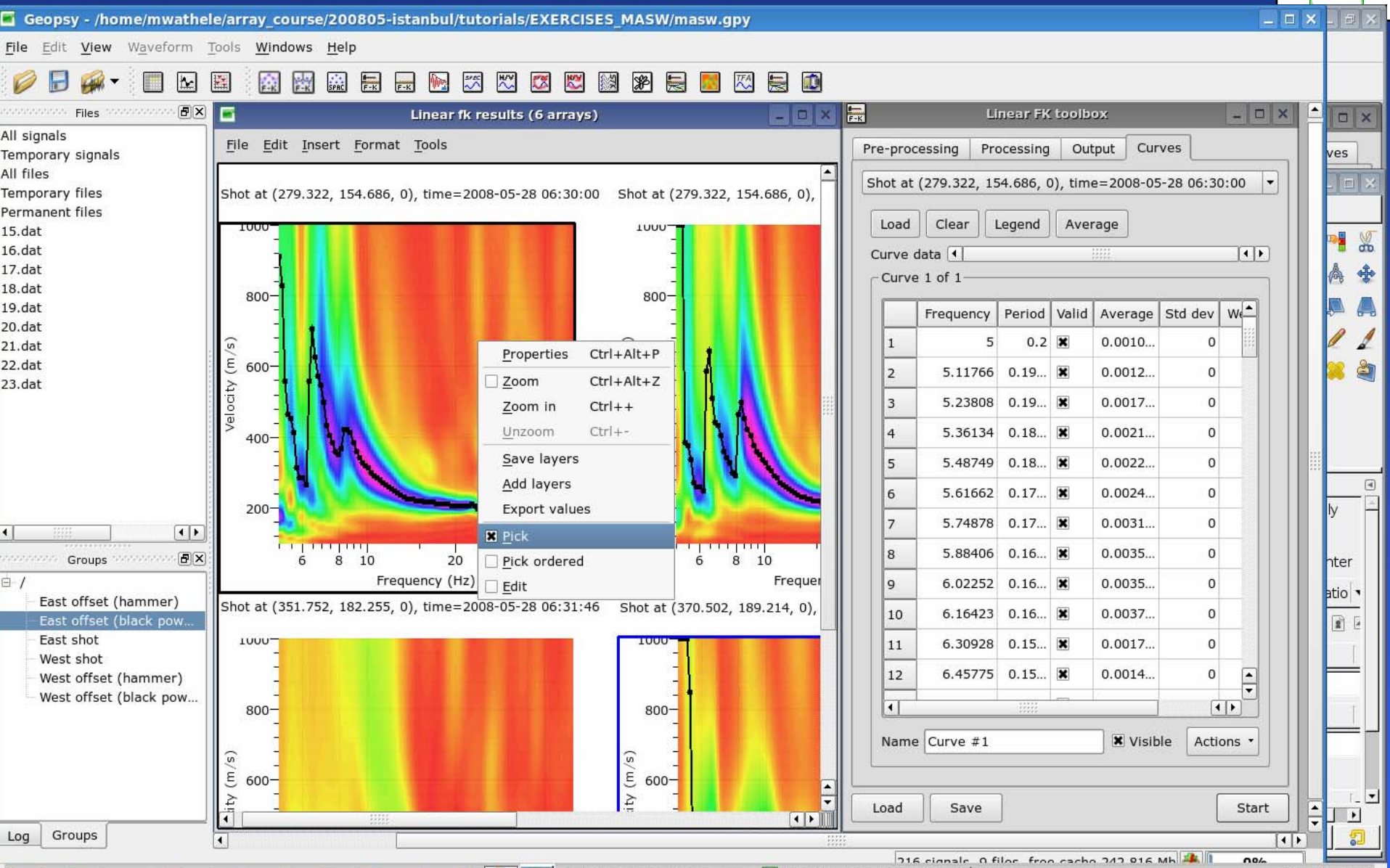




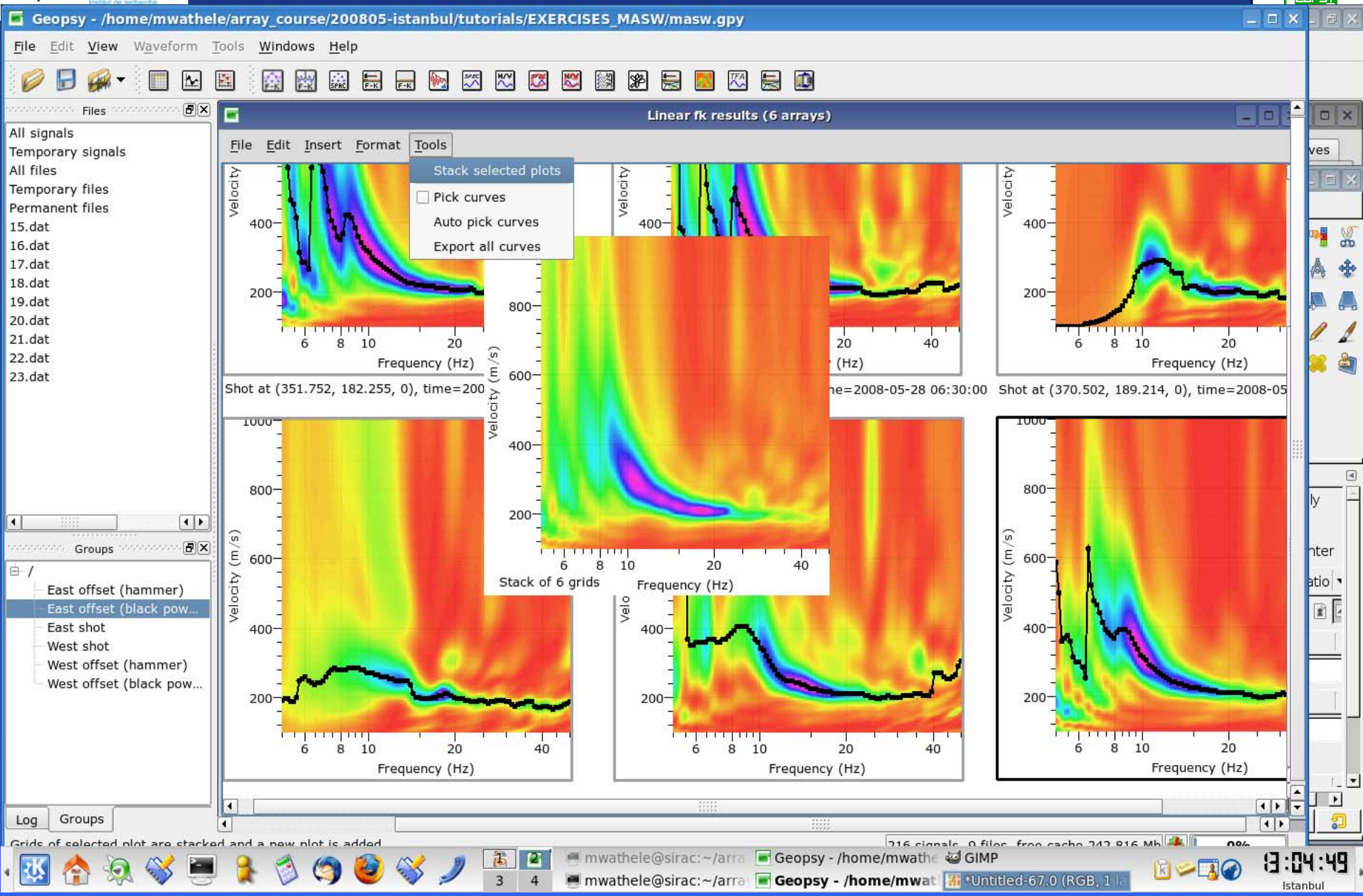



Geopsy - /home/mwathele/array_course/200805-istanbul/tutorials/EXERCISES_MASW/masw.gpy
File Edit View Waveform Tools Windows Help
Files
All signals
Temporary signals
All files
Temporary files
Permanent files
15.dat
16.dat
17.dat
18.dat
19.dat
20.dat
21.dat
22.dat
23.dat
Groups
East offset (hammer)
East offset (black pow...
East shot
West shot
West offset (hammer)
West offset (black pow...
Log
Groups
Linear fk results (6 arrays)
File Edit Insert Format Tools
Stack selected plots
Pick curves
Auto pick curves
Export all curves
Shot at (279.322, 154.686, 0), time=2008-05-28 06:31:46
Shot at (297.98, 161.891, 0), time=2008-
Shot at (351.752, 182.255, 0), time=2008-05-28 06:31:46
Shot at (370.502, 189.214, 0), time=2008-05-28 06:30:00
Shot at (370.502, 189.214, 0), time=2008
Velocity (m/s)
Frequency (Hz)
Ctrl+a to select all plots

Save, cut, resample, smooth, average, manual pick curves, ...



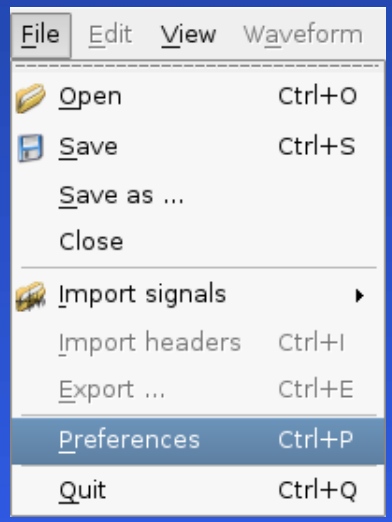
Stack Frequency-Velocity grids

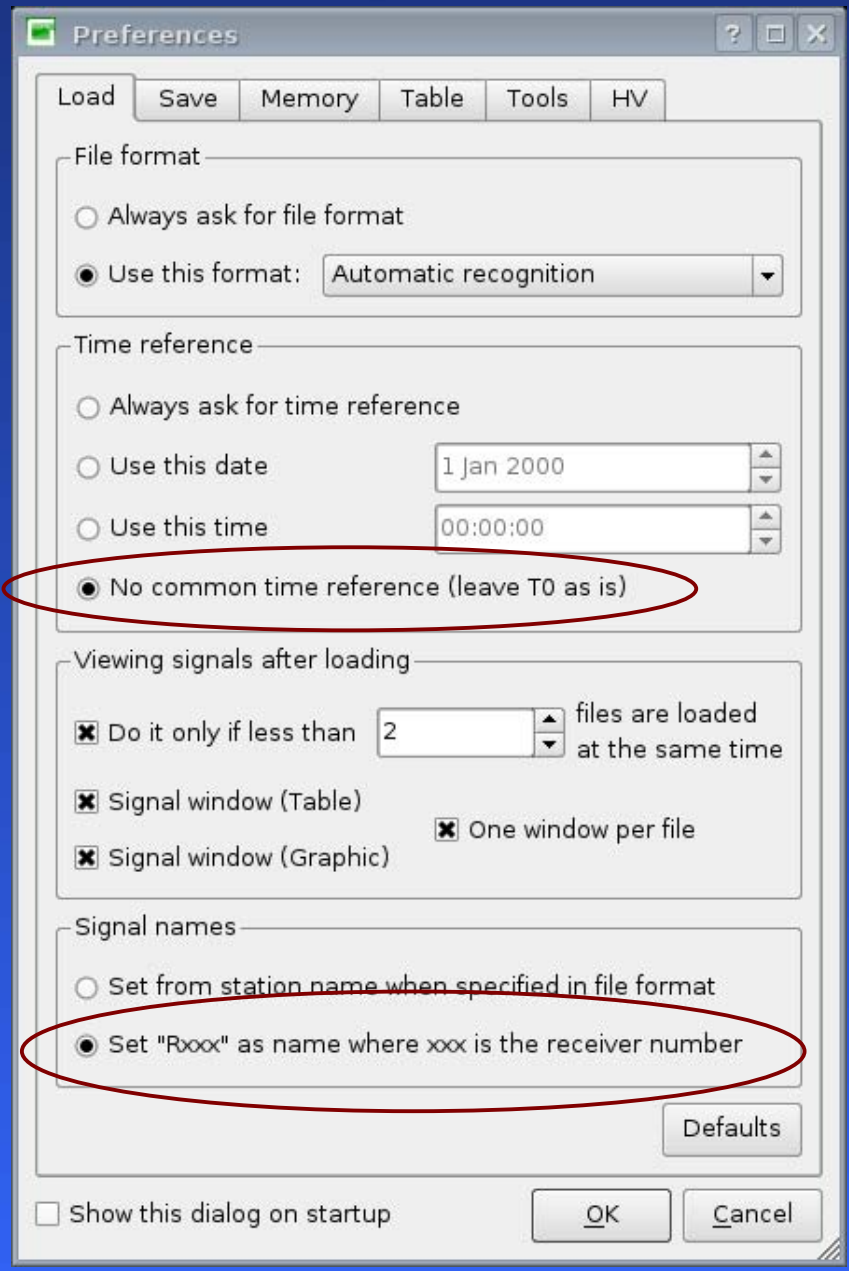


Creating a database for a MASW experiment

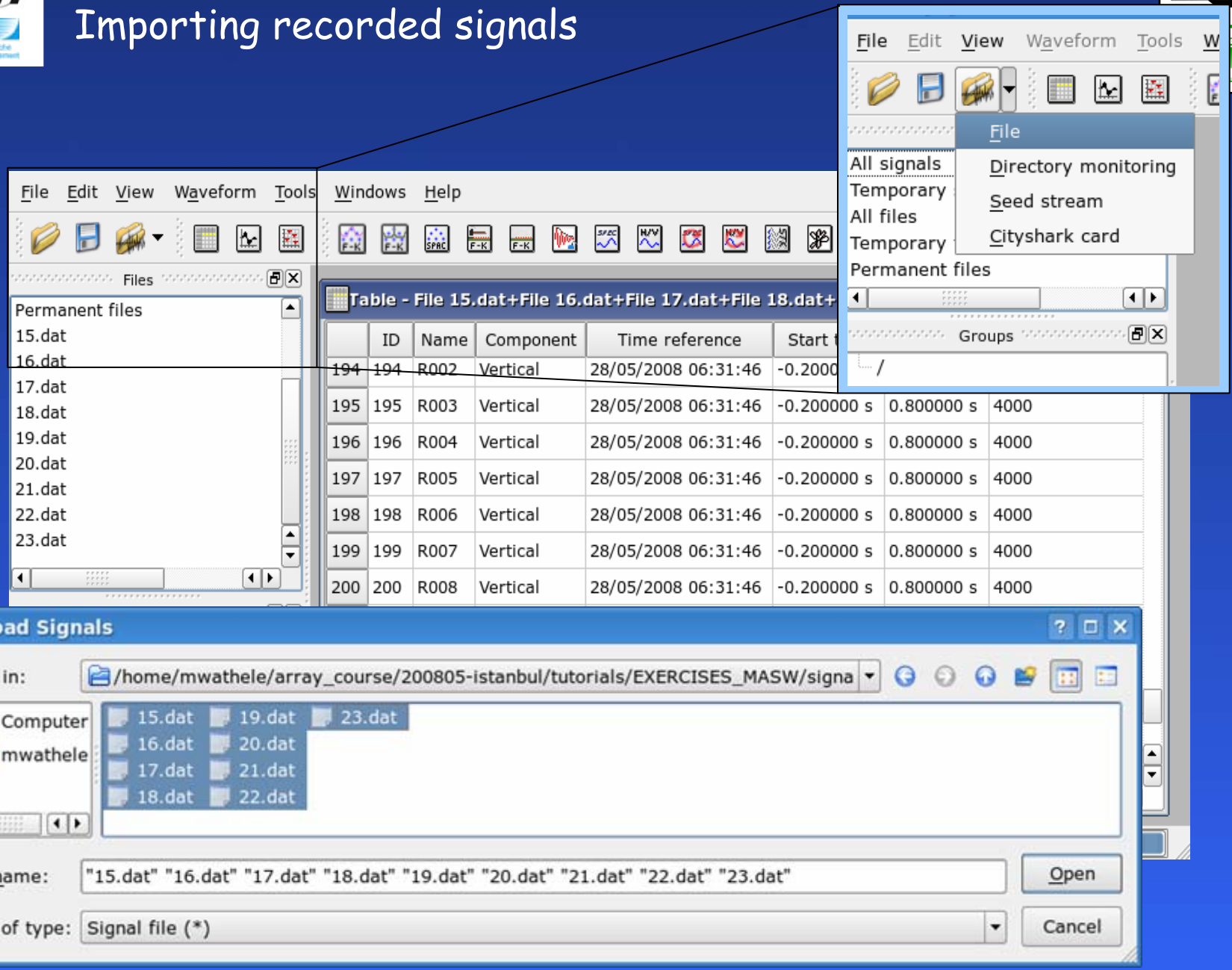
Setting source and receiver coordinates

Usual preferences for loading active source recordings

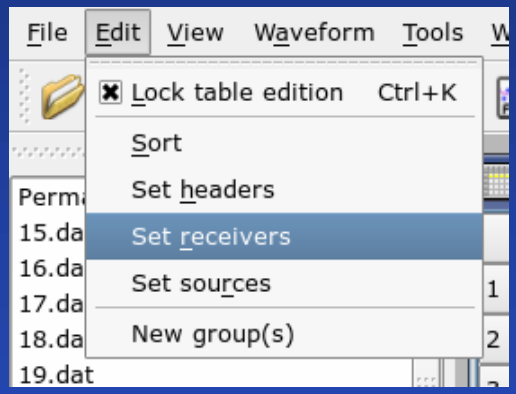


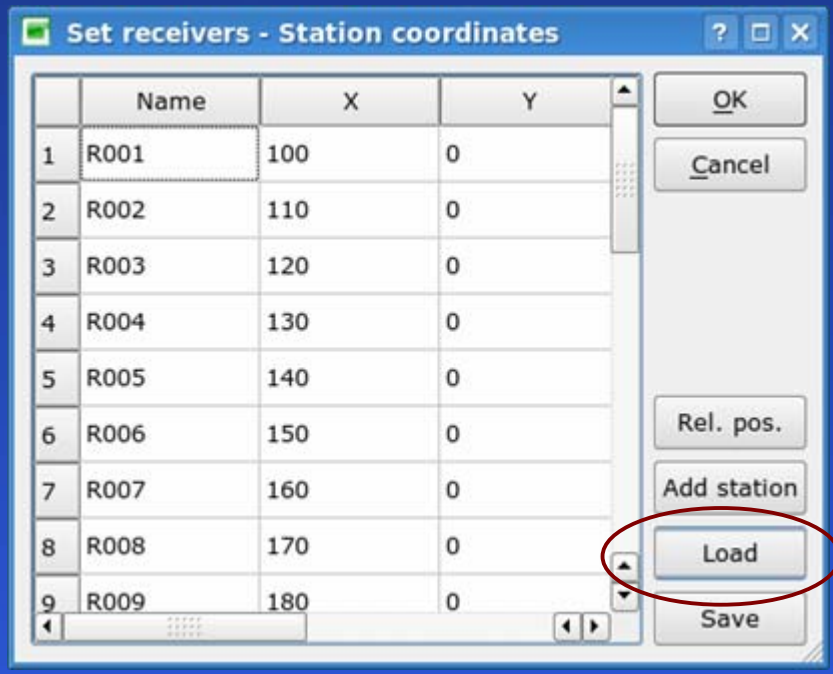


Importing recorded signals



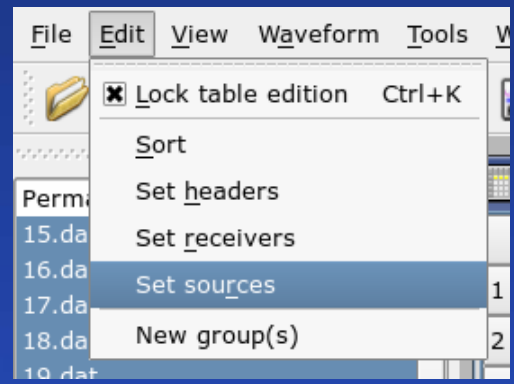
Set proper coordinates of geophones





Load coordinate file : "geophones.coord"

Set proper coordinates of shot points



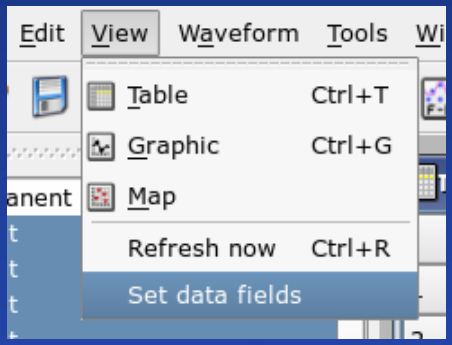
Source coordinates

	Name	X	Y	Z
1	Shot_15	370.502	189.214	0
2	Shot_16	351.752	182.255	0
3	Shot_17	340.033	177.906	0
4	Shot_18	325.97	172.687	0
5	Shot_19	370.502	189.214	0
6	Shot_20	311.972	167.295	0
7	Shot_21	297.98	161.891	0
8	Shot_22	279.322	154.686	0
9	Shot_23	279.322	154.686	0

OK
Cancel
Rel. pos.
Add station
Load
Save
Apply

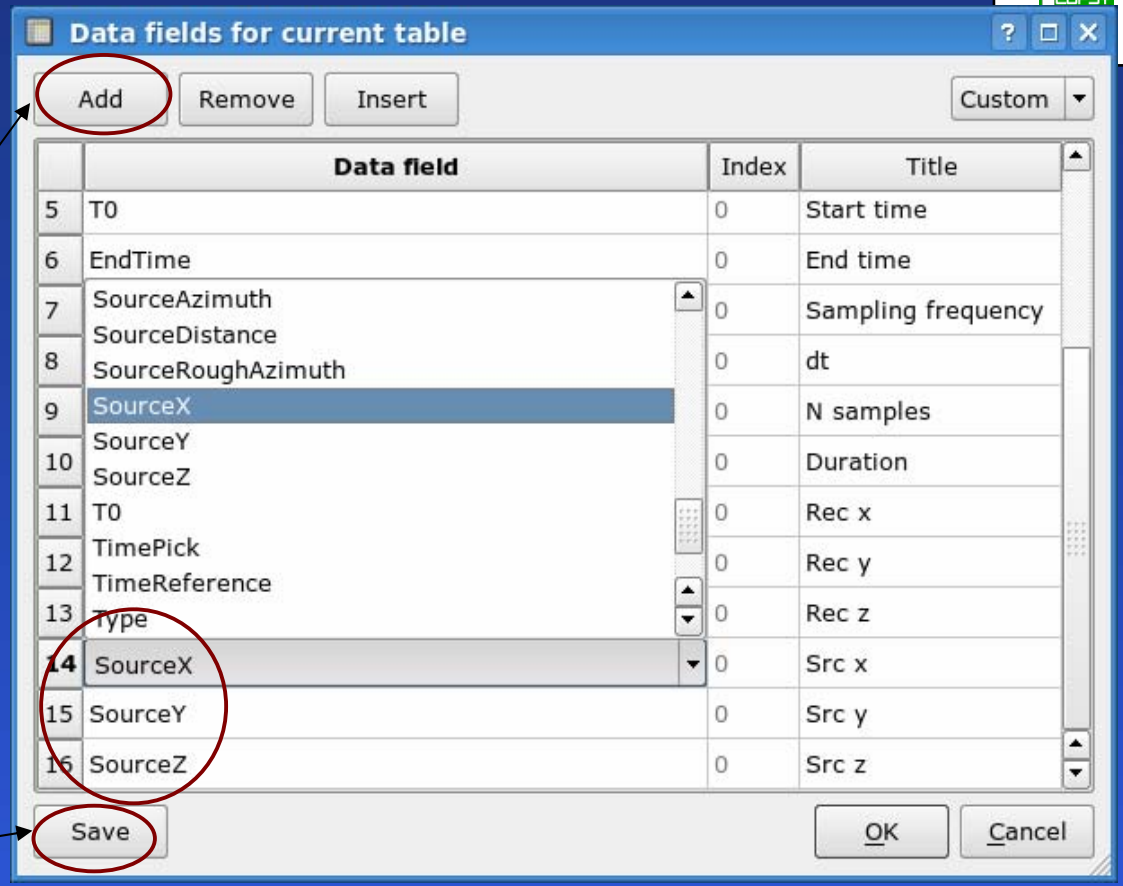
Source name pattern Shot_{Return=left(ShortFileName,length(ShortFileName)-4);}

Check coordinates



Add columns to the standard display

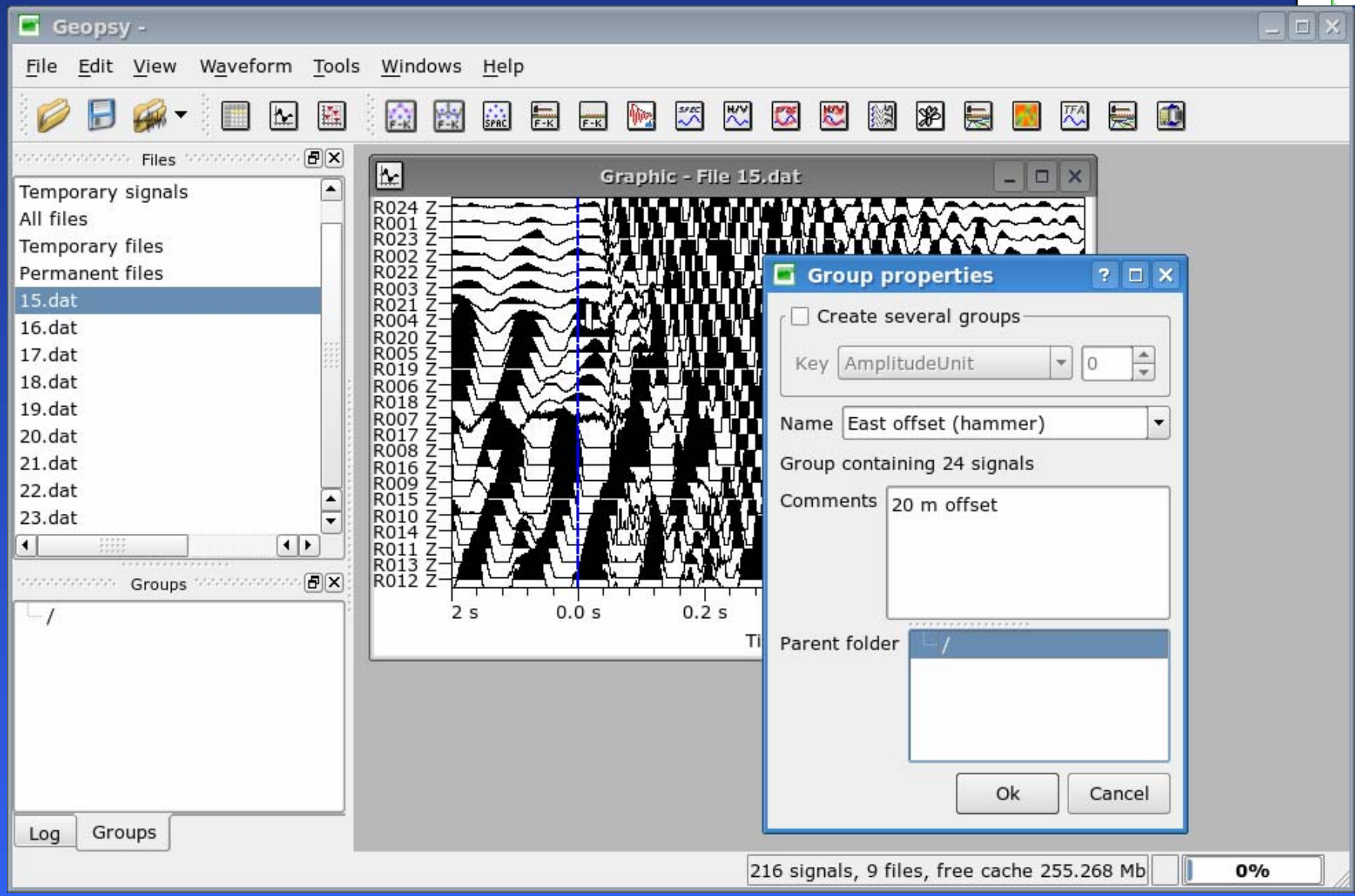
View coordinates in a table



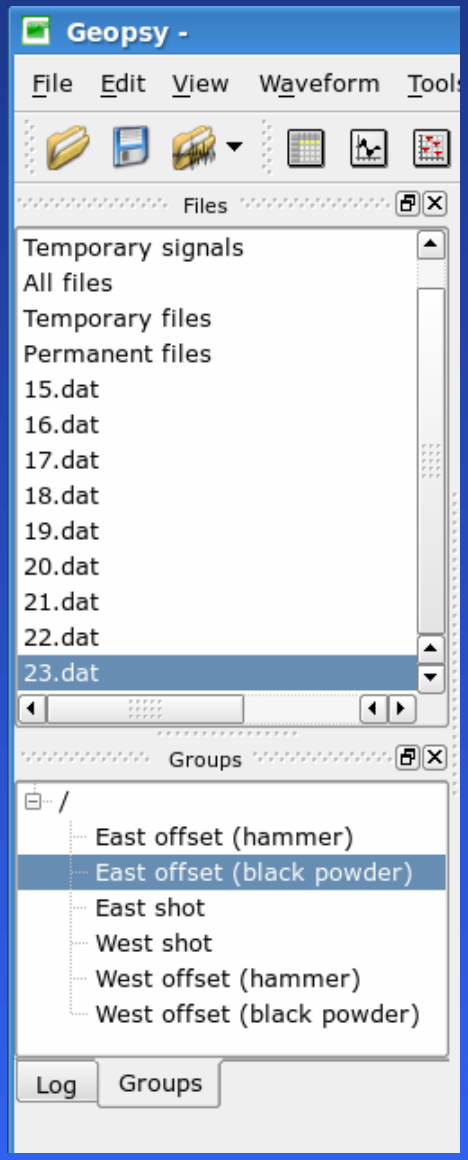
Apply it to all tables, not only for current one

N samples	Duration	Rec x	Rec y	Rec z	Src x	Src y	Src z
4000	1.000000 s	349.408	181.385	0	370.502	189.214	0
4000	1.000000 s	344.72	179.646	0	370.502	189.214	0
4000	1.000000 s	340.033	177.906	0	370.502	189.214	0
4000	1.000000 s	335.345	176.166	0	370.502	189.214	0
4000	1.000000 s	330.657	174.427	0	370.502	189.214	0
4000	1.000000 s	325.97	172.687	0	370.502	189.214	0

Organizing signals in a database: groups



Organizing signals in a database: groups



For each shot, sort signal by increasing distance to source and create a new group

Number	Group name	Comments
Shot 15	East offset (hammer)	20 m offset
Shot 19	East offset (black powder)	20 m offset
Shot 16	East shot	No offset
Shot 21	West shot	No offset
Shot 22	West offset (hammer)	20 m offset
Shot 23	West offset (black powder)	20 m offset

Finally, the database contains all information to process MASW, save it!