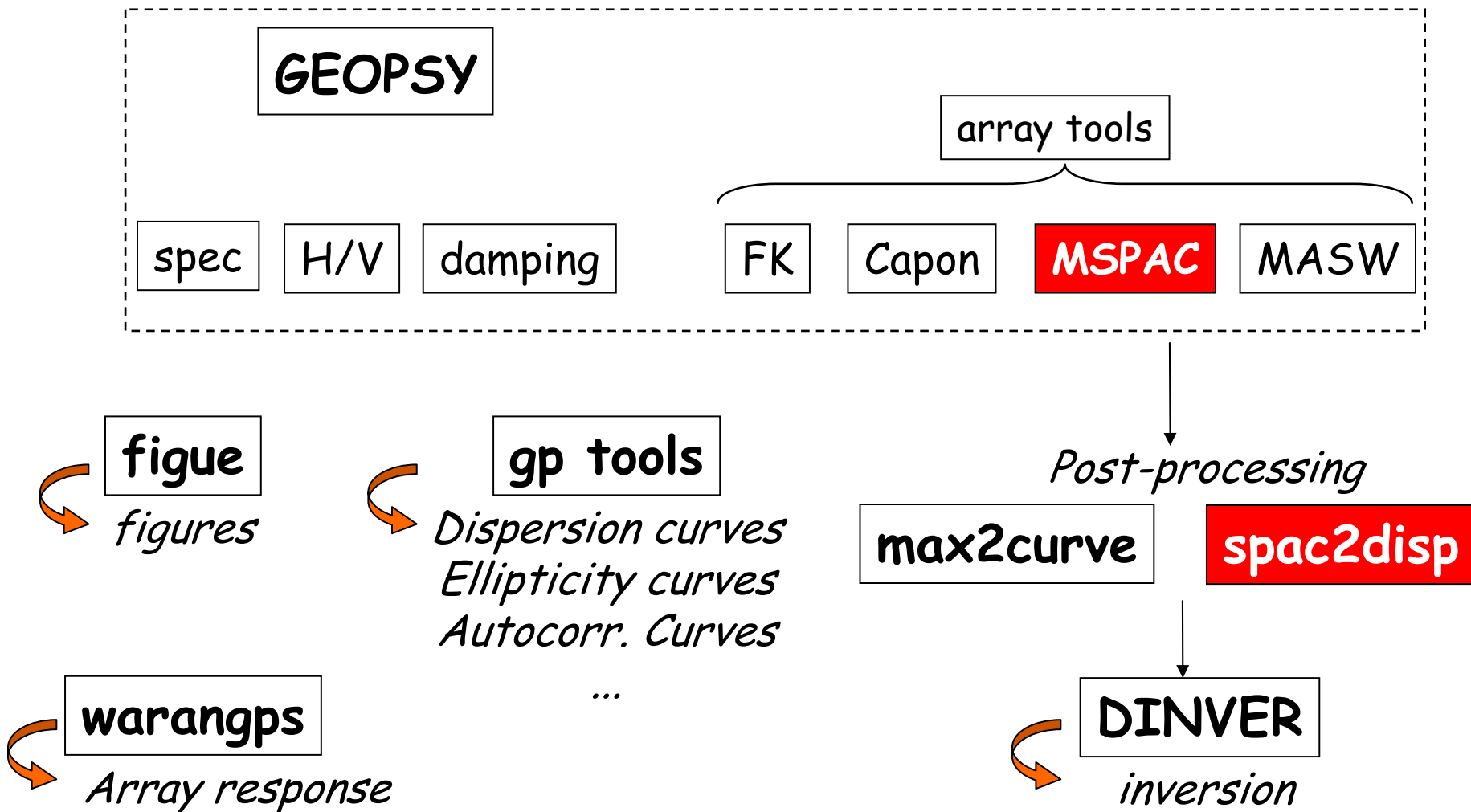


Using Ambient Vibration Array Techniques for Site Characterization

Spatial Autocorrelation

Tutorial

geopsy PACKAGE

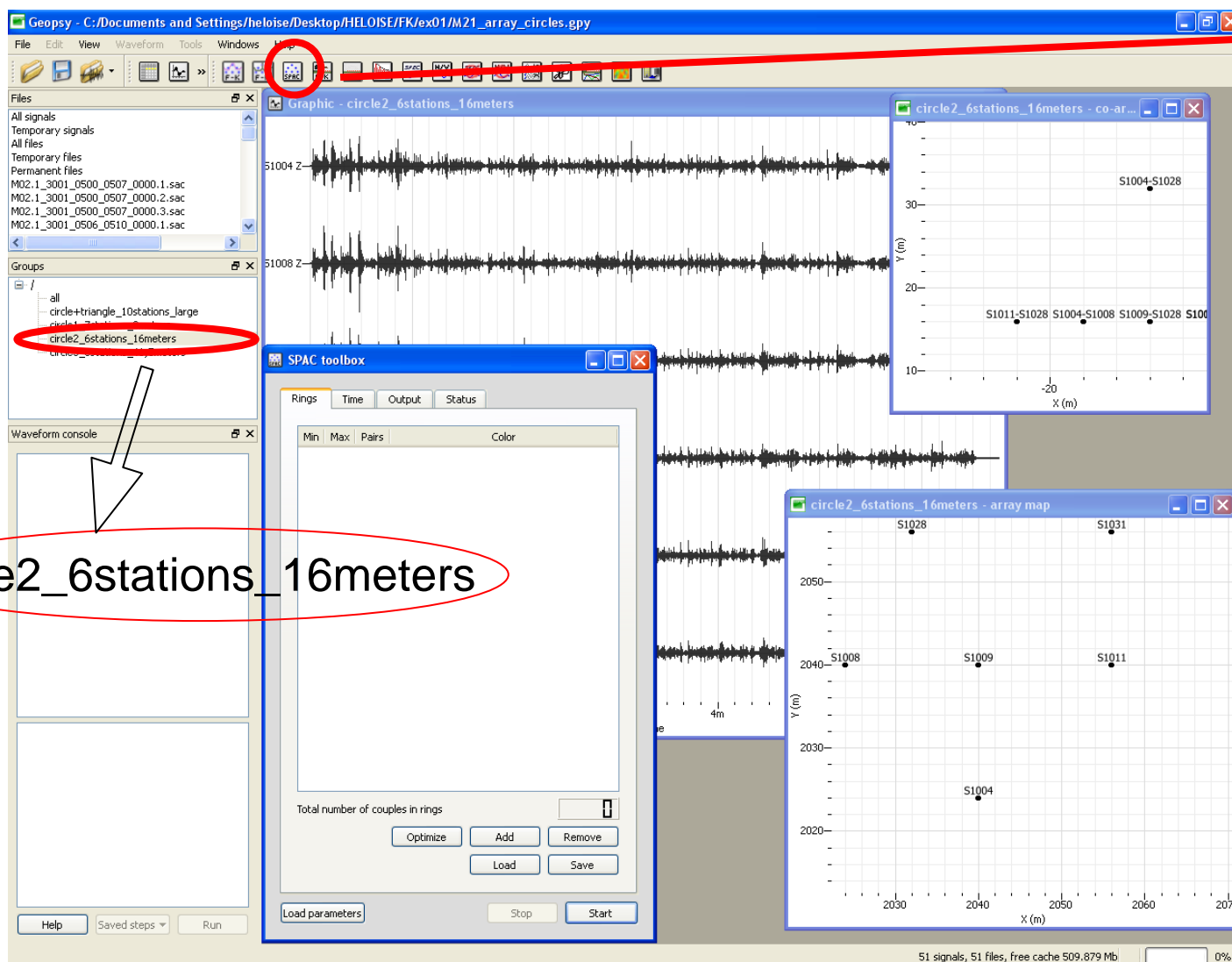


Loading database and launch spac

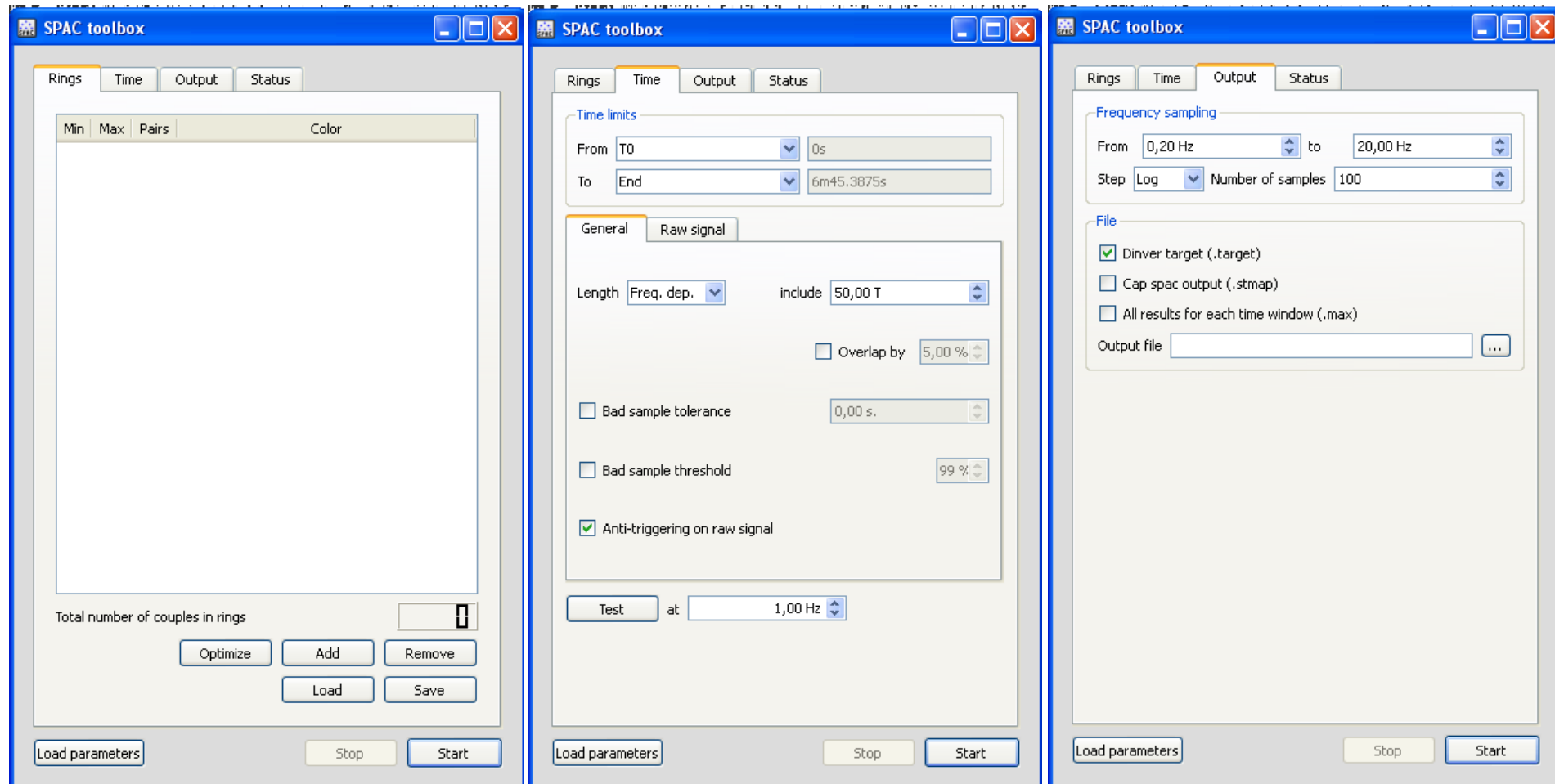
EX01/M21_array_circles.gpy



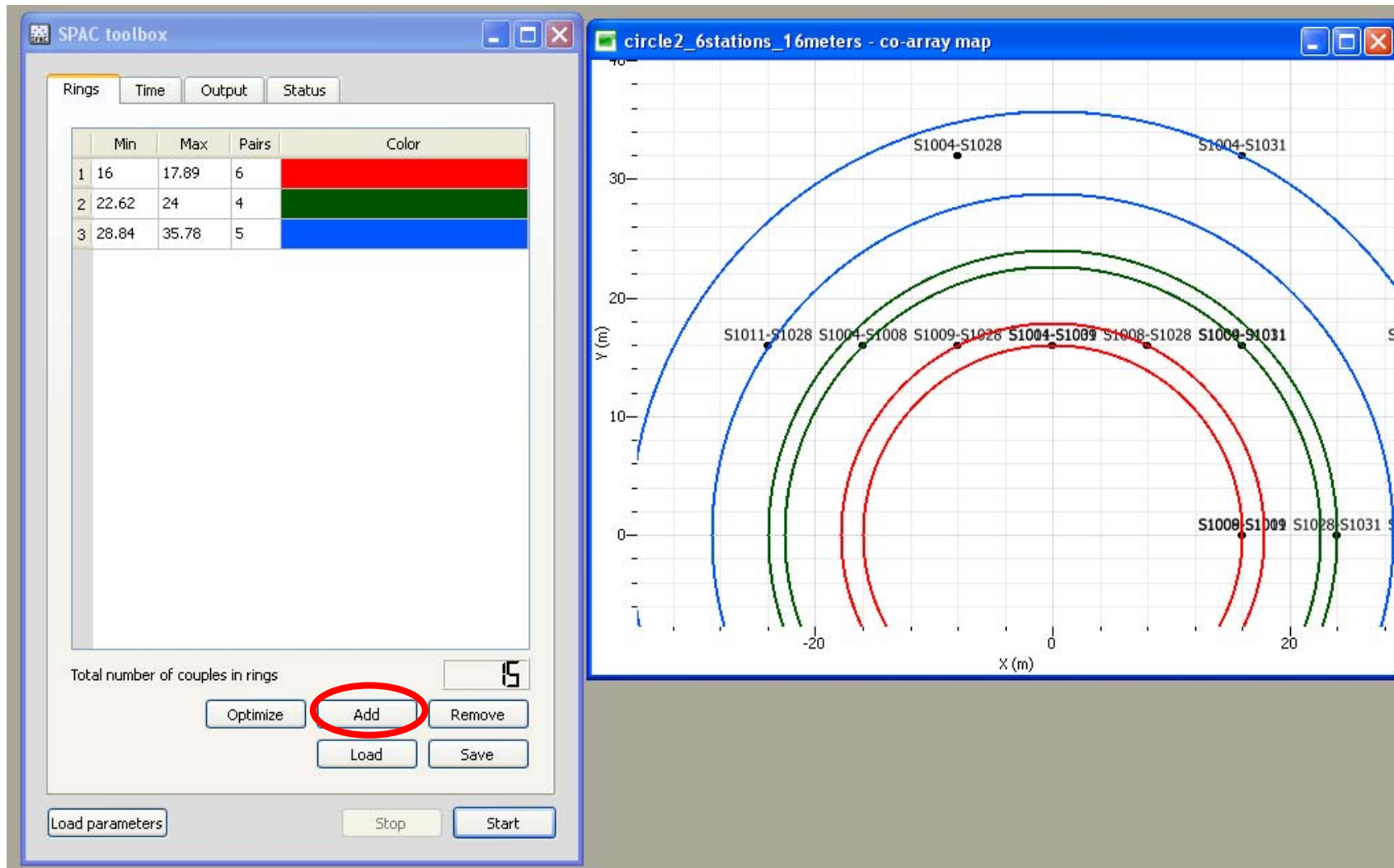
SPAC



The toolbox



Design the rings



Save the rings

SPAC toolbox

Rings Time Output Status

	Min	Max	Pairs	Color
1	16	17.89	6	Red
2	22.62	24	4	Green
3	28.84	35.78	5	Blue

Total number of couples in rings: 15

Optimize Add Remove Load **Save**

Load parameters Stop Start

circle2_6stations_16meters - co-array map

Y (m)

X (m)

Save rings file

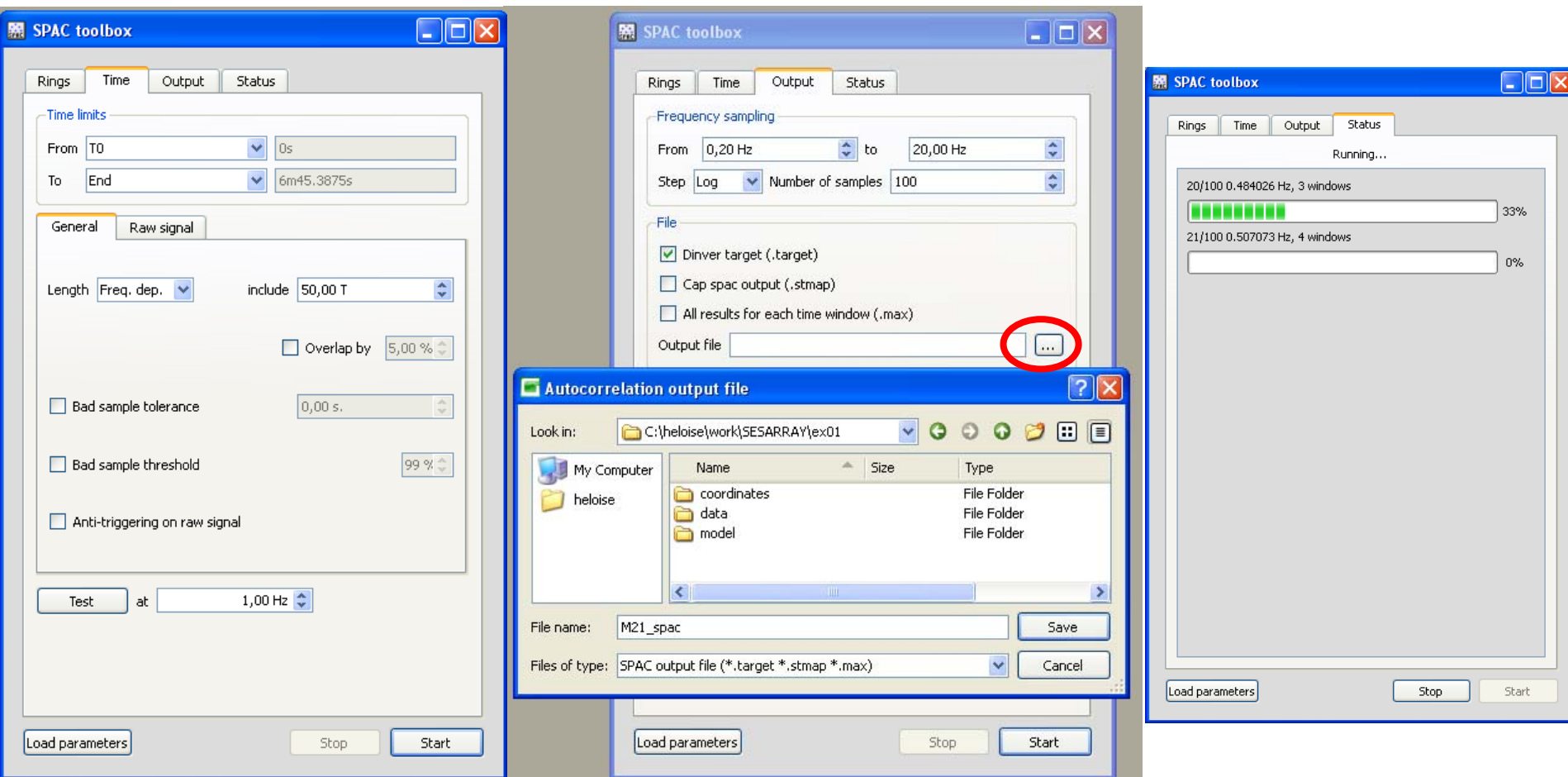
Look in: C:\heloise\work\SESARRAY\ex01

Name	Size	Type
coordinates		File Folder
data		File Folder
model		File Folder

File name: spac_rings Save

Files of type: Rings file (*.rings) Cancel

Run MSPAC



The image displays three screenshots of the SPAC toolbox software interface, illustrating the steps to run MSPAC.

Left Screenshot (Time Tab): The 'Time' tab is selected. The 'Time limits' section shows 'From' set to 'T0' and 'To' set to 'End'. The 'General' section shows 'Length' set to 'Freq. dep.' and 'include' set to '50,00 T'. The 'Test' button is visible at the bottom.

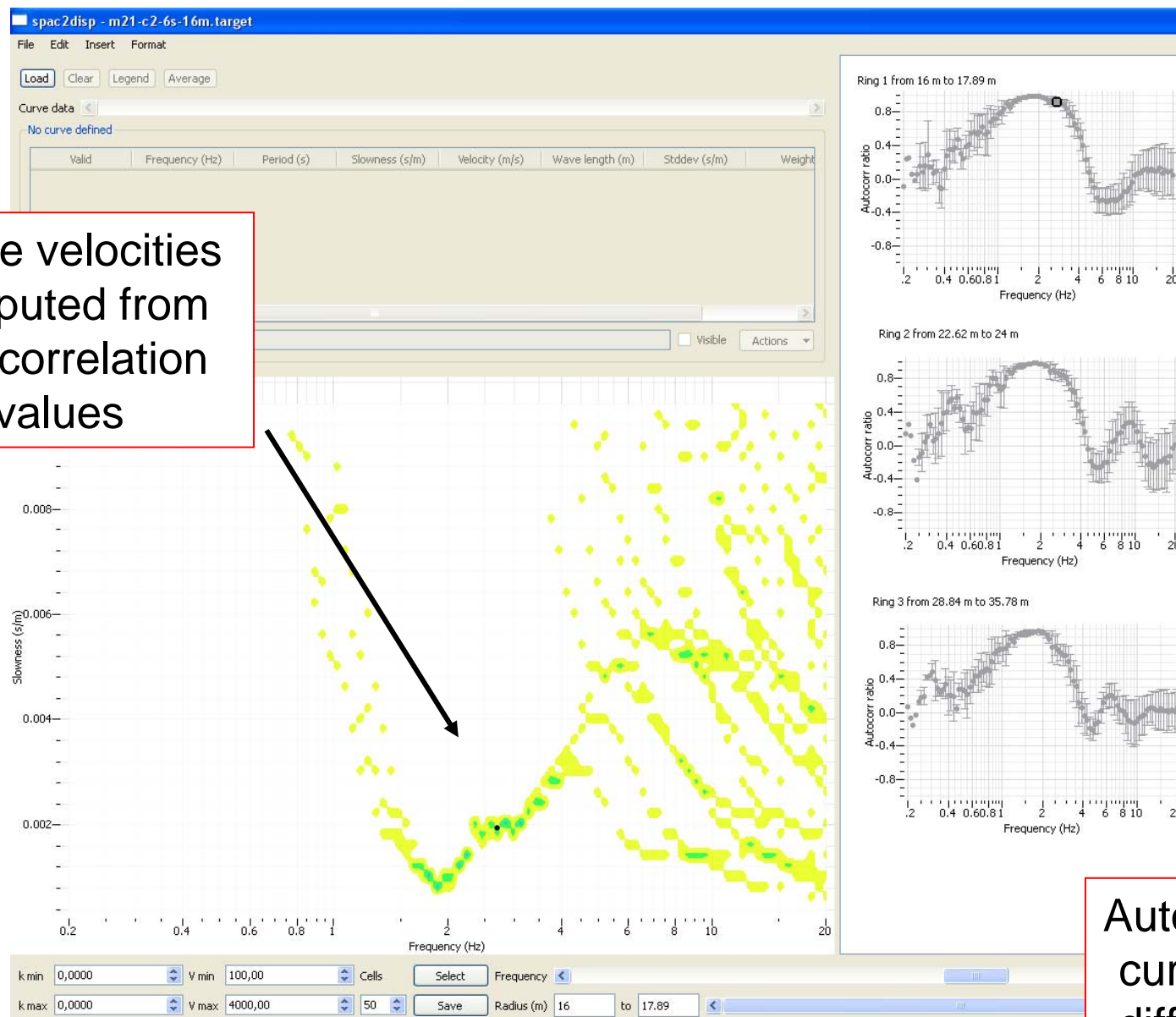
Middle Screenshot (Output Tab): The 'Output' tab is selected. The 'Frequency sampling' section shows 'From' set to '0,20 Hz' and 'to' set to '20,00 Hz'. The 'Step' is set to 'Log' and 'Number of samples' is set to '100'. The 'File' section shows checkboxes for 'Dinver target (.target)', 'Cap spac output (.stmap)', and 'All results for each time window (.max)'. The 'Output file' field is empty. A red circle highlights the '...' button next to the 'Output file' field.

Autocorrelation output file Dialog: This dialog box is open, showing the 'Look in:' field set to 'C:\heloise\work\SESARRAY\ex01'. The file list shows folders: 'coordinates', 'data', and 'model'. The 'File name' field is set to 'M21_spac'. The 'Files of type' dropdown is set to 'SPAC output file (*.target *.stmap *.max)'. The 'Save' button is highlighted.

Right Screenshot (Status Tab): The 'Status' tab is selected. The 'Running...' section shows progress bars for two windows: '20/100 0.484026 Hz, 3 windows' at 33% and '21/100 0.507073 Hz, 4 windows' at 0%. The 'Load parameters', 'Stop', and 'Start' buttons are visible at the bottom.

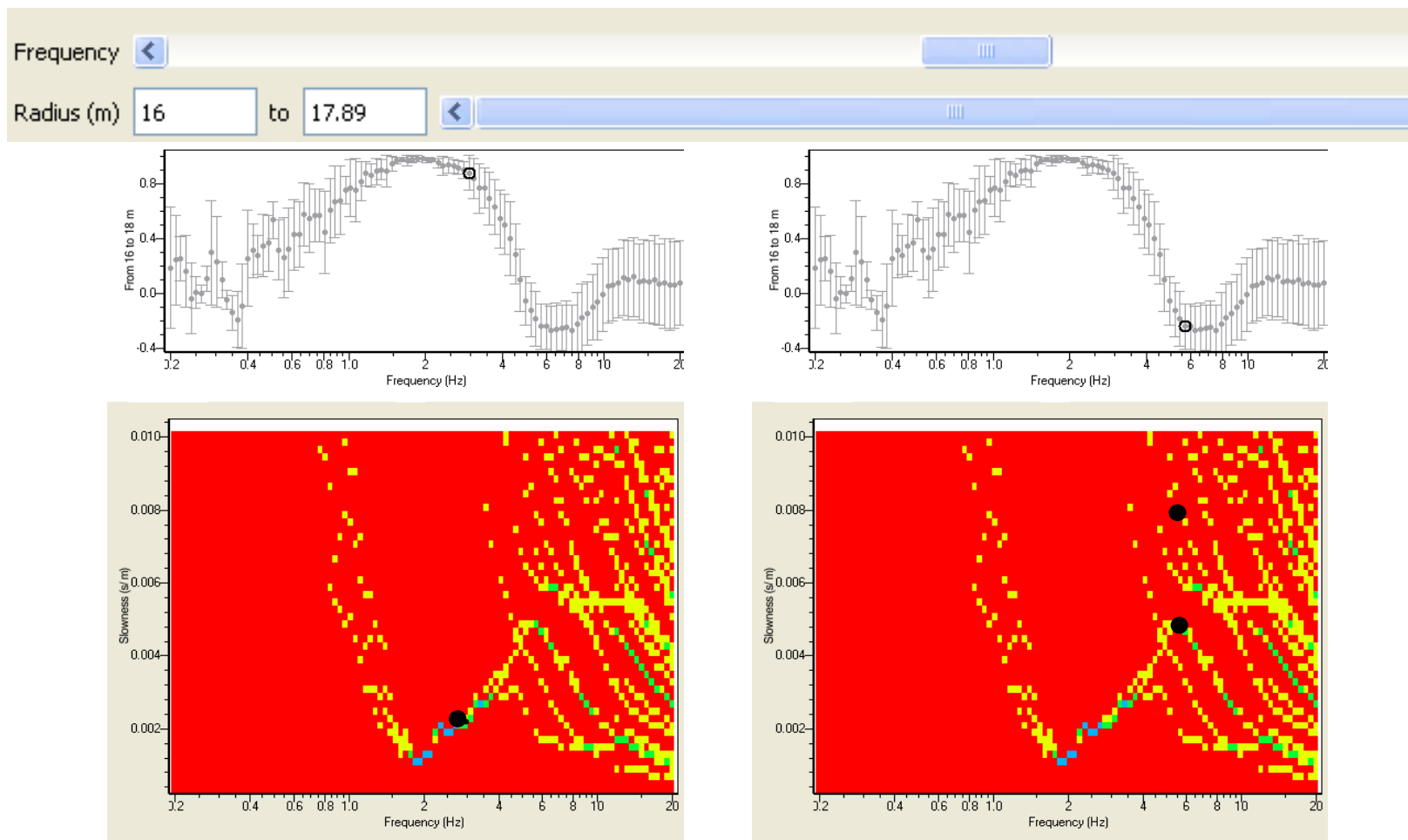
Display MSPAC results using *spac2disp*

Phase velocities
computed from
autocorrelation
values



Autocorrelation
curves for the
different rings

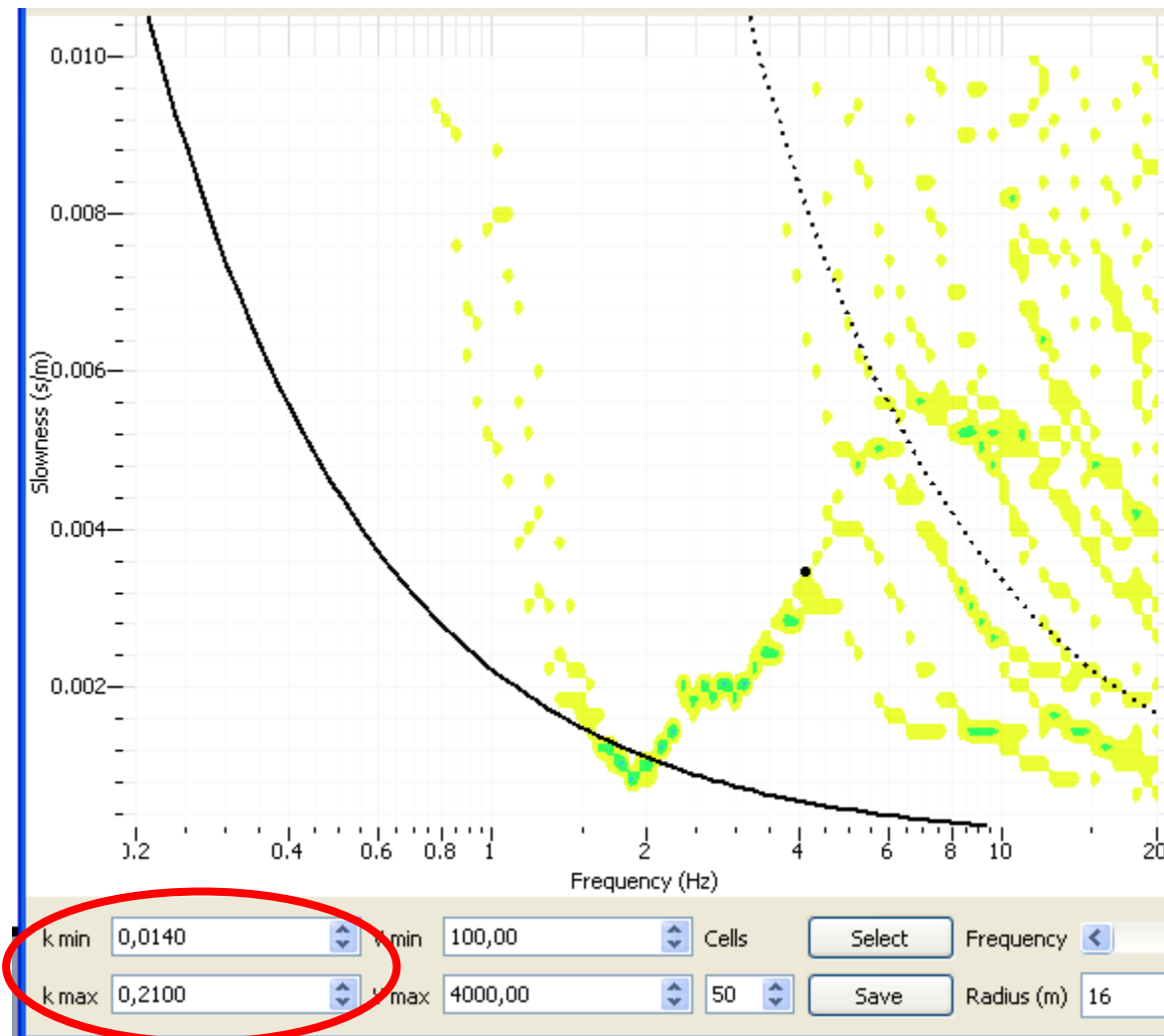
Relationship between autocorrelation coefficients and phase velocities



Uniqueness of
phase velocity

Non-uniqueness of
phase velocity

Selection of the autocorrelation coefficients



Selection of the autocorrelation coefficients

File Edit Insert Format

Load Clear Legend Average

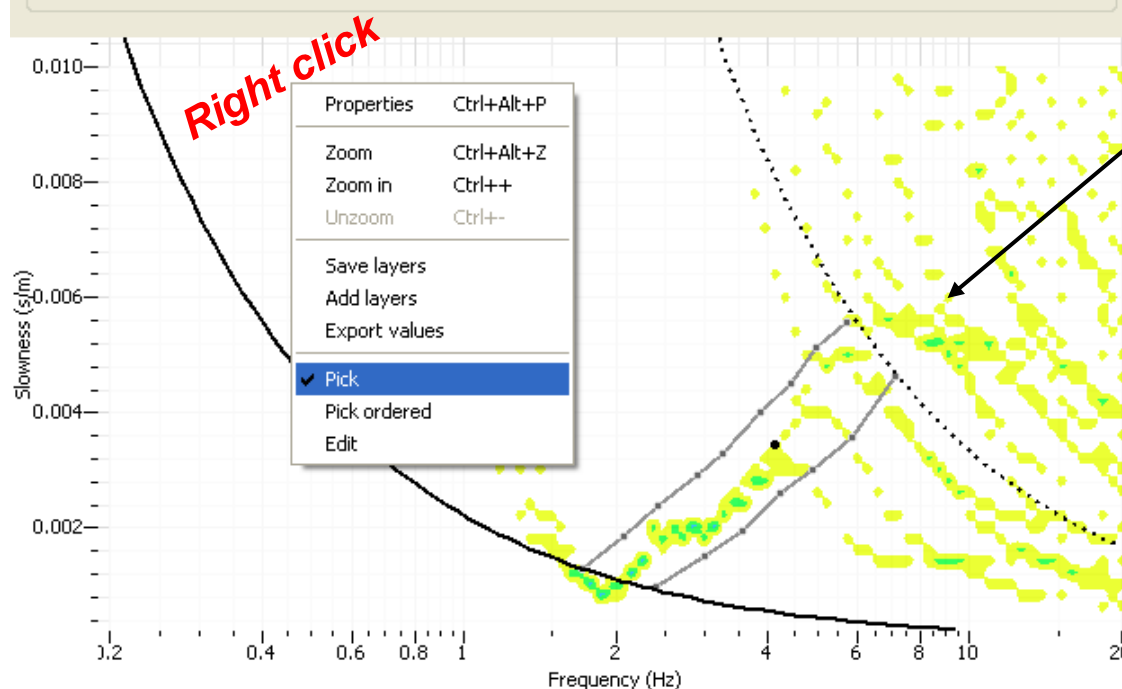
Curve data

Curve 1 of 2

	Valid	Frequency (Hz)	Period (s)	Slowness (s/m)	Velocity (m/s)	Wave length
1	<input checked="" type="checkbox"/>	1,714649312	0,5832096355	0,001306510417	765,397648	446,
2	<input checked="" type="checkbox"/>	2,067152999	0,4837571291	0,001870170455	534,7106183	258,
3	<input checked="" type="checkbox"/>	2,415666901	0,4139643589	0,002394957386	417,5439637	172,

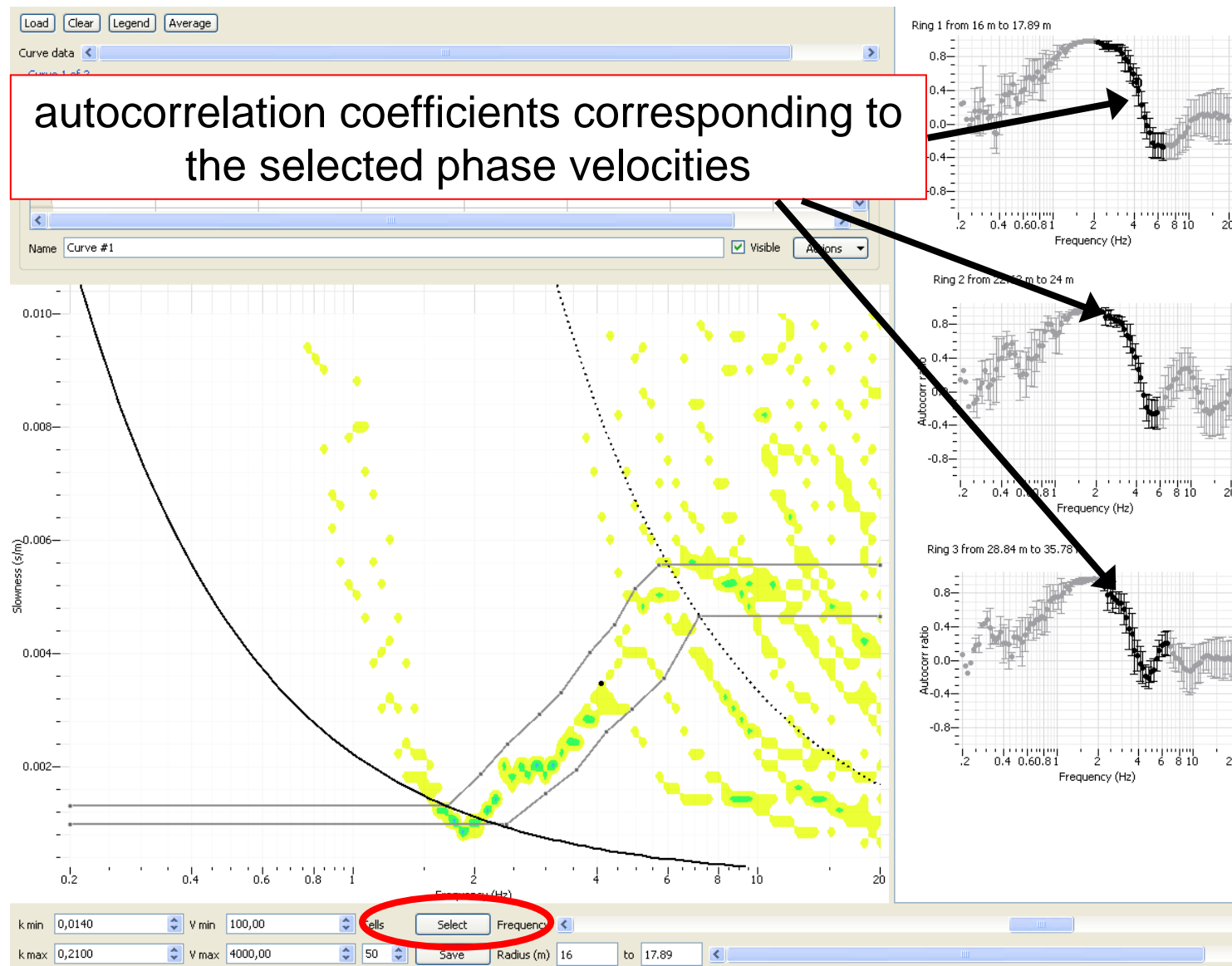
Name Curve #1 ☒ Visible Actions

Select
the slowness band
using the *pick* icon



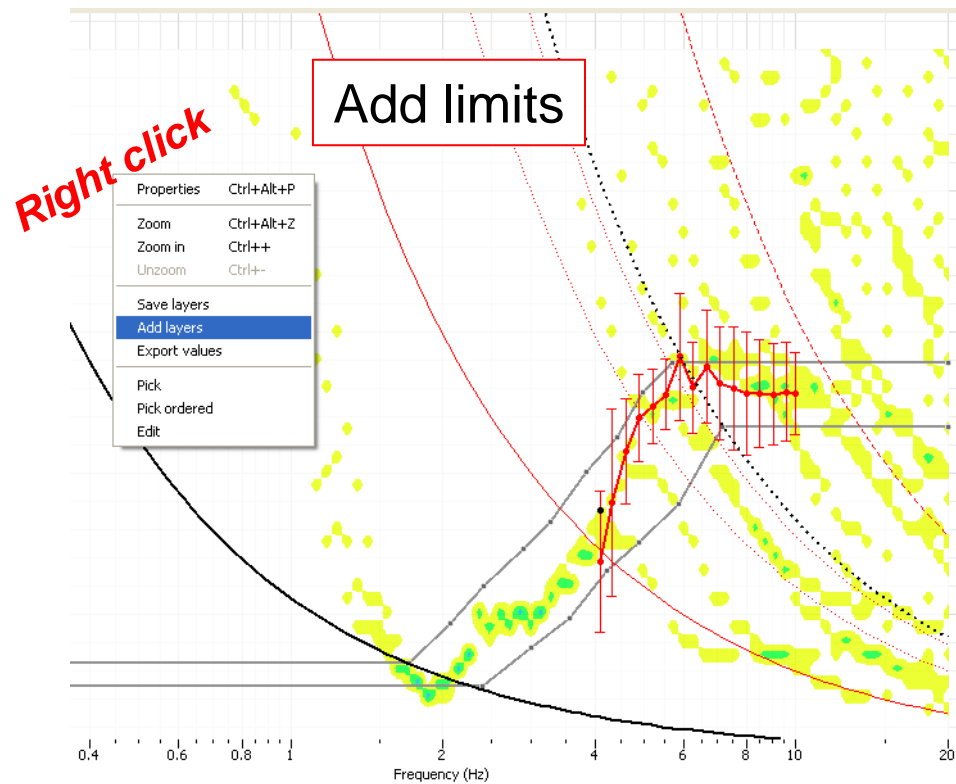
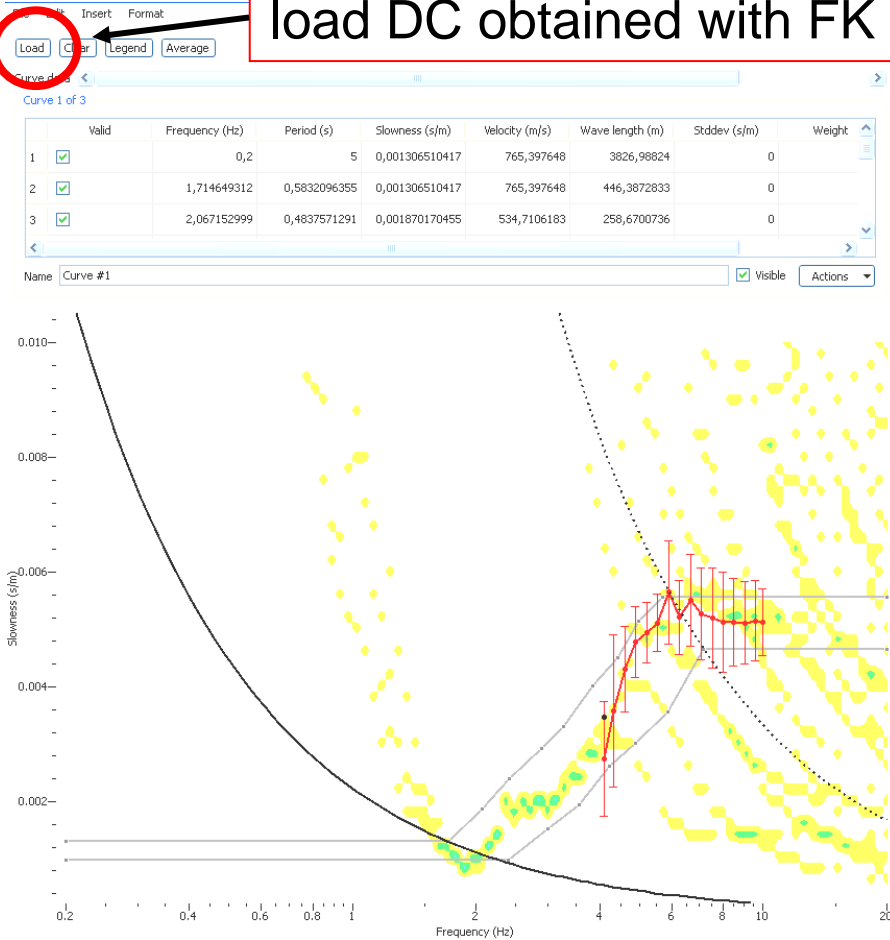
Selection of the autocorrelation coefficients

autocorrelation coefficients corresponding to the selected phase velocities

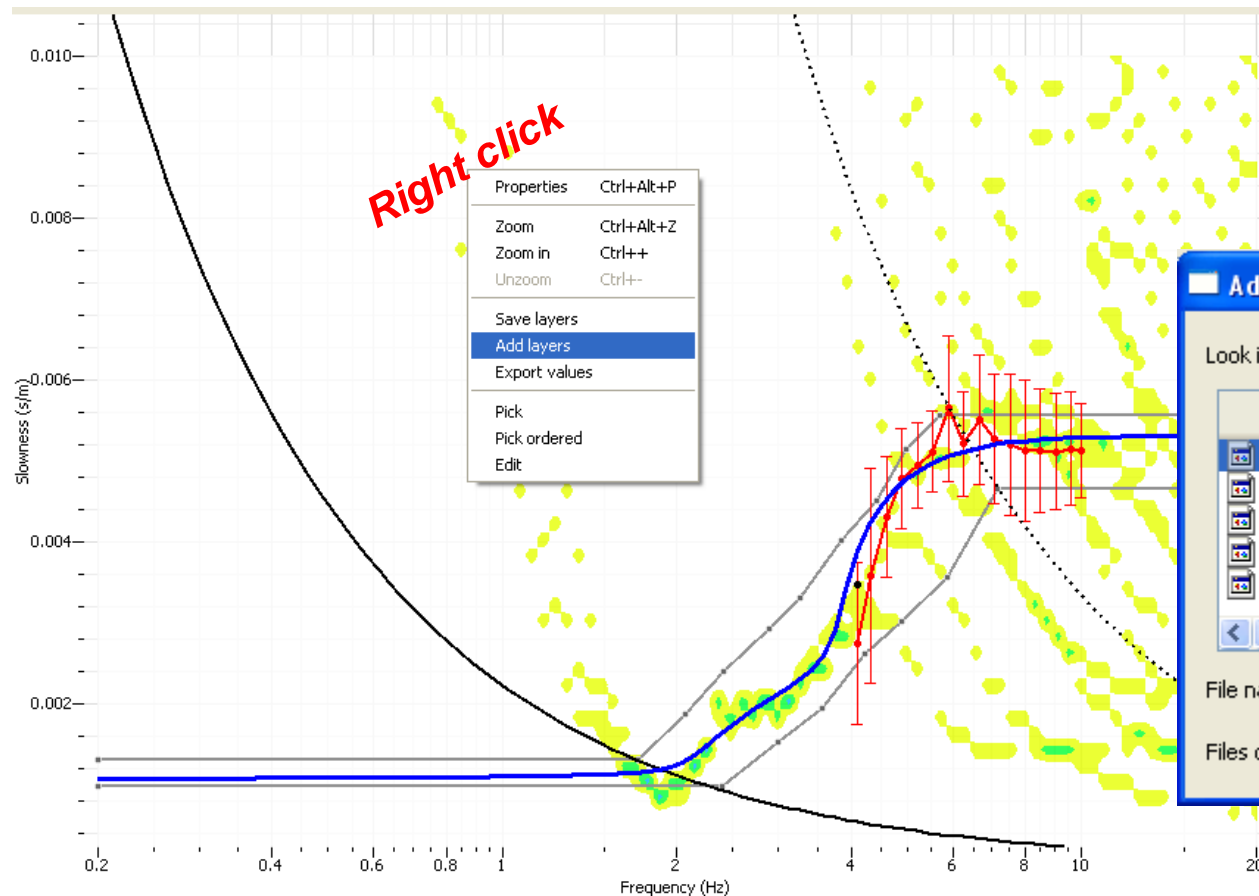


Comparison between DC estimated by MSPAC and FK analysis

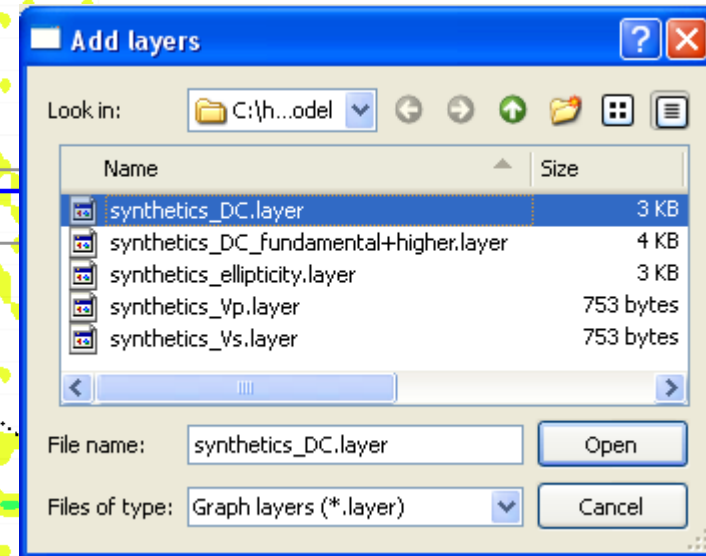
load DC obtained with FK or HRFK



Comparison between DC estimated by MSPAC and theoretical DC



Path:
FK\ex01\model



In this case, resolution of MSPAC (FK)
is better at low frequency (high frequency)

Do the same exercise with the two other predefined arrays

- Rings design
- MSPAC computation
- Selection of reliable autocorrelation coefficients
- Comparison of DC estimated by MSPAC and FK