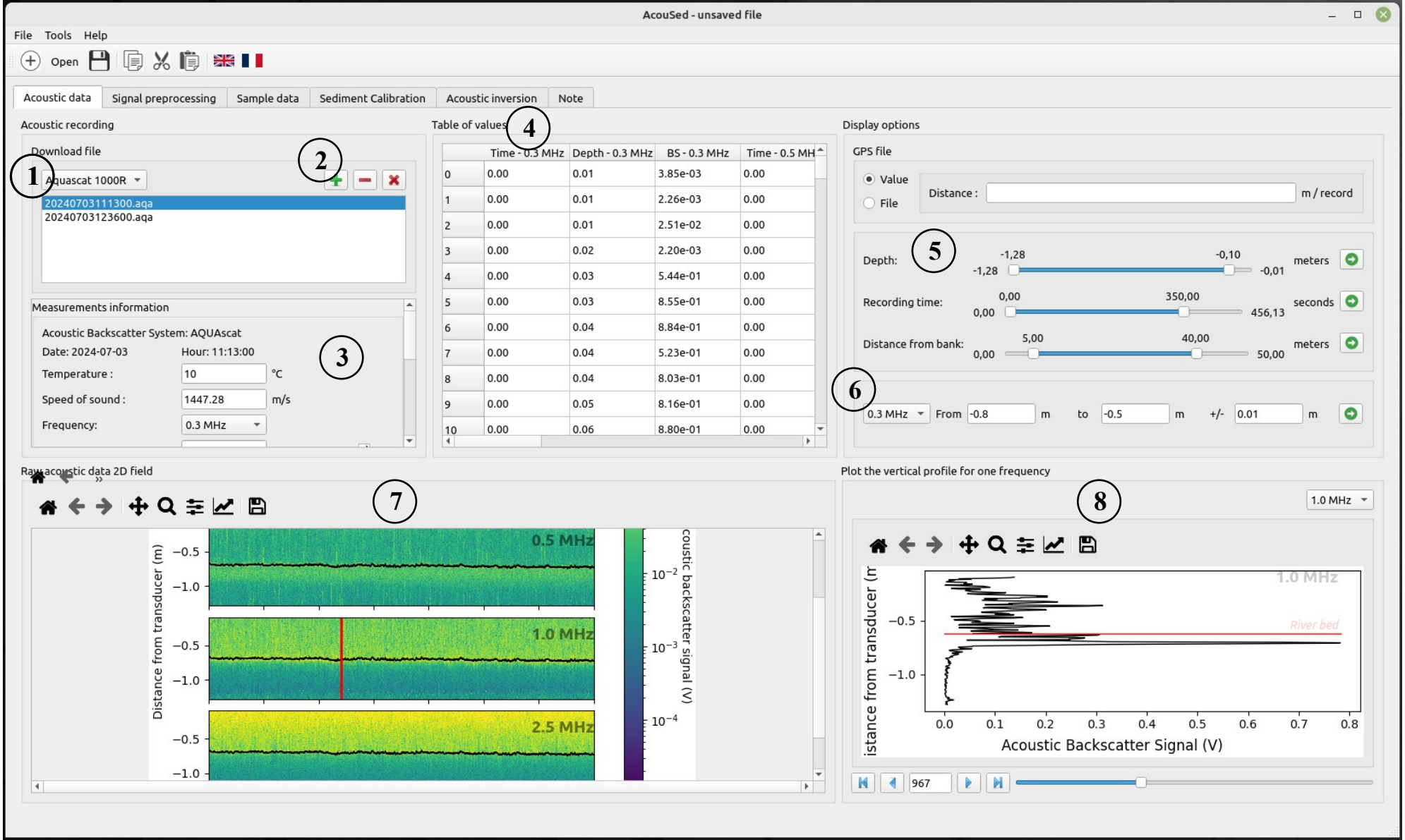
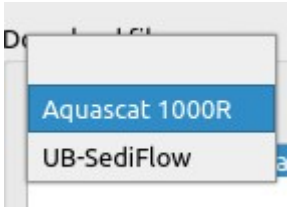
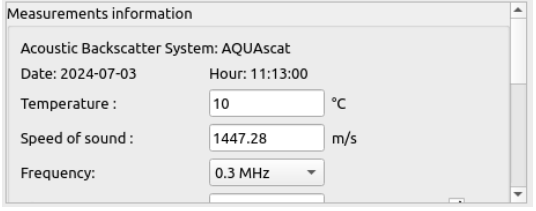

AcouSed - unsaved file
File
Tools
Help
Open
Acoustic data
Signal preprocessing
Sample data
Sediment Calibration
Acoustic inversion
Note
Acoustic recording
Download file
1
Aquascat 1000R
2
20240703111300.aqa
20240703123600.aqa
Measurements information
Acoustic Backscatter System: AQUAscat
Date: 2024-07-03
Hour: 11:13:00
Temperature :
10
°C
Speed of sound :
1447.28
m/s
Frequency:
0.3 MHz
3
Table of values
4
Time - 0.3 MHz
Depth - 0.3 MHz
BS - 0.3 MHz
Time - 0.5 MH
0 0.00 0.01 3.85e-03 0.00
1 0.00 0.01 2.26e-03 0.00
2 0.00 0.01 2.51e-02 0.00
3 0.00 0.02 2.20e-03 0.00
4 0.00 0.03 5.44e-01 0.00
5 0.00 0.03 8.55e-01 0.00
6 0.00 0.04 8.84e-01 0.00
7 0.00 0.04 5.23e-01 0.00
8 0.00 0.04 8.03e-01 0.00
9 0.00 0.05 8.16e-01 0.00
10 0.00 0.06 8.80e-01 0.00
Display options
GPS file
Value
File
Distance :
m / record
Depth:
5
-1,28
-0,10
-1,28
-0,01
meters
Recording time:
0,00
350,00
0,00
456,13
seconds
Distance from bank:
5,00
40,00
0,00
50,00
meters
6
0.3 MHz
From
-0.8
m
to
-0.5
m
+/-
0.01
m
Raw acoustic data 2D field
7
0.5 MHz
1.0 MHz
2.5 MHz
Distance from transducer (m)
−0.5
−1.0
coustic backscatter signal (V)
10^{-2}
10^{-3}
10^{-4}
Plot the vertical profile for one frequency
8
1.0 MHz
1.0 MHz
River bed
istance from transducer (m
−0.5
−1.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Acoustic Backscatter Signal (V)
967

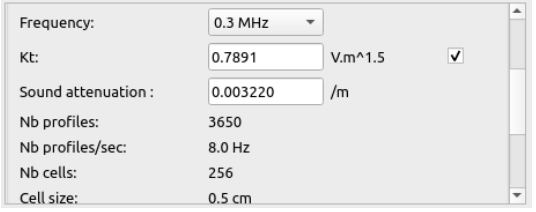
(1) 

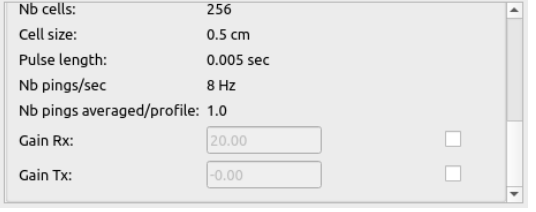
ABS (Acoustic Backscatter System) system choice: AQUAscat or UBSediFlow

(2) ✚ Downloaded acoustic file: AQUAscat (.aqa) or UBSediFlow (.udt)
- Remove one acoustic file
✖ Delete all files

(3) Measurement information
i. Enter temperature: The speed of sound is filled automatically
ii. Values of the constant kt are filled by default for each frequencies of the ABS
iii. Checkbox checked (kt and gains): values can be changed and will be used for calibration
iv. Checkbox not checked (kt and gains): values used for calibration are values read from the ABS







(4) Table of values :

Depth, time, Backscatter (BS) values for each frequencies

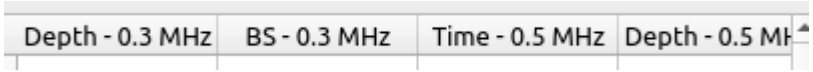
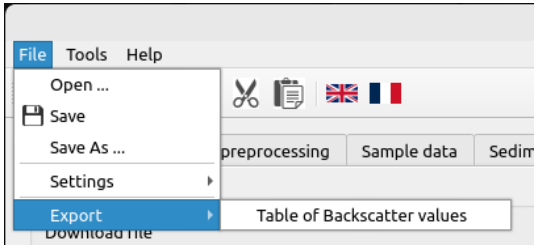


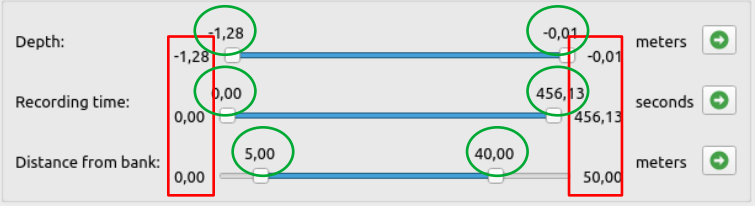
Table of values can be exported in an csv file



(5) Set limits of acoustic recording

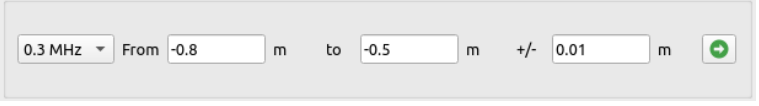
Boundaries of acoustic recording (can't be changed)

Limits of BS data for plots and following computations

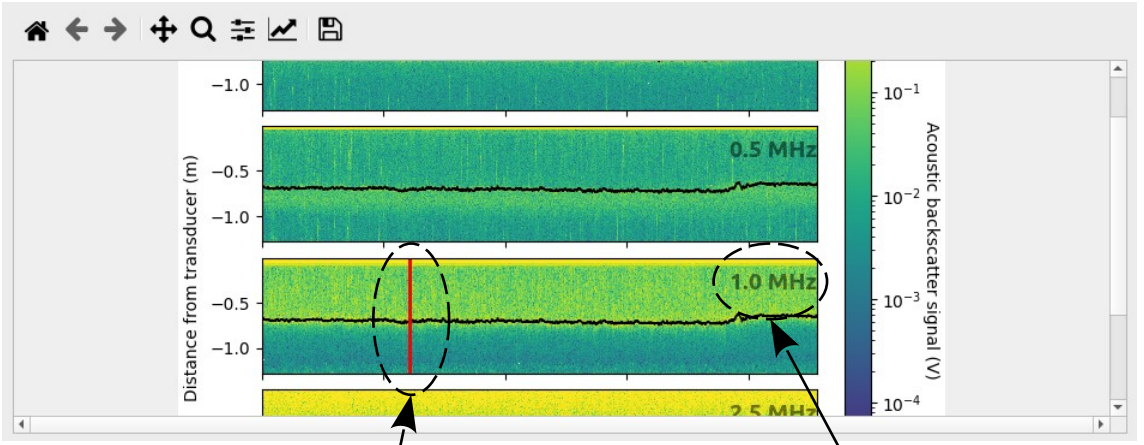


(6) Detect Bottom algorithm

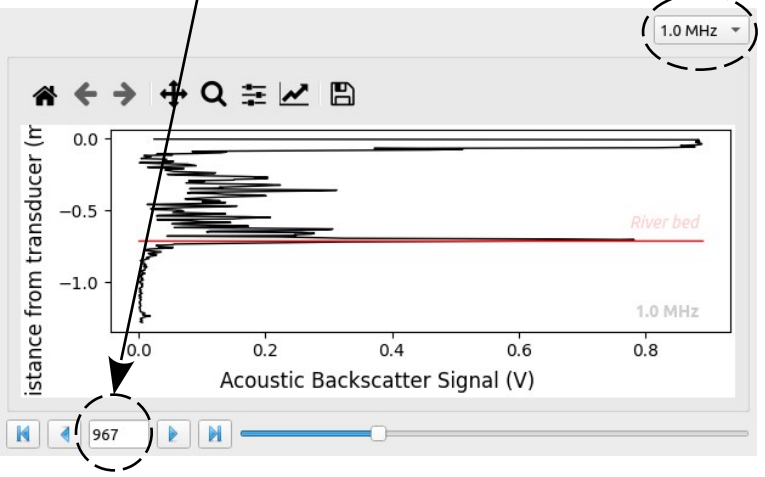
The maximum backscatter value is detected along the first vertical between two depth values fixed by the user. The search area is then moved, at the next vertical, by plus or minus a value defined by the user. The process is repeated up to the last vertical to draw the river bed line.

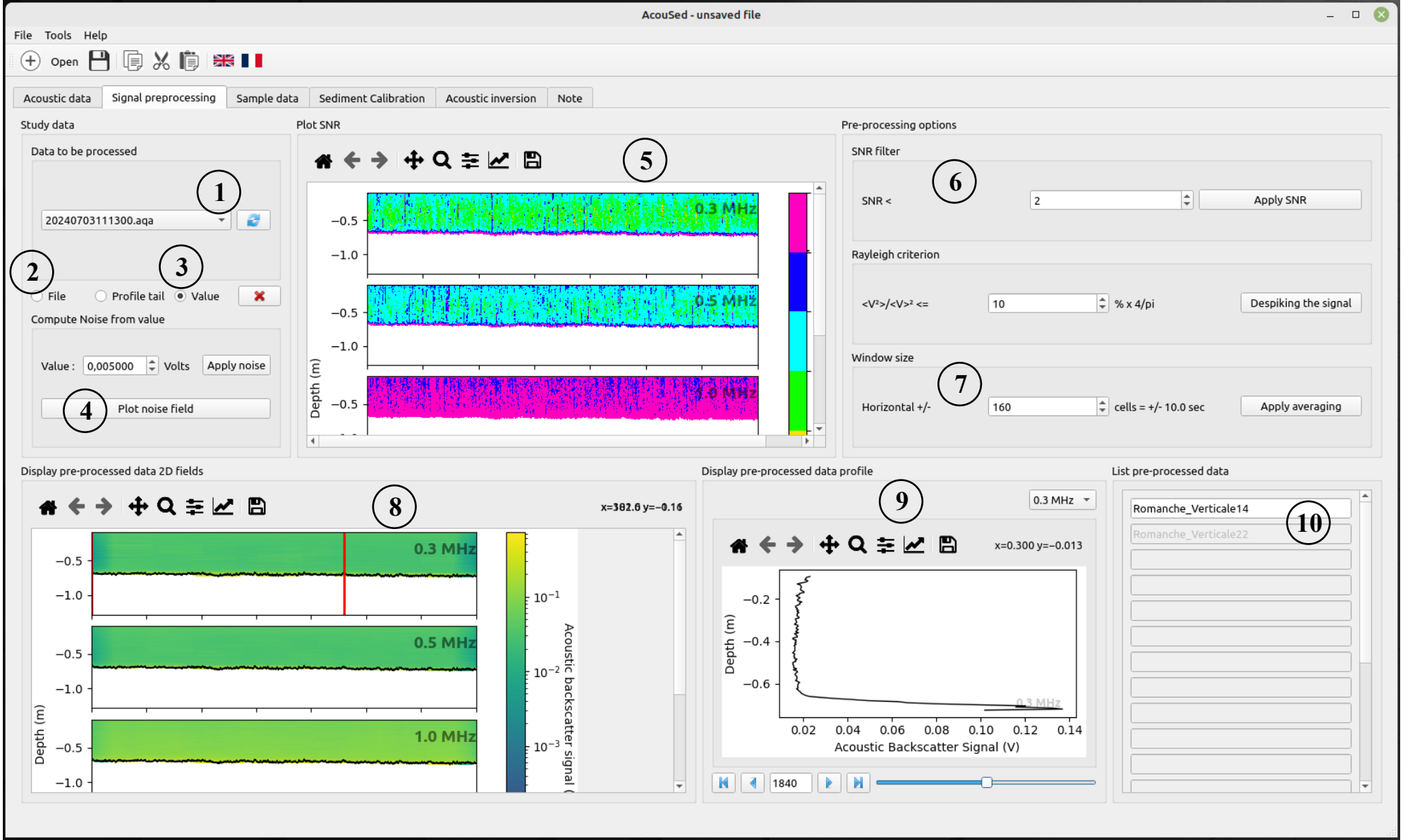


(7) Plot acoustic recording fields



(8) Plot acoustic recording profile




AcouSed - unsaved file
File
Tools
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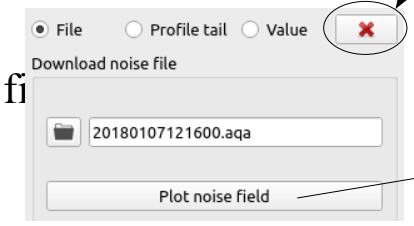
Acoustic data
Signal preprocessing
Sample data
Sediment Calibration
Acoustic inversion
Note
Study data
Data to be processed
1
20240703111300.aqa
2
File
Profile tail
3
Value
Compute Noise from value
Value :
0,005000
Volts
Apply noise
4
Plot noise field
Plot SNR
5
0.3 MHz
0.5 MHz
1.0 MHz
Depth (m)
Pre-processing options
SNR filter
6
SNR <
2
Apply SNR
Rayleigh criterion
<V²>/<V>² <=
10
% x 4/pi
Despiking the signal
Window size
7
Horizontal +/-
160
cells = +/- 10.0 sec
Apply averaging
Display pre-processed data 2D fields
8
Acoustic backscatter signal
Display pre-processed data profile
9
0.3 MHz
x=0.300 y=−0.013
Depth (m)
Acoustic Backscatter Signal (V)
1840
List pre-processed data
10
Romanche_Verticale14
Romanche_Verticale22

(1) Update and/or loaded acoustic data (uploaded in Acoustic data tab)
If an acoustic data are added in Acoustic data tab, the user need to refresh with the button

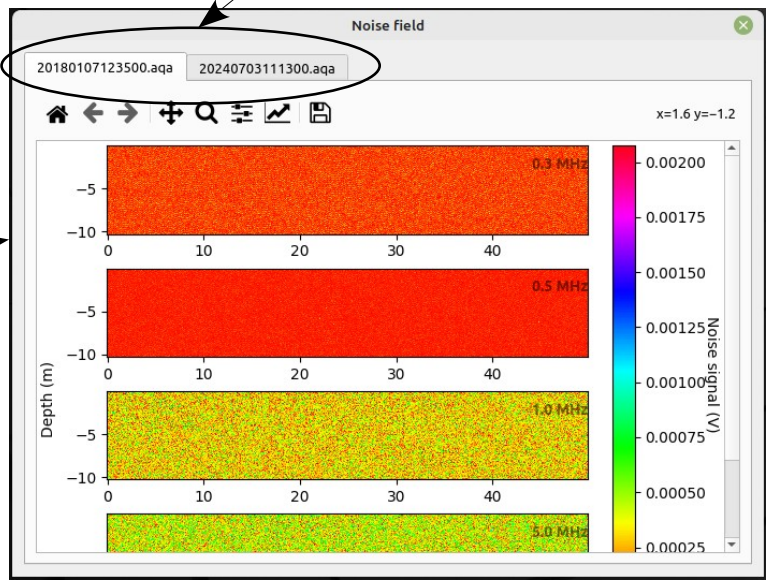
(2) Load a noise data file
All plots are displayed when the fi is downloaded

Delete noise



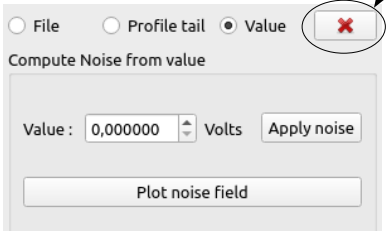
Open a dialog window

As many tabs as acoustic files



(3) Define a value
All plots are displayed when the button « Apply noise » is pushed.

Delete noise



(4) A dialog window opens when the user clicks on the button. There are as many tabs as there are acoustic files.

(5) Plot SNR as follows $SNR(\nu)=\frac{(\overline{V_{BS}}-V_{noise})^2}{(V_{noise})^2}$

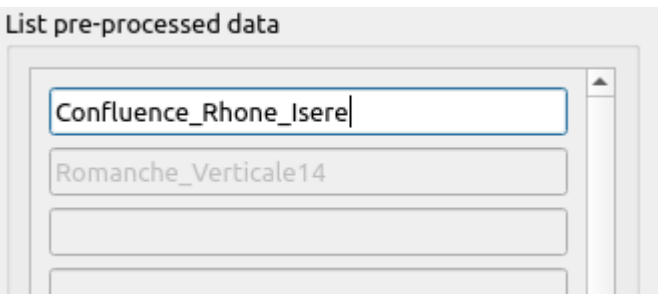
(6) SNR filter : remove all value where SNR in less than the value

(7) Average is applied for each cells, between a number of cells along the horizontal and around the considered cell.
The number of cells used for average is also converted in time.

(8) Plot of pre-processed data (filtered with SNR and/or averaged).

(9) Plot the profile of pre-processed data for the frequency choose in the frequencies list.

(10) The list of pre-processed data is updated when the user defines the noise in step 2 or 3.
By default, the name of pre-processed data is the same as that of the acoustic file. The user can rename the pre-processed acoustic data with a more meaningful name.
The data selected in step 1 is enabled and the other ones are disabled.
This list of modified (or not modified) names are used in the next tabs.



AcouSed - unsaved file

File Tools Help

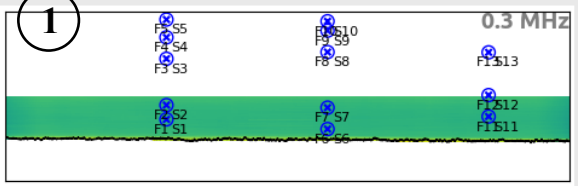
Open

Acoustic data | Signal preprocessing | Sample data | Sediment Calibration | Acoustic inversion | Note

Plot samples positions

Plot Acoustic data | Romanche_Verticale14 | 0.3 MHz

1



Fine sediments

2

fine_sample.ods

Color	Sample	time	depth	Ctot fine
b	F6	200	-0.556	0.3
b	F7	200	-0.256	0.3
b	F8	200	0.524	0.3
b	F9	200	0.824	0.3
b	F10	200	0.956	0.3
b	F11	300	-0.38	0.3
b	F12	300	-0.08000000...	0.3
b	F13	300	0.52	0.3
b	F14	300	0.82	0.3
b	F15	300	1.03	0.3

Sand sediments

3

sand_sample.ods

Color	Sample	time	depth	Ctot sand
b	S6	200	-0.556	2.0905
b	S7	200	-0.256	0.9577
b	S8	200	0.524	0.4221
b	S9	200	0.824	0.3059
b	S10	200	0.956	0.2809
b	S11	300	-0.38	0.7976
b	S12	300	-0.08000000...	0.4752
b	S13	300	0.52	0.2627
b	S14	300	0.82	0.2137
b	S15	300	1.03	0.1877

Display options

Total concentration plot

4

x axis: Concentration (g/L)

y axis: z (m)

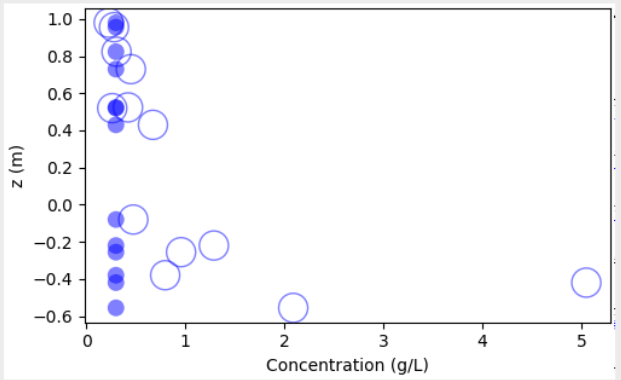
Particle Size Distribution plot

5

Class PSD

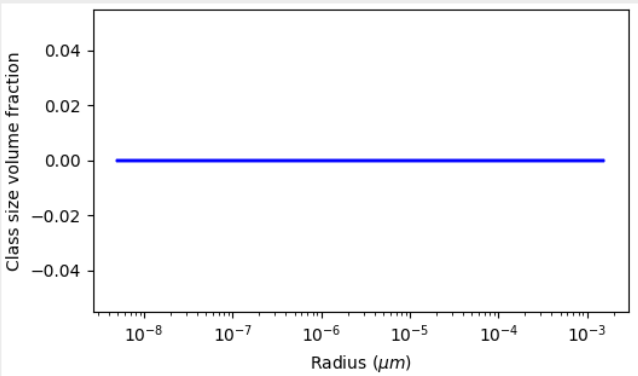
Plot total concentration

4

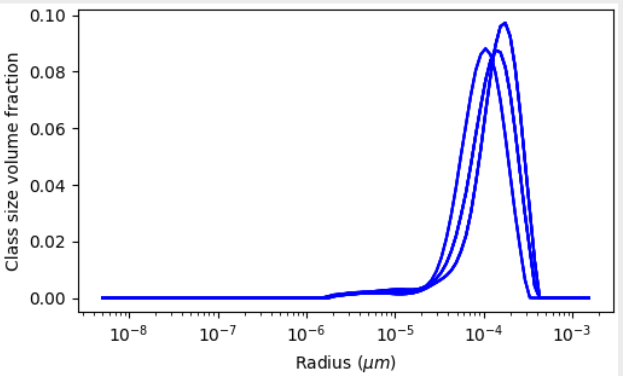


Plot particle size distribution

5

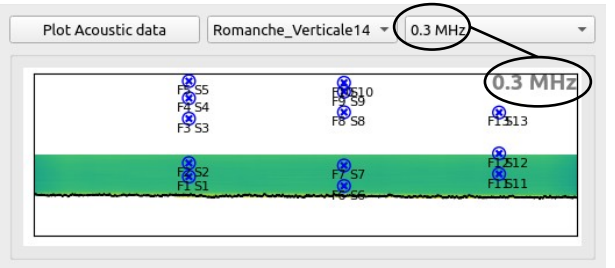


5



(1) Plot aoustic noise button :

- refreshes the list of acoustic data
- displays acoustic recording selected in the acoustic data list, and for one frequency.



(2) Download fine sample data

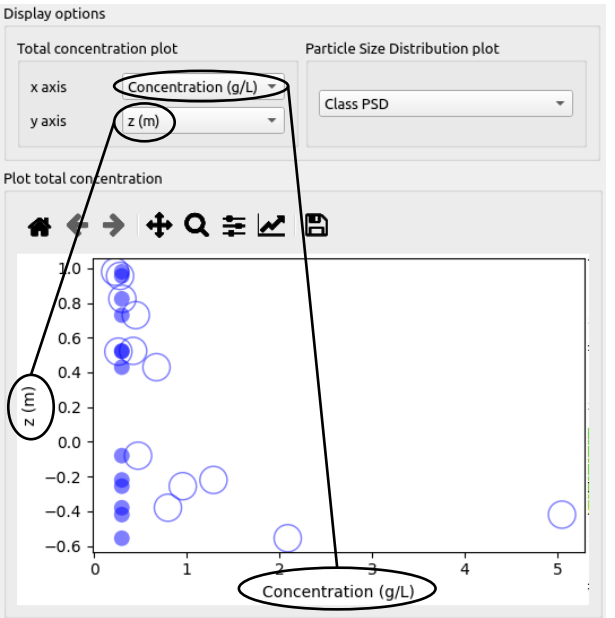
By default all fine sample are plotted with crosses on the acoustic recording.
The user can unchecked or checked to, respectively, remove or add the sample position. The color of the sample can be changed.

(3) Download sand sample data

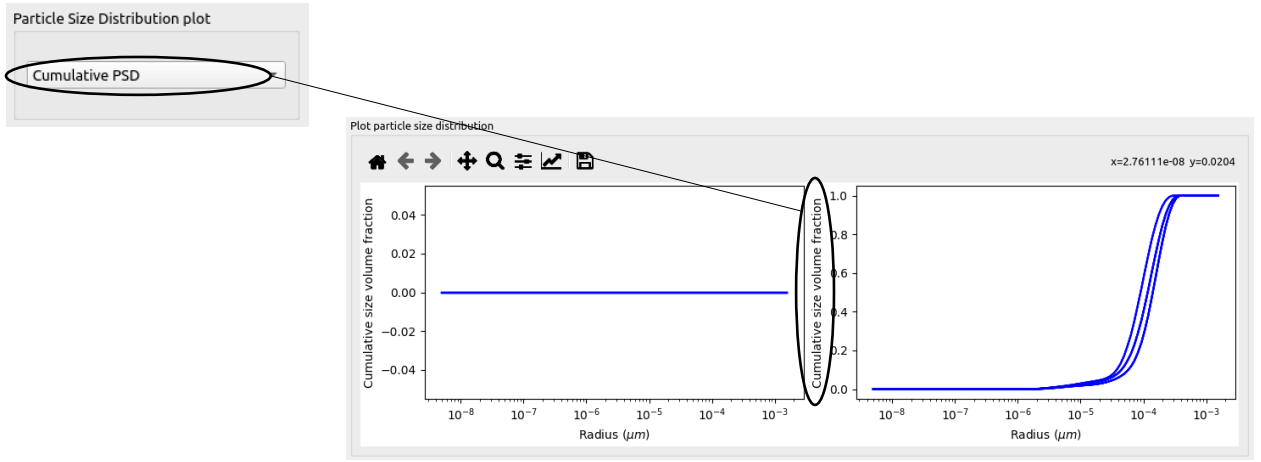
By default all sand samples are plotted with circles on the acoustic recording.
The user can unchecked or checked to, respectively, remove or add the sample position.
The color of the sample can be changed.

(4) Plot total concentration of fine and sand sediments.

The concentration can be displayed in g/L or in %.
The depth of the sample can be displayed in m or normalized by the depth of the river.



(5) Plot Particle Size Distribution of fine (left) and sand (right) sediments : class or cumulated.



AcouSed - unsaved file

File Tools Help

Open

Acoustic data | Signal preprocessing | Sample data | Sediment Calibration | Acoustic inversion | Note

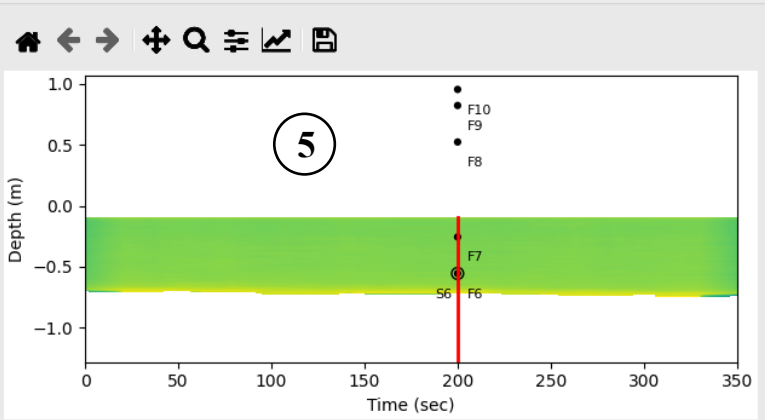
Step 1 : acoustic and sample data choice

1
Acoustic data: Romanche_Ve

2
Frequency 1: 0.5 MHz
Frequency 2: 1.0 MHz

3
Fine profile: F6, F7, F8, F...
Sand target: S6

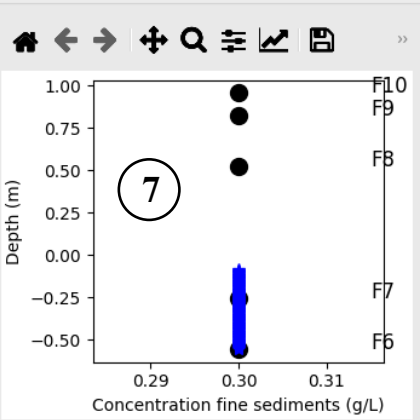
4
Plot sample



Step 2 : profile of the fine sediment concentration

6
Interpolate

Sample	Depth (m)	time	Cfine (g/L)
F6	-0.42	100	0.3
F7	-0.22	100	0.3
F8	0.43	100	0.3
F9	0.73	100	0.3
F10	0.98	100	0.3
Sample	Depth (m)	time	Csand (g/L)
S6	-0.556	200	2.0905



Step 3 : Compute Calibration

Import sediment calibration file
Compute sediment calibration

8
Compute Calibration

T = 0.00 °C

	0.5 MHz		1.0 MHz	
kt	0.3626		0.6445	
ks	0.19801	m/kg^0.5	0.58267	m/kg^0.5
sv	0.00489	/m	0.04236	/m
X	3.11			
αs	2.03572	/m	1.92473	/m
ζ	14.59295	/m	13.79733	/m

9

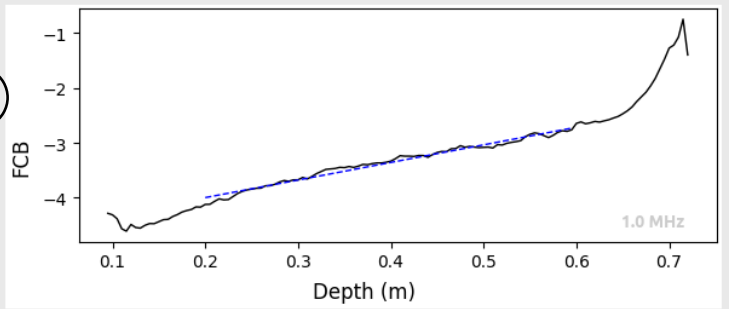
Save calibration

Step 3 (optional) : Fluid Corrected Backscatter

Frequency: 1.0 MHz
From: 0,20 to: 0,60

αs = -1.6006 dB/m

10



1600

(1) Update list of the acoustic recordings to use for calibration.
The acoustic recording use for calibration is plotted with all samples.

(2) Select the frequencies for calibration. Frequency 2 will be used for inversion.

(3) Select profile of fine sediments samples and sand sample target.

(4) Plot samples selected in step 3, on acoustic recording (step 5) and profile of fine sediments (step 7).
List and details of selected samples are provided under button « Interpolate ».

(5) Plot of acoustic recording selected in step 1. By default, all samples are displayed.

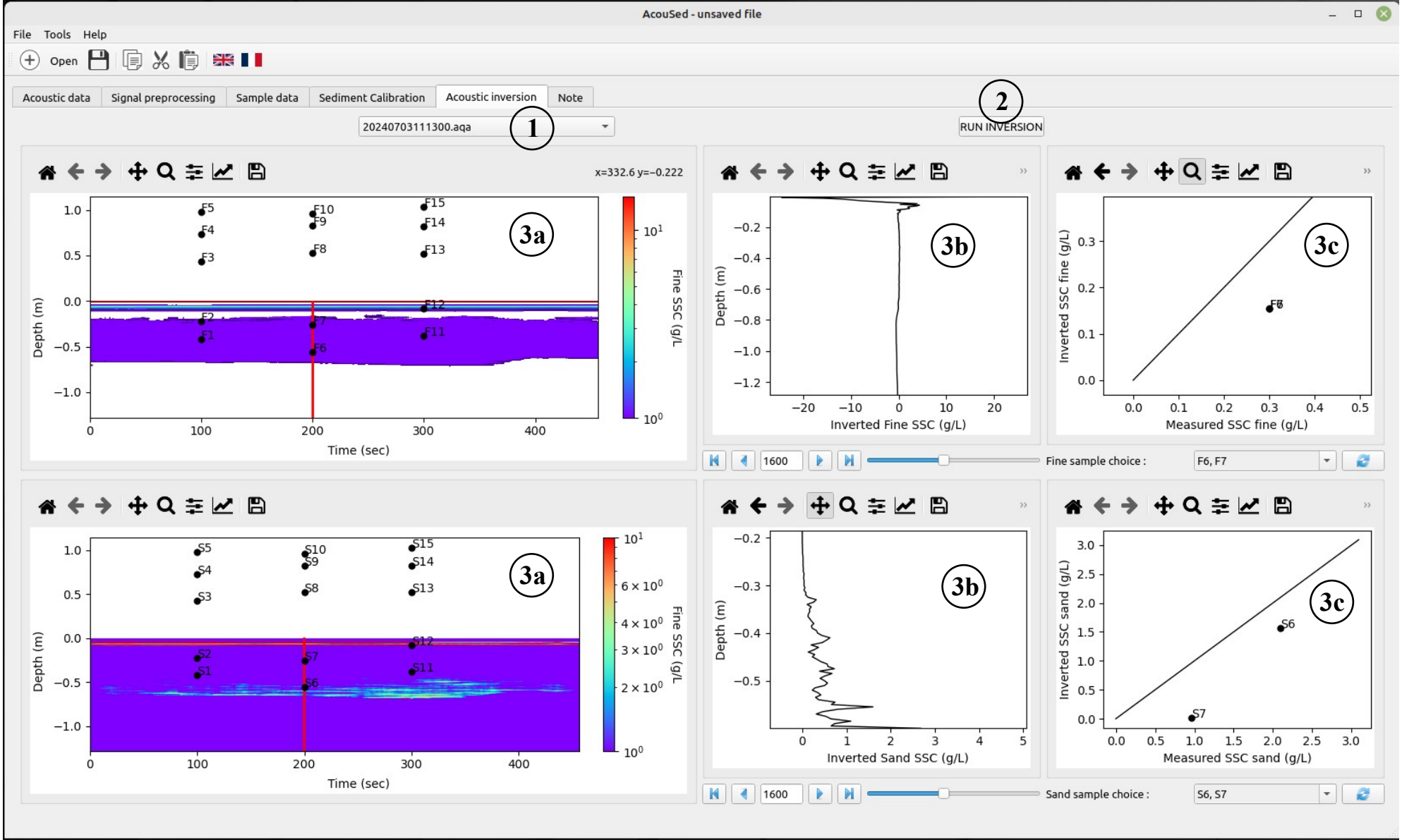
(6) Linear interpolation of fine samples concentration profile.

(7) Concentration profile of fine sediments samples selected in step 3. The linear interpolation is plotted with blue markers.

(8) Compute or load calibration.

(9) Values of calibration parameters. Temperature and constant kt are read from values in « acoustic data tab ». Frequencies correspond to frequencies selected in step 2. The other parameters are enabled and can be change by the user.

(10) FCB computation and profile. By default the FCB profile is plotted at the position of the vertical sediment profile for calibration (red vertical line in step). The user chooses two abscissas between which the linear regression is performed and plotted with blue dashed line.


AcouSed - unsaved file
File
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Signal preprocessing
Sample data
Sediment Calibration
Acoustic inversion
Note
20240703111300.aqa
1
2
RUN INVERSION
x=332.6 y=−0.222
3a
3b
3c
Depth (m)
Time (sec)
Fine SSC (g/L)
Inverted Fine SSC (g/L)
Measured SSC fine (g/L)
Inverted SSC fine (g/L)
1600
Fine sample choice :
F6, F7
Inverted Sand SSC (g/L)
Measured SSC sand (g/L)
Inverted SSC sand (g/L)
Sand sample choice :
S6, S7

(1) Choose the acoustic recording to invert.

(2) Run inversion and plot results.

(3) Fine sediments
- (a) Inverted concentration field : positions of all sample are displayed
- (b) Inverted concentration profile
- (c) Inverted concentration vs Measured concentration : samples can be choosed in the list of sample.

(1) Sand sediments
- (a) Inverted concentration field : positions of all sample are displayed
- (b) Inverted concentration profile
- (c) Inverted concentration vs Measured concentration : samples can be choosed in the list of sample.