



SES-2000

Narrow Beam Parametric Sub-Bottom Profiler

User's Guide ISE 2.9.5
Post Processing Software



2017-10

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Revision Log

Revision	Description	Date
0	First issue of restructured manual	Sep. 2015
1	Added dialog description <i>The Convert SES3 Files Tool</i> Added <i>How to convert SES3 files</i> and <i>How to generate voxel files out of SES files</i>	Dec. 2015
2	Added <i>Revision Log</i>	Jan. 2016
3	Added button for saving changes after the <i>manipulated SIS</i> function. Added new function with The <i>Reduce Raw Files Tool</i> .	April 2016
4	Added <i>The Tide File Converter</i> dialog.	April 2016
5	Added Import Motion Data from Text File to <i>Motion Processing...</i>	June 2016
6	Added Rotate Coordinates to <i>SIS Process....</i> Description of a new kind of export function inside the GIS module called <i>Voxler Area Export</i> . Updated <i>SESGridder</i> description.	Dec. 2016
7	Updated <i>The Process Script Tool</i> dialog. Updated <i>The Export Graphic Dialog</i> .	May 2017
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SES-2000 Post Processing Software

User's Guide

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ISE Post Processing Software

This User's Guide is a task oriented manual which describes how to use the ISE software application for processing echo sounder data of the Parametric Echo Sounder SES-2000. To use this product effectively, one should be familiar with the following:

- Microsoft® Windows® Operating System and personal computers
- Sediment Echo Sounder System SES-2000
- Underwater Acoustics and Echo Sounding Terminology

For additional information about personal computers and Windows® read your computer manual or visit your local book store.




Please, read the hard and software manuals for additional information about the Parametric Sediment Echo Sounder SES-2000.

Introduction

The Sediment Echo Sounder SES-2000 is a sub bottom profiler that is equipped in advanced online signal processing capabilities. The first results are presented as a picture on the screen or a hardcopy on paper. Often the users want to process the data again to get as much information as possible. The system SES-2000 possibility to digitize and store the echo sounder data allows further processing. With the software package ISE the user has a great tool for different processing tasks, like digitizing layers, correcting echo plots with tide data, motion sensor data or GPS data and extracting the information to export into compatible formats. The ISE software is fully compatible with all recorded data files from the systems SES-2000 smart, SES-2000 compact, SES-2000 light, SES-2000 standard, SES-2000 medium, SES-2000 ROV, SES-2000 deep and SES-2000 quattro.

ISE User's Guide

This user's guide describes how to use the ISE software in general and tries to show solutions for realizing different processing tasks. After a short description of the main function it will show in a task orientated way how to use the software effectively. Some facts about the document structure:

- **Bold** marks subordinated headlines.
- *Italics* (black) is used for file and path names.
- *Italics* (blue) is used for internal and external links.
- Keys belonging to the keyboard are enclosed in brackets. If some keys have to be pressed at the same time, they are separated by '+' (example: Press [Ctrl]+[Alt]+[Del] to open the task manager).
- The symbol  marks a very useful hint or key fact.

ISE Installation

The ISE software is shipped on a USB memory device or a CD-ROM. It is possible to install the software on the SES-2000 acquisition PC as well as on a personal computer for processing tasks in the office. Use the Windows® explorer to copy the ISE software to the hard drive of the personal computer. Our folder recommendations are:

- do not use common system folders where you may not have read/write access, such as "C:\Windows\"
- you may install the software under "C:\Program Files\"
- do not use a folder on a network drive
- do not use a folder on a removable drive
- you must use an installation folder with read/write access for the user
- the data folder must have read/write access for the user
- ISE will use the shared folder "C:\Windows\Temp" for storing temporary files and it is required that the user has read/write access for this folder
- the default folder for SES-2000 systems with integrated PC hardware is called "C:\SES_Applications\" where all Innomar software is stored

To start the ISE software the program file ISE.EXE needs to be copied from the provided disk. There are no additional DLL's required. Innomar does not provide a dedicated setup program for the ISE software. Start the program like every other program under the Microsoft® Windows® environment. If desired, a link to the ISE.EXE program on the desktop can be created.

In case of software updates, the updated ISE.EXE needs to be copied to the ISE folder by replacing the original file. In order to check if any updates are available, the ISE menu item "Help/Check for Update..." will make a connection to our server and retrieves the latest ISE version number and release history. An update will not be downloaded automatically, but has to be requested from Innomar by e-mail or phone. Innomar will also provide major updates at certain times by sending download links via e-mail to the users when available.



When using the ISE software for the first time on a PC, the installation of the drivers for the USB hardware dongle is required in advance.

It's recommended to carry out processing on the local hard drive, since processing over the network tends to be slower. For better performance it is also recommended, not to start the software from a removable media. We recommend to use a SSD when processing large SES-2000 data files

The ISE software will save some settings, program parameters and window positions in the MS Windows Registry after the first usage. The registry key used is called "Computer\HKEY_CURRENT_USER\Software\Innomar\ISE".

USB Hardware Dongle

The ISE software requires a USB hardware dongle, which is compatible with all USB interface standards. Plugging the dongle into a free USB socket will start the installation process automatically. MS Windows 10 provides the dongle driver automatically. For MS Windows 7 a dongle driver is provided by Innomar. The driver can be installed from the CD or USB pen drive manually. The driver is located in the directory called "Windows7_MatrixDongleDriver". For USB dongles shipped 2015 or earlier a driver is provided as well. This driver might be used if the automatic installation under MS Windows 10 failed. The driver is located in the directory called "Windows10_MatrixDongleDriver_DonglesBefore2015".

Requirements for a personal computer

A personal computer with Microsoft® Windows® operating system is required. The ISE software is compatible and tested with Windows 7®, Windows 8®/8.1® and Windows 10®. As a minimum for a processing workstation we suggest a dual core processor with min. 2 GHz, at least 4 GB RAM and a standard hard drive. For processing larger data files, the working speed can be significantly increased by using more RAM, multi core processors and SSD drive. The screen resolution should have a minimum of 1024x768 pixel. A free USB slot is necessary for the hardware dongle. A mouse or compatible control device is absolutely necessary to operate the software, particularly when picking reflectors or digitizing objects and features. In order to create print outs with the ISE software a Microsoft® Windows® compatible printer is needed.

The recommended hardware for the processing workstation is:

- Intel i5, i7 or i9 processor
- 8 GB RAM or more
- SSD drive for storing the data
- a screen with Full HD resolution (1080p with 1920 x 1080 pixels)
- when using the GIS Extension of the ISE software a second monitor is highly recommended in order to have one screen for the map display and the other screen for the display of the seismic sections
- when using the GIS Extension of the ISE software with large background maps and numerous track lines a dedicated graphics adapter is highly recommended in order to improve the visualization performance

General Processing Preparation Steps

ISE is a post processing software tool for the parametric sediment echo sounders SES-2000. With ISE digitally stored data can be loaded. The visualization of the echo data can be adjusted by different processing algorithms and processing methods. Furthermore the data correction is possible for instance: tide and/or position.

SES-2000 has the capability to store raw and demodulated data, which can be converted to SEG-Y, XTF and ASCII format for processing with third party software.

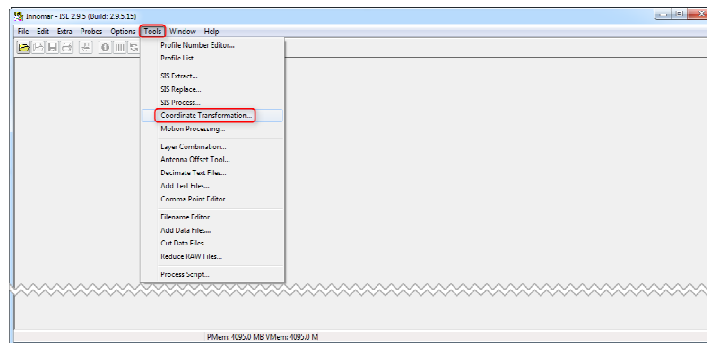
The recorded data by the SESWIN software is available in two formats. SES format represents frequency envelope and RAW format represents full wave form data. The SES-2000 compact has the RAW format optional; the basic version stores only the frequency envelope.

File Management

It is highly recommended to create a structured database. Use one folder to keep the original data files and create a working folder within stored file are to be modified. That will prevent from any corruption of acquired information.

Coordinate Transformation

An important step for the preparation of the data is the transformation of the coordinates. This is always necessary if the output of the results should be in a coordinate system that was not set during recording. Apart from this, it is recommended to work in a metric coordinate system, as some of the tools are more comfortable to use. The transformation tool can be found under **Tools** → **Coordinate Transformation**.



- ① Choose the directory with the data files.
- ② Choose the file extension filter according to the data files.
- ③ Select one or multiple files.

Data Source and Destination

- ④ Set the SIS-IDs according to the recorded Lat/Lon and the corresponding hemisphere.
- ⑤ Set the SIS-IDs for as destination for the new coordinates. The content of these fields will be overwritten with the new coordinates.

- ⑥ Set the format of the Lat/Lon values according to the recorded Lat/Lon values.
- ⑦ Set to projected conversion for coordinate transformation.
- ⑧ Consider to set a prefix to generate new data files. Make sure the box is ticked and text prefix is given.

Conversion Parameters

- ⑨ Select the desired coordinate system from the list.
- ⑩ When UTM projection is used, the UTM zone can be determined automatically.
- ⑪ Start the coordinate transformation.

The screenshot shows the 'Coordinate Transformation' dialog box. It is divided into several sections:

- Files:** A table listing files with columns for Start Time, Stop Time, Size, Profile, Area, and Remarks. Red circle 1 points to the file path, and red circle 2 points to the file list.
- Data Source and Destination:**
 - Position Data Source: SIS String for LDN Position (SIS1: E) and SIS String for LAT Position (SIS2: N). Red circle 4 points to the E dropdown.
 - Position Data Destination: SIS String Number for X Position (7) and SIS String Number for Y Position (8). Red circle 5 points to the X dropdown.
 - Input Format (WGS84): DDDMM.MMMM (degrees, minutes, e.g. 1225.336 - 5420.656). Red circle 6 points to the input format field.
 - Output Format: Projected Conversion. Red circle 7 points to the output format field.
 - Use a prefix to generate new files: (checkbox). Red circle 8 points to the checkbox.
- Buttons:** Convert (red circle 11) and Exit.
- Conversion Parameters:**
 - Set projected Coordinate System: Projected Coordinate System: WGS 84 UTM zone 30N (epsg:32630). Red circle 9 points to the dropdown.
 - Determine UTM Zone automatically (red circle 10) and WKT Setup.
 - Decimal Digits of Output: 2.
 - Position Input (LDN): 0.0000000, Position Output (X): 833978.56
 - Position Input (LAT): 0.0000000, Position Output (Y): 0.00

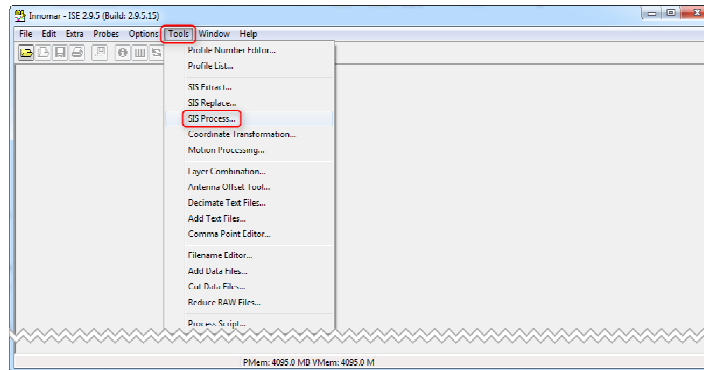
Interpolation

An interpolation of the coordinates is in general recommended. If the update rate of the positioning system is less than the ping rate of the SES-2000 system, an interpolation should be always done. For example GPS update rate 5 Hz and Ping rate 20 Hz: so only every 4th ping has a measured position. In such cases it is necessary to interpolate between true received positions so that every ping can have an individual coordinate position. The interpolation can be done in permanent or temporary manner. This interpolation is for metric coordinate systems such as UTM.

Permanent Interpolation

This type of interpolation affects all the records representing the positions. These changes will be saved within the data file and are permanent.

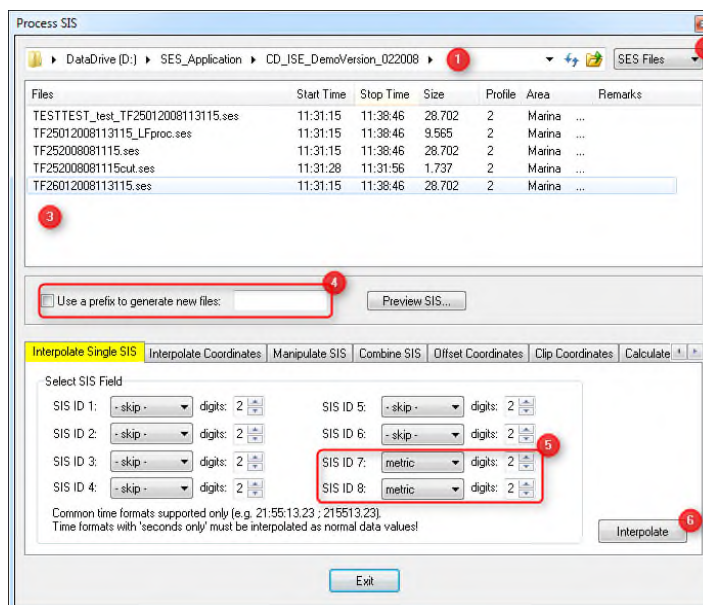
Start the ISE software and go to **Tools** → **SIS Process** of the menu to open the dialog which contains the interpolation functionality. More options given in this tab and other tabs will be explained in chapter *How to use SIS Process Tools*.



- ① Choose the directory with the data files.
- ② Choose the file extension filter according to the data files.
- ③ Select one or multiple files.
- ④ Consider to set a prefix to generate new data files. Make sure the box is ticked and text prefix is given.

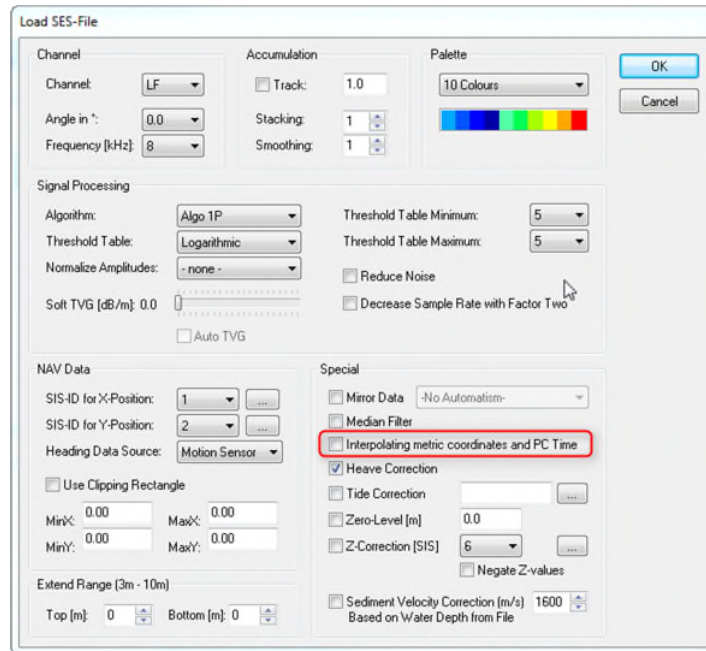
Interpolation Single SIS

- ⑤ Set the SIS-IDs to be interpolated. This example has metric UTM coordinates on SIS field 7 and 8.
- ⑥ Press the button **Interpolate** to execute the interpolation.



Temporary Interpolation

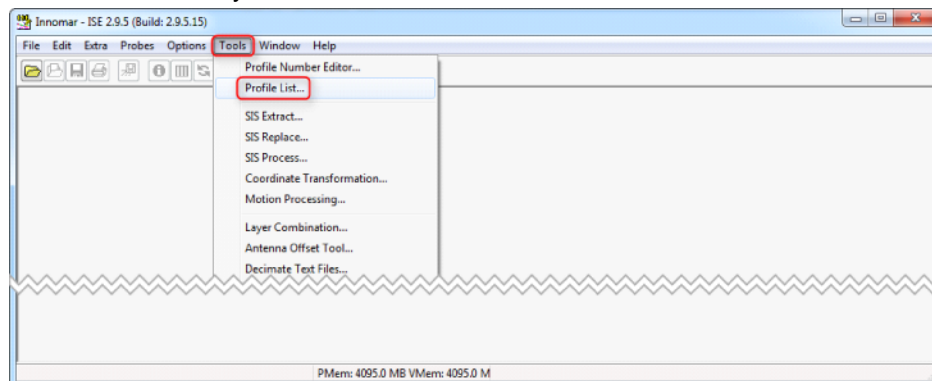
It can be enabled via the loading dialog window during the file loading process, if the red highlighted tick box is checked. Be aware this interpolation won't be saved into the file.



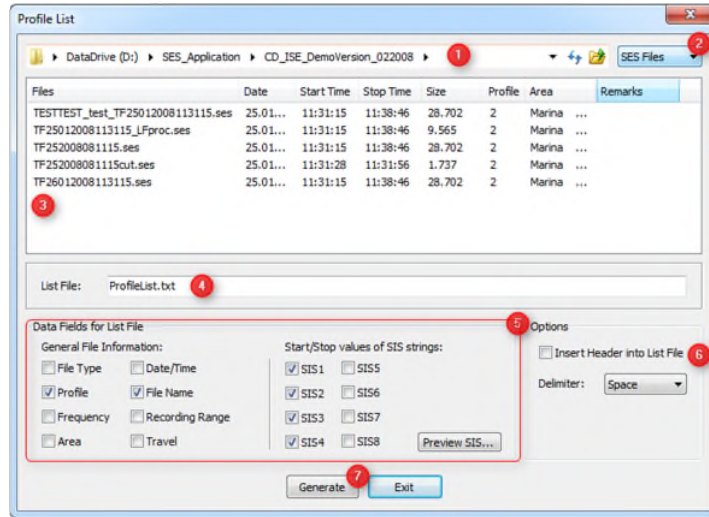
Profile List (optional)

In order not to lose the overview of larger processing sessions, it is advisable to create a log file. For this purpose the ISE offers a tool to extract header information of the data files to an ASCII file.

Start the ISE software and go to **Tools** → **Profile List** to open the dialog which contains the functionality of extraction of the header information.



- ① Choose the directory with the data files.
- ② Choose the file extension filter according to the data files.
- ③ Select one or multiple files.
- ④ Enter an output file name with the extension.
- ⑤ Tick the desired information (possible several in one time)
- ⑥ To know the exported order tick the header check box.
- ⑦ Start the log file generation.



This information can be imported into third party software such as Excel® and can be rearranged for a better viewing.


1	SBP - Innomar Offline Processing Log																				AC									
2	Project file	Profile ID	Area	Start Range	End Range	Range	Time source	Line Type (TL, Tenthline, U, Langline, CL, Crossline)	Line Frequency (kHz/Pulse)	Coordinate system/ Projection	SEP	NAV	ORIG DATA TO SERVER	INTERPOLATE NAV	SWP LAST	TIDE GAUGE	SEASWAVE TRACKING Layer (H)	ORIG SWAVE REPROJECED	SWAVE TRACKING Layer (H)	INTERP 2C	INTERP 2C	ASCII REPORT MD	ASCII REPORT LAYER	TXT INFO CHARTS	TXT INFO AUTOCAD	CHART QC	CREATE BIF	CREATE SEGY	PROJECT BACKUP (PLOT/BI)	COMMENT
3	Set file																													
4																														
5																														
6																														
7																														
8																														
9																														
10																														
11																														
12																														
13																														

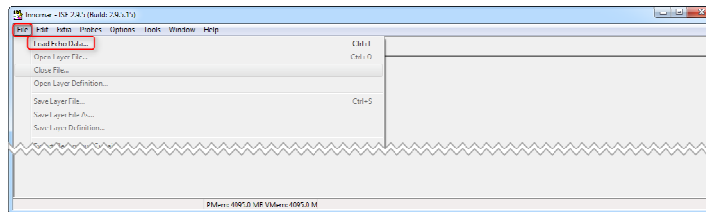
Loading Data

The loading of Files



For loading the data files with **The Load Data Dialog** it is highly recommended to use the GIS module which is described under **How to work with the GIS module**. Otherwise **The Load Data Dialog** can be opened as explained here.

Start the ISE software and either go to **File** → **Load Echo Data** of the menu or select the icon  (when hovering above any icon the description is visible), with tag **Load Echo Data**, to open the Windows® file browsing dialog. Dependent on the selected file type *The Load Data Dialog* window will popup.



There is a vast range of different survey types and depending on survey targets the appropriate setup of *The Load Data Dialog* is crucial to achieve desired results.

The Loading of SES Files

The following paragraph describes the needed steps to open a SES-2000 data file. The essential settings are highlighted with red boundaries. The optional settings are highlighted with yellow boundaries. A few settings cannot be changed without reloading the data file. All other settings on the load dialog can be changed in *The Signal Processing Dialog* which is reached in the menu **Extra** → **Signal Processing**. The explanation for the single components can be found at the section *Load Dialog SES Data*.

- ① Select the desired **Channel**. **HF** (high frequency) in general gives better seafloor definition and is often used for the bathymetry. The **LF** (low frequency) is penetrating the seabed and gives information about the strata.

When during acquisition the multi frequency data were acquired then desired low frequency can be selected from the pull down menu **Frequency**.

- ② Select the SIS-IDs which contain the position coordinates. Those position values are used for all export functions and cannot be changed during the processing. Further select a source for the heading data.



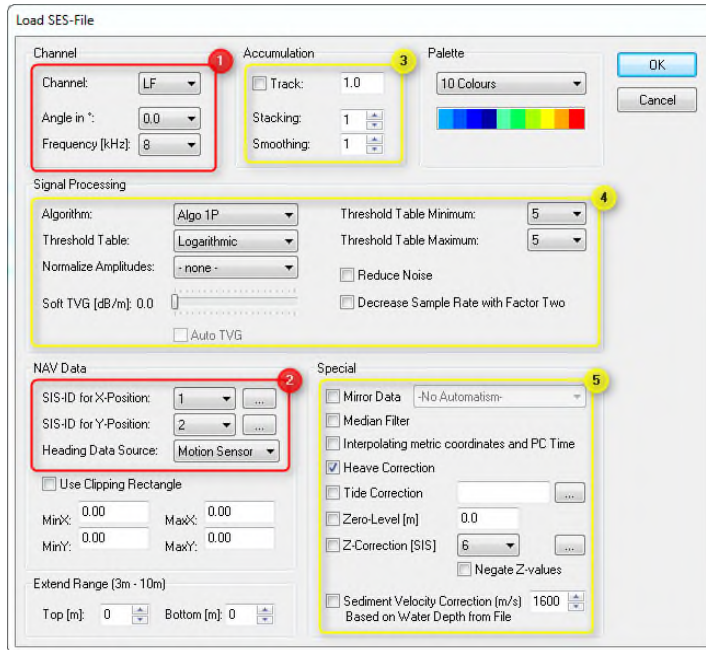
The frequency channel and the SIS-IDs cannot be changed without reloading.

- ③ Optional different accumulation methods can be applied to improve the signal to noise ratio. A more detailed description can be found under *The Load Data Dialog* → **Accumulation**.



The track accumulation cannot be changed without reloading.

- ④ Optional different algorithms can be applied to visualize the data. Furthermore different filters and thresholds can be used to improve the signal to noise ratio. More information can be found under **The Load Data Dialog** → **Signal Processing**.
- ⑤ Miscellaneous options such as tide correction or mirror data can be used for further adjustments. All options are described under **The Load Data Dialog** → **Special**.



The Loading of RAW Files

The following paragraph describes the needed steps to open a SES-2000 raw data file. The essential settings are highlighted with red boundaries. The optional settings are highlighted with yellow boundaries. A few settings cannot be changed without reloading the data file. All other settings on the load dialog can be changed in **The Signal Processing Dialog** which is available in the menu **Extra** → **Signal Processing**. The explanation for the single components can be found at the section **Load Dialog RAW Data**.

- ① Select the desired **Channel**. **HF** (high frequency) in general gives better seafloor definition and is often used for the bathymetry. The **LF** (low frequency) is penetrating the seabed and gives information about the strata.

When during acquisition the multi frequency data were acquired then desired low frequency can be selected from the pull down menu **Frequency**.

- ② Select the SIS-IDs which contain the position coordinates. Those position values are used for all export functions and cannot be changed during the processing. Further select a source for the heading data.



The frequency channel and the SIS-IDs cannot be changed without reloading.

- ③ Optional different accumulation methods can be applied to improve the signal to noise ratio. A more detailed description can be found under **The Load Data Dialog** → **Accumulation**.



The track accumulation cannot be changed without reloading.

- ④ Optional different algorithms can be applied to visualize the data. Furthermore different filters and thresholds can be used to improve the signal to noise ratio. More information can be found under **The Load Data Dialog** → **Signal Processing**. In order to take advantage of the noise filers, the data have to be demodulated. If no Pre-Filters and no Demodulate modus have been set up, the full content of the raw data will be visualized (positive and negative phase). In combination with these settings the Red-White-Blue and Red-White-Black palettes can be used. Consider also not to use the median filter.

- ⑤ Miscellaneous options such as tide correction or mirror data can be used for further adjustments. All options are described under **The Load Data Dialog** → **Special**. Due to the high sample rate of the raw data in combination with a large range the vertical exaggeration can be very strong. To reduce the vertical exaggeration the sample rate can be decreased by a factor.

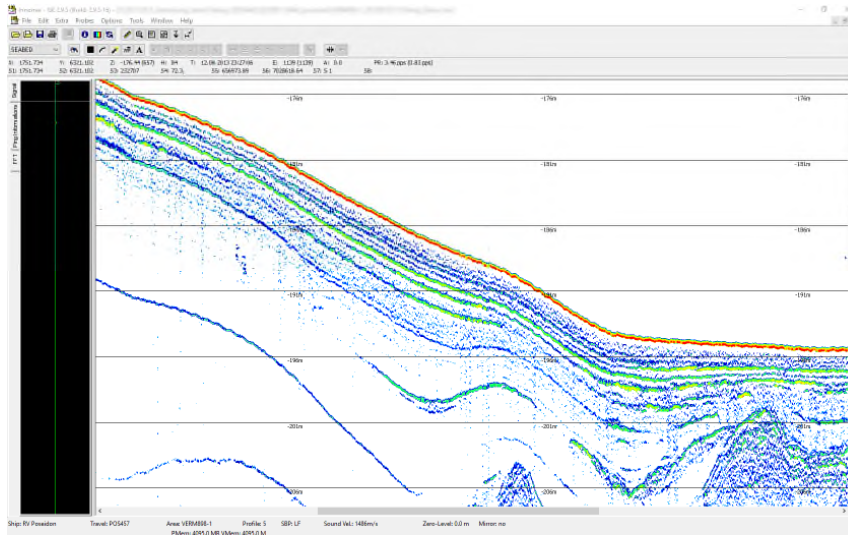
The screenshot shows the 'Load RAW-File' dialog box with the following sections and callouts:

- 1** (Red box): Channel section containing 'Channel' (LF), 'Angle in °' (0), and 'Frequency [kHz]' (8).
- 2** (Red box): NAV Data section containing 'SIS-ID for X-Position' (1), 'SIS-ID for Y-Position' (2), 'Heading Data Source' (Motion Sensor), 'Tide Correction from File', and 'Z-Correction [SIS]' (7).
- 3** (Yellow box): Accumulation section containing 'Track' (checkbox), 'Stacking' (1), and 'Smoothing' (1).
- 4** (Yellow box): Signal Processing section containing 'Pre-Filter' (<none>), 'Demodulate' (<none>), 'Algorithm' (Algo AMP), 'Threshold Table' (Logarithmic), 'Soil TVG [dB/m]' (0.0), 'Threshold Table Minimum' (5), 'Threshold Table Maximum' (5), and 'Reduce Noise' (<none>).
- 5** (Yellow box): Special section containing 'Mirror Data' (checkbox), 'Median Filter' (checkbox), 'Interpolating metric coordinates and PC Time' (checkbox), 'Heave Correction' (checkbox), 'Decrease Sample Rate by' (3), 'Sediment Velocity Correction [m/s]' (1600), and 'Based on Water Depth from File' (checkbox).

ISE User Interface

The ISE Screen

When double clicking on the ISE icon, the ISE main screen appears. The software is designed as a common Windows® MDI application. This means it is possible open and work with different data files at the same time in the same application space. The only limitation for opening files is the memory space. The ISE screen is divided into a main menu, the workspace, where all opened windows are arranged, a tool bar with some speed buttons, for instance access to functions, and a status bar at the bottom of the main window with some program information. Each opened data window has its own tool bar with some speed buttons and an info panel at the top and a status bar at the bottom. Additionally, some tool windows can be opened, which are free placeable on the screen. They give access to special functions or contain extra information about the data. An example is the zoom window, which allows zoom in a certain area around the cursor position.



The ISE Tool Bars and Status Bars

The main application window and every data window have their own tool bar. These groups of buttons provide quick access to commonly used commands.



A quick hint will appear if hovering the mouse over one of the tool bar buttons.

The main application window has a status bar with program information and every data window has a status bar with some information about the loaded file. A status panel below the tool bar of the data window shows some information about the data below the actual cursor position, e.g. the time.

The Main Tool Bar

This tool bar on the upper side of the main application window contains some buttons for quick access to program functions, e.g. “open data file” and “save layer file”. The main tool bar includes the following buttons:



Button	Description
<i>Load Echo Data</i>	Opens an open dialog to select data files for loading into the ISE software.
<i>Open Layer File</i>	Opens an open dialog to select a layer file in order to load the saved layers into the active data window.
<i>Save Layer File</i>	Saves all digitized layer of the data window, in the previous loaded layer file. If no file was loaded, the standard Windows® save dialog is opened.
<i>Print Graphic</i>	Prints the echo plot of the active window.
<i>Write Water Depth to Active Data File</i>	Overwrites the on-line calculated water depth or overwrites a SIS field with the calculated water depth from the active layer.
<i>Save manipulated SIS to SES-File</i>	The icon becomes enabled after using the <i>SIS manipulate</i> function. It saves the changes to the SES file and updates the track within the GIS module.
<i>Show File Information</i>	Shows the parameters of the file in the active data window, e.g. recording time, frequency, amplifier setting etc.
<i>Select Color Palette</i>	Sets color palette for the actual data window.
<i>Signal Processing</i>	Selects and configures the digital signal processing for the echo sounder data in the active window.
<i>Tool Box</i>	Opens or closes the tool box window.
<i>Zoom Box</i>	Opens or closes the zoom window.
<i>Overview Box</i>	Opens or closes the overview window.
<i>GIS/Track Box</i>	Opens or closes either the GIS window or the track plot window depending on which version is installed.
<i>Target Picker Box</i>	Opens or closes the target picker window.
<i>Segment Box</i>	Opens or closes the segment box window.

The Data Window Tool Bar

Every data window has its own tool bar. A combo box for the selection of the active layer is included in the tool bar. There are twenty layers per data for separate editing available. The data window tool bar includes the following buttons:



Button	Description
Hide Layer	Allows to show or to hide the active layer. The layer data themselves won't be modified.
Pen Color	Opens the standard Windows® color dialog and allows selecting the pen color for the active layer.
Pen Width and Mode	Selects the pen width for the active layer in the range between 1 and 5 pixels. Additionally it is possible to select between freehand and line mode.
<i>Capture Mode</i>	Starts and stops the capture mode. During the capture mode the program tries to calculate automatically the layer position under the cursor or in a special mode for a bigger range starting from the cursor position.
<i>Text Block</i>	Inserts a text block into the actual data window.
Undo Segment	Removes the last edited segment from the active layer.
Delete Layer	Deletes the whole active layer.
Copy Layer	Copies the layer contents into the ISE clipboard.
Paste Layer	Copies the ISE clipboard contents into the active layer.
Merge Layer	Merges the ISE clipboard contents into the actual layer.
Undo Layer	Undoes the last change in actual layer. with the ISE layer undo buffer contents
Mirror Layer	Performs a mirror function to the whole layer data.
<i>Scale Layer</i>	Scales the layer data in the horizontal direction.
<i>Add Offset</i>	Adds an offset to the active layer in the vertical direction.
<i>Smooth Layer</i>	Smooth the active layer.
<i>Remove Peaks</i>	Tries to remove peaks from the active layer.
<i>Remove Overlaps within</i>	Rebuilds a layer and deletes all overlapping parts. It's

<i>Layer</i>	also a tool to remove peaks when editing layers.
<i>Manipulate SIS Fields</i>	Interpolates or deletes selected SIS fields within a particular area.
Mark Block	Marks a block of the data for separate processing or exporting parts of the data.
Unmark Block	Resets a previously marked block.

The Main Status Bar

The Main Status Bar shows the available system memory. It is divided into free physical memory and free virtual memory which is the amount of free hard disk space available as system memory. The whole free memory can be used by the application for loading data files and processing tasks. The more free physical memory is available, the faster the computer system can handle the data and the faster the program can run.

The Data Window Status Bar

The Data Window Status Bar shows some information about the file, loaded into the data window. There are shown some information's of the survey such as the name of the ship, the name of the travel, the name of the area, the profile number, the speed of sound and some applied processing settings.

Ship: Deipkieker	Travel: TrainingWmde	Area: Marina	Profile: 2	SBP: LF	Sound Vel.: 1500m/s	Zero-Level: 0.0 m	Mirror: no
PMem: 4095.0 MB VMem: 4095.0 M							

The Data Window Status Panel

The **Data Window Status Panel** is located below the **Data Window Tool Bar**. It shows different values depending on the actual cursor position. While moving the mouse cursor over the echo plot these values will be updated instantly. On the panel there are shown the X position from the SIS data, the Y position from the SIS data, the Z value in the echo plot, the date and time, the total height of the echo plot, the ping number, the actual amplitude, the mean amplitude around the cursor position and the online calculated ping rate as well as the actually achieved ping rate within the brackets.

If in the *environment option* the display of all SIS strings is enabled, the status panel has two lines. The second line shows the contents of all eight SIS strings.

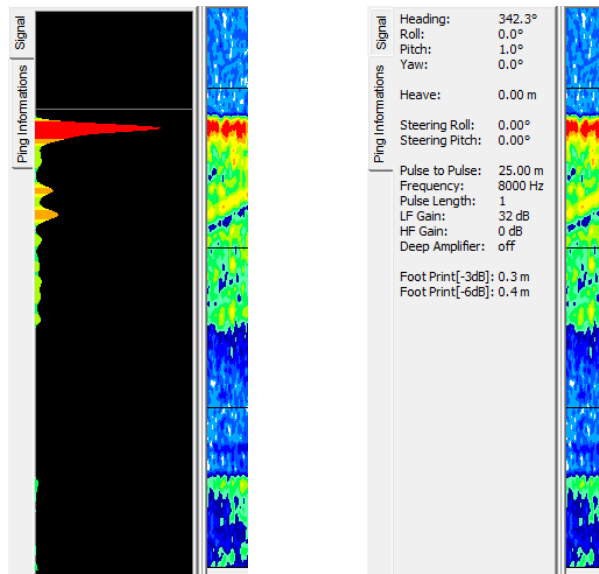
If the loaded data file is a Side Scan file then the projected coordinates are also shown with the offset from the track (heading data in one SIS field or from a motion sensor required)

X: 351254.47	Y: 6788303.53	Z: -3.03	H: 7	T: 25.01.2008 11:31:22	E: 96 (192)	A: 0	MA: 19	PR: 30.00 pps (30.33 pps)
S1: 351254.47	S2: 6788303.53	S3: 113122	S4: -4.91	S5:	S6:	S7: 833978.56	S8: 0.00	

The Ping Information Panel

The ping information panel can be found on the left hand side of the main ISE screen. The panel provides two tabs. The first tab called Signal, shows the signal strength for the entire trace at the cursor position based on the chosen signal processing algorithm. The tab Ping Information gives some more information e.g. motion sensor

values, amplification values or the calculated foot print size at the current cursor position.



The ISE Menus with corresponding Dialogs

On top of the ISE window the main menu can be found. The most functions of the program can be accessed from here. Some of the menu commands are accessible with a Hot Key, which is shown in the menu string.



Menu commands are disabled if they are not accessible for certain reasons.

File Menu

The File Menu allows selecting files to open, save layer files, save pictures, export data files and print data files. The last four opened files are held within the **File Menu** for quick access. The following menu commands are accessible:

Command	Description
<i>Load Echo Data</i>	Opens an open dialog to select data files for loading into the ISE software.
<i>Open Layer File</i>	Opens an open dialog to select a layer file in order to load the saved layers into the active data window.
Close File	Closes the active window.
<i>Open Layer Definition</i>	Opens a definition file for the layers which are attached to the active data window.
<i>Save Layer File</i>	Saves all digitized layer of the data window, in the previous loaded layer file. If no file was loaded, the standard Windows® save dialog is opened.

<i>Save Layer File As</i>	Opens a standard Windows® save dialog in order to save all digitized layer of the data window into a selectable file.
<i>Save Layer Definition</i>	Saves the definition of the layers of the active data window into a file.
<i>Export Fledermaus Curtain</i>	Exports the active data window into a QPS Fledermaus sd file.
<i>Export Marked Section as SES File</i>	Saves the marked section as individual SES or RAW file depending on the original data format.
<i>Export Processed SES/RAW-File</i>	Exports the active data window with all applied settings into a SES/RAW file depending on the original data format.
<i>Export Graphic</i>	Exports the actual window contents (annotated echo plot) into a graphic file.
<i>Export Layer Data</i>	Exports the layer information of the active window into ASCII files for an easy import into other software packages, e.g. GIS or volume calculation tools.
<i>Export Layer as CODA-File</i>	Exports the layer information of the active window into ASCII files in CODA format based on layer segments.
<i>Export Layer as PIPE-File</i>	Exports the layer information of the active window into ASCII files in PIPE format based on layer segments.
<i>Export Layer as SVG-File</i>	Exports the layer information of the active window into SVG files (Scalable Vector Graphics) based on layer segments.
<i>Export Layer as DXF-File</i>	Exports the digitized layer into an AutoCAD *.dxf file.
<i>Export Signal Traces</i>	Exports the data from signal traces within a marked block into ASCII files.
<i>Export Window</i>	Captures the application window into a graphic file.
<i>Print</i>	Prints the data of the active window.
Recent File List	Lists the last 4 opened data files.
Exit	Closes all open data files and exits from the application.

The ISE File Dialogs

This section deals with the dialogs to set or to modify parameter for selected function or to choose between alternative options. Some of the dialogs are self-explanatory, e.g. the color palette dialog or the pen dialog, however others require some descriptions. The dialogs have to be closed, before the user has access to the open data windows again.

The Load Data Dialog

The Load Data dialog summarizes all needed settings to load SES-2000 data files. Some of those settings can be changed after loading the file and some not.

The ISE post processing software supports both Innomar's SES data format and Innomar's RAW data format. The *.ses data are already filtered and demodulated whereas *.raw are unfiltered and unmodulated. Therefore the load data dialog for *.ses data differs a little in choices of signal processing algorithms and functions compared to the load data dialog for *.raw data.

Load Dialog SES Data

- Channel

The SES data format is able to store multiple channels e.g. low and high frequency as well as data which were acquired by different transmit modes e.g. multi frequency mode or beam steering mode.

Channel	Channels to load can be selected from the drop down list LF – low frequency HF – high frequency LF/HF both channels will be loaded into the program (that function is not supported by the <i>Process Script</i> tool)
Angle in °	SES-2000 systems with beam steering capability are able to transmit the soundwave in different angles if the beam steering mode is enabled. These angles can be selected from the drop down list to load into the software.
Frequency [kHz]	SES-2000 systems with enabled multi frequency mode have the capability to transmit alternating up to three different low frequencies. These frequencies can be selected from the drop down list to load into the software.

- Accumulation

Accumulation is a signal processing function to reduce the noise level in order to improve the signal-to-noise ratio of the echo data.

Stacking	There are n consecutive echo signals added up to calculate one new echo with enhanced SNR to be displayed. Then the original signals will be discarded and the next n received echo signals are used to calculate a second echo to be displayed. Thus not only the SNR is enhanced, there is also a data reduction (compression) of the resulting echo print.
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	The reduced amount of data is useful if the ping rate is very high and the survey is not aimed to find very small features in the sub-seafloor. If the main task is searching small objects like pipes, stacking should be set to a very low value (1 or 2).
Smoothing	There are n consecutive echo signals added up to calculate one new echo with enhanced SNR to be displayed. Then the oldest original signal will be discarded and the next received echo signal is used with the remaining previously received signals to calculate a second echo to be displayed. Thus the SNR is enhanced without data reduction.
Track	This is in fact the "stacking" algorithm with variable width n . In this case n is chosen automatically to have a constant number of traces per distance unit in the echo print. Thus one gets a track-made-good corrected echo print.

- Palette

Palette	Selection of different color tables to visualize the echo data
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- Signal Processing


The signal processing is used to visualize the echo data. With help of the different parameters the signal-to-noise-ratio can be improved for a better interpretation and presentation of the echo data.

Algorithm	Sets the display mode of the echo data Algo 1P: displays the gradient of the echo amplitude for a better visualization of amplitude changes Algo AMP: displays the amplitude of the echo envelope
Threshold Table	Sets the parameter for the threshold table either to linear or logarithmic distribution. Threshold Table Minimum: Defines the lowest threshold level. Threshold Table Maximum: Defines the highest threshold level The threshold table is used to map the signal amplitudes to a selected color palette. By controlling the Min/Max values the noise level (min value) and the contrast (max value) can be changed.

Normalize Amplitudes	Sets an equal gain for the amplitudes to compensate various gain settings during the data acquisition.
Soft TVG [db/m]	Enhances the gain with increasing time (distance) beginning from the seabed in order to compensate attenuation by absorption and spreading.
Reduce Noise	Enables or disables a noise reduction algorithm.
Decrease Sample Rate with Factor Two	Enables or disables reducing of sample rate by factor 2 in vertical direction. This can be useful for data files with large ranges.

- NAV Data

The SES data format provides 8 SIS fields to record the navigation information together with acoustic data. Depending on the field operator decision the coordinates can be found on different SIS-IDs. In this area of the load dialog all relevant navigation information can be set. It is possible to work either with Lat/Lon or metric coordinates. The coordinates selected here are used for all export functions as output coordinates. It is recommended to use a metric coordinate system because many functions are more comfortable to use with metric units. If it is needed to convert Lat/Lon to a metric system the ISE software provides a converter tool under the *Tools* menu so called *Coordinate Transformation*.

	Displays the current assignment of the SIS-ID fields.
SIS-ID for X-Position	Select the SIS-ID from the drop down list with the desired X position.
SIS-ID for Y-Position	Select the SIS-ID from the drop down list with the desired Y position.
Heading Data Source	Select the source for the heading information from the drop down list. The true heading information is important if Side Scan data will be loaded. It is needed in combination with digitized seabed after spikes removing to calculate instantly positions of spotted objects.
Use Clipping Rectangle	Defines a rectangle from lower left and upper right corner to exclude positions during loading data.

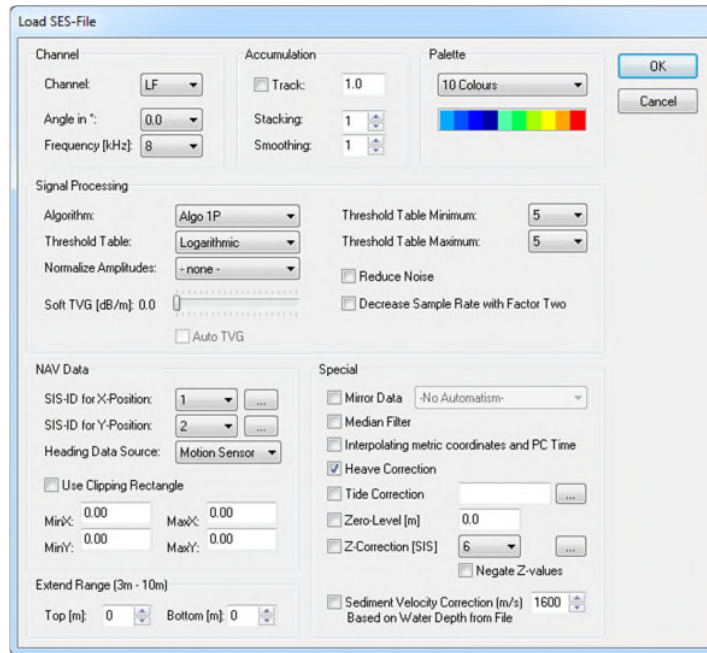
- Extend Range

Enable compensation of different data ranges to maintain a constant vertical scale.

Top [m]	Adds the selected number of meter to the top of the echo print.
Bottom [m]	Adds the selected number of meter to the bottom of the echo print.

- Special

Mirror Data	Flips (mirrors) start and end of the echo print. This function is applicable to one and to several lines. When the automatism is being selected the system will recognize itself which lines shall be mirrored, according to chosen mirror direction – N,E,S,W.
Median Filter	Enables or disables a digital filter to remove noise peaks from the echo data e.g. stripes from other echo sounder or regular patterns from electrical noises.
Interpolating metric coordinates and PC – Time	Enables or disables interpolation of the coordinates in the active window. This is a temporary procedure. The data file itself will not be modified.
Heave Correction	Enables or disables the heave correction for the echo data. It's only functional if motion sensor data were acquired during survey.
<i>Tide Correction</i>	Applies a tide gauge to the echo data.
Zero Level [m]	Enables or disables definition of a new Zero-Level which allows putting a constant offset on the echo plot.
Z – Correction [SIS]	Enables or disables the usage of the maximum value of the Z component found in selected SIS-ID as Zero Level shift.
Sediment Velocity Correction [m/s]	Sets a different sound velocity for the sub bottom. That function needs a corrected and clean online water depth.



Load Dialog RAW Data

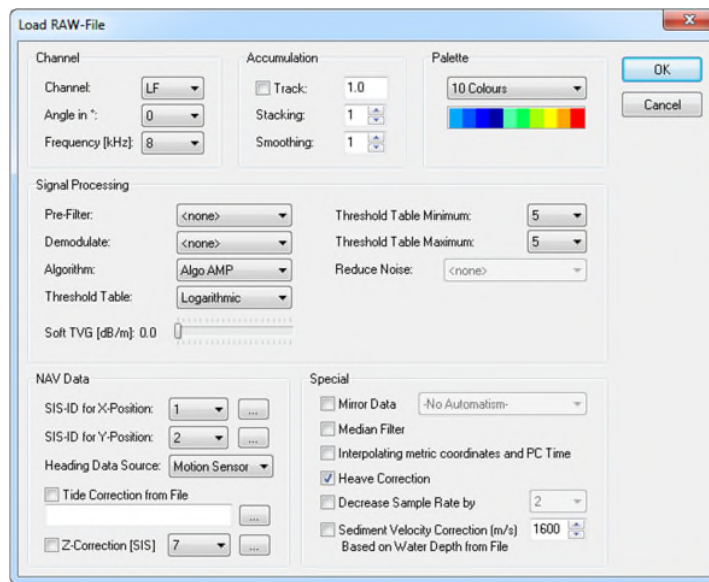
As mentioned before, the loading dialogs differ slightly. Therefore, the following section deals only with the differences.

- Signal Processing

The signal processing is used to visualize the echo data. With help of the different parameters the signal-to-noise-ratio can be improved for a better interpretation and presentation of the echo data.

<p>Palette</p>	<p>Selection of different color tables to visualize the echo data. For RAW data two more color tables are available. The additional color palettes working for unmodulated bipolar data only.</p>
<p>Pre-Filter</p>	<p>This is an adjustable band pass filter. The option “optimized” will automatically choose the bandwidth related to signal frequency and pulse length used during acquisition. The option “light” will result in a slightly wider filter band width and the option “strong” will narrow the band width for an increased noise reduction.</p>

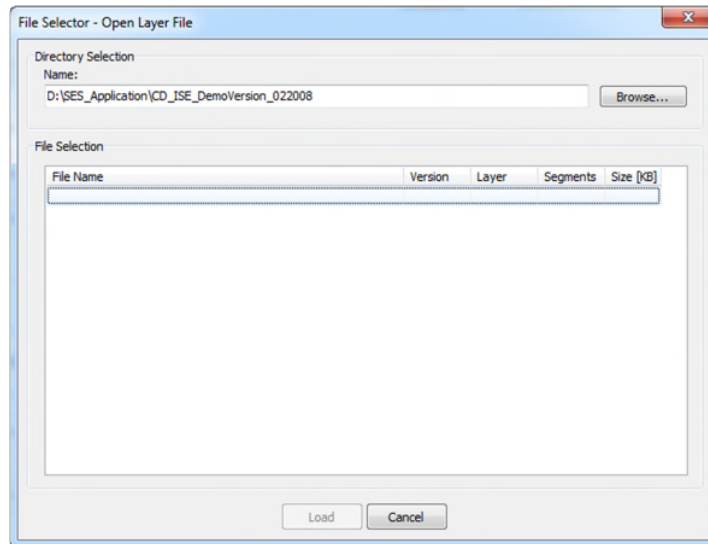
<p>Demodulate</p>	<p>This feature will apply an envelope function to the full wave form signals of the RAW files. As a result the data become unipolar and in most cases the interpretation and digitization of reflectors is improved. However, the phase information is not retained within the envelope data. There is an option to apply a low pass post filter after the envelope function for an increased noise reduction.</p>
<p>Reduce Noise</p>	<p>Data with an envelope function applied may be processed with additional noise filters. The WD based algorithm will determine the noise content within the water column, based on the digitized water depth within the data file and subsequently subtract it from the signal. The Small Range and Big Range algorithms are useful if noise is not uniformly distributed over a series of traces and will estimate and reduce the noise with the method of normalization.</p>



The Open Layer Dialog

That dialog is a simple file selector which lists all *.sch files within the selected folder.

Directory Browser	Selects single layer files (*.sch) to reimport onto the current echo data
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The Open Layer Definition Dialog

The Open Layer Definition dialog is a standard Windows® open dialog and allows to browse through the windows folder directory and to choose a single *.sdd file. This file contains the properties of each layer. Those properties e.g. layer name, pen color or pen size can be set and saved within the *Environment* settings.

The Save Layer File Dialog

There is actually no dialog under this menu. It is an option to save. A dialog appears only if the layer within the current data window was not saved yet. In that case the Save Layer File As dialog will be opened otherwise the loaded layer file will be overwritten.

The Save Layer File As Dialog

The Save Layer File As dialog is a standard Windows® save dialog and allows to navigate thru the windows folder directory and to choose a location for saving the layer files. (*.sch)

The Save Layer File Definition Dialog

The Save Layer File Definition is a standard Windows® save dialog and allows to navigate thru the windows folder directory and to choose a location for saving the local modified layer properties to a *.sdd file.

The Export Fledermaus Curtain Dialog

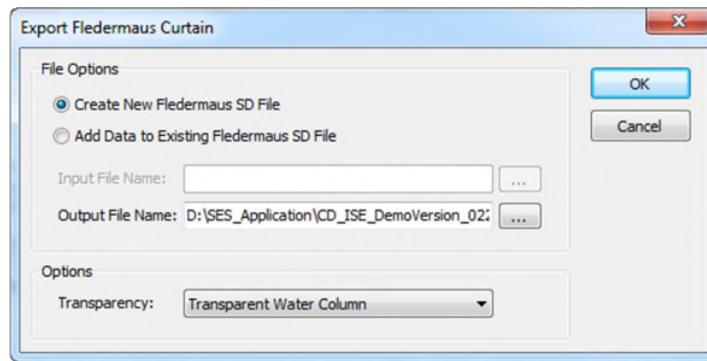
Fledermaus is an interactive 4D geo-spatial processing and analysis tool. This export dialog allows to visualize either *.ses or *.raw data files as SBP curtains or fence diagrams in the Fledermaus software or the free available iView4D tool.

- File Options

Create a New Fledermaus SD File	Exports the SBP data into a new SD file
Add Data to Existing Fledermaus SD File	Exports the SBP data into an existing SD file thereby the data will be added
Input File Name	When 'Add Data...' option is used the existing SD file can be selected
Output File Name	When 'Create New...' option is used file location and filename can be selected

- Options

Transparency	Selectable background options: No Transparency the file will be exported as shown in the ISE Transparency Background Color Transparency Water Column Transparency Water Column + Transparency Background
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The Export Marked Section As SES/RAW-File Dialog

This function is only enabled when a section within the current data file is marked by the *mark block* button. It opens a standard Windows® save dialog and the marked section will be exported into a new data file. This tool can be used to create small data snippets in order to send them for instance as e-mail or to remove parts of the echo data and replaces *The Cut Data Files Tool*.

The Export Processed SES/RAW-File Dialog

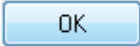
By exporting a processed data file a new ses/raw file depending on the loaded format will be. Only the data of the current *channel* will be saved with all settings applied, such as digital filters or *stacking/smoothing*. The data should be saved in *Algo Amp* display. If saved in *Algo 1P* mode the real amplitude values are lost and cannot be recovered from *Algo 1P* data file anymore.



If the processed file is to be loaded back into the ISE software, the settings of the previously generated file, need to be switched off, otherwise they will be applied twice.

The Export Graphic Dialog

For data presentation the echo data can be exported into various raster graphics e.g. formats such as gif, tiff or jpeg format. The term coordinate, is related to the selected SIS-ID's which were chosen for the X/Y position during loading the file. This function works also with the Scrip Tool.

	Opens the standard Windows® save dialog to select the name and folder for saving the graphic. The file selector allows switching between various file formats.
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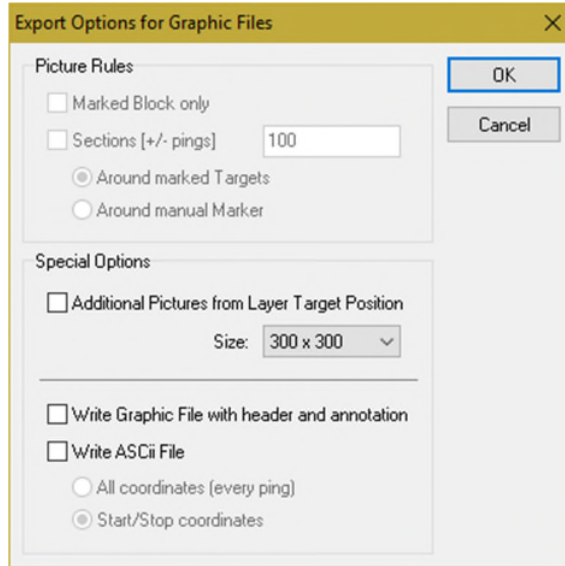
- Picture Rules

Mark Block only	The function requires a marked section to be enabled (<i>Mark Block</i>) and creates a picture of the marked section only.
Sections[+/- pings]	Adds the given number of pings around the chosen kind of marker and creates a raster graphic of that area only. <ul style="list-style-type: none"> • Around marked Targets • Around manual Marker Marked Targets can be imported under <i>Probes Overlay Target Position</i> . Manual Markers were set during the data acquisition within the SESWin software.

- Special Options

Additional Pictures from Layer Target Position	Exports pictures with a selectable size around a target position. This function requires loading a layer with saved target positions.
Write Graphic File with header and annotation	Adds data specific information and coordinates to the raster graphic.
Write ASCII File	Writes an additional ASCII file with:


	<ul style="list-style-type: none"> • All coordinates • First and the last coordinate only
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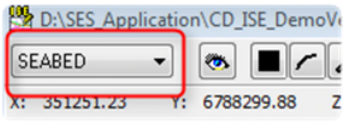


The Export Layer Data Dialog

This dialog allows setting the parameters for exporting the edited layers into compatible ASCII files. If no options are chosen the output file consists of x, y (depending on what was selected for X/Y during file loading) and a z value. Those ASCII files can be imported for further processing or presenting into several third party software packages such as Surfer or other mapping software. The function is accessible also by the key combination [Ctrl]+[E]. It also works together with the script tool.

- Output


File Name	Sets the filename and location for the output file.
File Options	<p>Provides several option for writing the data:</p> <ul style="list-style-type: none"> • All to One File: Writes the content of Layer1 to Layer20 into a single file. <ul style="list-style-type: none">  The Layer Selection must be set to All Layers. • All to One File and Attach to Existing File: Appends the content, depending on the Layer Selection to a single file. • Separate Files for Layer Selection exports the content of the layer in separated files, when chosen All Layers at Layer Selection. Each file gets the layer name as prefix.

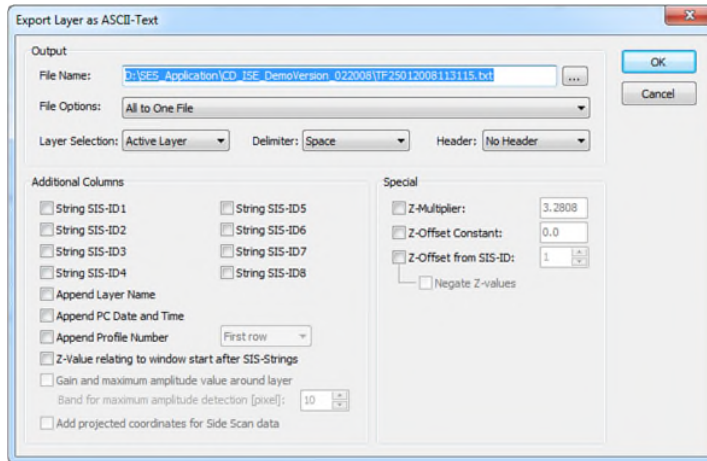
Layer Selection	<p>Sets the layers to be exported.</p> <ul style="list-style-type: none"> • Active Layer exports the selected layer within the data window only  <ul style="list-style-type: none"> • All Layers exports all layer from Layer1 to Layer20 • All visible Layer exports all not hidden layers.
Delimiter	Sets a desired delimiter to separate the columns such as Space, Comma, Semicolon or Tabulator
Header	Adds the column description on top of each column.

• Additional Columns

String SIS-ID1-8	Adds additional columns to the output file with the content of SIS-ID1 to SIS-ID8
Append Layer Name	Adds an additional column to the output file with the layer label.
Append PC Date and Time	Adds an additional column to the output file with PC date and time
Append Profile Number	<ul style="list-style-type: none"> • First row: Adds an additional column to the output file with the profile number to the first row only. • All rows: Adds an additional column to the output file with the profile number to all rows.
Z-Value relating to window start after SIS-Strings	Adds an additional column to the output file with Z-values related to start of the data window, independent of the absolute Z-values.
Gain and maximum amplitude around layer	Adds additional columns to the output file with the gain and the maximum amplitude around the layer. This function is enabled in <i>Algo Amp</i> display mode only. The search bandwidth for the maximum amplitude can be modified.
Add projected coordinates for Side Scan data	Adds additional column to the output file with projected coordinates. This function is only working with Side Scan data. It also requests a clean seabed digitization and true heading values.

• Special

Z-Multiplier	Applies a multiplier to the Z-values. (unit conversion)
Z-Offset Constant	Adds a constant offset to the Z-values (transducer draft or any fixed vertical offsets)
Z-Offset from SIS-ID	<p>Adds SIS-values from the chosen SIS-ID to the output values.</p> <p> This function is useful when RTK GPS heights in combination with the constant Z-Offset are used to reduce depths to a height datum.</p> <ul style="list-style-type: none"> • Negate Z-Values: SIS-ID values can be negated.

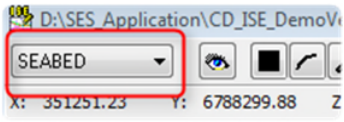


The Export Layer as CODA File Dialog

The Coda file is a user specific ASCII file format following the scheme of the CODA processing suite. The CODA file export works similar to the *Layer Export*. The function is accessible also by the key combination [Ctrl]+[E]. It also works together with the script tool.

• Output


File Name	Sets the filename and location for the output file.
Output Data	<p>Selects the kind of Z-values to be exported into the CODA file:</p> <ul style="list-style-type: none"> • Absolute Z-values • Difference (depth) relative to seabed layer


Layer Selection	<p>Sets the layers to be exported.</p> <ul style="list-style-type: none"> Active Layer exports the selected layer within the data window only  <ul style="list-style-type: none"> All Layers exports all layer from Layer1 to Layer20 All visible Layer exports all not hidden layers.
All to One File	Exports all layer into one single file.
Delimiter	Sets a desired delimiter to separate the columns such as Tabulator, Space or Comma . Tabulator is defined by default at the <i>format description</i> .
Output Format	<p>Sets the desired output format. Gives control of the content of the Coda file.</p> <p>Date - Time - Tag - KP - Easting - Northing - Depth - Empty - Node</p> <p>Date - Time - KP - Easting - Northing - Depth - Tag - Node</p> <p>Easting - Northing - Depth - Node - Tag - Description</p>
Write header information to exported file	Adds the column description on top of each column.

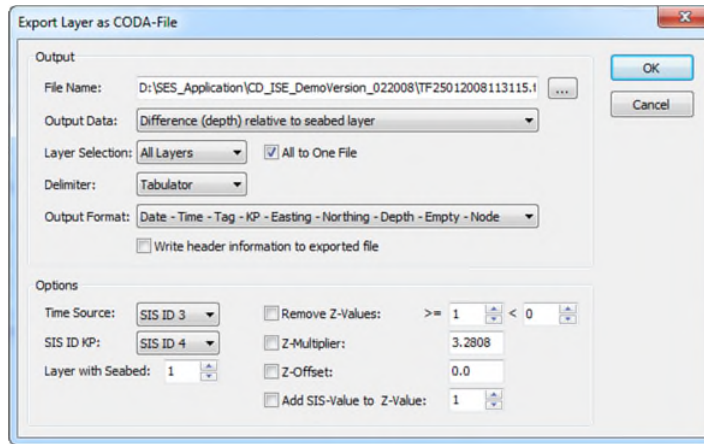
• Options



Depending on the chosen output format some options become enabled or disabled.

Time Source	Sets the SIS-ID as time source. All SIS-IDs (GPS time) or PC time are available.
SIS-ID KP	Sets the SIS-ID as source for the KP values. KP's are the kilometer of pipeline or generally the kilometer of survey line and gives the distance along the line from the start.
Layer with Seabed	<p>Sets the layer as source for the seabed information.</p> <p> When Output Data – Difference... is selected, here selected layer is treated as base. All differences will be calculated in reference to this layer.</p>
Remove Z-Values	Sets a filter to remove Z-values outside the given range
Z-Multiplier	Applies a multiplier to the Z-values. (unit conversion)

Z-Offset	Adds a constant offset to the Z-values (transducer draft or any vertical offsets)
Add SIS-Value to Z-Value	Adds SIS-values from the chosen SIS-ID to the output values.  This can be useful if an external depth (multi-beam depth) is available in order to get the absolute depth of a layer according to the external depth.



The Export Layer as PIPE-File Dialog

This dialog is to export layer data as PIPE files, an ASCII based format, based on the CODA format, but custom made for pipeline surveys.

• Output

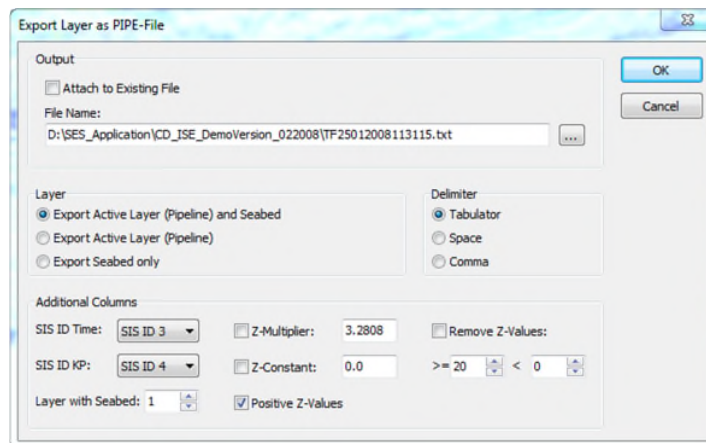
Attach to Existing File	Appends the data to the selected output file.
File Name	Sets the filename and location for the output file.

• Layer/Delimiter

Layer	Sets the layers to be exported. <ul style="list-style-type: none"> • Export Active Layer (Pipeline) and Seabed exports the selected layer for the seabed and the active layer as pipeline. • Export Active Layer (Pipeline) exports the active layer only. • Export Seabed only exports the seabed layer only.
Delimiter	Sets a desired delimiter to separate the columns such as Tabulator, Space or Comma . Tabulator is defined by default at the <i>format description</i> .

- Additional Columns

SIS ID Time	Sets the SIS-ID as time source. All SIS-IDs (GPS time) or PC time are available.
<i>SIS ID KP</i>	Same as described under The Export Layer as CODA File Dialog → Options
Layer with Seabed	Sets the layer as source for the seabed information.
Z-Multiplier	Applies a multiplier to the Z-values. (unit conversion)
Z-Constant	Adds a constant offset to the Z-values (transducer draft or any vertical offsets)
Positive Z-Values	Writes positive Z values into the file.
Remove Z-Values	Sets a filter to remove Z-values outside the given range



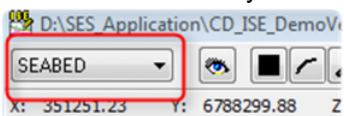
The Export Layer as SVG File Dialog

This tool allows exporting layer into a SVG file. The file structure is based on XML specification and stands for 'Scalable Vector Graphics'. SVG files can be imported by several graphic programs and may be used for presentation purposes of interpreted results.

- Output

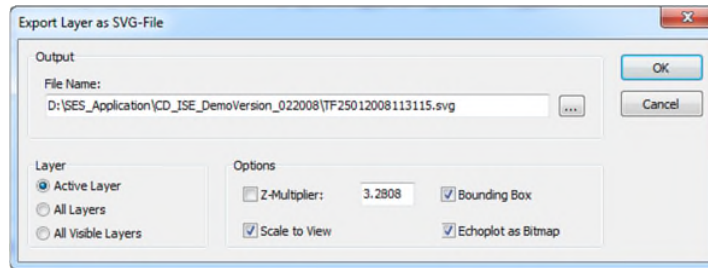
File Name	Sets the filename and location for the output file.
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- Layer

Layer	<p>Sets the layers to be exported.</p> <ul style="list-style-type: none"> • Active Layer exports the selected layer within the data window only  <ul style="list-style-type: none"> • All Layers exports all layer from Layer1 to Layer20 • All visible Layer exports all not hidden layers.
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- Options


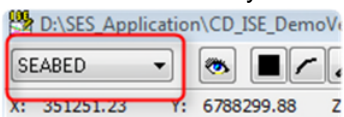
Z-Multiplier	Applies a multiplier to the Z-values. (unit conversion)
Scale to View	Adjusts the image size to the template (page size) in the graphic software.
Bounding Box	Makes the borders visible by a bounding box.
Echo plot as Bitmap	Adds the echo data as bitmap file. This results in two output files.



The Export Layer as DXF-File Dialog

This dialog helps to export layer to make them available in AutoCAD. AutoCAD is a well-known construction software package which is also used to generate maps. For a comfortable import of layer the export tool will generate a dxf file.

• Output

File Name	Sets the filename and location for the output file.
File Options	<p>Provides several option for writing the data:</p> <ul style="list-style-type: none"> • All to One File: Writes the content of Layer1 to Layer20 into a single file. <p> The Layer Selection must be set to All Layers.</p> <ul style="list-style-type: none"> • All to One File and Attach to Existing File: Appends the content, depending on the Layer Selection to a single file. <p>Separate Files for Layer Selection exports the content of the layer in combination with Layer Selection All Layers in separated files. Each file gets the layer name as prefix</p>
Layer Selection	<p>Sets the layers to be exported.</p> <ul style="list-style-type: none"> • Active Layer exports the selected layer within the data window only.  <ul style="list-style-type: none"> • All Layers exports all layer from Layer1 to Layer20. • All visible Layer exports all not hidden layers.


• Options

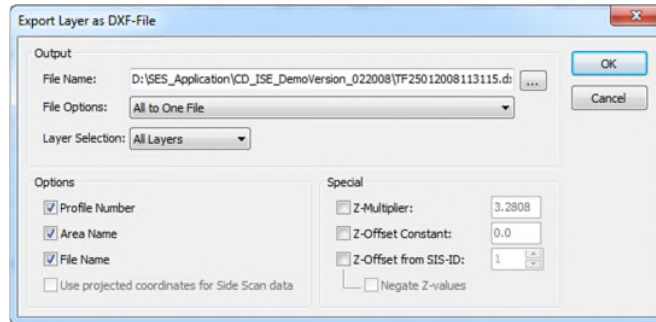
An additional layer will be created within AutoCAD, which provides the following profile information. The layer is named 'Profile Information'.

Profile Number	Adds the profile number to the information layer.
Area Name	Adds the area name to the information layer.
File Name	Adds the filename to the information layer.
Use projected coordinates for Side Scan data	Adds projected coordinates to the AutoCAD layer. This function is only working with Side Scan data. It also requests a clean seabed digitization and true heading values.

• Special

Z-Multiplier	Applies a multiplier to the Z-values (unit conversion).
Z-Offset Constant	Adds a constant offset to the Z-values (transducer draft or any fixed vertical offsets).

<p>Z-Offset from SIS-ID</p>	<p>Adds SIS-values from the chosen SIS-ID to the output values.</p> <p> This function is useful when RTK GPS heights in combination with the constant Z-Offset are used to reduce depths to a height datum.</p> <ul style="list-style-type: none"> • Negate Z-Values: SIS-ID values can be negated.
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The Export Signal Traces Dialog

For advanced signal analysis with external software packages this dialog allows to export single signal trace or groups of signal traces into ASCII files. To enable this function an area of the current data window needs to be *marked*. The file format can be seen under *The ASCII Convert & Export File Format*.

• Output

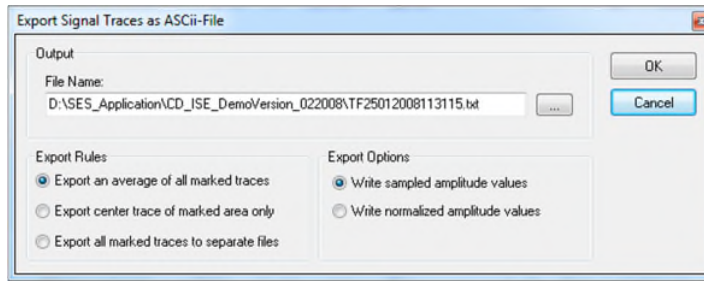
File Name	Sets the filename and location for the output file.
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• Export Rules

Export an average of all marked traces	Writes the average of all marked traces into a file.
Export center trace of marked area only	Writes the data from the trace in the middle of marked area.
Export all marked traces to separate files	Writes each trace within the marked area to a separate file.

• Export Options

Write sampled amplitude values	Writes the sampled amplitudes as shown in the data window.
Write normalized amplitude values	The normalization will take into account the amplifier setting and the water depth. As a result the exported amplitude values are comparable for files or areas where different amplifier settings were used or the water depth has changed.



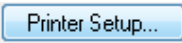
The Export Window Dialog

The **Export Window** function creates a screen dump of the entire ISE screen. It opens a standard Windows® save dialog to set the location, filename and file format. The function is accessible also by the key combination [Ctrl]+[W].


The Print Dialog

The dialog helps to prepare printing of echo plots. Every printer which is installed under the Windows® environment can be selected. The function is accessible also by the key combination [Ctrl]+[P].

- Printer

Name	Shows the selected printer name
	Opens the standard Windows® dialog for selecting and setting properties for printers installed under Windows®.

- Print Range

All	Prints all pages.
Page from	Prints the selected pages only.  The selected start and end page will be changed if the scale settings will be adjusted!

- Preview

Preview	Displays a preview of the echo plot to be printed depending on the selected scale. Under the preview the number of pages to print is displayed.
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- Page Handling

Print Page Header	Adds data specific information to the print out.
Print Annotation	Adds coordinates to the print out. Coordinates are related to the selected SIS-ID's which were chosen for the X/Y position during loading the file.

Fit to Page	Sets a scale factor automatically to fit the echo plot to a single page.
Fit to Page Height	Sets a vertical scale factor automatically to fill out the vertical range of the page.
Scale Echo Plot Height [mm per 1m Range]	Sets a vertical scale factor.
Scale Echo Plot Width [Pings per mm]	Sets a horizontal scale factor.

Edit Menu

The **Edit Menu** allows setting up and selecting tools for the layer digitization. Among other things, there is an Undo function as well as a copy the actual picture to the clipboard function. The **Edit Menu** contains the following commands:

Command	Description
Undo Last Segment	Removes the last edited segment from the active layer.
Delete Layer	Deletes the whole active layer.
Copy Layer	Copies the layer contents to the ISE clipboard.
Paste Layer	Pastes the ISE clipboard contents into the actual layer.
Merge Layer	Merges the ISE clipboard contents into the actual layer.
Undo Layer	Replaces the actual layer contents with the ISE layer undo buffer contents
<i>Pen</i>	Gives access to the configuration of the layer editing pen, like the color, the pen width and the pen mode.
<i>Capture Mode</i>	Starts the capture mode for the layer editing.
Text Block	Inserts a text block into the actual data window.
Mirror Layer	Performs a mirror function to the whole layer data.
Scale Layer	Scales the layer in the horizontal direction.
Add Offset	Adds an offset to the active layer in the vertical direction.
Smooth Layer	Smooths the active layer.
Remove Peaks	Tries to remove peaks from the active layer.

Remove Overlaps within Layer	Rebuilds a layer and deletes all overlapping parts. It's also a tool to remove peaks when editing layers.
Copy Graphic	Copies the actual data window as a bitmap graphic into the Windows® Clipboard.
Mark Block	Marks a block of the data for separate processing of parts of the data.
Unmark Block	Resets a previously marked block.

The ISE Edit Dialogs

The Pen Dialogs

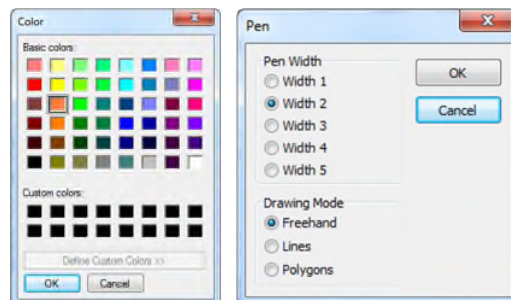
There are actually two forms for setting the pen properties for the current data file.

Color

The dialog provides several colors for the active layer to be selected. Custom colors are not supported and are therefore disabled.

Pen Width + Mode

Pen Width	Sets the pen width for the current layer
Drawing Mode	<p>Sets the drawing mode to:</p> <ul style="list-style-type: none"> • Freehand draws the layer by pressed left mouse button following the mouse pointer. • Lines draws straight lines as long the left mouse button is pressed. • Polygons draws straight chained lines by pressing the left mouse button. The polygon will be completed by double click on left mouse button.

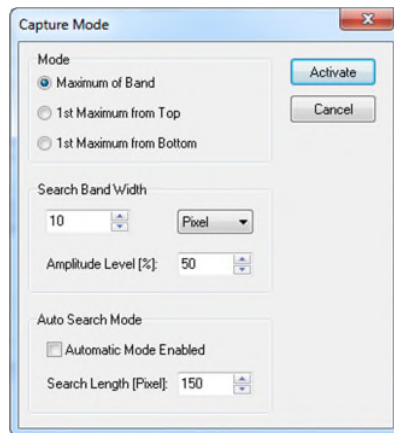


The Capture Mode Dialog

The capture tool is used to digitize layer semi automatically. While the mouse pointer with pressed left mouse button is moved over the layer, it digitizes the layer depending on the defined settings. It can also be used in combination with the

Remove Overlaps within Layer tool to remove spikes, outliers or to redraw parts of a layer. The Capture Mode button in the tool bar is always pressed when the capture mode is active. To disable the capture mode press the Capture Mode button again.

Mode	<p>In order to minimize fluctuations during digitization, there are three modes available. The first one is the default.</p> <ul style="list-style-type: none"> • Maximum of Band the layer is determined at the maximum amplitude value within the search band. • 1st Maximum from Top the layer is determined at the first maximum amplitude value beginning from the top of the search band. • 1st Maximum from Bottom the layer is determined at the first maximum amplitude value beginning from the bottom of the search band.
Search Band Width	Sets a search band around the mouse pointer. The bandwidth can be selected in pixel, centimeter and meters.
Amplitude Level [%]	Sets the amplitude level as a threshold for the layer detection. It is enabled in combination with Maximum of Band mode only. The layer position is set at selected threshold of the maximum amplitude value beginning from the top of search band.
Automatic Mode Enabled	Enables the automatic search mode. The determined layer always appears automatically during the edit process. By hitting the left mouse button the layer will be acknowledged.
Search length [Pixel]	Sets the length in pixel for the pre-calculation area.



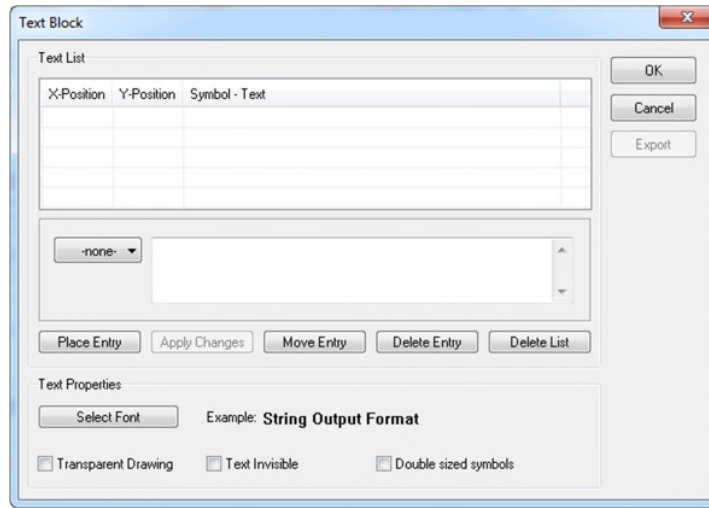
The Text Block Dialog

For presentation purposes and for commenting echo plots it is possible to overlay text and symbols onto the echo plots. A list of up to 50 individual lines can be edited and placed on the echo plot at any position.



All text entries can be saved within layer files. The text font will not be saved. The text is visible on printed echo plots and on exported graphics too.

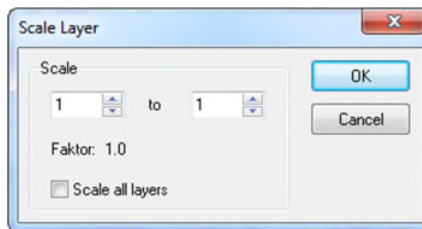
Text List	Lists all text entries placed within the current data window. The text editor for entering the text can be found below the text list. For each text a pre-defined symbol can be selected from the drop down menu left of the text editor. All text entries can be modified in content, position or symbol, when the concerning entry is highlighted in the text list. There is also a function to delete the entire list.
Text Properties	Sets the general text properties. These settings are valid for all text entries within the current data window. <ul style="list-style-type: none"> • Select Font allows selecting any Windows® font or color for the overlaid text. • Transparent Drawing sets a transparent background to the text. • Text Invisible allows hiding all text entries. • Double sized symbols scale the symbols by factor two.
<div style="border: 1px solid black; padding: 2px; display: inline-block;">Export</div>	The overlaid text can be exported into a ASCII text file. The text will be saved together with the content of SIS-IDs at the text position.



The Scale Layer Dialog

Due to different accumulation rates (Stacking factors) during the file load, it might be that the saved layer does not fit to the echo data anymore. To correct this, layers can be adjusted by applying a scale factor.

Scale	Calculates a scale factor by entering the stacking factor of the current data window in the first box and the stacking factor of the data file where the layer was drawn in the second box.
Scale all layer	Optional applies the scale factor to all layers.

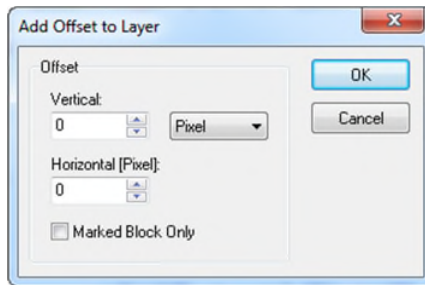


The Add Offset Dialog

This function allows shift the layer in vertical and horizontal position. This can be useful when a high amplitude level was used during the layer digitization to avoid spikes. Then the layer position appears deeper than it should be. This can be corrected by moving up the layer by 1 or 2 pixels. Negative values are accepted to move a layer down.


Offset	<p>The offset can be given in pixel, cm and meter.</p> <p>Vertical sets the vertical offset for the active layer in selected unit.</p> <p>Horizontal sets the horizontal offset for the active layer in selected unit.</p>
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Marked Block Only	Applies the selected offset to the layer for the marked area only.
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The Smooth Layer Dialog

The active layer can be smoothed to get a more continuously line and to remove small peaks in the layer line.

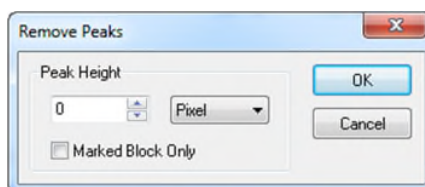
Values	<p>Sets the number of values for the calculation. Higher values result in a more smoothing effect.</p> <p> The smoothing operation with even values will produce a small horizontal shift of the recalculated layer therefore odd values are selectable only.</p>
Marked Block Only	Applies the smoothing to the layer for the marked area only.



The Remove Peaks Dialog

The Remove Peaks function can be used to remove peaks in the active line of the active layer, which sometimes appears in automatically calculated layers.

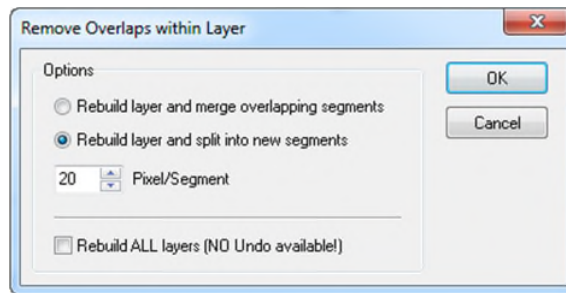
Peak Height	Sets the peak height to be removed in the selected unit. The peak height can be defined in pixel, cm or meter .
Marked Block Only	Applies Remove Peaks only for the selected area.



The Remove Overlaps within Layer Dialog

During the digitalization with the “*Capture Tool*” it might be that two segments are overlapped. This means that one position can have two different z values. That could result in unexpected behavior during export the data. This function will prevent from such behavior by removing all overlapping layer parts. This function is also a very useful to remove spikes within a layer. Spikes can be removed by redrawing the particular place by using the “*Capture Tool*” or even free hand. The “Remove Overlaps within Layer” tool rebuilds the layer and merges all drawn layer parts together.

Rebuild layer and merge overlapping segments	Rebuilds the layer and merges all overlapping parts into a new layer composed of one segment
Rebuild layer and split into new segments	Rebuilds the layer and merges all overlapping parts into a new layer and split the layer into segments with selected length.
Pixel/Segment	Sets the segment length.
Rebuild ALL layers (NO Undo available)	Executes the function for all layers. This cannot be undone.



Extra Menu

This menu contains commands for special tasks, like the configuration of the signal processing, the water depth calculation and some user adjustable functions such as the color palette or the ruler definition. The Extra Menu contains the following commands:

Command	Description
File Information	Shows the parameters of the file in the active data window, e.g. recording time, frequency, amplifier setting etc.
Palette	Sets color palette of the actual data window.
Signal Processing	Selects and configures the digital signal processing for the echo sounder data in the active window.
Ruler Lines	Changes the number of ruler lines which can be seen on the echo plot. The start value and the distance between two lines are configurable.
Motion Sensor Lines	Inserts curves of the values from a motion sensor. The values of heave roll and pitch can be selected with an user defined offset within the data window.
Way Lines, Fix Lines, KP Lines, Cross Lines...	Inserts vertical lines into the echo plot based on several sources e.g. based on distance, KP's, Fixes or predefined cross lines.
Time Lines	Inserts vertical lines into the echo plot after defined time periods.
Manual Marker Lines	Enables or disables the view of the markers in the active data window and shows a list of all markers.
Insert Water Depth as Layer	Calculates the water depths for the active data window. The user can edit some parameters for the calculation, like the sensitivity.
Insert Seabed Multiples	Calculates the multiple of a given layer and creates a new layer on the calculated horizon.
Insert Sub-bottom Layer	Calculates a sub-bottom layer based on a previously edited layer above. The user can edit some parameters for the calculation, like the sensitivity.
Insert Layer from XYZ Grid File	Calculates and shows a layer based on a XYZ grid file.
Insert Layer with User Defined Parameter	Calculate a layer based on property values of two other layers above and below.

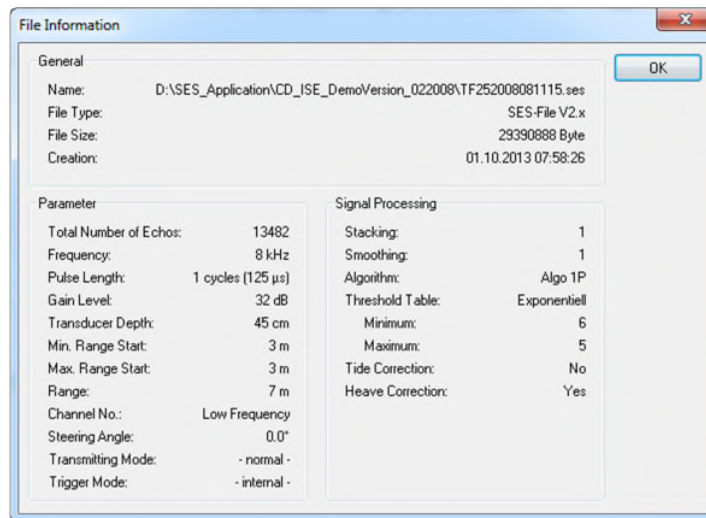
Write Water Depth to Active Data File	Overwrites the on-line calculated water depth or overwrites a SIS field with the calculated water depth from the active layer.
Swell Filter	Applies a software filter to echo data plots to remove heave ripples.
Remove Seabed Multiples	Applies a software filter to echo data plots to remove multiple echoes.
Remove Ghost Echo	Applies a software filter to remove echo signals caused by reflections which produce time shifted signals as an overlay to the main signal.
Reduce Water Column Noise	Applies a software filter to remove water column noise from the echo plot.
Move Profile to Trackplot List ¹	Sets the active profile to the track plot window.
Manipulate SIS Fields	Interpolates or deletes selected SIS fields within a particular area.
Save manipulated SIS to SES-File	Saves the changes of the manipulated SIS fields and updates the track within the GIS module.
View Tide Graph	Shows the tide graph if there is a tide data file available.
View SIS-Value Graph	Shows a graph of the values of a selectable SIS Field.

The ISE Extra Dialogs

The File Information Dialog

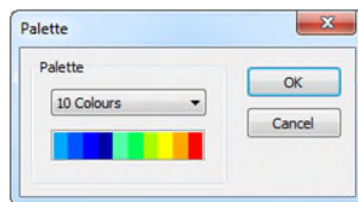
The file information dialog summarizes file specific information for the current data file. These include, for example, file and recording parameter and the current settings of the signal processing.

¹ Only visible in ISE releases without GIS extension module



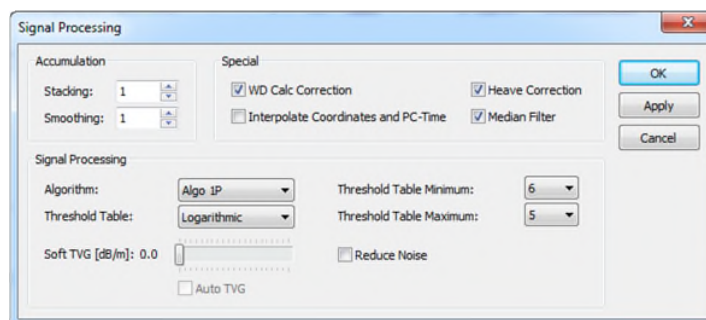
The Palette Dialog

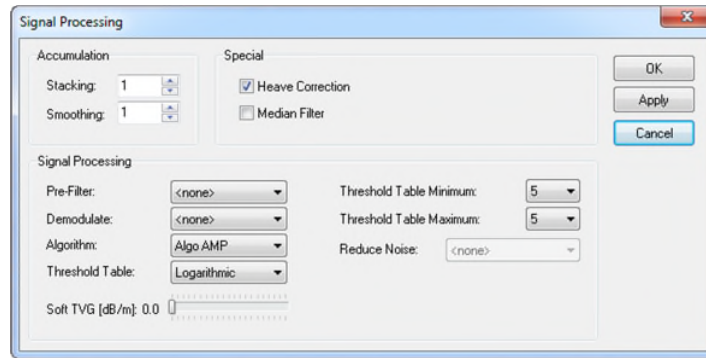
The palette dialog can be used to select a suitable color palette for the current data window. The available color tables for *.ses data and *.raw data differs a little due to a different value range of the signals.



The Signal Processing Dialog


This dialog gives access to some settings of the *Load Data Dialog*. The appearance of the signal processing dialog varies depending on the current data file (raw-data, ses-data).





The Ruler Lines Dialog

The ruler lines dialog allows modifying the appearance of the horizontal depth or time lines.

 All settings made in the ruler lines dialog are valid for all subsequent loaded data files.

The smallest distance between two ruler lines is one unit of selected units.

The display of time lines will result in incorrect values, when the echo plot is corrected for different speed of sound values in the water column and the sediment body.

• View

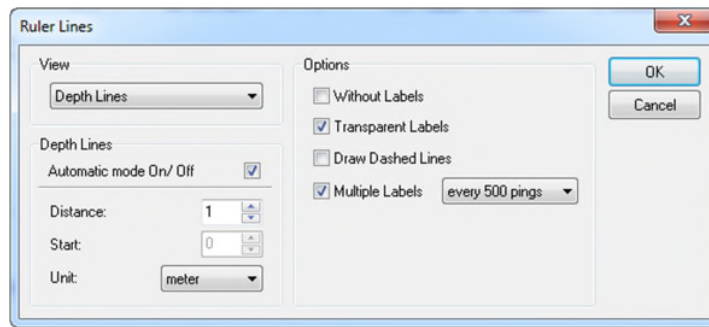
<div style="border: 1px solid gray; padding: 2px; width: 100%;">Depth Lines ▾</div>	<p>Sets the base for the ruler lines.</p> <ul style="list-style-type: none"> • No Ruler Lines disables the ruler lines. • Depth Lines displays ruler lines based on depth. • Time Lines (TWT) displays ruler lines based on two way travel time.[milliseconds]
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• Depth/Time Lines

Automatic Mode	Enables or disables the automatic for distance/interval calculation between the ruler lines. The distance/interval depends on the range of the echo plot. Large ranges causing more distance/bigger intervals for the ruler lines.
Distances/Interval [ms]	Sets either the distance or time interval between two ruler lines.
Unit	Sets the unit for the distance between two ruler lines. This is only enabled for Depth Lines .

- Options

Without Labels	Enables or disables the labels on the echo plot.
Transparent Labels	Enables or disables a transparent background for the labels.
Draw Dashed Lines	Draws dashed lines as ruler lines instead of continuous lines.
Multiple Labels	Enables or disables multiple labels at given distances in number of pings. If disabled, labels for the ruler lines will be displayed only at the beginning of the echo plot.



The Motion Sensor Lines Dialog

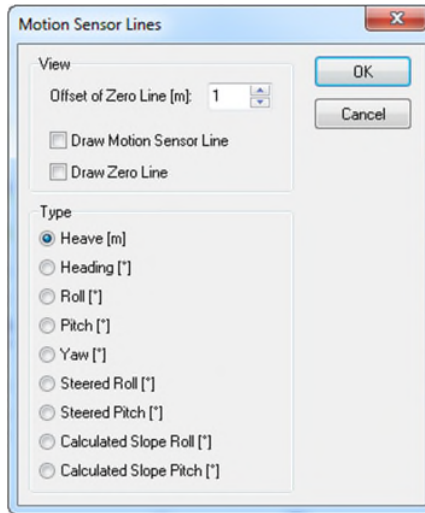
The recorded values from an attached motion sensor can be plotted as a curve on the echo plot.

- View

Offset of Zero Line [m]	Sets an offset from the top of the window to display the motion sensor line.
Draw Motion Sensor Line	Enables or disables plotting the motion sensor line onto the echo plot.
Draw Zero Line	Enables or disables the zero line.

- Type

Type	Sets type of value to be displayed.
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The Way Lines, Fix, KP Lines, Cross Lines Dialog

The dialog allows configuring and displaying vertical marker lines at regular distances. This is very useful in order to get an idea about the lateral dimensions in the echo plot. Different sources and possibilities are available to generate those vertical markers. Way lines are generated automatically based on a defined distance beginning from start of the echo plot.

- Way Lines

Draw Way Lines	Enables or disables displaying way lines.
Draw Way Numbers	Enables or disables displaying way line labels.
Transparent Labels	Enables or disables transparent background for labels.
Distance [way unit]	Sets the distance between two way lines in way units. Way units depending on the selected SIS-IDs for x/y position during the file load. If a metric coordinate system was chosen the way unit is meter. When Lat/Lon was chosen the way unit is in degrees.
Show Unit	Enables or disables displaying the way unit next to the marker line. Sets also the desired unit.

To obtain a better comparability between survey lines and different survey systems, way lines can be generated by logged KP or Fix values. KP's also kilometer of pipeline gives a distance, with respect to the axis start point. Fix values are integer numbers such as event numbers which increase with ongoing survey.

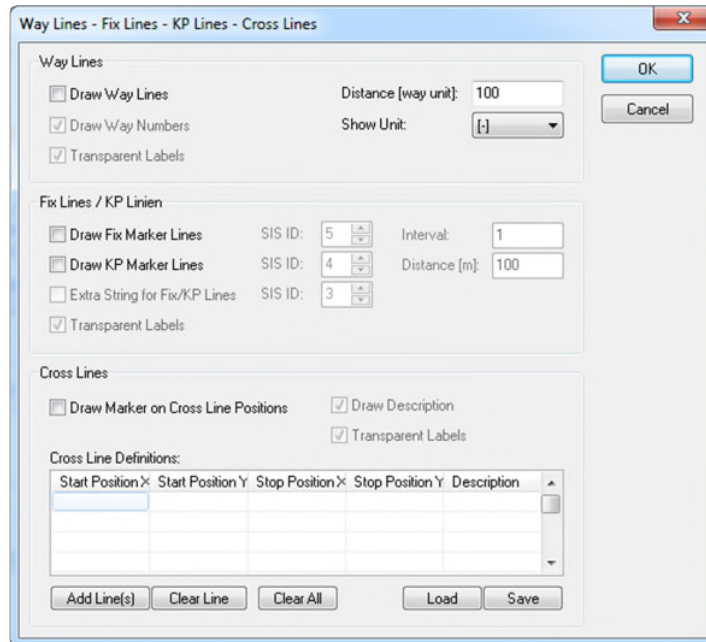
- Fix Lines/KP Lines

Draw Fix Marker Lines	Enables or disables displaying Fix Marker lines based on the selected SIS-ID as source for the fix marker. Interval sets the interval for displaying the fix markers.
Draw KP Marker Lines	Enables or disables displaying KP Marker lines based on the selected SIS-ID as source for the KP marker. Distance [m] sets the distance in meter between the KP marker lines to be displayed.
Extra Strings for Fix/KP Lines	Enables or disables to add a string to the KP/Fix Marker line labels based on the selected SIS-ID as source for the string information.
Transparent Label	Enables or disables a transparent background for the labels.

An event line will be displayed if the vessel's track is crossing a defined line. A vertical line with the line name as annotation will be shown in the echo prints. As an example the segments of a pipeline could be entered, a cross line will be displayed always if the echo data crosses the pipeline.

- Cross Lines

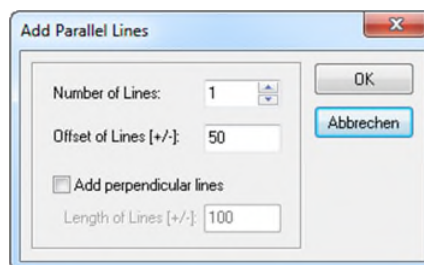
Draw Marker on Cross Line Positions	Enables or disables displaying cross lines.
Draw Description	Enables or disables displaying the cross line description label.
Transparent Labels	Enables or disables a transparent background for the labels.
Cross Line Definitions	Cross lines can be defined by entering a start and end coordinate into the corresponding fields on the way line dialog. Also a line name should be entered accordingly on the field list.
<input type="button" value="Add Line(s)"/>	Generates parallel lines to a selected line.
<input type="button" value="Clear Line"/>	Removes the selected line.
<input type="button" value="Clear All"/>	Removes all lines.
<input type="button" value="Load"/>	Loads a text file with the needed information and a space as delimiter.
<input type="button" value="Save"/>	Saves the entered data in a text file.



The Add Line(s) Dialog

This dialog appears if a line within the cross line definitions is highlighted and the **Add Line(s)** button was pressed. The dialog helps to generate parallel lines or perpendicular lines to the selected line.

Number of Lines	Sets the number of parallel lines to be calculated.
Offset of Lines [+/-]	Sets the distance between two parallel lines. It sets also the side for calculating the parallel lines. Positive values create lines to the right and negative values create lines on the left hand side of the selected line.
Add perpendicular lines	Enables or disables to calculate perpendicular lines to the selected line.
Length of Lines [+/-]	Sets length for the perpendicular lines to each side.



The Time Lines Dialog

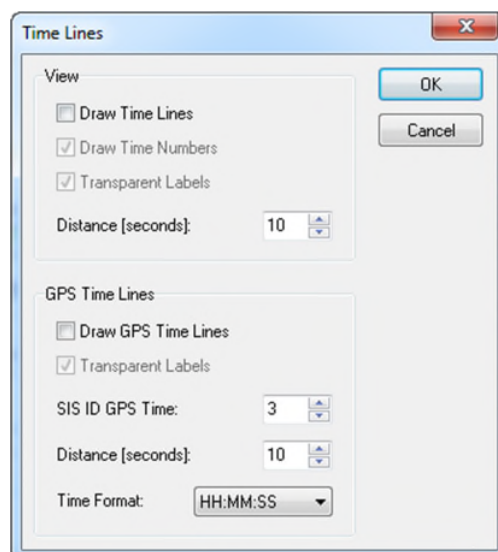
Within this dialog it is possible to define a time period for drawing vertical lines onto the echo plot.

- View

Draw Time Lines	Enables or disables displaying time lines in relation to the start of the file onto the echo plot.
Draw Time Numbers	Enables or disables displaying labels to the time marker.
Transparent Labels	Enables or disables a transparent background for the labels.
Interval [seconds]	Sets the time interval for displaying the marker lines.

- GPS Time Lines

Draw GPS Time Lines	Enables or disables displaying time lines based on recorded time values e.g. from a GPS receiver.
Transparent Labels	Enables or disables a transparent background for the labels.
SIS-ID GPS Time	Sets the SIS-ID as source for the time.
Interval [Seconds]	Sets the time interval for displaying the marker lines.
Time Format	Sets the time format according to the recorded time.

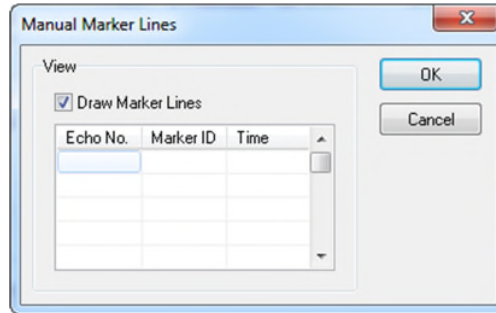


The Manual Marker Lines Dialog

This dialog shows a list of all manual markers in the active data window which were set during the data acquisition. The list contains the echo number, the marker ID and the time.

- View



Draw Marker Lines	Enables or disables displaying manual marker onto the echo plot.
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The Insert Water Depth As Layer Dialog


The water depth dialog sets the parameter for the automatic seabed layer detection. The layer will be created on the active layer. The selected layer should be empty in order to avoid overwriting layer segments.

- Parameter

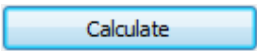
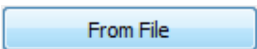
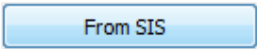
Sensitivity	<p>Sets the amplitude level as a threshold for the layer detection. A low value results in a higher sensitivity. This not only leads in more accurate layer detection but also to the increased occurrence of spikes.</p> <p> For getting good results different settings could be tested. Default value here is 20-30%.</p>
Smoothing	<p>Sets the number of values to be used for smoothing the layer. Smoothing will decrease the fluctuation within the calculated layer.</p> <p> Smoothing the seabed layer line should be done after removing spikes and outliers.</p>
Offset from Top	<p>Defines a blanked area for the depth calculation beginning from the top. This avoids spikes due to air bubbles around the transducer which can be seen as high amplitudes on top of the data window. The offset can be set in Pixel, meter or centimeter.</p>

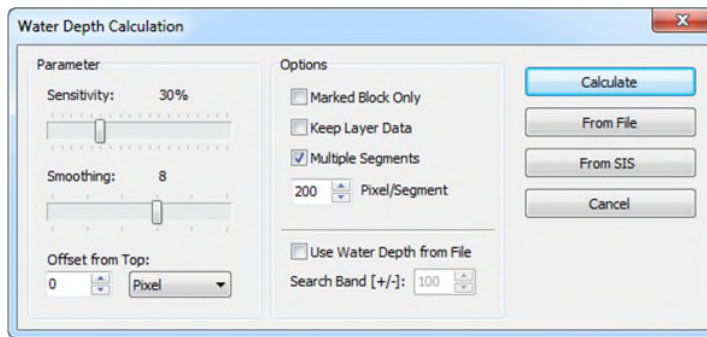
- Options

Marked Block Only	Enables or disables the calculation of a layer for a selected area.
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Keep Layer Data	Enables or disables keeping previously edited layer segments during the calculation.  The calculation process will remove all layer segments on the active layer as long this option is not activated.
Multiple Segments	Divides the layer in segments according to the selected segment length.
Use Water Depth from File	Enables or disables the use of the online water depth in order to support the offline calculation algorithm.
Search Band [+/-]	Sets the size of the search band around the online water depth.

• Buttons


	Starts the calculation of the seabed layer with the selected parameters.
	Insert the seabed layer based on the water depth calculation during the data acquisition. (on-line water depth)
	Insert the seabed layer based on values recorded on a SIS-ID. This will open an additional dialog.



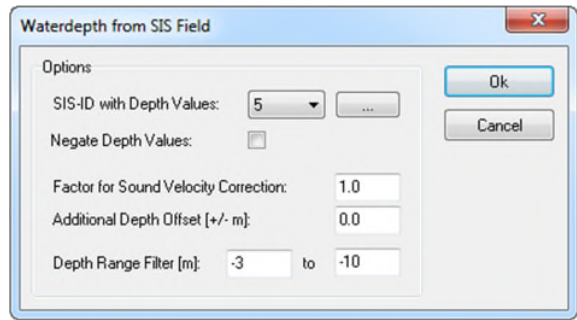
The Water Depth from SIS Field Dialog

SES systems which have a multi-purpose input port are able to receive the water depth from another device e.g. Multi-beam system. Those received depth values are stored on a SIS field and can also be used to create the seabed layer.

• Options

SIS-ID with Depth Values	Sets the SIS-ID as source for the external depth information.
	Displays the current assignment of the SIS-ID fields.

Negate Depth Values	Negates the depth values coming from the selected SIS-ID.
Factor for Sound Velocity Correction	Sets a factor to compensate different speed of sound settings for the systems to match both depth values.
Additional Depth Offset [+/- m]	Sets a constant offset to compensate different draft settings for the systems to match both depth values.
Depth Range Filter [m]	Sets a range as a depth filter to remove spikes.



The Insert Seabed Multiples Dialog

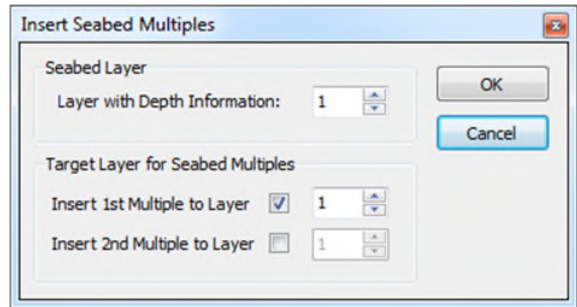
For better interpretation and to avoid accidentally digitizing multiples as real layer the tool makes multiples as layer visible.

- Seabed Layer

Layer with Depth Information	Sets the layer number with the seabed information.
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- Target Layer for Seabed Multiples



Insert 1 st Multiple to Layer	Enable or disables inserting the 1 st multiple as layer line on the selected layer number.
Insert 2 nd Multiple to Layer	Enable or disables inserting the 2 nd multiple as layer line on the selected layer number.




The Insert Sub-bottom Layer Dialog

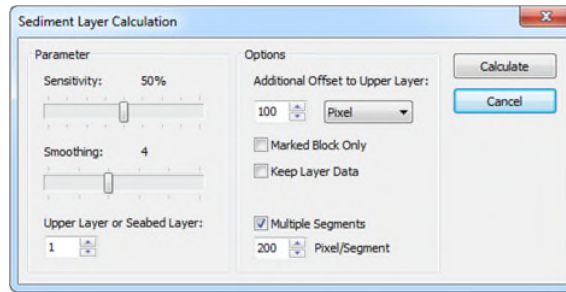
This function inserts a layer to active layer and is very similar to the *insert water depth* function. In contrast to the water depth determination the algorithm starts searching from already digitized layer and not from the top of the data window. The success of this calculation is mostly depending on the type and quality of the echo data. Usually a manually editing with the *capture mode* is required, but if there are very distinct layers within the data, then this processing function may be used.

- Parameter

Sensitivity	<p>Sets the amplitude level as a threshold for the layer detection. A low value results in a higher sensitivity. This not only leads in more accurate layer detection but also to the increased occurrence of spikes.</p> <p> For getting good results different settings could be tested. Default value here is 50%.</p>
Smoothing	<p>Sets the number of values to be used for smoothing the layer. Smoothing will decrease the fluctuation within the calculated layer.</p> <p> Smoothing the seabed layer line should be done after removing spikes and outliers.</p>
Upper Layer or Seabed Layer	<p>Sets the layer number as source for the upper layer. The search algorithm starts below the selected layer.</p>

- Options

Additional Offset to Upper Layer	<p>Defines a blanked area for the layer calculation beginning from the upper layer. The offset can be set in Pixel, meter or centimeter.</p>
Marked Block Only	<p>Enables or disables the calculation of a layer for a selected area.</p>
Keep Layer Data	<p>Enables or disables keeping previously edited layer segments during the calculation.</p> <p> The calculation process will remove all layer segments on the active layer as long this option is not activated.</p>
Multiple Segments	<p>Divides the layer in segments according to the selected segment length.</p>

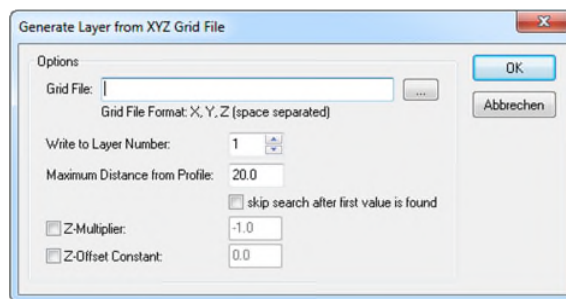


The Insert Layer from XYZ Grid File Dialog

This tool allows inserting a layer from a xyz grid file and is working for SES-Files only.

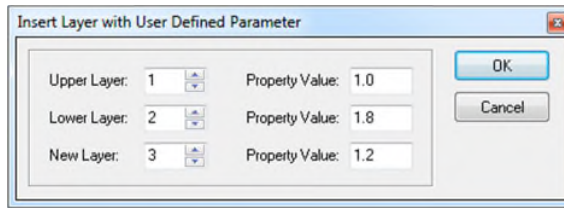
- Options

Grid File	Selects the grid file with the x, y, z information.
Write to Layer Number	Sets the layer number to create the layer.
Maximum distance from Profile	Sets the maximum distance away from SES data for accepting the point from the grid file.
Skip search after first value is found	Enables or disables search for further points after the first point which matches to the settings is found.
Z-Multiplier	Sets a factor to compensate different speed of sound settings for the systems to match both depth values.
Z-Offset Constant	Adds a constant offset to the Z-values (transducer draft or any vertical offsets)



The Insert Layer with User Defined Parameter Dialog

This dialog allows the calculation of a layer in between two existing layers. Assuming two layers (or one layer and the water depth) were digitized and some kind of parameter can be applied to each layer (for example a density value), then this tool can calculate the position of a given value between those two layers. This is based on a linear change of the parameters. All the positions of the given parameters are connected to build a separate layer, which will be drawn onto the echo plot.





The Write Water Depth To Active Data File Dialog

Once a water depth was digitized and exists as a layer within the data window, this dialog allows writing that information directly to the according data file. It will replace the on-line calculated water depth.



The online calculated values will be lost in this case and cannot be recovered. Optionally the information can be written to the one of the SIS fields.

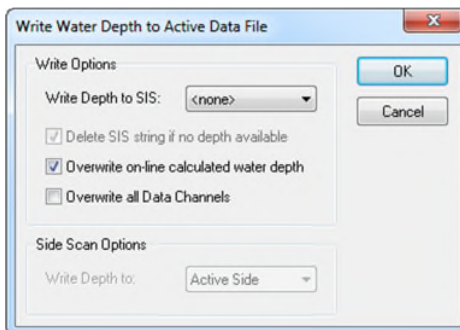
• Write Options

Write Depth to SIS	Sets the SIS-ID to write the depth values.  The content of the selected SIS-ID will be overwritten!
Delete SIS string if no depth available	Enables or disables deleting the content of the selected SIS-ID if no depth value, due to interrupted layer, is available.
Overwrite on-line calculated water depth	Enables or disables replacing the on-line calculated water depth.
Overwrite all Data Channels	Enables or disables all data channels to be overwritten.  SES data files contain more than one channel (e.g. HF and LF) the digitized depth can be written individually to each channel or can be used for all channels.

• Side Scan Options

This option is only available if the data file is a side scan data file.

Write Depth to	Selects the side to write the depth values. Either the active side or both sides.
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The Swell Filter Dialog

The swell filter can help to remove heave from the echo data if no motion sensor was used during the survey. This filter allows a software swell compensation and needs digitized cleaned bathymetry saved as separated layer.




Be aware, that the software swell filter may remove not only heave ripples from the data, but real ripples on the seabed as well. Therefore a motion sensor with heave output is preferred and it is recommended to use the heave correction in advance of the swell correction.

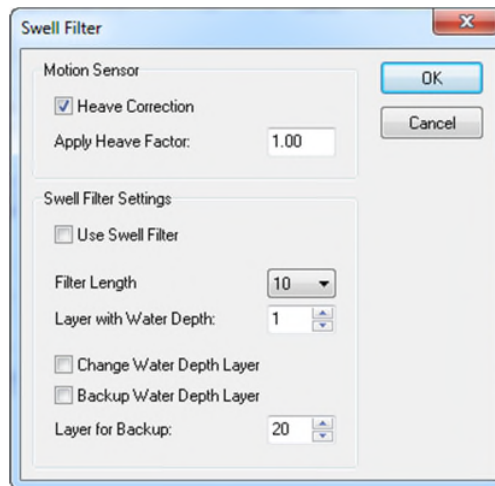
Swell Filter for SES Data

- Motion Sensor

Heave Correction	Enables or disables the heave correction.
Apply Heave Factor	Applies a factor for the heave values to increase or decrease the amplitude of the heave data.

- Swell Filter Settings

Use Swell Filter	Enables or disables the swell filter.
Filter Length	Sets the filter length. The filter length depends on the period of the swell and ping rate. In general long filter length will remove long swell and a short filter length will remove short swell ripples.
Layer with Water Depth	Allows choosing one layer to be the bathymetry layer.
Change Water Depth Layer	Enables or disables changing the bathymetry layer in order to match the echo data after filtering.
Backup Water Depth Layer	Enables or disables backing up the bathymetry layer.  If the option Change Water Depth Layer was used, it is recommended to back-up the original bathymetry to another layer. Since the swell filtering is not stored in the data files and needs to be recalculated whenever a data file is reloaded. The origin bathymetry layer can be used to apply the swell filter again. If the data file is saved as <i>processed data</i> , the swell filter will be saved within the data file.
Layer for Backup	Sets the layer number for the layer back up.



Swell Filter for RAW Data

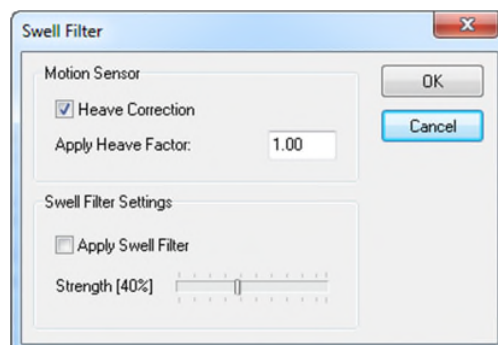
The swell filter dialog for raw data differs a little compared to the ses data dialog. The swell filter for raw data demands a clean bathymetry saved within the data. In order to write the cleaned seabed layer back into the data, the **Write Water Depth to Active Data File** can be used.

- Motion Sensor

Heave Correction	Enables or disables the heave correction.
Apply Heave Factor	Applies a factor for the heave values to increase or decrease the amplitude of the heave data.

- Swell Filter Settings

Apply Swell Filter	Enables or disables the swell filter.
Strength [%]	<p>Sets the filter strength.</p> <p>The swell filter is a low-pass filter, uses the online water depths to determine the frequency of the swell. Higher value will fit better to the lower swell frequencies (longer waves) and lower value will fit better to the higher swell frequencies.</p>

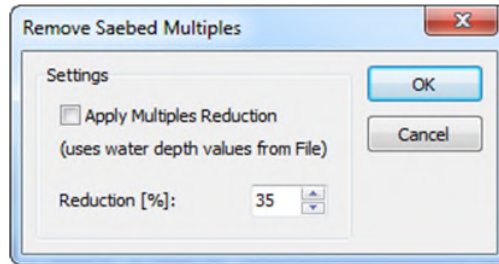


The Remove Seabed Multiples Dialog

This dialog works with raw data only and is only available when raw data is loaded. The filter removes unwanted signal parts from an echo plot caused by multipath signal propagation also called multiples. The condition for the optimal function is a clean online water depth. In order to save the cleaned seabed layer back into the data, the *Write Water Depth to Active Data File* can be used.

- Settings


Apply Multiples Reduction	Enables or disables the multiples reduction.
Reduction [%]	Sets the reduction of the amplitude values of the multiples in percent.

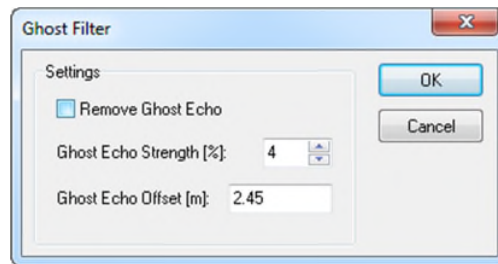


The Remove Ghost Echo Dialog

The Ghost Filter dialog gives the possibility to remove signal parts from an echo plot, which are caused by reflectors within the sound propagation path. Such signal parts have nearly the same echo curve, but with a time delay. For example a parallel echo below the seabed will be visible on an echo plot. This function is only working for SES data.

- Settings

Remove Ghost Echo	Enables or disables the ghost echo reduction.
Ghost Echo Strength[%]	Sets the approximate signal strength of the ghost echo in percentage of the primary echo.
Ghost Echo Offset [m]	<p>Sets the offset of the ghost echo to the real echo.</p>  <p>The more accurate the offset of the parallel reflection is given, the better the filter will remove the unwanted ghost echo.</p>

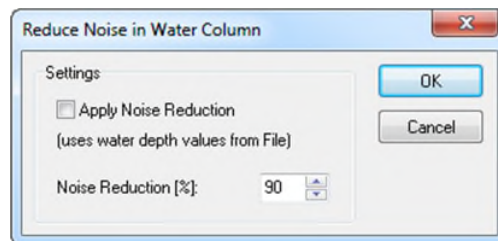


The Reduce Water Column Noise Dialog

This function helps to reduce or remove the noise within the water column. The condition for the optimal function is a clean online water depth. In order to save the cleaned seabed layer back into the data, the *Write Water Depth to Active Data File* can be used.

- Settings

Apply Noise Reduction	Enables or disables the water column noise reduction.
Noise Reduction [%]	Sets the reduction level in percentage.




The Manipulate SIS Fields Dialog

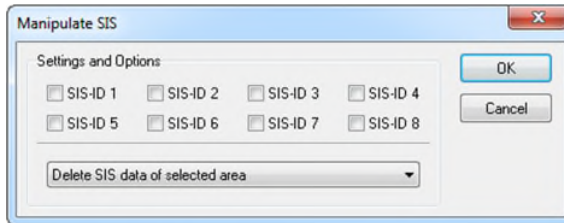
With this function it is possible to edit the content of the SIS fields for a particular area. This makes it possible for example to remove GPS outliers. To identify such outliers the file needs to be loaded with the Track/GIS window. This function is only available when the data file was loaded with no *Stacking*, no *Smoothing* and no *Track Accumulation*. Moreover the tool does not work with multi frequency and beam steering data files. If all conditions are met, the tool is activated by marking an area with the *Mark Block* tool. The changes won't be saved automatically and need to be saved by *Save manipulated SIS to SES-File*.



Be aware, the tool will modify the SIS-IDs directly. No back up file will be generated. Once the changes are saved the SIS-IDs cannot be recovered. If the manipulation went wrong for some reason, it is possible to close the file and to discard the processing by not saving.

- Settings and Options

SIS-IDs	Enables or disables the desired SIS-IDs to be manipulated.
Delete SIS data of selected area	Deletes the content of the selected SIS-IDs for the marked area.
Interpolate SIS data of selected area	Interpolates the content of the selected SIS-IDs for marked area.  The interpolation is only working for metric values. It doesn't interpolate Lat/Lon or time.

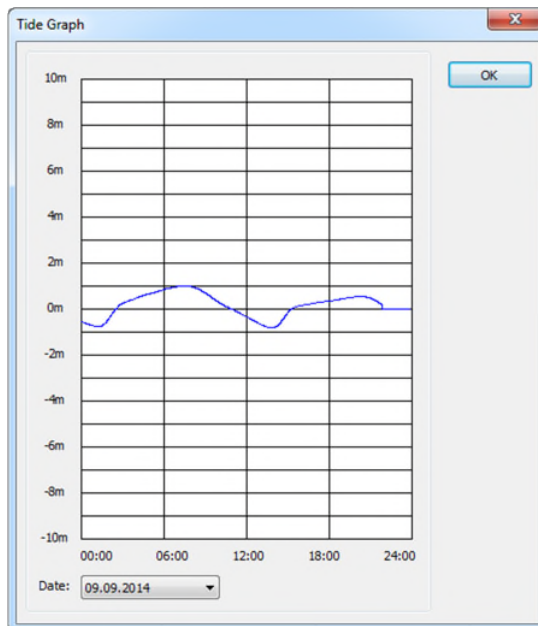


The View Tide Graph Dialog

This is more a status window than a dialog. If the data file was loaded together with a *tide file*, the tidal curve will be displayed in the window. When the tide file consists of more than one day the desired day can be selected by the pull down box. It's useful to verify the tidal curve for outliers.

- Tide Graph

Date	Sets the desired date for displaying the tide curve, if a multi-day tide file was loaded.
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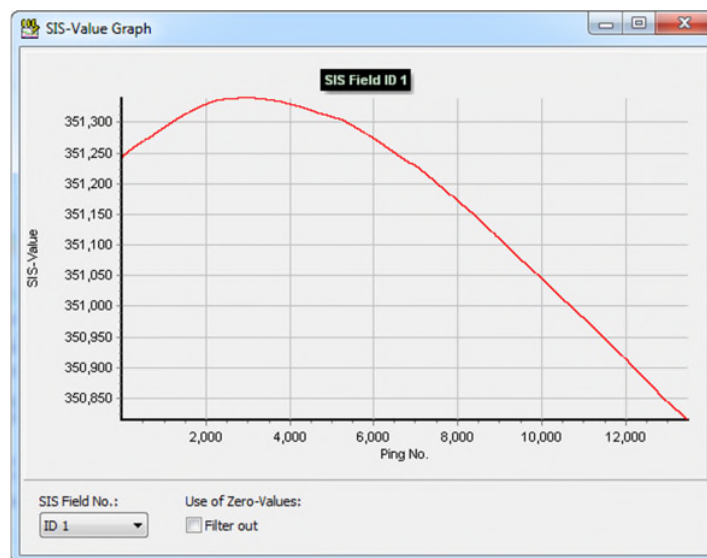


The View SIS-Value Graph Dialog

This window allows the representation of the individual SIS fields in a chart with respect to the pings. This is a quick method to check the SIS fields for outlier. The window responds to mouse interactions. The content of the chart can be moved in all direction by holding down the right mouse button while moving the mouse. There is also a zoom capability. Zoom in will be activated by holding down the left mouse button while drawing a rectangle from left to right over the point of interest. Zoom out will be activated when drawing the rectangle from the right to left.

- SIS-Value Graph

SIS Field No	Sets the SIS-ID for displaying the graph.
Use of Zero-Values	Enables or disables filtering out zero numbers.



Probes Menu

This menu gives access to the sediment probe data base and the sound velocity profile. The probe data can be edited, loaded and saved to a disk and also combined with a layer data in the open windows. The Probes Menu contains the following commands:


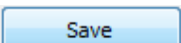
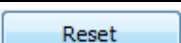
Command	Description
Sound Velocity Profile	Opens the dialog for the input and activation of a sound velocity profile.
Correct Echo Plot with Sound Velocity Profile	Corrects the echo plot and active layer in an open data window with a given sound velocity profile.
Numerical Profiles	Opens the Editor for the numerical profile data base.
Overlay Echo Plot with Numerical Profiles	Enables the overlay of numerical profiles on the actual data window with different options.
Sediment Probes	Opens the Editor for the sediment probe data base.
Overlay Echo Plot with Sediment Probes	Enables the overlay of sediment probe data on the actual data window with different options.
Overlay Target Positions	Enables the overlay of manual marker lines provided by a text file

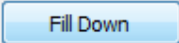



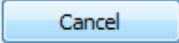
The ISE Probes Dialogs

The Sound Velocity Probe Dialog

This dialog allows the definition of a sound velocity profile to correct the water column for sound velocity which is valid for the whole application. It can be used in any open data window. For each meter, starting at -1m, a value can be defined. Each field is manually accessible. Fields with no data in between will be interpolated automatically after activation. From the last entered value till the end of the table the values are constant. That is also valid for the beginning of the table, when the values do not start from -1 meter.

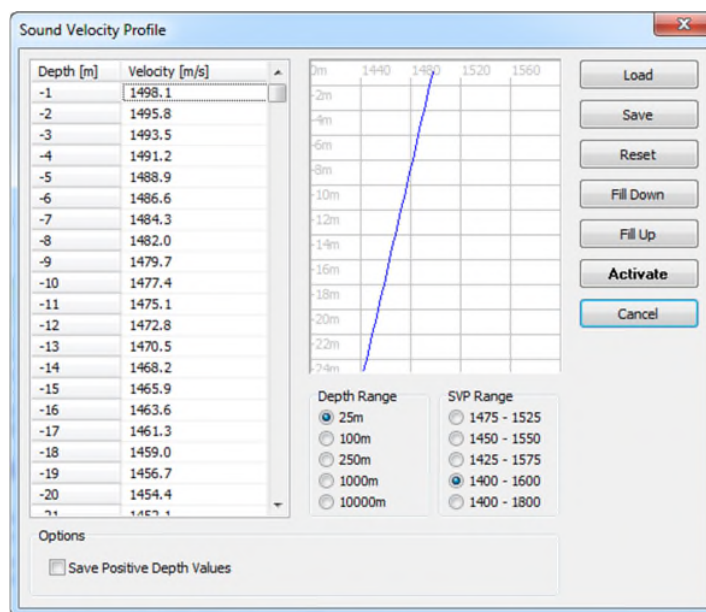
- Sound Velocity Profile

	Opens a standard Windows® open dialog to choose a sound velocity file. The file format can be found in the appendix under <i>The Sound Velocity File Format</i> .
	Opens a standard Windows® save dialog to save the entered sound velocity profile. The default file extension will be *.svp.
	Clears the whole sound velocity table and the sound velocity probe becomes inactive.

	Fills down the whole table with the value from the marked cell.
	Fills up the whole table with the value from the marked cell.
	Activates the sound velocity profile to correct the SBP data.  That will not apply the correction to the SBP data yet. That will be done by <i>Correct Echo Plot with Sound Velocity Profile</i> .
	Cancels modifying the sound velocity profile and closes the dialog.
Depth Range	Sets the depth ranges for the sound velocity chart.
SVP Range	Sets the sound velocity ranges for the chart.

- Options

Save Positive Depth Values	Writes positive depth values when the sound velocity data is saved to a file.
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The Correct Echo Plot with Sound Velocity Profile Dialog

Once a sound velocity profile is defined and activated, the correction needs to be enabled. While the upper part of the dialog refers to sound velocity correction for the water column, the lower part deals with the sound velocity correction for the sediment body. This is useful to get corrected echo plots with more accurate depth and thickness of sediment layers because the speed of sound inside the sediment is usually different than in the water column.

- Water Depth

Layer with Water Depth	Sets the layer for the seabed information. This is needed to define the border between water column and sub-bottom data.
------------------------	--

- Correction Parameters

Apply SVP Correction	Enables or disables the SVP correction for the water column for the data window.
Change Water Depth Layer	Enables or disables adjusting the seabed layer according to the sound velocity profile.
Backup Water Depth Layer	Holds the original seabed layer on a selected layer number. Since the corrected echo data is not saved, the echo plot needs to be recalculated, whenever the SES data file is reloaded.
Layer for Backup	Sets the layer number to back up the original seabed layer when the option is enabled.


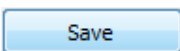
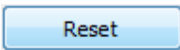
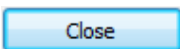
- Sediment

Apply Correction for Sediment	Enables or disables a sound velocity correction for the sediment body.
Change Sediment Layers	Enables or disables adjusting the sub-bottom layers according to the sound velocity for the sediment body.
Speed of Sound of Sediment	Sets the speed of sound for the sediment body.





The Numerical Profiles Dialog

Numerical profiles can be done in many ways. Each kind of measurement connected to a depth value can be overlaid to the echo plots. An example would be a density profile. This dialog allows to import and to modify the numerical profile data base. Once the database is activated, it can be used for all loaded data files.

	Loads a collection of numerical profiles within a numerical data file *.den.
	Saves the collection of all numerical profiles within the profile list to one data file. It results in a binary file with *.den as file extension. This file can be reloaded by the Load function.
	Clears the whole dialog. It removes all loaded numerical profiles.
	Closes the dialog and exits.

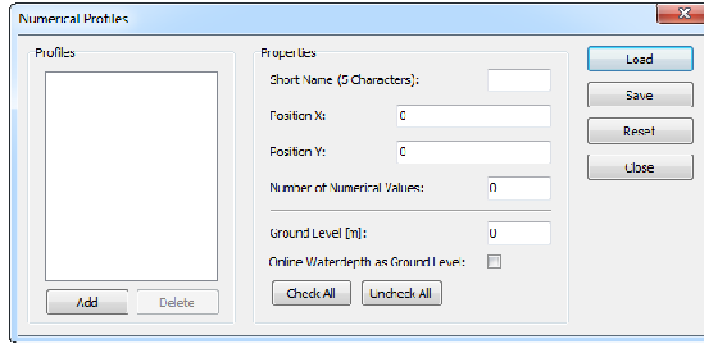
- Profiles

	Adds single or multiple ASCII text files including the numerical profile data according to the desired file format. The file format can be found within the appendix under <i>The Numerical Profile File Format</i> .
	Deletes selected numerical profiles from the list view.

- Properties

Short Name (5 Characters)	Sets or edits the probe name.
Position X	Sets or edits the x position of a selected numerical profile.
Position Y	Sets or edits the y position of a selected numerical profile.
Number of Numerical Values	Sets or edits the number of numerical values within a selected numerical profile.
Ground Level [m]	Sets the ground level for the selected numerical profile.
Online Water Depth as Ground Level	Enables or disables the usage of the online water depth as ground level for the selected numerical profile.

<p>Check All</p> <p>Uncheck All</p>	<p>Enables or disables the usage of the online water depth as ground level for all numerical profile.</p>
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The Overlay Numerical Profiles Dialog

Once a numerical profile data base is edited and activated, the information can be combined with echo plots.

- View

Draw Numerical Profiles	Enables or disables overlaying the numerical profiles onto the echo plots.
Maximum Distance from Profile	When overlaying the sediment probes with echo plot, this allows to set the maximum distance to exclude all numerical profiles which are outside that distance.

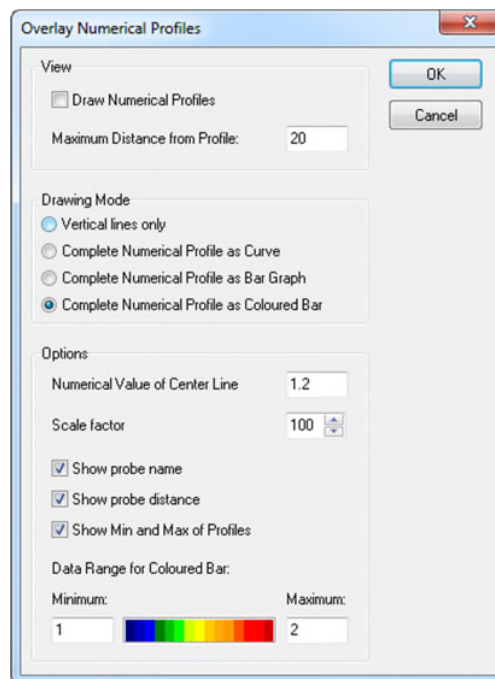
- Drawing Mode

Vertical lines only	Draws only a vertical line at the position of the numerical profile.
Complete Numerical Profile as Curve	Draws all values of the numerical profile as a curve diagram onto the echo plot.
Complete Numerical Profile as Bar Graph	Draws all values of the numerical profile as bar diagram onto the echo plot.
Complete Numerical Profile as Colored Bar	Draws all values of the numerical profile as colored bar diagram onto the echo plot.

- Options

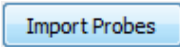

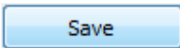

Numerical Value of Center Line	Sets a value of the numerical profile as a cross point for the vertical marker line.
Scale factor	Sets a scale factor to adjust the appearance of the numerical curve or bar diagram.

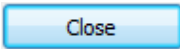
Show probe name	Enables or disables displaying probe name onto the echo plot.
Show probe distance	Enables or disables displaying the distance of probe to the echo data.
Show Min and Max of Profiles	Enables or disables displaying the minimum and maximum value of the numerical profile onto the echo data.
Data Range for Colored Bar	Sets the data range for the colored bar diagram.



The Sediment Probes Dialog



The main function of this dialog is the editing of the sediment probe data base. This data base is application wide accessible.

	Imports sediment probes as an ASCII text file. The file format can be checked under <i>The Sediment Probe File Format</i> .
	Loads a sediment probe data base. This is a binary file with *.sed as file extension.
	Saves all sediment probes to a single file. This will create a new file with *.sed as file extension.
	Clears the sediment probe data base.

	Closes the sediment probes dialog. That will not clear the sediment probe data base.
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- Probes

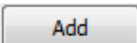

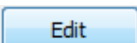
The list view shows all sediment samples of the data base.

	Adds a new sample to the data base.
	Deletes selected samples within the list view from the data base.

- Properties

Short Name (5 Characters)	Specifies or edits the selected probe name.
Description	Specifies or edits a short description of the selected probe.
Date and Time	Specifies or edits the date and the time of the selected sediment probe.
Position X	Specifies or edits the X-Positon of the selected sediment probe.
Position Y	Specifies or edits the Y-Positon of the selected sediment probe.
Ground Level [m]	Specifies or edits the ground level for the selected sediment probe. The ground level must be entered as a negative value.
Online Water Depth as Ground Level	Enables or disables the using of the online water depth as ground level for the selected sediment profile.

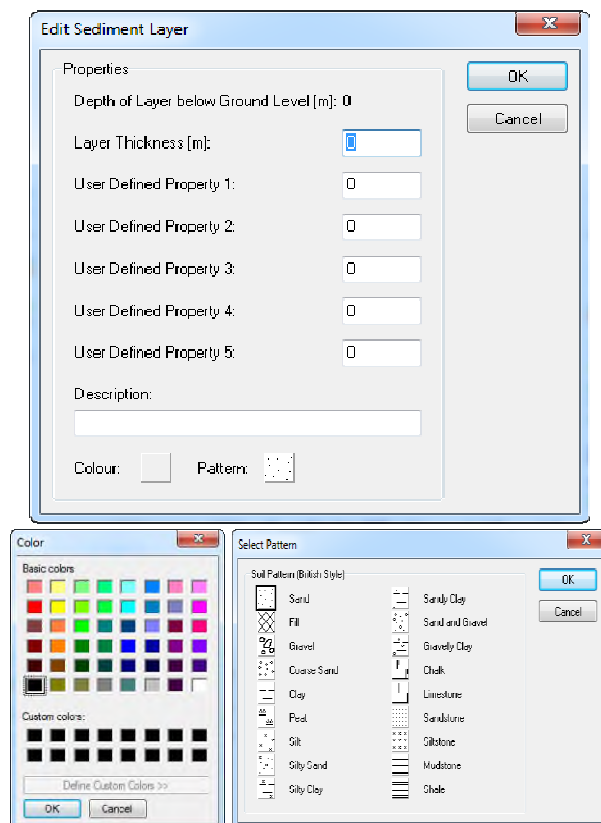
- Sediment Layer

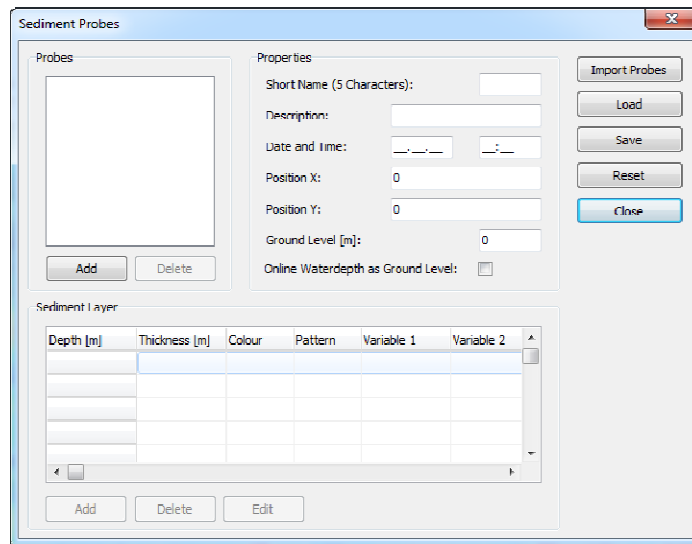
	Adds a new sample/layer to the selected sediment probe. An input mask Edit Sediment Layer will be opened.
	Deletes a sample/layer of the selected sediment probe.
	Edits a selected sample/layer of the selected sediment probe. An input mask Edit Sediment Layer will be opened.

The Sediment Layer Input Mask

- Properties

Depth of Layer below Ground Level [m]	Shows the depth of the current sample/layer below the seabed. The depth of each layer will be calculated automatically depending on the probes ground level and on the thickness of the upper layers. The depth will be updated if a single layer is deleted.
Layer Thickness [m]	Specifies or edits the sample/layer thickness in meter. In order to create a new sample/layer, the value must be specified.
User Defined Property 1-5	Variable fields for entering further properties such as density, granularity or SPT values.
Description	Variable field for entering a description of the sample/layer.
Color	Specifies a color for the sample/layer. That will open an additional window to select the color.
Pattern	Specifies pattern for the sample/layer. That will open an additional window to select the pattern. The pattern list follows the standard sediment classification symbol set of the British Style.





The Overlay Sediment Probes Dialog

Once a sediment probe data base is edited and activated, the information can be combined with echo plots.

- View

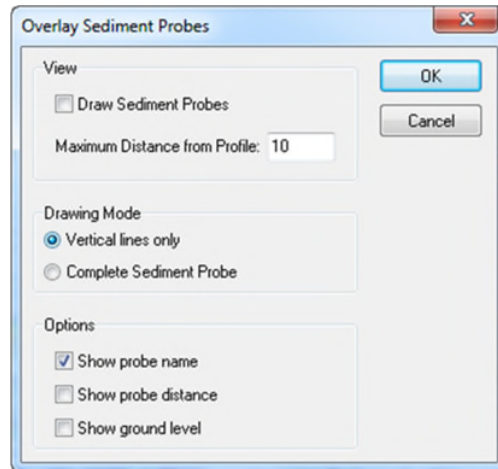
Draw Sediment Probes	Enables or disables overlaying the sediment probes onto the echo plots. The overlay can be switched on or off for each data window separately.
Maximum Distance from Profile	Sets a maximum distance to exclude all sediment probes outside for overlay.

- Drawing Mode

Vertical lines only	Draws only a vertical line at the position of the sediment probe.
Complete Sediment Probe	Draws the complete sediment probe like a colored bar with the soil patterns.

- Options

Show probe name	Enables or disables displaying the sediment probe name onto the echo plots.
Show probe distance	Enables or disables displaying the distance of the sediment probe to the echo data.
Show ground level	Enables or disables displaying the ground level of the sediment probe onto the echo plots.



The Overlay Target Positions Dialog

There are many types of targets, such as points of interest, cross points with other profiles or probe locations. A target can be at any position which is selectable on the echo plot. In order to overlay targets onto the echo plot, an ASCII text file with the information is needed. This text file can be created manually with a text editor or automatically by some functions of ISE software such as **Calculate Cross Points** from the GIS module.

	Loads an ASCII data file with the target information. The file format can be looked under <i>The Target File Format</i> .
	Clears all targets from the list.

- Options

Show Targets	Enables or disables displaying of the loaded targets.
Maximum Distance from Profile	Sets a maximum distance, after which targets are excluded from the view.
Show Target Distance from Profile	Enables or disables displaying the distance of the target to the echo data.
Show Coordinates	Enables or disables displaying the coordinates of the target.
Show Targets ID's	Enables or disables displaying the target IDs.
Show Target Information	Enables or disables displaying the target information.
Show additional Window with matched Targets	Opens an additional window that lists all of the targets which are located in the current data file.

Options Menu

This menu gives access to the different tools of the ISE application, like the zoom box or the track plot window. The Options Menu contains the following commands:

Command	Description
<i>Toolboxes</i>	Configures which tool box window should be visible on the screen.
<i>Environment</i>	Configures some application wide options.

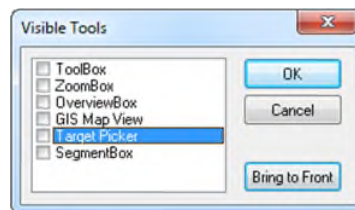
The ISE Option Dialogs

The ISE application has some useful tools for special handling or views in a separate window respectively box. These boxes can be opened even though no data are loaded, but in this case not all functionalities are available. The positions of these small tool boxes are saved, which means they will always appear at the same position they were closed. According to this and under the condition that multiple screens were used, it is possible that the wanted tool box doesn't appear, which is caused because of this tool box lies outside of the current available screen.

The Toolbox Dialog

This dialog allows the selection of the tool boxes which shall be displayed. Every tool box can be separately enabled or disabled. The available tool boxes are listed under the section of *The Ise Tool Bars and Status Bars*.

Bring to Front	Sets the current selected tool box of the dialog to the foreground, sets the focus on it and closes this dialog.
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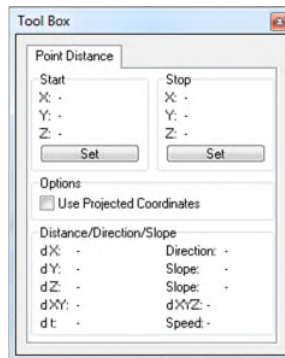
The Tool Box

This tool box can be used to show additional specific information for two coordinates.



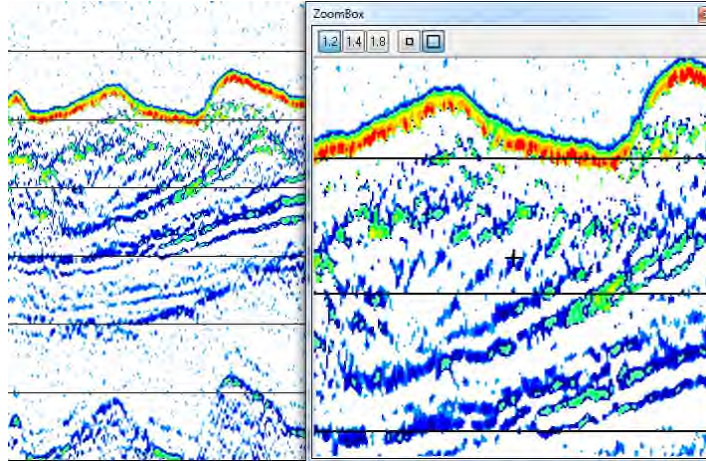
If the selected points are not in the same window the calculation is also possible. This is useful to measure distances between features in different data files.

Set	<p>If it is pressed the mouse cursor changes to an arrow. The point of concern which is then selected into the data window will be put into the tool box. After the selection of two points, the differences in all directions, the distance on the flat plane and distance in three dimensions, the course or direction, the slope angle and the slope steepness in percentage will be calculated.</p> <p> Is only enabled if a data window is available.</p>
Use Projected Coordinates	<p>If it is checked, the data files are side scan files, the water depth is processed and a true heading source is chosen then the true distance between the selected projected data points (offset from track applied) below the water depth ground line will be calculated.</p>



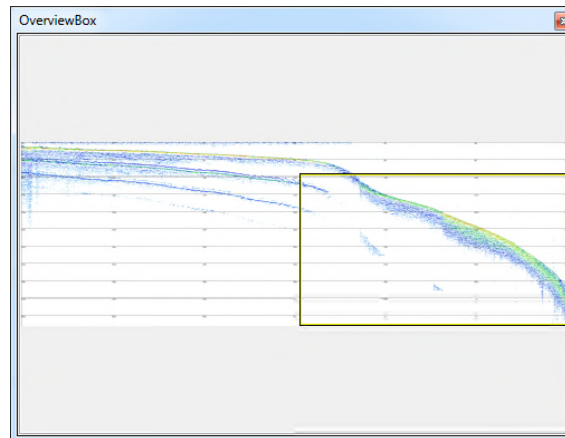
The Zoom Tool Box

This tool box gives a zoomed view around the cursor. It is updated immediately when the mouse is moving over the echo plot. Three different zoom levels and two zoom window sizes are selectable. The box is useful for accurate layer or target editing.



The Overview Tool Box

This resizable tool box window gives an overview of the total echo plot, even if it exceeds the screen size. The visible part on the computer screen is highlighted. By dragging with the mouse the highlighted section can be changed to navigate within the echo plot.




The Gis/Track Box Tool Box


When the GIS extension is available, an access is permitted to more powerful tool which allows several views and manipulations, which can be saved. For instance it is possible to show tracks, side scan coverage, profile crossing or depth views. Without the GIS extension only a simplified track window version is available to show the tracks of the loaded profiles.

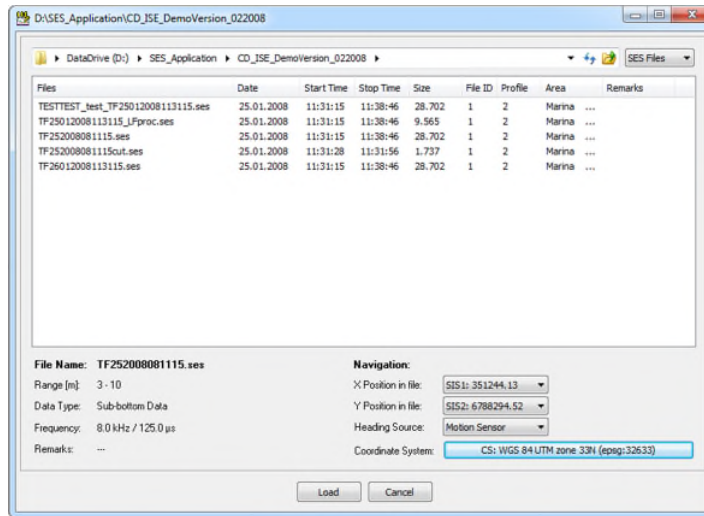
The actual position of the cursor in the active data window is marked with a small cross into the tool box view field. To get more information view the section ***How to work with the GIS module.***

The File Menu

Open Data Files	Opens The GIS Map View Loading Dialog echo data loading dialog.
Open Background	Open a Windows® browser dialog to load an image file which is used as image for the background  The image file should match the area of the loaded data else the view won't be helpful.
Export Tracks	Opens a Windows® browser dialog to export the X and Y coordinate positions and dependent on the target file type may the water depth of all loaded files in the order they are loaded and listed at the right in the Map Layer under <u>Tracks</u> .
Export Map View	Opens a Windows® browser dialog to export the current map view as an image.
Exit	If no profile is loaded the GIS Map View will be closed.



• The Gis Map View Loading Dialog

Directory Browser	Selects single or multiple files.
X Position in file	This is the SIS-ID which contains the X coordinates of the positions of the files data.
Y Position in file	This is the SIS-ID which contains the Y coordinates of the positions of the files data.
Heading Source	Determines whether the SIS-ID or the motion sensor is assigned as the source for the heading angle, which is needed for data files containing side scan channels and to calculate a coverage map.
Coordinate System	This is the coordinate system in which the positions of the selected files were recorded and have to be shown in. Choose between projected and geographic systems.  The GIS Extension supports more than 4000 coordinate systems and it is possible to create user defined coordinate systems. SES-2000 data files may contain an EPSG code already. In such case the Open Data dialogue will ask the user to apply this stored coordinate system.



The Map Menu

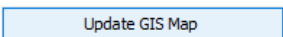
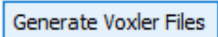
These functionalities are used to interact with the graphical view of the loaded data.

Select Mode	The closest track to the clicked point will be selected and highlighted
Drag Mode	Reposition the view field by moving the mouse during the left mouse button is pressed
Measure Mode	Calculates the distance between two set points which can be gained with the pressed left mouse button  Only available if an EPSG code is selected. The measure bar with distance value remains active until a second measurement is performed or the mode is switched.
Zoom Selection Mode	Zooms into the selected region if the region start corner lies left and above the region end corner, otherwise zooms out  Zooming can be done easy by the mouse wheel.
Zoom In/Out	Performs zoom action
Zoom Full Extent	Zooms to the full view extent for all loaded tracks
Zoom to previous Extent	Reset the zoom to the last extent before the latest mouse wheel usage, after adding tracks, backgrounds or other objects to the Map View
Delete All	Erases all loaded profiles and background images

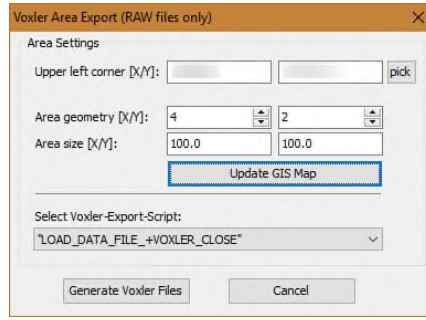
The GIS Functions Menu

<i>Show Depth Colours</i>	If it is toggled on, the colors chosen in the Options dialog of the GIS Functions menu will be given to the depth values of the profile files.
<i>Show Side Scan Coverage</i>	If it is toggled and side scan profiles are loaded the projected coverage of this data are shown
<i>Export Voxler Data</i>	Allows exporting SES or RAW data into a binary point cloud based on a predefined raster. The exported point clouds can be used to calculate voxels by the Innomar Gridder software. That voxel information can be visualized as a 3D model in a 3 rd party software such as Avizio or Voxler. The function is available for licenses with Innomar Gridder software permission only.
Options	Opens the GIS map options dialog
Set Coordinate System	Opens a dialog to choose between three possibilities. If one EPSG code is set during the loading of the files this EPSG code can be changed but only for viewing. The third option is to turn off the geographic interpretation but as a result the distance measurement will be unavailable.
<i>Calculate Track Cross Points</i>	Calculates all cross points of the loaded profiles and assign numbers to them with: Ta#:#

- The Export Voxler Data Dialog

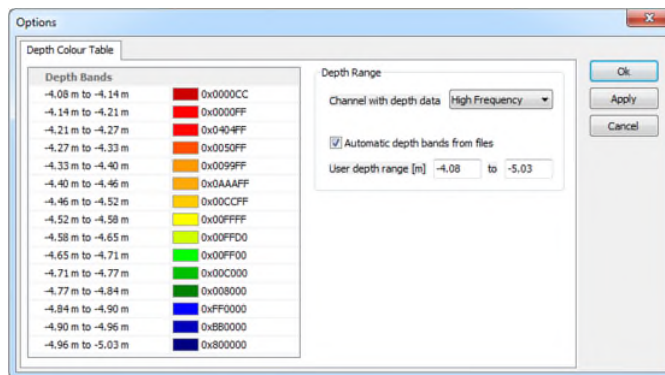
Upper left corner [X/Y]	Sets the coordinates of the upper left corner for the entire area by entering manual or either by clicking the pick button followed by clicking the point in the map.
Area geometry [X/Y]	Sets the number of tiles in x and y direction.
Area size [X/Y]	Sets the size of each tile.
	Updates the GIS Map in order to visualize the chosen number of tiles and size. If the arrangement does not meet the requirements, these can be adapted and can be checked by pressing the button again.
Select Voxler-Export-Script	The pull down list provides the available scripts to export the data.
	Starts the selected script for the export. Only visible survey tracks will be exported. Depending on the export settings binary or text files for each tile will be

	created. The according tile number is added to each filename. Additionally a dxf file with all tiles is created.
<div style="border: 1px solid blue; padding: 2px 10px; display: inline-block;">Cancel</div>	Stops the definition of tiles and closes the dialog window. If the script is already started the Cancel button will not interrupt the script.



- The GIS Map Options Dialog

Depth Color Table	Defines colors for different ranges in meter representing the depth values of the files which are used if the Show Depth Colors option is enabled. Once assigned colors for the chosen range may not be suitable for another loaded file with different range. Therefore these colors can be adjusted.
Channel with depth data	Selects the HF or LF channel as source for the depth data
Automatic depth bands from file	If it is checked, then the depth range of all files will be automatically determined and applied. Unless under User depth range the depth range will be manually selected.
User depth range [m]	Defines a range where the colors for the depth data are assigned to



The GIS Tool Bar

The buttons from tool bar have the same functionalities as described above in the menus, but there is one exception - the **Open selected Track** button. Icons for a fast referencing are the same as well.

Open selected Track	If it is checked <i>The Load Data Dialog</i> will occur to load this data file into the data window
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The Map Layer

This panel shows the content of the view and allows several changes for the loaded background images, the loaded echo data or available objects.

- Background

If this tick box is checked all loaded and ticked background images are shown with their settings on the map. The right mouse button click opens a popup menu which allows the removing of the current background image. Further the transparency of the current background image can be adjusted.

- Grid

If this tick box is checked the grid lines and/or the grid points are shown on the map.

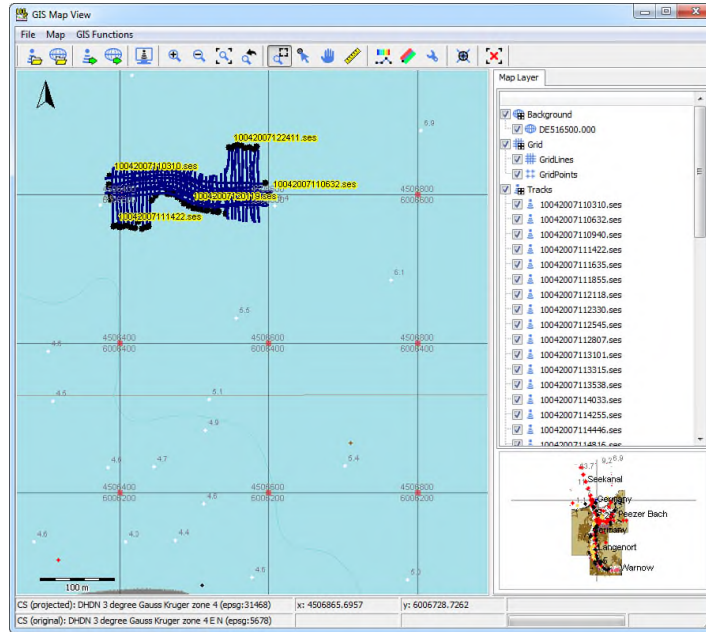
- Tracks

If this tick box is checked all loaded and ticked echo data files are shown on the map. The right mouse button click opens a popup menu with the following options.

Open Echo Plot	If it is checked <i>The Load Data Dialog</i> will occur to load this data file into the data window.
Remove from Map	If it is checked the loaded file will be removed from the map view.
Show Info Columns	The selected columns will be shown behind the file name, which is presented on the tree list view.

- Objects

If this tick box is checked all objects of all loaded and ticked echo data files are shown on the map. The right mouse button click opens the same popup menu as described under Tracks. The loaded track file will be moved from Tracks to here.





The Target Picker Tool Box



This tool can be used to digitize single reflectors from the echo data. It summarizes all digitized single reflectors and creates a database. In addition, digitized reflectors are highlighted in the echo data. Reflectors can be added to the database from any data file.





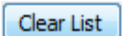
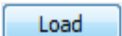
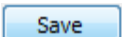
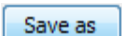
It is recommended to use the **Target Picker Tool** only with interpolated coordinates to avoid offsets in position due to different update rates of the sensors.

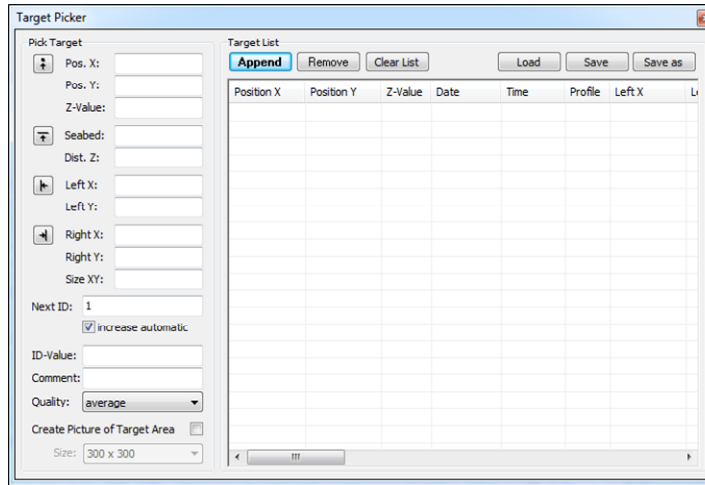
- Pick Target

	<p>Allows picking a single reflector within the echo plot. The reflector is marked by a downwards looking triangle, a number and a dashed vertical line. The position (x,y,z) is filled into the according fields next to the button.</p>
	<p>Allows picking the seabed in order to calculate the distance between reflector and seabed. The z-value of the seabed and the distance between reflector and seabed is filled into the according fields next to the button. The fields can be left empty.</p>

	Picks the position on the left hand side of the reflector and fills the values into the according fields next to the button. The fields can be left empty.
	Picks the position on right hand side of the reflector and fills the values into the according fields next to the button. If both sides are picked, the dimensions can be calculated and are filled into the field accordingly. Fields can be left empty.
Next ID	Shows the next coming ID for the reflector, if increase automatic is checked.
ID-Value	Specifies a manual ID for the reflector. This number, if used, is also shown next to the reflector marker. The field can be left empty.
Comment	Specifies a user comment to the reflector. The field can be left empty.
Quality	Sets a quality tag for the target.
Create Picture of Target Area	Enables or disables creating a picture of the area around the target. The picture size is selectable from the pull down list. The selected size of the picture is shown as dashed line on the echo plot.


- Target List

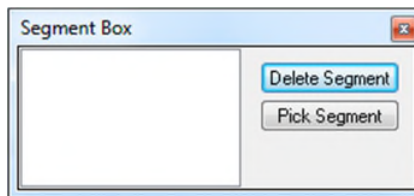
	It adds the content of the text fields from Pick Target to the list and completes the SIS-IDs records for that point. Furthermore the average amplitude of reflector, average amplitude of the seabed and the ratio is given. Name of the file from which the reflector was digitized and the name of the image file, if it was created, are attached to the list. The placeholder for empty fields is a minus. Thus the number of columns is constant. (30)
	Removes a selected row from the list.
	Removes all entries from the list.
	Loads an existing list to continue them.
	Saves all entries of the list to an ASCII text file.
	Saves all entries of the list to a certain ASCII text file.



The Segment Tool Box

This tool box contains a list of all edited layer segments. During the edit process different segments are created. Selecting one segment in the Segment Tool Box highlights this segment in the active data window. Each segment can be deleted from the list and therefore also from the layer in the data window. Additionally it's possible to pick a single segment with a left mouse button click via the button Pick Segment.

Delete Segment	If it is pressed all selected segments will be deleted from the list and the data window.
Pick Segment	If it is pressed the mouse cursor changes to an arrow. The closest segment to the mouse cursor position of the data window will be selected by the left mouse button click then.  Is only enabled if a data window is available.



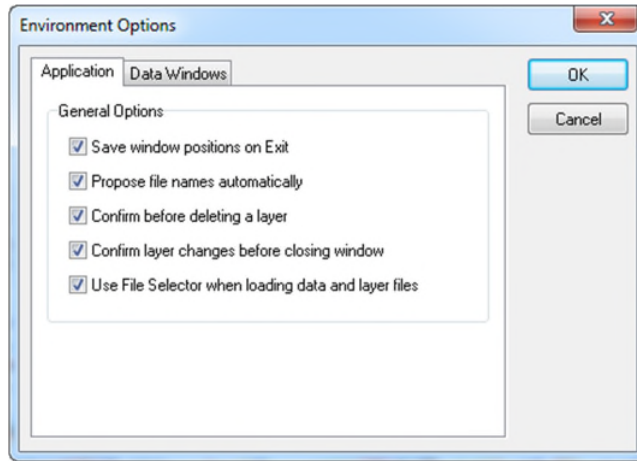
The Environment Dialog

Within this dialog it is possible to set up some options for the application itself. This will be done in a global manner.

- Application

Save window positions on Exit	If it is checked all positions and settings regarding the visibility of the application window and the tool windows will be saved when the ISE is closed. These settings will be restored during the next start of the ISE.
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Propose file names automatically	If it is checked the file name proposals, based on the names of the loaded data files, will be done for several functions and operations automatically. This may help to find a suitable name.
Confirm before deleting a layer	If it is checked a confirmation is necessary before a layer is deleted.
Confirm layer changes before closing window	If it is checked a confirmation for changes on layers is necessary before an opened data window is closed.
Use File Selector when loading data and layer files	If it is checked the <i>ISE File Selector</i> will be used as file selecting dialog instead of the common Microsoft® Windows®.



- Data Windows View

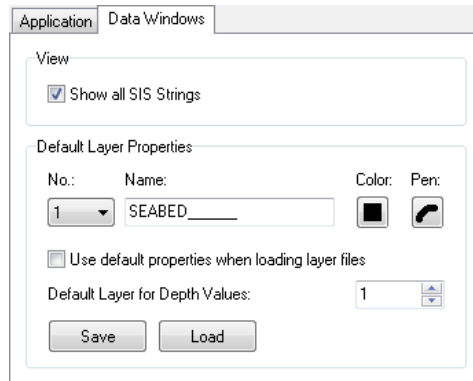
Show all SIS Strings	If it is checked the data window status bar has a second line with all SIS strings of the ping at the cursor position. Otherwise only the first line is viewable with the general information of the ping at the cursor position.
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- Data Windows Default Layer Properties

Global options for the created data windows. Local changes out of these data windows won't influence these settings. Settings can be saved and loaded for the global as well as for local options.

No.	Specifies for the other settings actual layer from 1 to 20.
Name	Specifies the default name of the current layer. ! It is used during export of files and for better orientation during processing.

Color	Specifies a color for the layer as described under <i>Pen Dialogs</i> .
Pen	Opens a settings dialog for the layer as described under <i>Pen Dialogs</i> .
Use default properties when loading layer files	<p>If it is checked the default layer properties will be used for generated layer</p> <p>If a layer is with different stored layer properties is loaded, the default values will replace the loaded settings.</p>
Default Layer for Depth Values	Specifies the layer between 1 and 20 where the depth values are written in as default.



Tools Menu

The Tools Menu allows choosing different tools for separate tasks, which are not directly attached to a data window but sometimes very useful. For instance, there is a tool for editing of the profile information of the data files available. Another tool can be used to generate a list of profiles of the whole contents of a directory. The Tools Menu contains the following commands:

Command	Description
<i>Profile Number Editor</i>	Starts a tool for the manipulation of the profile number, the ship name, the travel name and the area name in a data file.
<i>Profile List</i>	Generates a list of all profiles in a directory.
<i>SIS Extract</i>	Starts a tool for the extraction of SIS strings into ASCII data files.
<i>SIS Replace</i>	Starts a tool for the replacement of SIS strings in data files with SIS strings in an external text file.
<i>SIS Process</i>	Starts a tool for several functions regarding coordinate processing and processing of the SIS fields, e.g. interpolation, clipping, offsets, course calculation.
<i>Coordinate Transformation</i>	Starts a tool for coordinate transformation.
<i>Motion Processing</i>	Starts a tool to apply or modify lever arm corrections.
<i>Layer Combination Tool</i>	Combines two ASCII layer files and calculates the difference between them.
<i>Antenna Offset Tool</i>	Starts a tool for the calculation of the position offset if during the recording the GPS antenna was not directly mounted above the transducer (processes ASCII files).
<i>Decimate Text Files</i>	Decimates text files with tables, for instance exported x, y, z files, by removing lines.
<i>Add Text Files</i>	Combines two or more text files to one target file.

<i>Comma Point Editor</i>	Switches between comma and semicolon in ASCII files, which is sometimes useful for data exports.
<i>Filename Editor</i>	Changes the file name of a data file between short and extended style and allows systematic file name modifications.
<i>Add Data Files</i>	Combines two or more echo data files to one target file.
<i>Cut Data Files</i>	Cut echo data files and create new data files with regions of interest or to remove unimportant parts.
<i>Reduce RAW Files</i>	Reduces the range length of a RAW data file.
<i>Convert SES3 Files</i>	Converts SES3 files into RAW data files.
<i>Tide File Converter</i>	Converts from Hypack exported tide correction files into Innomar tide files.
<i>Process Script</i>	A scripting tool to apply various processing steps to a number of data files successively e.g. load data file and calculate water depth.

The ISE Tools Dialogs

Some tools are included in the ISE software package which are not directly involved in the edit process but are sometimes very useful. They can be started even though no data window is open.



Tools work directly with the files on the disk, so be careful because the data will be modified irreversibly. Always make data backups prior to processing.

The Profile Number Editor

With this editor it is possible to edit the general file information of SES-2000 data files. If a file is selected in the file list, the actual contents are shown and can be changed by pushing the Replace button.

Directory Browser	Selects single or multiple files.
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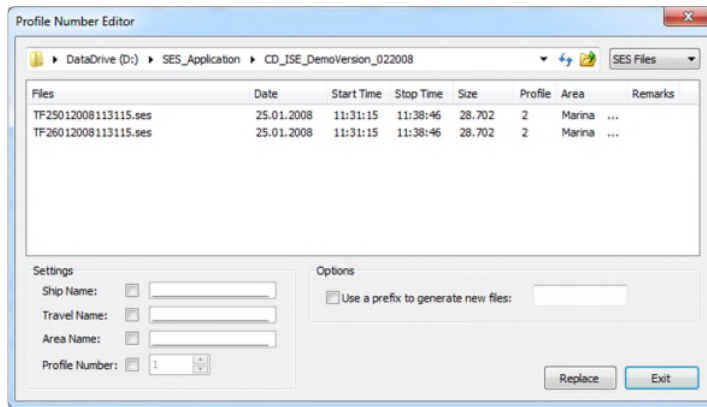
- Settings

Ship Name	Name of the ship of the selected file.
Travel Name	Name of the travel of the selected file.

Area Name	Name of the area of the selected file.
Profile Number	Profile number of the selected file.

- Options

Use a prefix to generate new files	A prefix can be used to generate new files to avoid overwriting the existing files.
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The Profile List Tool

With this tool it is possible to generate a list of selected profiles from a directory. The profile list is an ASCII file within the same directory and is written file by file in the order listed below under Data Fields.

Directory Browser	Selects single or multiple files.
List File	Name of the output file inclusive the extension.

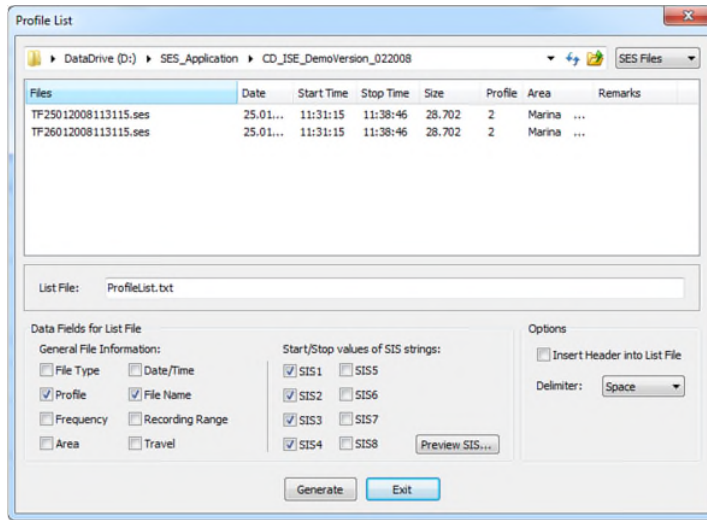
- Data Fields for File List

File Type	Type of the selected files.
Date/Time	Gives the date and time of the selected files creation.
Profile	Profile number of the selected files.
File Name	Name of the selected files.
Frequency	Frequency of the selected files.
Recording Range	Range value of the selected files.
Area	Area of the selected files.
Travel	Travel of the selected files.
Start/Stop values of SES strings for the IDs 1 to 8	The first and the last string entries of the selected SIS-IDs ordered ascending with all start entries followed by the end entries.
Preview SIS...	Opens a preview window which shows the start and the end string entries for all SIS-IDs of the first

	selected file.
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• Options

Insert Header into File List	Writes a headline into the output file of the selected contents.
Delimiter	The delimiter sign between the entries are: Space, Comma, Semicolon, Tabulator.



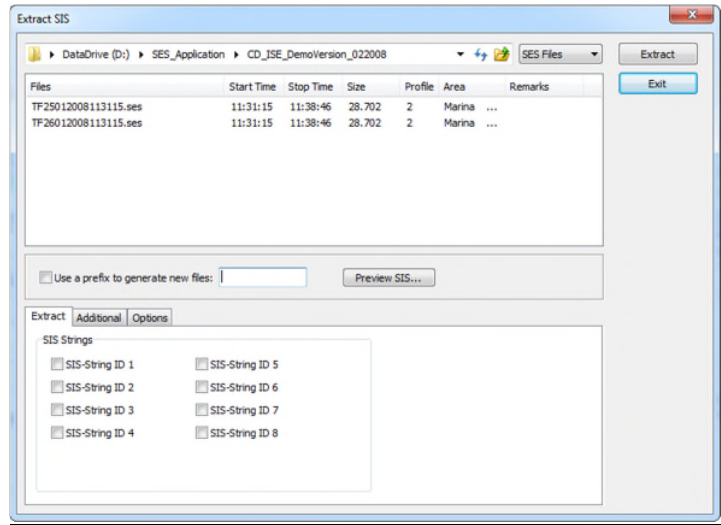
The Extract SIS Tool

The tool extracts strings of the selected SIS-IDs with or without additional data entries. The SIS data are recorded into ASCII files within the same directory with a white space character as delimiter between every entry. The created files have the same filenames as the source files with an optional prefix and file extension '.txt'. The additional data entries into the output file are arranged in the same way as the check boxes and tabs.

Directory Browser	Selects single or multiple files.
Use a prefix to generate new files	A prefix can be used to generate new files to avoid overwriting already existing files.
Preview SIS...	Opens a preview window which shows the start and the end string entries for all SIS-IDs of the first selected file.

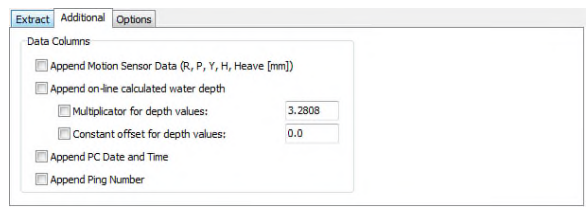
• Extract

SIS-String ID 1 to 8	String entries of the selected SIS-IDs in ascending order.
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• Additional (Data Columns)

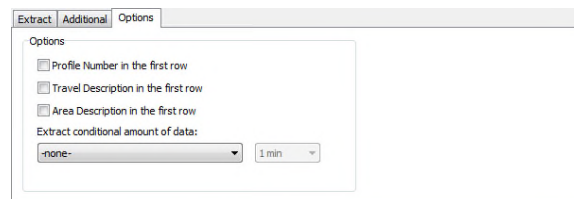
Append Motion Sensor Data (R, P, Y, H, Heave [mm])	Motion sensor data entries belonging to the SIS entry (only if available): Roll, Pitch, Yaw and Heading angle; Heave values in millimeter
Append on-line calculated water depth	Belonging to the SIS entry on-line water depth, presented as negative values in meter with the optional check boxes: Multiplier for depth values: Multiplies the water depth by the entered value to convert into another metric system or to negate the negative sign. Constant offset for depth values: Adds the entered value to the water depth.
Append PC Date and Time	Date and time of the control computer belonging to the SIS entry.
Append Ping Number	Ping number belonging to the SIS entry.



- Options

The check boxes will be added to the first data entry line only. This might be useful for some labelling functions in external software packages.

Profile Number in the first row	Profile number of the corresponding file.
Travel Description in the first row	Travel description string of the corresponding file.
Area Description in the first row	Area description string of the corresponding file.
Extract conditional amount of data	<p>Only entries will be extracted which fulfill the chosen condition:</p> <p>-none-: Only entries which differentiate to the last extracted entry.</p> <p>Extract SIS for event marker only: Only entries which have an event marker.</p> <p>Extract SIS for time interval only: Only one entry every chosen interval.</p> <p>Extract SIS for every ping: An entry for every ping.</p>



The Replace SIS Tool

The tool is developed for the replacement of any data recorded on the SIS-IDs. In order to use this replace function, it is necessary to provide a corresponding time base for synchronization such as GPS time. The tabs of 'Input Data' and 'Replace' contain the essential settings for the replacement process whereas the tabs 'Data Gaps' and 'Options' contain only optionally and auxiliary settings. The number of enabled set up controls of 'Data Gaps' and 'Replace' depends on the number of columns, available within the text file.

Data gaps have two origins. The first case is when no time stamps for the synchronization are available. The second case is if time stamps are available but the value for replacement are missing.



Only entries of the SES files where a valid time synchronization entry is available will be overwritten. If for any of these entries no data entries of the SIS text file are available, where these data entries are the called data gaps too with gaps where no time stamp is available, then these gaps can lead to unwanted results. Such gaps might be generated due to removing position outliers.

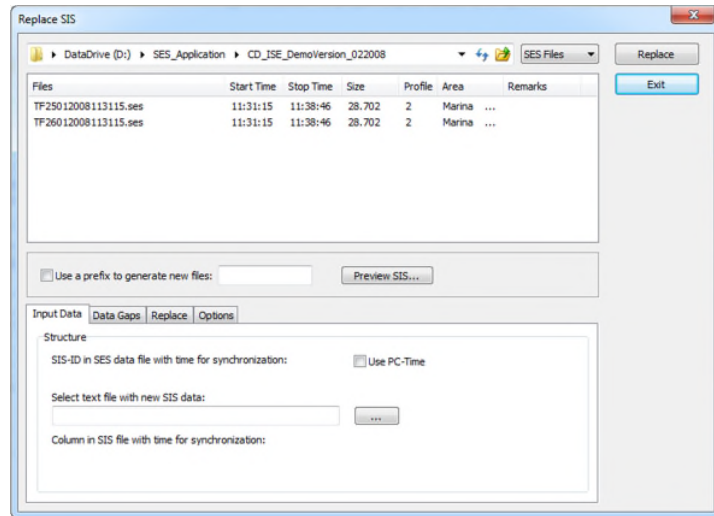
To prevent unwanted behavior the avoidance of setting the same target SIS-ID of the SES files is advisable for multiple columns of the SIS text file.

Directory Browser	Selects single or multiple files
Use a prefix to generate new files	A prefix can be used to generate new files to avoid overwriting the existing files.
Preview SIS...	Opens a preview window which shows the start and the end string entries for all SIS-IDs of the first selected file.

- Input Data

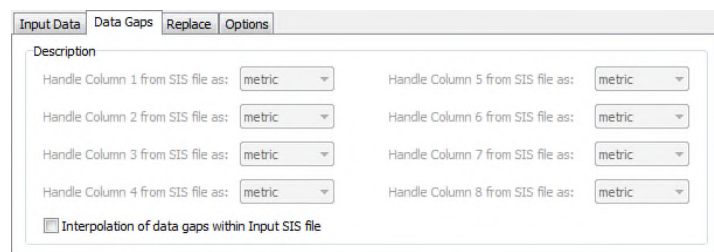
The time string format can be differ from the format inside the SES data files.

SIS-ID in SES data file with time for synchronization	Used only if Use PC-Time is unchecked Means the SIS-ID of the SES files where data entries for the time based synchronization can be found.
Use PC-Time	Use the time from the control computer for the synchronization.
Select text file with new SIS data	Field has to hold the absolute path together with the name of an ASCII text file. This SIS file, with up to eight usable columns, has to contain the synchronization data and the data entries for the substitution. All columns are separated by single white space, tabulator or comma characters. A heading line isn't allowed! This would lead to none column entry to be found. First row of the SIS text file must represent the correct number of columns otherwise not all columns or more columns than actually exist, will be found.
Column in SES file with time for synchronization	Specifies the column of the text file where data entries for the time based synchronization can be found.




• Data Gaps

<p>Handle Column x from SIS file as where x is a digit 1 to 8</p>	<p>Following options have the interpretation meanings for the interpolation: metric: Interpret column entries as metric entries heading: Interpret column entries as heading angle -skip-: Don't interpolate gaps of this</p>
<p>Interpolation of data gaps within the Input SIS file</p>	<p>If it is checked up to seven of the first eight columns' possible existing data gaps can be interpolated before these entries replace any entries of the SES files. The column which is used for the time based synchronization won't be available.</p>



• Replace

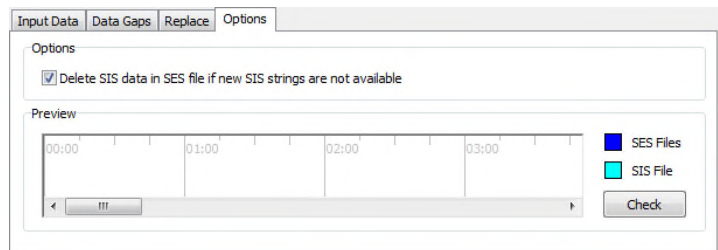
<p>Column x from SIS file to SIS-ID 1 to 8 where x is a digit 1 to 8</p>	<p>Tells which SIS fields with the IDs 1 to 8 of the SES files have to be replaced by the actual column of the SIS text file. All with -none- selected or disabled columns of the SIS text file will be ignored.  If more than one column is set to the same SIS-ID of the SES files then the entries of the highest column number will be the result. Be careful not to overwrite the synchronization string</p>
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	<p>in the SES file if it is needed for further processing steps within this tool.</p> <p>If any SIS-ID of the SES files is replaced by the time based synchronization field of the SIS text file and the interpolation is checked then the interpolated entries of the time are in decimal format. That means whether another format is used for the time into the SIS text file this values are written to the chosen SIS-ID of the SES files in the given format, which may be different from the decimal format because of using delimiter signs like colons, whereas the interpolated values are written into the decimal format. This leads to inconsistent entries at the chosen SIS-ID of the SES files.</p>
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- Options

Delete SIS data in SES file if new SIS strings are not available	If this option is checked without interpolation then any SIS-ID string entry of the SES files which belongs to a data gap will be empty.
Preview	After the Check button is pressed the preview shows the under 'Input Data' entered time based synchronization entries of the SES files and the SIS text file, which reveals data gaps and overlapping.



The SIS Process Tool

The tool allows several operations to process or manipulate SIS data entries within a SES data file. Every function has its own tab and is executed by pressing the present button of the tab.



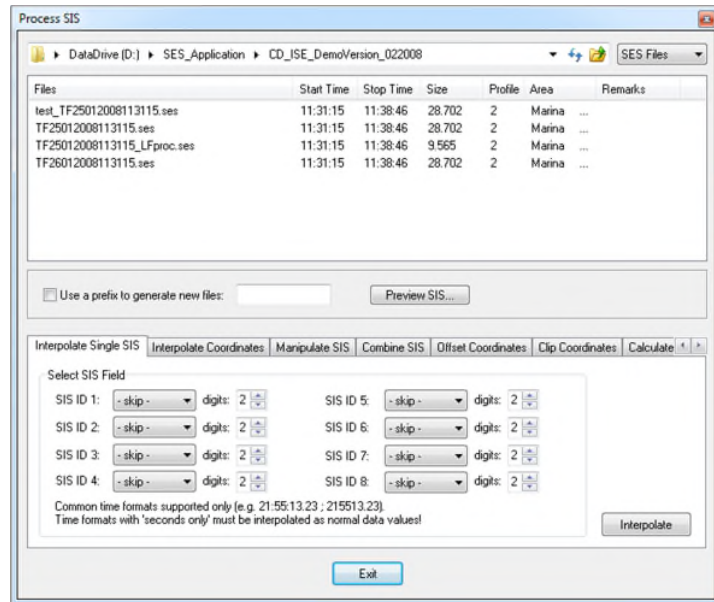
Overwriting the original data within SIS fields may become irreversible. Therefore a backup is strongly recommended.

Directory Browser	Selects single or multiple files
Use a prefix to generate new files	A prefix can be used to generate new files to avoid overwriting the existing files.
Preview SIS...	Opens a preview window which shows the start and the end string entries for all SIS-IDs of the first selected file

- Interpolate Single SIS

Interpolate the data of the chosen SIS-IDs linearly. Each SIS-ID will be interpolated for its own without being influenced by other data of another SIS-ID.

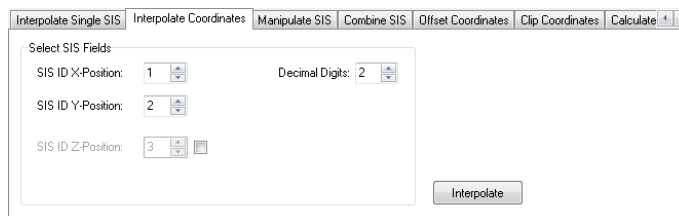
SIS ID 1 to 8	Set one of the following data interpretation for the wanted SIS-IDs: metric: Interpret SIS strings as metric entries heading: Interpret SIS strings as heading angle time: Interpret SIS strings as time values of common format which uses the delimiter colon or dot;; is not to use for pure decimal digit based time entries, therefore the metric option has to be chosen -skip-: Don't interpolate the SIS strings
digits	Means the resulting number of digits behind the decimal delimiter separate for every SIS-ID



- Interpolate Coordinates


Interpolate the data of the chosen SIS-IDs linearly, but only if the value at the X and the Y position changes.

SIS ID x-Position where x represents the coordinate direction X, Y or Z	Assign a SIS-ID to the coordinate position. This is optionally in case of Z direction.
Decimal Digits	Means the resulting number of digits behind the decimal delimiter for all coordinate directions

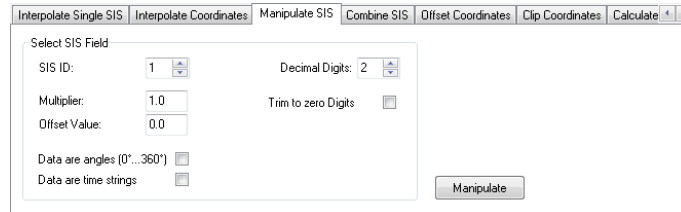


- Manipulate Coordinates

Change the data entries of the chosen SIS-ID, which are interpreted as decimal digits if nothing else will be specified.

SIS ID	The SIS-ID which shall be modified
Multiplier	Multiply all data entries by this defined factor
Offset	Add this offset to all data entries  If the data entries are of time format this offset will be interpreted as seconds.

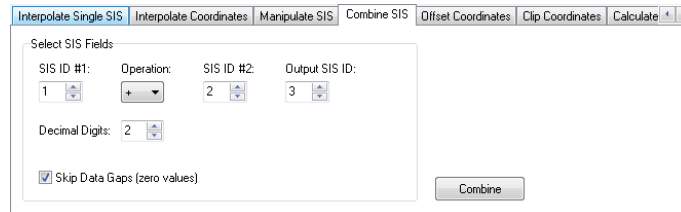
Data are angles (0°...360°)	If is checked all data entries will be interpreted as angles between 0 and 360 degree
Data are time strings	If is checked all data entries will be interpreted as time formatted strings.
Decimal Digits	The result digit number behind the decimal delimiter
Trim to zero Digits	The result entries will be integer values



- Combine SIS


Combine the entries of two input SIS-IDs with a specified operation to a specified output SIS-ID.

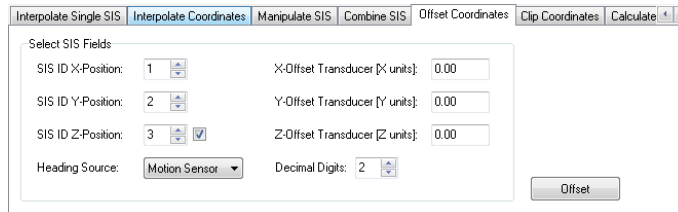
SIS ID #1	The SIS-ID as the left-hand side of the operator
Operation	The mathematical operation which shall be executed is one of the following: +: Add the second SIS-ID to the first SIS-ID -: Subtracts the second SIS-ID from the first SIS-ID *: Multiplies the first SIS-ID with the second SIS-ID /: Divides the first SIS-ID by the second SIS-ID, if the second value is zero the result will be set to zero
SIS ID #2	The SIS-ID as the right-hand side of the operator
Output SIS ID	The SIS-ID where the result will be stored
Decimal Digits	The result digit number behind the decimal delimiter
Skip Data Gaps (zero values)	If is checked and one of the input SIS-IDs is zero the result will be zero



- Offset Coordinates

Add an offset to chosen SIS-IDs entries which have to contain the position coordinate. The offset for the X and Y position will be processed together with a given heading angle to gain the corrected offsets for these both positions.

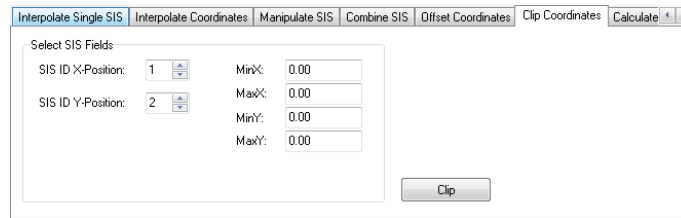
SIS ID x-Position where x represents the coordinate direction X, Y or Z	Assigns a SIS-ID to the X, Y or Z coordinate position. This is optionally in case of Z direction.
x-Offset Transducer [x Unit] where x represents the X, Y or Z	The offset which will be added to the X and Y coordinate positions dependent on the heading angle, whereas the offset for the Z position will be added to the Z Position as it is  The offset unit have to be the same as the coordinate position where it will be added to
Heading Source	Specifies where to find the necessary heading angle: Motion Sensor: Use the internal saved heading angles delivered by a used motion sensor SIS ID x: Use the entries of the SIS-ID x where x is a digit from 1 to 8 as heading angle source
Decimal Digits	Means the resulting number of digits behind the decimal delimiter for all coordinate directions



- Clip Coordinates

Cut off all X and Y coordinate positions which don't lie into the specified rectangle through erasing the string entries of them.

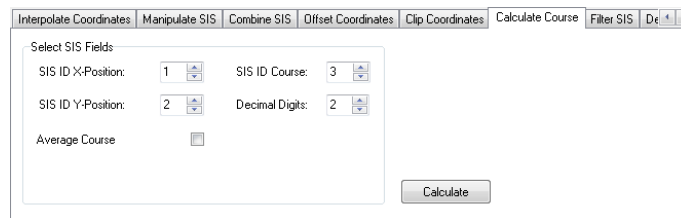
SIS ID x-Position where x represents the coordinate direction X, Y	Assigns a SIS-ID to the X or Y coordinate position.
MinX, MaxX, MinY, MaxY	Specifies an interval for the X Position and one for the Y Position



- Calculate Course

Calculates a course with chosen input SIS-IDs entries which have to contain the position coordinate and store it to the specified output SIS-ID. Useful when no heading sensor was available to generate approximated heading angles.

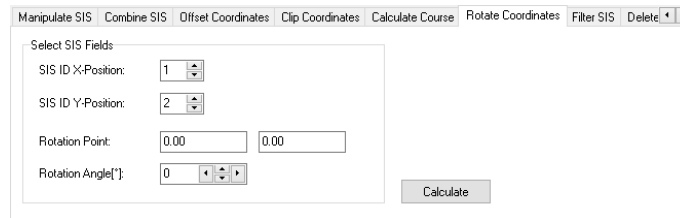
SIS ID x-Position where x represents the coordinate direction X, Y	Assigns a SIS-ID to the X or Y coordinate position.
SIS ID Course	The SIS-ID where the result will be stored
Decimal Digits	The result digit number behind the decimal delimiter
Average Course	If is checked the calculated course may be more smoothed because of not using only the next change of the X and Y coordinate position but the following variation



- Rotate Coordinates

The function rotates the survey area around a certain point in order to reduce the amount of data during gridding and visualization. This will change the origin coordinates of the data files. In order to prevent overwriting the coordinates use a prefix to generate new files.

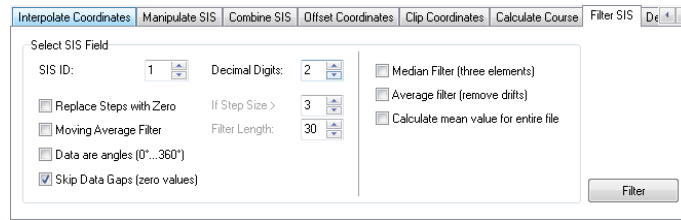
SIS ID x-Position where x represents the coordinate direction X, Y	Assigns a SIS-ID to the X or Y coordinate position.
Rotation Point	Sets the point in x and y for the rotation.
Rotation Angle[°]	Sets the rotation angle in degrees. Positive values will rotate the area counter clockwise.



- Filter SIS

Filter the entries of the chosen SIS-ID with different filter options. One or multiple filter options have to be checked. The following listed filter options will be applied in the following listed order: 'Median Filter (three elements)', 'Replace Steps with Zero', 'Moving Average Filter' and 'Average Filter (remove drifts)'.

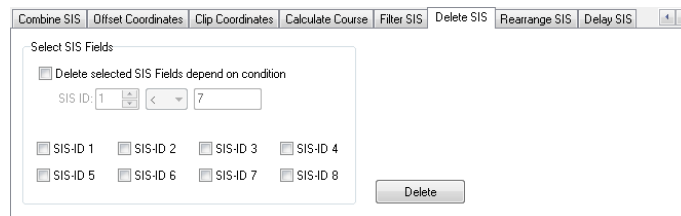
SIS ID	The SIS-ID which shall be filtered
Decimal Digits	The result digit number behind the decimal delimiter
Replace Steps with Zero	If is checked all entries which are less respectively greater than the entry of the next entry subtracted respectively added by the under If Step Size > specified range will be replaced by zero
If Step Size >	This entry specifies the maximal allowed variation
Moving Average Filter	If is checked for all entries an moving average filter with the under Filter Length specified filter length will be applied
Filter Length	This entry specifies the range of used entries for building an average value for the current entry
Median Filter (three elements)	If is checked spikes will be removed through usage of a median filter over three elements
Average Filter (remove drifts)	If is checked drifts will be removed through applying an DC offset filter
Data are angles (0°...360°)	If is checked all data entries will be interpreted as angles between 0 and 360 degree
Skip Data Gaps (zero values)	If is checked then occurrences of data gaps will be interpreted as the last valid value else this gaps will be interpreted with zero
Calculate mean value for entire file	If is checked the average value for the selected SIS ID will be calculated. All origin values on this SIS field will be replaced by that average.



- Delete SIS

Delete all entries of the chosen SIS-IDs respectively erases entries partially dependent on a condition.

Delete selected SIS Fields depend on condition	If is checked only entries of the pings which fulfil the condition will be erased The entries at these ping positions will be deleted for all chosen SIS-IDs
Condition: SIS ID	Select one SIS-ID of 1 to 8 on which the condition will be applied
Condition: Comparison operator drop down box	Specifies one of the following comparison operation: <: Less than the followed value >: Greater than the followed value =: Equal to the followed value <>: Unequal to the followed value
Condition: Value field	Specify the comparison value
SIS-ID 1 to 8	If is checked the deletion will be executed for this SIS-ID



- Rearrange SIS

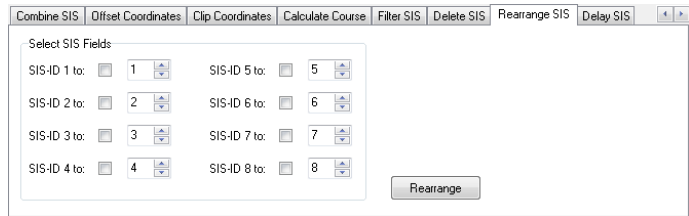
Rearrange all chosen SIS-IDs entries to specified SIS-IDs.



If multiple SIS-IDs have the same target SIS-ID then the resulting entries will be those of the SIS-ID with the highest number.

SIS-ID x to	If is checked an target SIS-ID have to be defined
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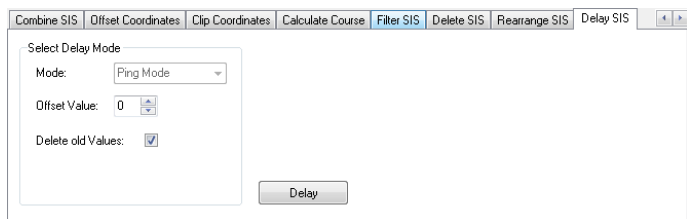
where x is a digit 1 to 8



- Delay SIS

Shift all entries of all SIS-IDs by an offset. In which wise this happens depend on the mode which is at current state only the ping based.

Mode	The mode on which the delay shift is based: Ping Mode: Interpret the entered Offset Value as direct ping shift in positive or negative direction
Offset Value	Specifies the offset which is interpreted and applied dependent on the chosen mode Can be negative, for backward shift direction, respectively positive, for forward shift direction, integer values
Delete old Values	If is checked the remaining entries of the pings which are shifted away but not replaced by new shifted values will be deleted otherwise this values remain at their original ping positions and may lead to confusion because these entries occur double



The Coordinate Transformation Tool




The tool allows the transformation of recorded LAT/LON positions to various metric coordinate systems. All available coordinate systems are listed by names and EPSG codes. More information about EPSG codes can be found under the internet [link](#). The tool has the same appearance and functionality as within the SESWIN software. The transformation can be performed for *.ses as well as *.raw data files.

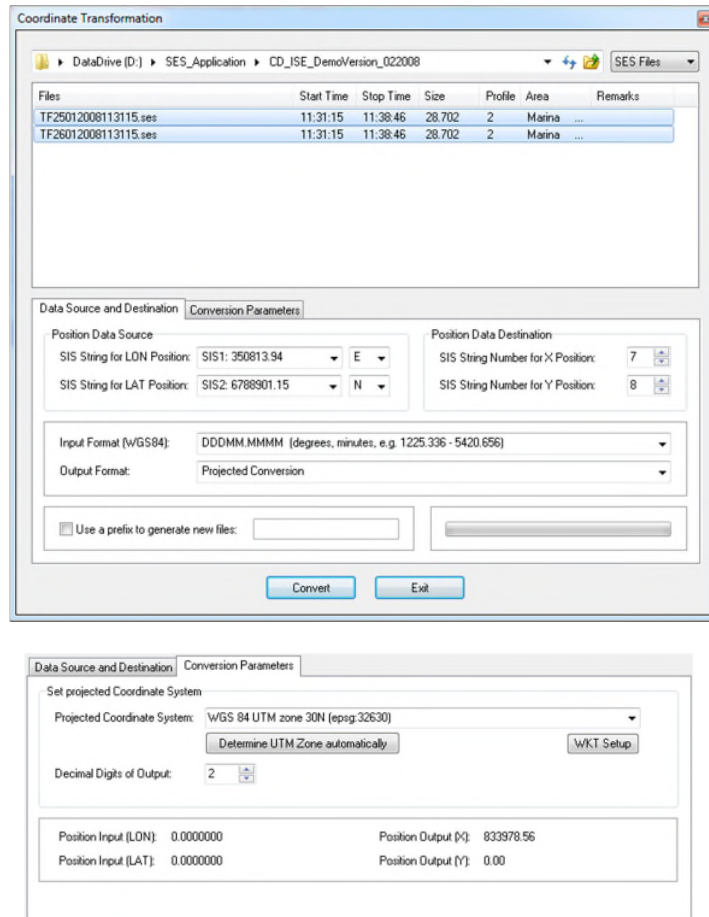
Directory Browser	Selects single or multiple files
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- Data Source and Destination

Positon Data Source	SIS-IDs which contain LAT/LON coordinates and the corresponding hemisphere
Position Data Destination	SIS-IDs as destination for the transformed coordinates
Input Format (WGS84)	Specifies the data format of the recorded LAT/LON positions. Typically for GPS receivers is: DDDMM.MMMM
Output Format	Sets the desired output format: Projected Conversion transforms the LAT/LON position into a projected coordinate system. This requires additional settings on the Conversion Parameters tab. DDD.DDDDDD will perform a format conversion of LAT/LON
Use a prefix to generate new files	A prefix can be used to generate a new file to avoid overwriting the existing file.

- Conversion Parameters

Set projected Coordinate System	Selects the destination coordinate system from the drop down list.  In order to find the desired system faster, the keyboard can be used to enter the name.
	Determines the native meridian strip for the UTM transformation automatically
	Detailed Information about the transformation parameters
Decimal Digits of Output	Sets the number of decimal place for the output coordinate.



The Motion Processing Tool

The Tool provides a lever arm correction during the post processing. A lever arm correction becomes necessary when the motion reference unit (MRU), which is here declared as motion sensor, is located on a different position than the transducer, which is here declared as monitoring point.



Directory Browser	Selects single or multiple files
Use a prefix to generate new files	A prefix can be used to generate a new file to avoid overwriting already existing files.

- Lever Arm processing

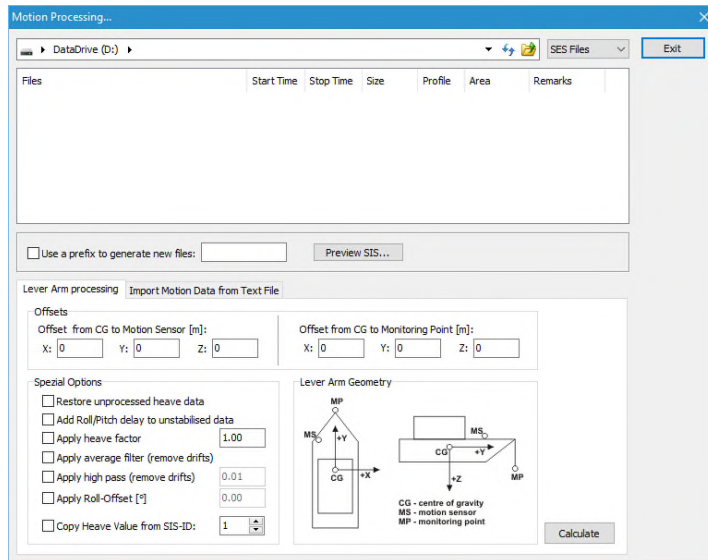
As described at the 'Lever Arm Geometry' explanation layout the center of gravity has the abbreviation CG, the motion sensor has the abbreviation MS and the monitoring point has the abbreviation MP. The average filter will be executed before the high pass filter and are always executed after any processing is done if they are activated.



In the general manner it is unsuitable to try this heave correction if an online heave correction is already done with the correct entered roll angle or by used motion sensor.


Offset from CG to Motion Sensor [m]	Defines the x , y and z offset vector from the center of gravity (CG) to the motion sensor (MS).
Offset from CG to Monitoring Point [m]	Defines the x , y and z offset vector from the center of gravity (CG) to the monitoring point (MP).
Restore unprocessed heave data	<p>If it is checked the lever arm correction won't be executed, the unprocessed heave data are restored only.</p> <p> Not available for the deep sea mode, because the heave data are calculated with a recording delay which is no longer available.</p>
Add Roll/Pitch to delay to non-stabilized data	<p>If it is checked the lever arm correction won't be executed.</p> <p>To correct an actual tilting of the MS, under the assumption that the sea ground is even and no online stabilizing was applied, it will correct wrong water depths which occur through a tilting angle conditioned wrong duration of the beam.</p> <p> This may improve the data quality but there's no guarantee because there are a lot influencing factors to the heave itself and the heave influences the data only as one of many other factors.</p>
Apply heave factor	If it is checked the old heave value will be multiplied by the entered factor before it's changed through the calculated lever arm correction
Apply average filter (remove drifts)	If it is checked drifts will be removed through applying a DC offset filter.
Apply high pass (remove drifts)	If is checked drifts will be removed through applying a high pass filter with the specified high pass frequency, which have to be between zero and the sample rate.
Apply Roll-Offset [°]	<p>If it is checked a roll offset will applied to correct the heave.</p> <p>It is added to the roll angle which was recorded during the acquisition process as a positive or negative offset angle.</p>
Copy Heave Value from	If is checked the lever arm correction won't be

SIS-ID	executed, only the old values will be replaced by the values of the entries of the specified SIS-ID.
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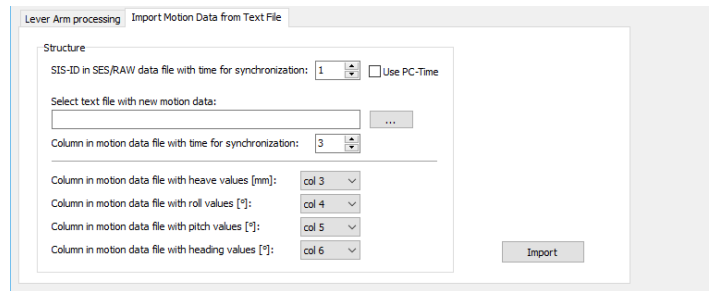


- Import Motion Data from Text File

The motion data import function allows importing reprocessed data from a motion reference unit such as heave, roll, pitch and heading. The basis for a successfully import is a correlating time for the SES2000 data and the MRU data. The motion data which were used during the survey will be overridden by the imported data.

SIS-ID in SES/RAW data file with time for synchronization	Used only if Use PC-Time is unchecked. Means the SIS-ID of the SES/RAW files where data entries for the time based synchronization can be found (GPS Time).
Use PC-Time	Use the time from the control computer for the synchronization.
Select text file with new motion data	Field has to hold the absolute path together with the name of an ASCII text file. This SIS file, with up to five usable columns, has to contain the synchronization data and the data entries for the substitution. All columns are separated by single white space, tabulator or comma characters.  A heading line isn't allowed! This would lead to none column entry to be found. First row of the SIS text file must represent the correct number of columns otherwise not all columns or more columns than actually exist, will be found.
Column in motion data	Specifies the column of the text file where data entries

file with time for synchronization	for the time based synchronization can be found.
Column in motion data....	Assign the columns according to the specific data such as heave, roll, pitch and heading.



The Layer Combination Tool

The tool combines two ASCII coded input layer text files where the chosen data from the first layer text file will be copied unchanged to the ASCII coded output layer text file supplemented by a processed Z coordinate position column.



The coordinate positions X, Y, and Z have to be in this order at the first three column positions. The decimal separator has to be the dot and the delimiter between the columns entries have to be single white space characters.

Source File A	Absolute path to the first input text file
Source File B	Absolute path to the second input text file
Output File C	Absolute path to the output text file

- Options

The Z coordinate position values into the input text files can be positive or negative which influences directly the calculation result.



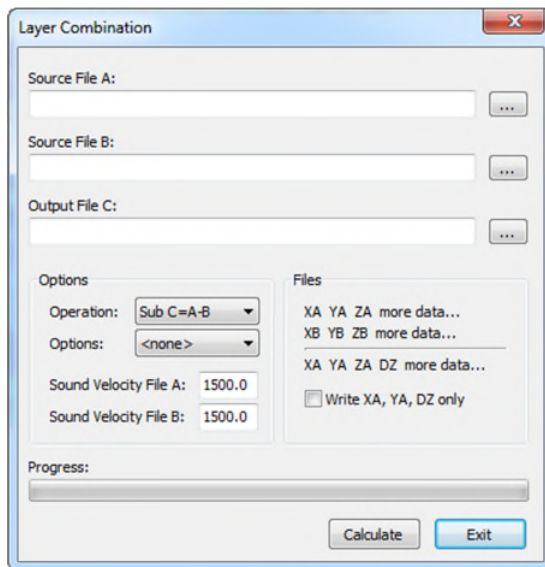
The possibility to change the true distance, if it differs from the one of the Z coordinate position, by assuming different sound velocities to the both input files should be done only if this wasn't already done before the layer were exported.

Operation	The mathematical operation for the Z coordinate position for the both input layer text files: Sub C=A-B: Subtract the Z values of file B from A
-----------	---

	Add C=A+B: Add the Z values of file B to A
Options	<p>If is not <none> positive, by selected Skip pos. Values, respectively negative, by selected Skip neg. Values, result data entries will be skipped</p> <p>ⓘ Be careful with it! Dependent on the operation in combination with this option up to all result entries can be deleted. This option should be used if unwanted values of the second layer shall be erased which lie on the other not wanted side of the first layer values.</p>
Sound Velocity File A or B	Determine the sound velocity value for the first input layer text file A respectively the second file B

• Files

Write XA, YA, DZ only	<p>If is checked only the X and Y coordinate positions of the first input file will be copied and the processed Z coordinate position will be added as third column</p> <p>If is unchecked the processed Z coordinate position values will be inserted as column behind the coordinate positions of X, Y and Z of the first input file followed by the other existing column entries of the first input file.</p>
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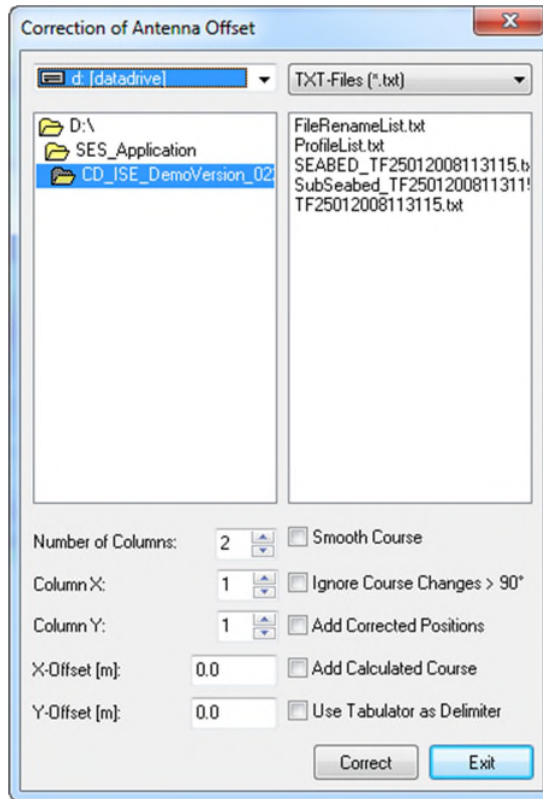
The Antenna Offset Tool

The tool correct the GPS antenna position coordinate of an ASCII coded text file by the specified offset for the X and Y coordinate position offset. This is useful if the GPS antenna was not mounted over the transducer. The delimiters of the text file have to be single white space characters.



It's advisable to use this only if the for the correction calculated course represents the heading direction of the vessel. Otherwise the specified offsets can't be used for the correction in a correct manner.

Directory Browser	Selects a single text file
Number of Columns	Specify the number of available columns between 2 and 12  Columns above this number will be erased out of the text file.
Column X or Y	Specify the columns where the X respectively the Y coordinate position is stored  These columns will be overwritten with the corrected values if nothing else will be specified. Ensure a different column index for X and Y and ensure that they are less equal the specified number of columns.
X- or Y-Offset [m]	Specifies the positive or negative offset for the X respectively the Y coordinate position in meters
Smooth Course	If is checked the for the coordinate correction necessary calculated course will be smoothed
Ignore Course Changes > 90°	If is checked occurrences of calculated course changes from one coordinate to the next greater than 90 degree won't be smoothed
Add Corrected Positions	If is checked the processed corrected coordinate position entries will be added at the end of the file instead of being substituted
Add Calculated Course	If is checked the for the calculation needed course data will be added at the end of the file in degrees
Use Tabulator as Delimiter	If is checked the used delimiter of the to the file written columns will be the tabulator else it will be single white space characters



The Text File Decimator Tool

The tool decreases the amount of rows of the selected ASCII coded text files.

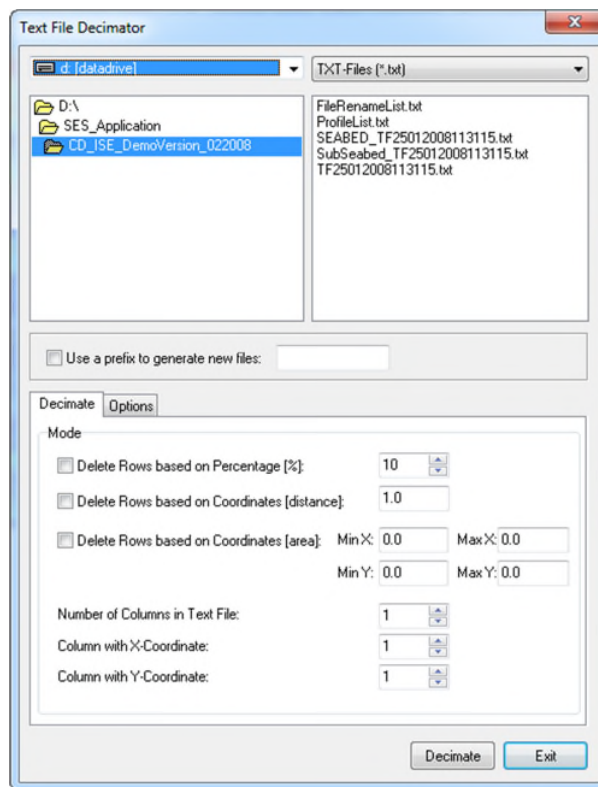
Directory Browser	Selects single or multiple files
Use a prefix to generate new files	A prefix can be used to generate new files to avoid overwriting already existing files.

- Decimate

Define the condition which has to be fulfilled by the rows which shall be deleted.

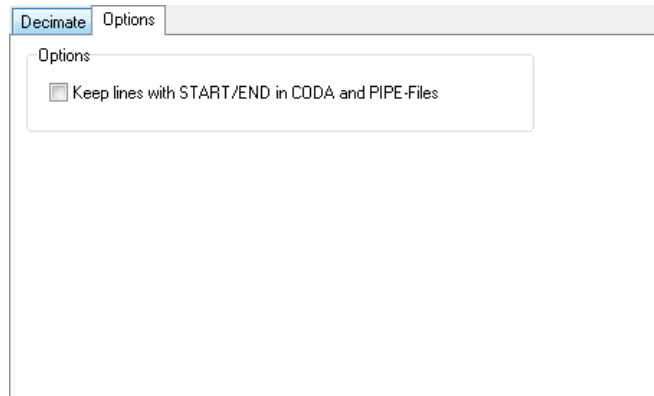
Delete Rows based on Percentage [%]	If is checked a percentage value between 10 and 90 is specified where only every nth row dependent on this value will be kept
Delete Rows based on Coordinates [distance]	If is checked a distance is specified where every entry will be kept only whose distance to the last kept value is greater to this specified distance
Delete Rows based on Coordinates [area]	If is checked an area through entering the minimum and maximum coordinate boundaries is specified where all entries are kept only which lie outside of this

	are
Number of Columns in Text File	Specify the number of available columns between 2 and 12 ↓ Columns above this number will be erased out of the text file
Column with X- or Y-Coordinate	Specify the columns where the X respectively the Y coordinate position is stored ↓ Ensure a different column index for X and Y and ensure that they are less equal the specified number of columns.



• Option

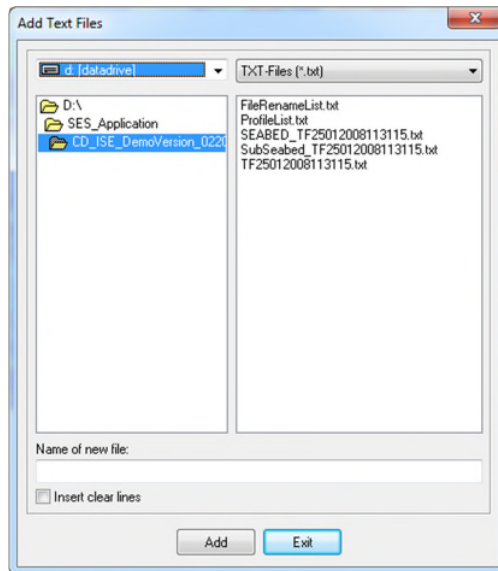
Keep lines with START/END in Coda and Pipe-Files	If is checked the for these formats necessary START and corresponding END tags will be kept
--	---



The Add Text Files Tool

The tool combines all selected ASCII coded text files file by file into a new output file.

Directory Browser	Selects single (senseless here) or multiple files
Name of new file	Have to contain the name of the output file inclusive the extension An empty field will lead to abort the process
Insert clear lines	If is checked an empty line will be added between the single files entry parts of the output file

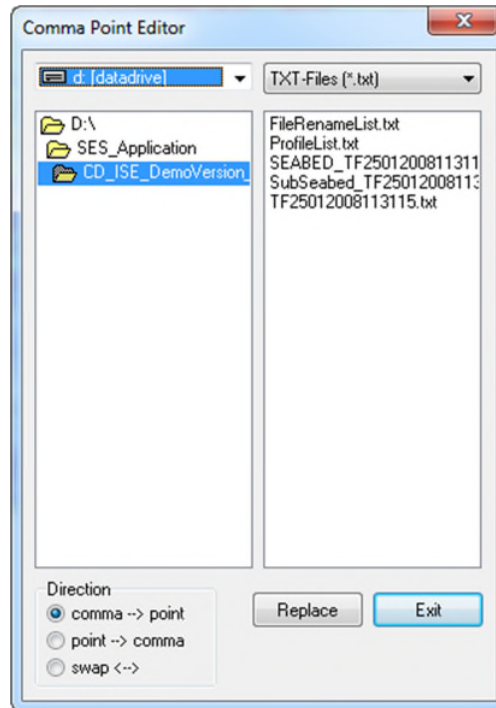


The Comma Point Editor

The tool allows the exchange of dot and comma entries of all selected ASCII coded text files.

Directory Browser	Selects single or multiple files
comma --> point	If is selected all occurrences of commas into the files

	will be exchanged by dots
point --> comma	If is selected all occurrences of dots into the files will be exchanged by commas
swap <-->	If is selected all occurrences of dots into the files will be exchanged by commas and all occurrences of commas will be exchanged by dots



The File Name Editor

The tool allows the renaming of file names in different manners.

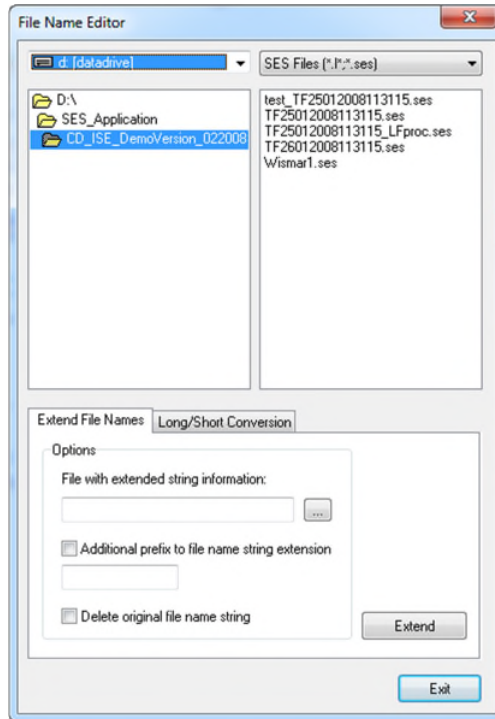
Directory Browser	Selects single or multiple files
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- Extend File Names

Load a text file which contains the file names, inclusive the file extension which shall be renamed respectively added by the specified naming, and the corresponding new names for the files, exclusive the file extension.

File with extended string information	Absolute path to the ASCII coded text file which contains the file names and the new names for every file in an extra line The delimiter for the naming tuple has to be a single white space character
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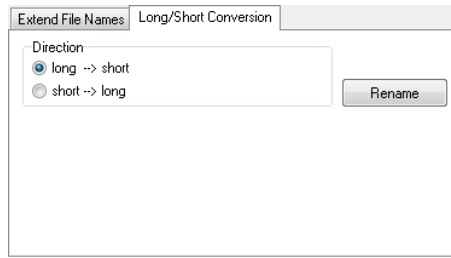
Additional prefix to file name string extension	If is checked the entered prefix will be added to all files' specified new names of the text file
Delete original file name string	<p>If is checked the old file names, without the file extension, of the selected files will be substituted by the specified new names of the text file</p> <p>If is unchecked the new names will be inserted between the old names and the file extensions</p>



- Long/Short Conversion

Selected SES files naming can be modified.

long --> short	<p>If is selected the selected files will be shortened to 8 characters concatenated with the file extension</p> <p>Takes the first 4 characters and 4 characters from the 9th to the 12th sign of the old file name</p>
short --> long	<p>If is selected the selected files will be shortened respectively expanded to 12 characters concatenated with the file extension</p> <p>Takes the first 4 characters of the old file name, concatenated with the year of the file, concatenated with 4 characters from the 5th to the 8th sign of the old file name and concatenated with the seconds of the file</p>



The Add Data Files Tool

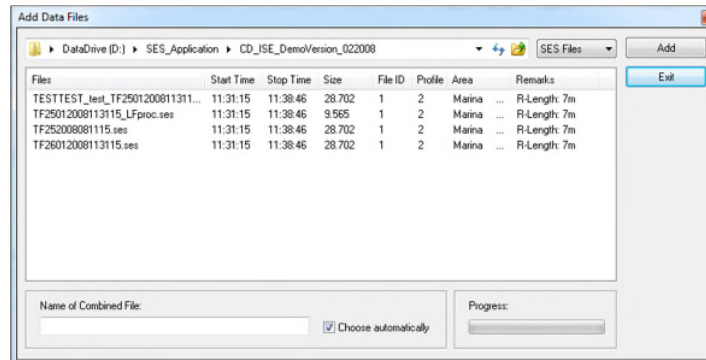
The tool concatenates the entries of the selected SES-2000 or RAW files together into one output file. This might be useful because of limited resource management during the recording process one profile could be split into multiple files but which shall be processed together. The selected files will be concatenated in the order as they are displayed into the browser list.



Add only compatible files to one target file because otherwise the processing can fail. For instance it isn't possible to process files with different range lengths or files with different beam steering settings or with different multi frequency settings. Also a mix of beam steering and multi frequency data will not be processed correctly.

The addition of the files isn't limited by the size. However, if the file size is bigger than 100 MB, the working speed becomes slow. It's advisable to limit the file size to an optimum for the processing workstation.

Directory Browser	Selects single (senseless here) or multiple files
Name of Combined File	Have to contain the name of the output file inclusive the extension
Choose automatically	If is checked a suggestion for an output file name will be offered dependent on the selected files



The Cut Data Files Tool (*deprecated*)

The tool works as the inverse tool of **The Add Data Files Tool** and trim a selected SES-2000 or RAW file of a specified section of defined boundaries. This tool has been replaced by the *Export Marked Section as SES/RAW-File....*




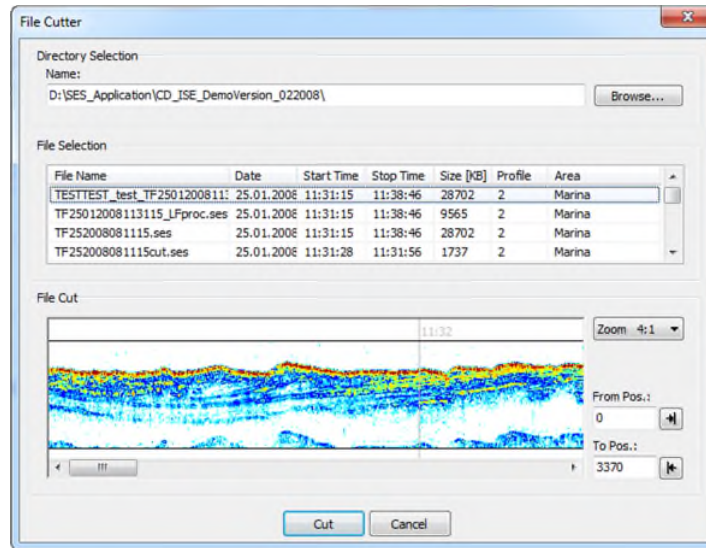
The new created file has to have a different file name as the selected one. Otherwise the tool won't work in a correct manner. This have to be done after the **Cut** button has been pressed.

Directory Browser	Selects a single file
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- File Cut

The boundaries for the section to which the file shall be trimmed to, can be set through specifying them with the preview field or with the edit fields. The rainbow colored section represents the remaining section whereas the inverted rainbow colored sections will be cut off.

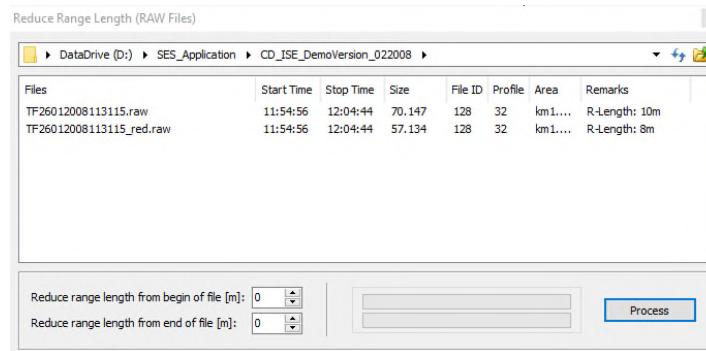
Zoom drop down box	<p>Specifies the zoom ratio for the preview field and influences the viewable ping precision with it which changes the scope of the file's data</p> <p> For a ping wise precision the zoom 1:1 have to be chosen, otherwise the selected section boundaries will be multiplied by the first digit of the zoom ratio to gain the true chosen ping positions for the trimming.</p> <p>Changing the zoom after already entered the boundaries will erase these settings.</p>
From Pos.	<p>Contains the lower trimming section boundary</p> <p>Can only be changed if the arrow button on the right side of this field is toggled</p>
To Pos.	<p>Contains the upper trimming section boundary</p> <p>Can only be changed if the arrow button on the right side of this field is toggled</p>



The Reduce RAW Files Tool

The tool cuts off the data of the selected RAW files which lie into the specified range. The specified range cuts off from the end of the file's range.

Directory Browser	Selects single or multiple files
Reduce range length from begin of file [m]	Specifies the range which shall be cut off from the begin of total range in meter
Reduce range length from end of file [m]	Specifies the range which shall be cut off from the total range's end in meter



The Convert SES3 Files Tool

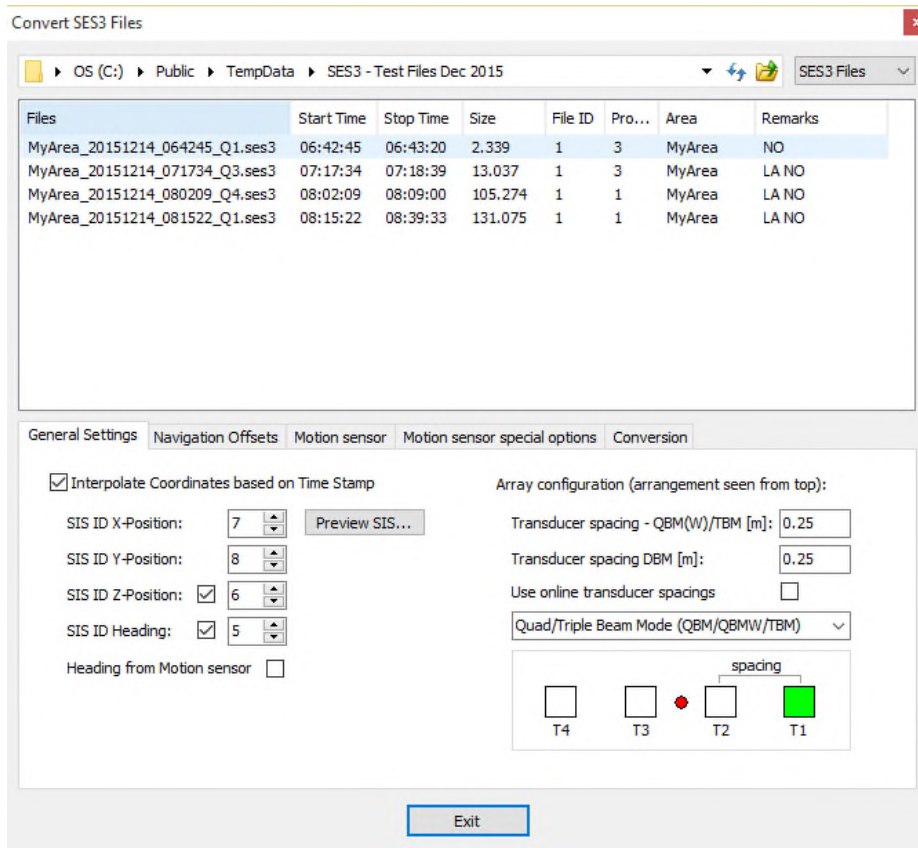
The tool converts SES3 data files into multiple RAW data files.

Directory Browser	Selects single or multiple SES3 files and informs with the remarks whether navigation offset (NO) or lever arm correction (LA) was already applied to the data.
Exit	Leaves the SES3 file converter

- General Settings

These settings determine the transducer build type with essential spacing information and other settings for interpolation and correction calculations.

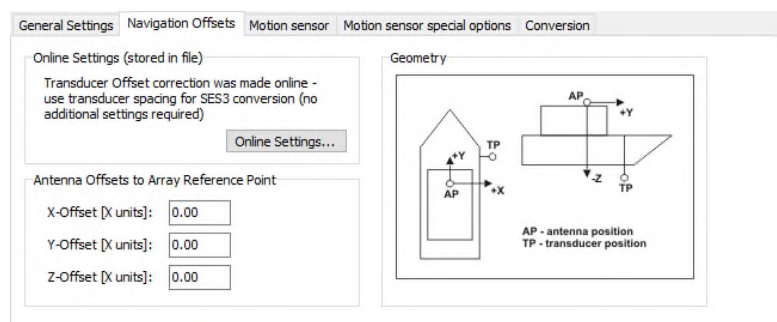
Interpolate Coordinates based on Time Stamp	<p>Interpolates the coordinates. The SIS-IDs for the x and y position are required. The SIS-ID for z position is optional as well as the SIS-ID for the heading whereas the heading is required if Navigation Offsets have to be calculated.</p> <p>The option to use the heading from the motion sensor excludes the SIS-ID usage.</p>
Transducer spacing	The used spacing depends on the selected array configuration mode.
Use online transducer spacings	If it is checked, the online spacing is written into the file and used, instead of the entered und Transduce spacing
Array configuration	<p>Selects a configuration of the Quattro array where the view is from top:</p> <p>Quad/Triple Beam Mode (QBM/QBMW/TBM)</p> <ul style="list-style-type: none"> - Quad Beam Mode (QBM) - Quad Beam Mode Wide (QBMW) - Triple Beam Mode (TBM) <p>Dual Beam Mode (DBM)</p> <p>Single Beam Mode (SBM)</p> <p>The transducer spacing is essential for the conversion. Value to be entered depends on the selected mode and is shown in the picture. The red dot marks the transducer array center point.</p>



- Navigation Offsets

Only has to be set for files for which the navigation offset was not already set online.

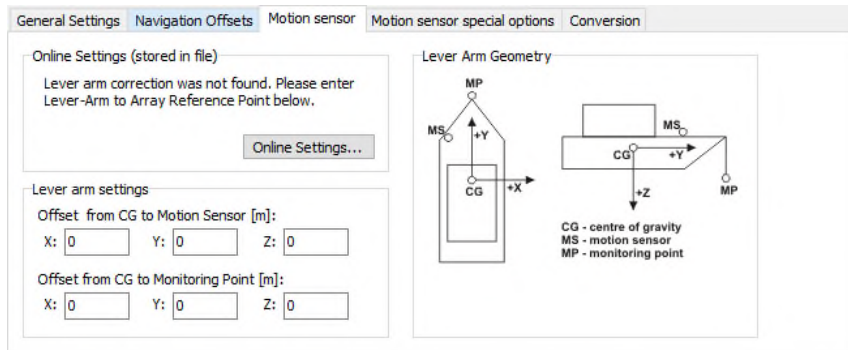
<p>Online Settings</p>	<p>Informs about the state of the selected files. If the selected files have different state then convert only all files of one type to avoid applying correction of files which already have online navigation offset set or to avoid to skip the files which missing it.</p>
<p>Antenna Offset to Array Reference Point</p>	<p>The correction offsets in x, y and z direction according to the sketch shown in field Geometry.</p>



- Motion sensor

Only has to be set for files for which the lever arm correction was not already applied online.

<p>Online Settings</p>	<p>Informs about the state of the selected files. If the selected files has different state then convert only all files of one type to avoid applying correction of files which already have lever arm correction set or to avoid to skip the files which missing it.</p>
<p>Lever arm settings</p>	<p>The correction offsets in x, y and z direction according to the sketch shown in field Lever Arm Geometry.</p> <p>The upper row defines the offset from the center of gravity to the motion sensor.</p> <p>The lower row defines the offset from the center of gravity to the monitoring point where the transducer is fitted.</p> <p>ⓘ Look at the geometry sketch to ensure entering the correct positive and negative offsets for the corresponding axes.</p>



- Motion sensor special options

<p>Restore unprocessed heave first</p>	<p>If it is checked the lever arm correction will be executed after the unprocessed heave data are restored.</p>
<p>Apply heave factor</p>	<p>If it is checked the old heave value will be multiplied by the entered factor before it's changed through the calculated lever arm correction.</p>
<p>Apply Roll-Offset [°]</p>	<p>If it is checked a roll offset will be applied to correct the heave.</p> <p>It is added to the roll angle which was recorded during the acquisition process as a positive or negative offset angle.</p>

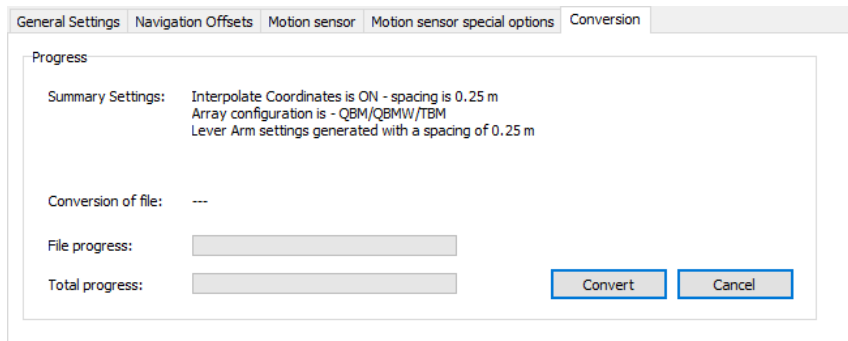
Apply average filter (remove drifts)	If it is checked drifts will be removed through applying a DC offset filter.
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The screenshot shows a software interface with a tabbed menu at the top containing 'General Settings', 'Navigation Offsets', 'Motion sensor', 'Motion sensor special options', and 'Conversion'. The 'Motion sensor special options' tab is active. Below the tabs is a 'Special options' section with a list of four items, each with an unchecked checkbox and a corresponding input field:

- Restore unprocessed heave first
- Apply heave factor
- Apply Roll-Offset [°]
- Apply average filter (remove drifts)

- Conversion

Summary Settings	Informs about done settings which will applied to the selected files during conversion.
Conversion of file	Informs which file currently is converted.
File progress	Informs about the conversion state of the current converted file.
Total progress	Informs about the total progress of the conversion of all selected files.
Convert	Starts the conversion process.
Cancel	Cancel the conversion at the current converted file.



The Tide File Converter Tool

Exported tide files from Hypack (*.tid) contain tide correction values instead of real tide values. To be able to use these files with ISE software it is necessary to convert them into Innomar Tide Files (*.itid). The tide file name has to contain the date in the following manner: *ddmmyyyy.tid

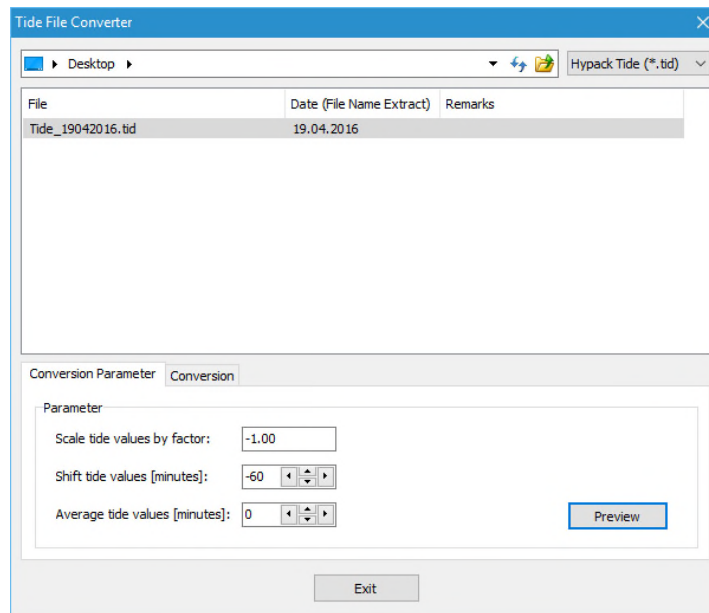


If the file name does not contain the date in the correct format, the tool will not work.

Directory Browser	Selects single or multiple *.tid and informs with the remarks when the file name is not in the correct format.
Exit	Leaves the tide file converter.

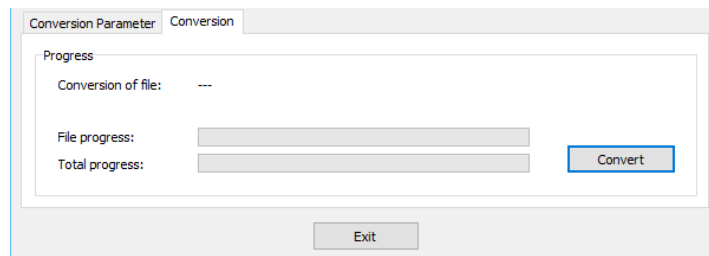
- Conversion Parameter

Scale tide values by factor	This is the multiplication factor to convert the tide correction values into tide values. Default: -1
Shift tide values [minutes]	Applies time offsets to tide file to compensate different time zones.
Average tide values [minutes]	Smooth the tide values by averaging the values based on time.
Preview	Show the tide correction values in comparison to the resulting tide values.



- Conversion Parameter

Convert	Executes the conversion
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The Process Script Tool

The tool executes a command sequence file for selected SES-2000 or RAW files, which are simply called 'script files'. This is useful if the same procedure shall be done for multiple files and shall not be done explicitly for each file for its own.

- Script File

The selected script sequence with the selected files can be saved into a script file and loaded again if it's wanted to process the files again in that wise.

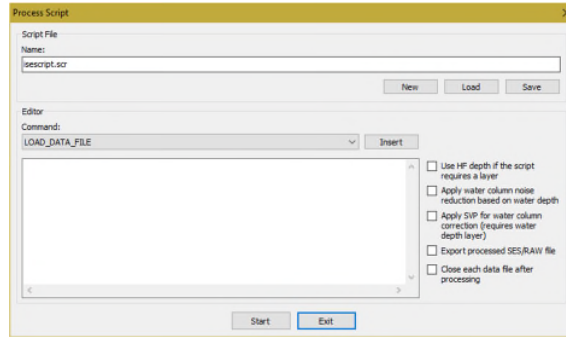
Name	Absolute path of the current loaded script Contains <i>isescript.scr</i> if no script is loaded
New	Generates a new script file for the current settings and selected files which can be saved if it's wanted
Load	Loads an existing script file
Save	Saves the current file Overwrites an opened file or saves as if a new file is generated

- Editor

The editor field contains the script text which will be executed. It can be modified directly, which is useful to delete parts which may no longer wanted if the script is loaded and shall be executed in a partially changed manner.

Command	The command sequence which shall be executed for the selected files
Parameter	Specifies what the list below have to contain for the command sequence execution: <FILENAME> : Absolute path of a file
Insert	Opens a browser dialog to select files Adds to the current selected command sequence files for which these sequences will be executed
Use HF depth....	Enables or disables the use of the water depth layer saved in the height frequency channel.
Apply water column noise reduction...	Enable or disables the reduce water column noise function to the files to be processed. (<i>The Reduce Water Column Noise Dialog</i>)
Apply SVP....	Enables or disables the sound velocity correction for the files to be processed. (<i>The Sound Velocity Probe Dialog</i>)

Export processed...	Enables or disables exporting processed data files with the applied settings as processed raw or ses files. (<i>The Export Processed SES/RAW-File Dialog</i>)
Close each data...	Enables or disables closing the files after processing in order to prevent computer memory overflow.

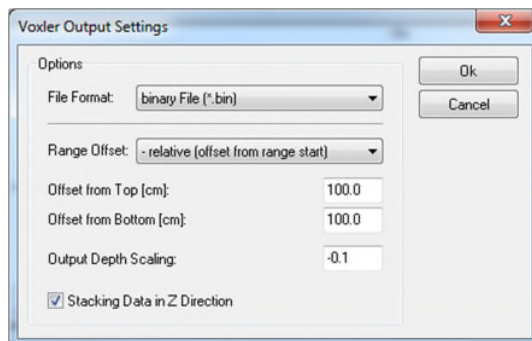


The Voxler Output Settings Dialog

The dialog occurs during exportation of voxel output data.

- Options

File Format	Binary or ASCII text file.
Range Offset	<p>Defines which type of offset will be used.</p> <ul style="list-style-type: none"> - absolute: define a range beginning from water surface - relative: define a range with offsets for start and end of the existing range - seabed: start from seabed and define absolute end <p>! All values are defined in centimeter (cm).</p>
Output Depth Scaling	Defines a multiplication factor for the vertical values.
Stacking Data in Z Direction	Enable or disable the stacking in z direction which means dividing the vertical data amount by factor two.



Window Menu

The Window Menu contains commands for the arrangement of the open data windows on the screen. These are the common arrangements from the Windows® environment, like cascade and tile. The Windows® Menu contains the following commands:

Command	Description
Cascade	Arranges all open data windows in the application space in a cascaded style, starting on the upper left corner.
Tile Vertical	Arranges all open data windows vertically, so that the whole application space will be shared between the windows.
Tile Horizontal	Arranges all open data windows horizontally so that the whole application space will be shared between the windows.
Arrange Icons	Arranges all data window icons in the application space.
Minimize All	Minimizes all open data windows to icons.
Close All	Closes all open SES files.

Help Menu

Command	Description
<i>Check for Update</i>	Opens the Update Dialog Box.
<i>About</i>	Shows the About Box with the software version information and the software registration data.

The ISE Help Dialogs

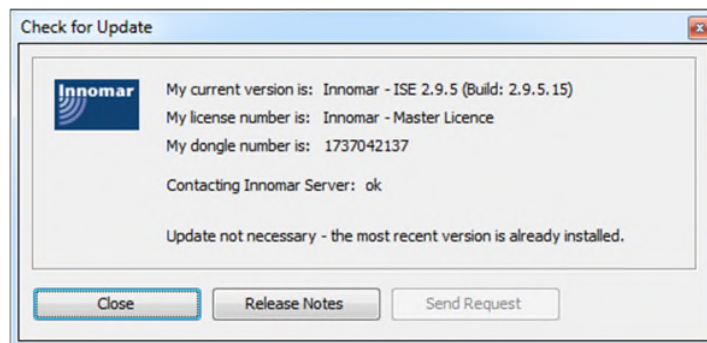
There is one dialog for update checking and an information box.

The Check for Update Dialog

Opens a dialog where information about the below listed contents are displayed:

- The current version of the ISE software
- The license and dongle number of the current active dongle
- Whether the Innomar server is accessible
- Which version of the ISE software is the latest

Close	Closes the dialog
Release Notes	Opens an information window listing the most recent changes into the ISE software
Send Request	Is available if a newer version of the ISE software exists Opens and prepare an html e-mail to Innomar to get the newest version of the software

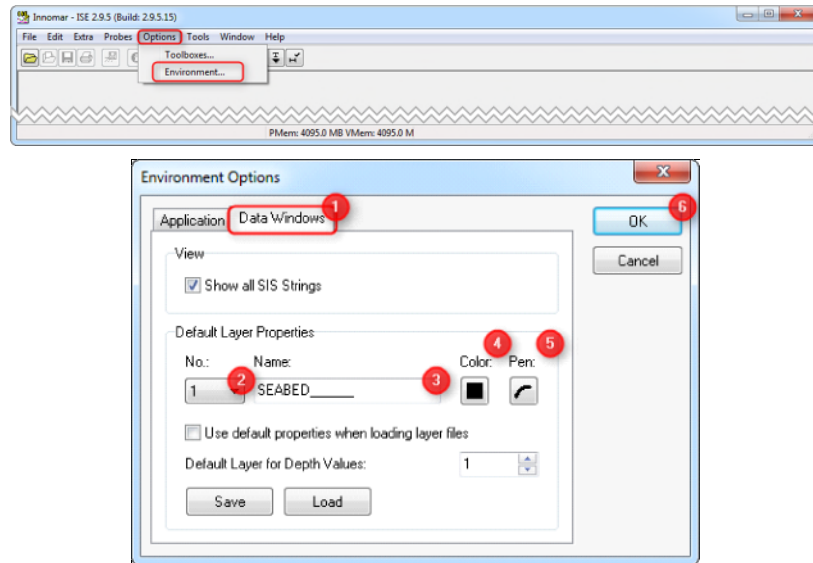


The About Box

Opens a dialog, which contains several information as licensing.


How to change layer names and set pen properties for each layer

For a better presentation and distinction digitized layers with different colors and pen width can be displayed. It can also be set individual name for each of the 20 layers. All these can be done within the *Environment Options*.



- ① Brings the data window of the environment dialog to front.
- ② Selects the number of the layer to be renamed.
- ③ Text field for entering the layer name.
- ④ Opens a standard color dialog in order to choose a color from.
- ⑤ Opens a dialog in order to set a certain pen width for the layer. Also a certain drawing mode is selectable. (**Freehand, Lines or Polygons**)
- ⑥ Confirms and applies the settings to the actual data file and to all following opened data files.

How to generate bathymetry data from SES-2000 profiles

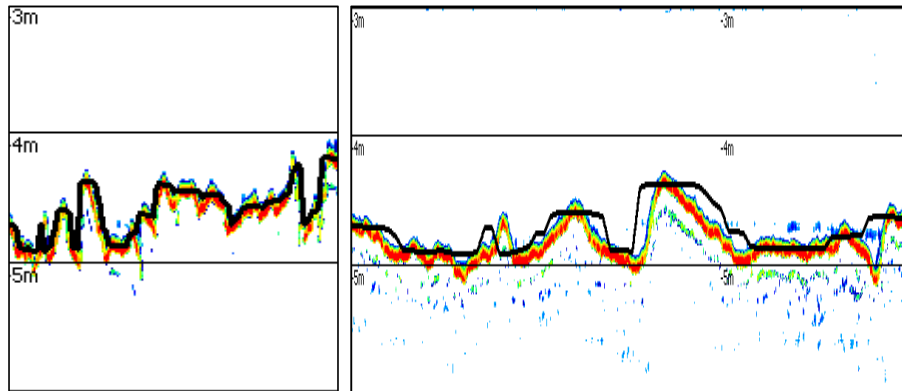
The insert water depth function can be found either under **Extra** → *Insert Water Depth as Layer...* or can be selected from the icon  (when hovering above any icon the description is visible), with tag **Calculate Depth**.



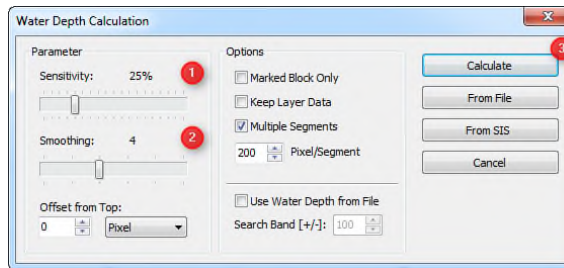
Before digitizing the bathymetry a few notices should be considered.

- The bathymetry is typically taken from the HF channel. The loading of the different data channels is described in the section *The loading of data Files*.

- The resolution of the bathymetry depends on the selected stacking factor during the digitization and on the position update rate during the data acquisition. To achieve a good depth data density it is important to work with interpolated data files. The interpolation of positions can be found under the section *Interpolation*. Also influencing the data resolution is the stacking factor. The following example shows the influence of the stacking factor. The picture on the left hand side shows the seabed layer with stacking factor 20, the right hand side shows the same layer with stacking factor 2. The difference is clearly visible the digitized seabed layer does not fit to the real seabed. The stacking factor can be changed in the *Signal Processing Dialog*.



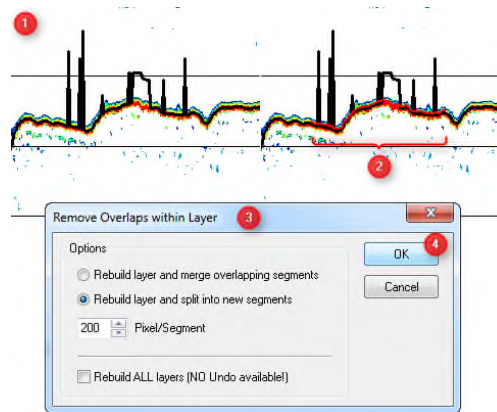
Once the HF channel of an interpolated data file is opened the depth calculation dialog can be opened.




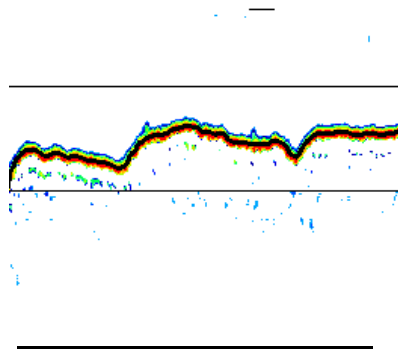
- ① A suitable parameter for the sensitivity can be from 20 to 30%.
- ② The smoothing factor should be set to 4.
- ③ Starts the calculation of the seabed layer.

How to remove spikes from layers


During the digitization of the seabed or any other layers spikes or outliers can occur. Those unwanted parts of the layer can be removed very comfortably by *The Remove Overlaps within Layer* tool.

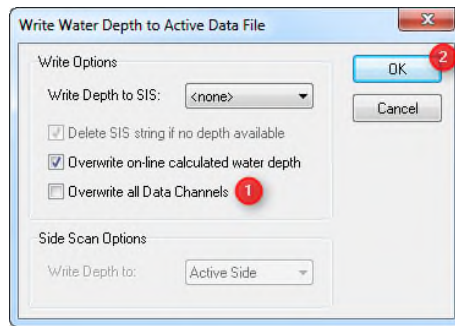


- ① Shows the layer with spikes.
- ② For removing the spikes the part where the spikes are located needs to be digitalized again. That can be done by the *capture mode* or rather freehand. This is displayed in the picture as red line on top of the black seabed line.
- ③ Once this part is digitized correctly the remove overlay tool can be opened under **Edit** → **Remove Overlaps within Layer...** or rather by pressing on the following icon  from the tool bar.
- ④ Begins to replace the parts of the previous layer by the new drawn parts. The result is shown in the following picture.




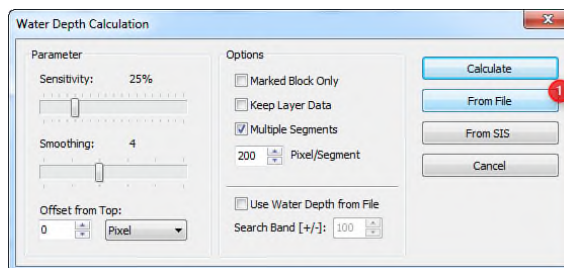
How to replace on-line water depth with digitized seabed layer

Once the seabed layer was digitized and was adjusted of spikes it is needed to save the work in order to avoid re-editing. The most elegant way is to write back the cleaned seabed layer into the data file. This procedure will replace the on-line calculated seabed. The function can be found either under **Extra** → **Write Water Depth to Active Data File...** or can be selected from the icon  (when hovering above any icon the description is visible), with tag **Write Water Depth to Active Data File....**



- ① ***Option*** This option can be considered if the seabed layer from the current channel (HF) should be also used to replace the on-line depth values of low frequency (LF). This results in the same seabed layer for the HF and LF channel.
- ② Starts the replacing of the on-line depth values for the selected channels.

The layer can be restored by the *Insert Water Depth as Layer* tool. The dialog can be found either under **Extra** → *Insert Water Depth as Layer...* or can be selected from the icon  (when hovering above any icon the description is visible), with tag **Calculate Depth**.



- ① Instead of re-calculation the seabed layer, the seabed can be restored from the file.

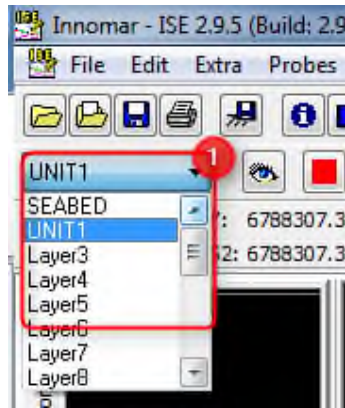
How to digitize a sediment layer

A typical application for a sub-bottom profiler is to find sediment layers and determine the thickness of the material.



Before digitizing sub-bottom layer a few notices should be considered.

- The sub-bottom layers are typically taken from the LF channel. The loading of the different data channels is described in the section *The loading of data Files*.
- Generate or load the seabed layer as described above. It is recommended to reserve “Layer1” as seabed layer.




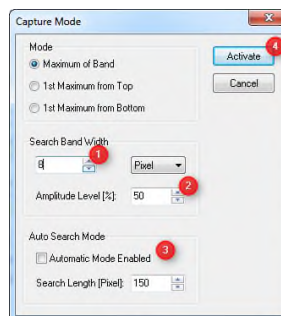
- It is furthermore recommended to select different layer numbers for digitizing units of different material properties.

① Select the next free layer number from the pull down menu. ("UNIT1") Renaming of layers and setting up different properties such as pen width and color is described under *How to change layer names and set pen properties for each layer*. The shown layer name on the top of the pull down menu ("UNIT1") is the active layer. All

function concerning layers such as drawing, copy, paste, smoothing and many more to be applied to this active layer.

- There are two different ways to generate a sub-bottom layer in the plot:
 1. Free Hand: Press the left mouse button and move the cursor onto the echo plot. The line segment is drawn until stop moving the mouse and releases the mouse button. This procedure can be repeated to draw more line segments. From *The Pen Dialog* different drawing modes can be selected such as free hand, lines and polygons. This method can be used if the data quality is poor. The accuracy of this procedure is consequently low and can consume a lot of time if the drawing has to be accurate.
 2. *The Capture Mode* is preferred for digitizing sub-bottom layers and is described below.

The Capture Mode dialog can be found either under **Edit** → **Capture Mode...** or can be selected from the icon  (when hovering above any icon the description is visible), with tag **Capture Mode**. In order to stop the **Capture Mode** the same button can be pressed again.




- ① Set a suitable search band around the cursor cross. For faster drawing a bigger search band is helpful because it is easier to follow the layer roughly. If there many adjacent layer or noise a smaller band width should be used.

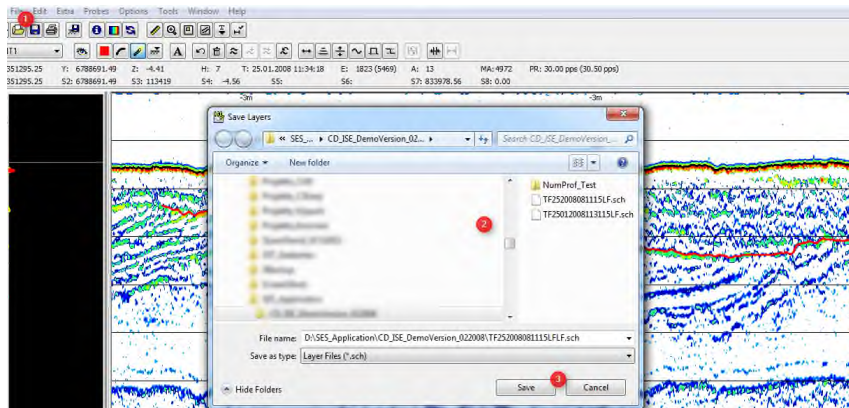
- ② Set the amplitude level to 50% as a kind of start value. This value controls the sensitive of the capture algorithm. Lower values are more sensitive than higher values, but the algorithm tends to fit then to noise peaks in the surrounding area of the cursor position if the amplitude level of the layer is not very different from the amplitude level of the noise. To find the best settings for the band width and the sensitivity it might be necessary to make some experiments with the parameters.
- ③ *****OPTION***** The Auto Search Mode calculates and displays a layer for a certain length beginning at the cursor position and looking ahead to the right hand side with the defined length.
- ④ By pressing the **Activate** button the cursor cross is extended with two lines. Both lines represent the search band width. The drawing of a layer segment works in the same way as during the free hand drawing mode. The line will fit automatically to a sediment layer during the mouse movement if the algorithm can find one.



In most cases it will be necessary to smooth the layer. This can be done by **Smooth Layer** tool. The tool can be found under **Edit** → **Smooth Layer...**

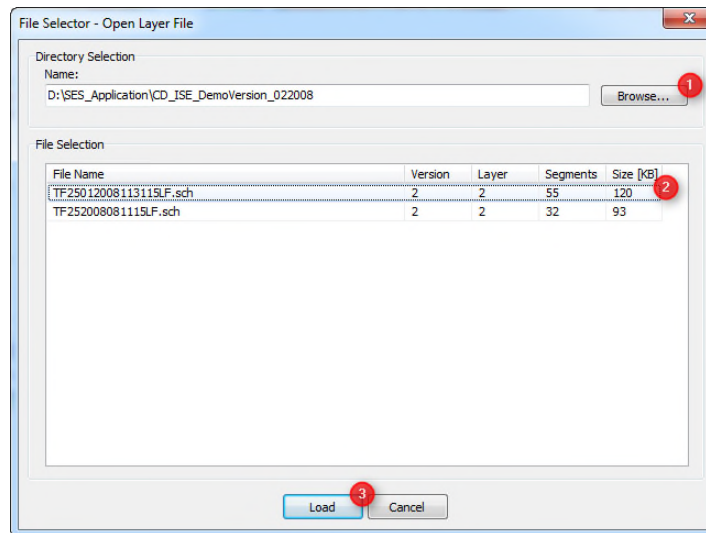
How to Save and Reload Layer

Once the layer is edited, the information should be saved. The **Save Layer as...** dialog can be found either under **File** → **Save Layer as...** or can be selected from the icon  (when hovering above any icon the description is visible), with tag **Save Layer File**.

- ① Select the **Save Layer as...** either from the file menu or from the tool bar.
- ② Choose the desired file location and choose a suitable name. It is recommended to use the automatic given file name.
- ③ The save button will finalize the saving.



Before reloading a layer, the data file must be loaded with the same parameters for stacking (horizontal and vertical) and mirroring. If the data file is loaded with other values for those parameters the saved layer file won't fit to the data. The layer can be corrected by scaling and mirror functions. These can be found within the tool bar  or under **Edit** → **Mirror Layer...** and **Edit** → **Scale Layer....** In order to avoid struggling with those functions, it is recommended to use the same loading parameters which were used during the layer interpretation and apply a different stacking factor afterwards whereby the layer will be scaled automatically. Select the **Open Layer File...** either from the file menu or from the tool bar. 

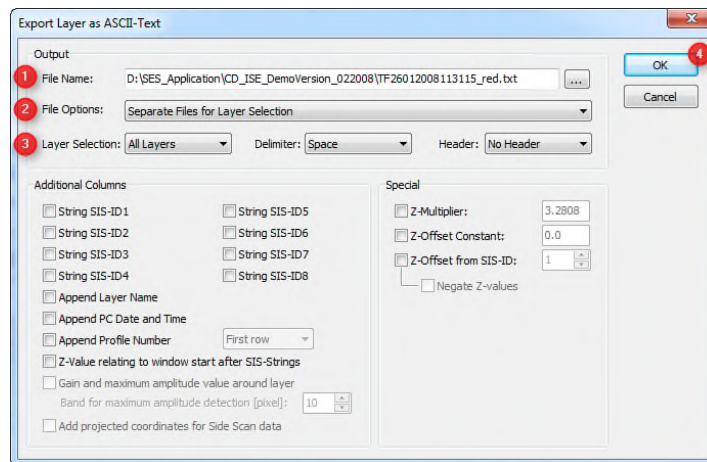


- ① Browse to the file location.
- ② Select the according layer file.
- ③ Press the load button to load the layer file.

How to Export Layer

Once all layers were interpreted they can be exported to an ASCII text file. Those text files can be imported into third party software for e.g. creating a map or for further

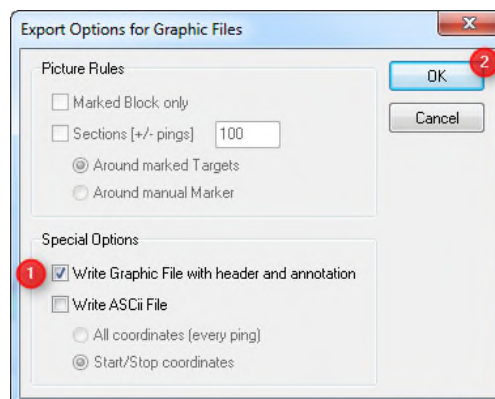
calculations. *The* Export *Layer* dialog can be found either under **File** → *Export Layer Data...* or can be selected by shortcut Ctrl+E.



- ① Browse to the desired folder for saving the ASCII files. Select suitable file name or use the given file name.
- ② If there is only one layer e.g. seabed the file option *All to One File* is fine. If there are more than one layer it should be considered to create separated files for each layer. The file option therefore is ***Separated Files for Layer Selection***.
- ③ The setting here depends on how many layers have been interpreted within the echo data and which needs to be exported. If unsure set to ***All Layer***. ***All Layer*** is just working in combination with the file option ***Separated Files for Layer Selection***.
- ④ Start exporting the layer.

How to Export Echo Data as Graphics

In order to use the echo-prints in presentations or to handed over to other people it is useful to export the data into graphic files such as *.gif, *.bmp or *.tif. The graphic export can be found under **File** → *Export Graphic...*

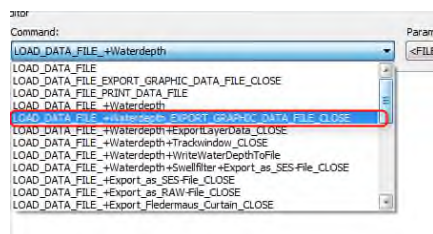


- ① In order to get an output with annotation and some profile information, **Write Graphic File with header and annotation** should be ticked on.
- ② Press Okay and select a folder and a file format for the output file.
 - 🔔 Due to the compressing algorithmus the jpeg format is not recommended for exporting the echo data.

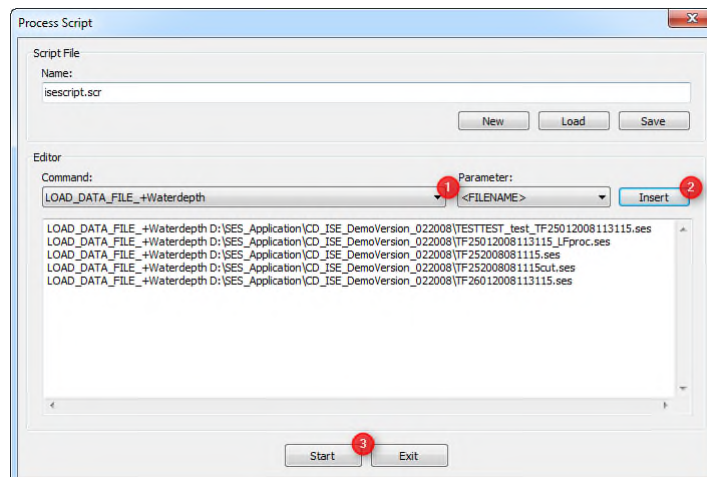
How to use the Process Script tool

The following chapter describes the use of the Process Script tool based on an example of loading data and calculating the seabed layer. The script tool can be found under **Tools** → **Process Script...**

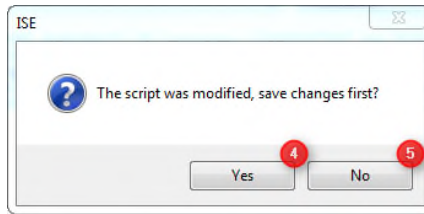
- ① Select the command from the pull down list.



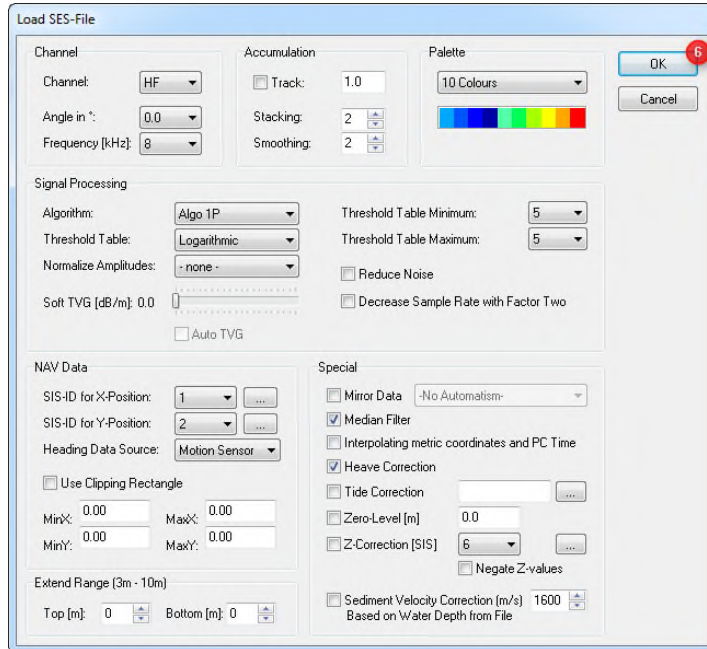
- ② Insert all files to be processed. It is important that no empty rows are in between.
- ③ Execute the script.



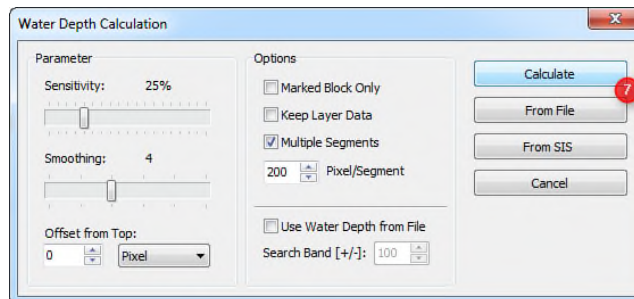
- ④ ***** Optional***** The script can be saved for later use. Just select a location and set a file name. After saving the script continues.
- ⑤ The script continues without saving the script.



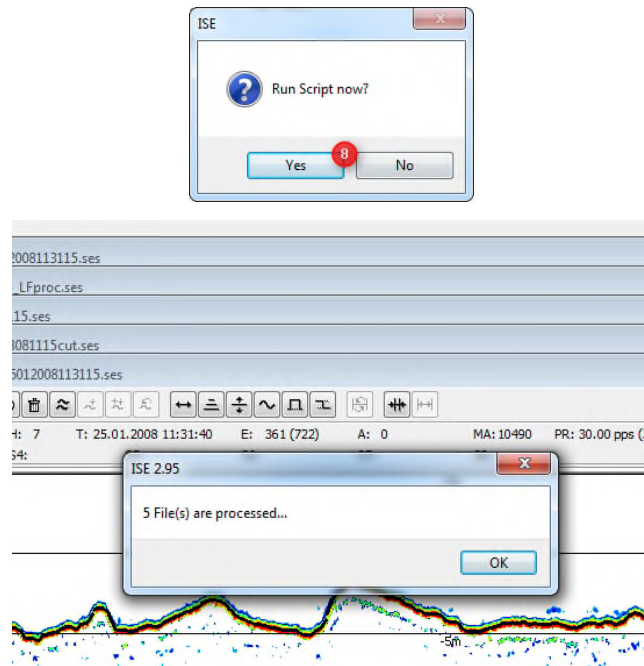
- ⑥ Set up the preferred settings to load the data files and confirm with **Okay**. All files are loaded with same settings.



- ⑦ Set up the preferred settings for water depth calculation or use water depths from file.



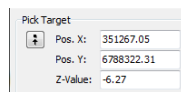
- ⑧ Confirm with **Yes** to start the script. All data files will processed with the same settings were made in the previous dialogs.



How to generate a list of embedded point features

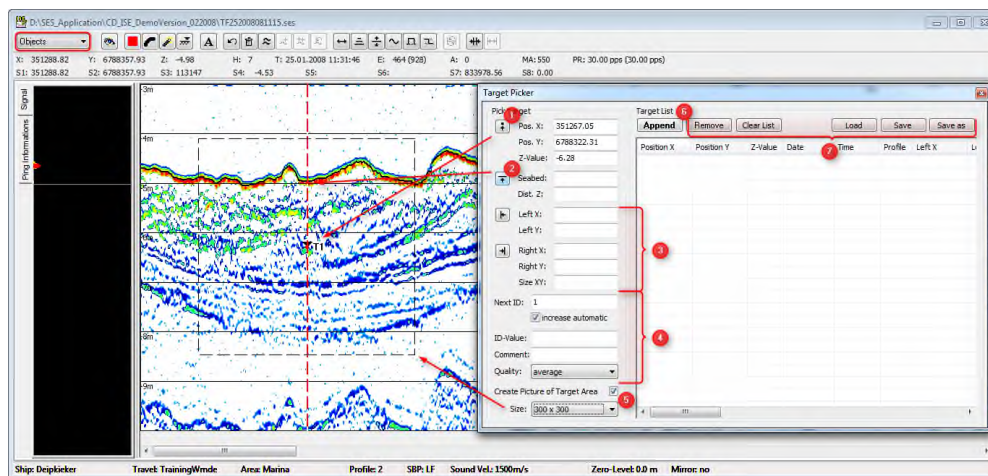
This chapter describes the digitization of single reflectors such as hyperbolas from pipe crossing or boulders and creating a list of all digitized objects. The tool which helps picking the objects is called **Target Picker** and can be found within the **Tool Box Dialog**. In most cases the digitization of single reflectors has to be accurate. Therefore small stacking rates and interpolated coordinates are recommended. Load one or more data files with the preferred settings and the seabed layer. Select an unused layer and open the **Target Picker** tool box.

- ① Klick the **Pick Target** button and click on the target within the echo data. The fields **Pos. X:**, **Pos.Y:** and **Z-Value:** should be filled with data of the cursor position.



- ⓘ The object sign and tag can be treated as overlaid text. Those can be modified by the **Text Block** editor.
 - ⓘ Object sometimes very hard to identify, consider using the **Zoom Box** to zoom the area around the cursor position.
- ② Click the **Select Seabed** button and click with the mouse pointer on the seabed above the target. That will calculate the coverage on top of the target. This is also working for object within the water column.

- ③ Click the **Select Left** and **Select Right Border** button and select the outer limits of the object if visible. This will calculate the horizontal expansion of the target along the track based on coordinates.
- ④ Enter an ID or use the automatic function to increase the ID's. There is also a place holder for a comment and a quality indicator.
- ⑤ Enable the option to create a picture of the picked object and the defined area around the object. The filename consist of the data file name and the object number. The picture file can be found within same folder as the data files.
- ⑥ Once all needed information's were taken, press **Append** to fill the list with the data. It is possible to use the same data file to pick further objects or open or rather switch to the next echo data to pick more objects.
 - ⓘ Before the data file is going to be closed, use the **Save Layer As...** function to save the digitized object including tag to a layer file.
- ⑦ In order to avoid loss of the data due to computer or software crash, the list should be saved as a standard ASCII file from time to time. The buttons can be used to save, to load or to clear the items from the list.



How to generate equidistant echo plots

Echo plots which are recorded by the SES-2000 echo sounder are ping or time, not distance orientated. That means each ping is stored independent of the vessel speed or actual ping rate. Therefore, an echo plot can show the same distance in reality with different lengths on the plot. The ISE software provides a tool to generate time and speed independent echo plots so called **Track Accumulation**. The track

accumulation is doing a ping stacking but instead of numbers of pings the distance is used to accumulate the data by an average algorithm.

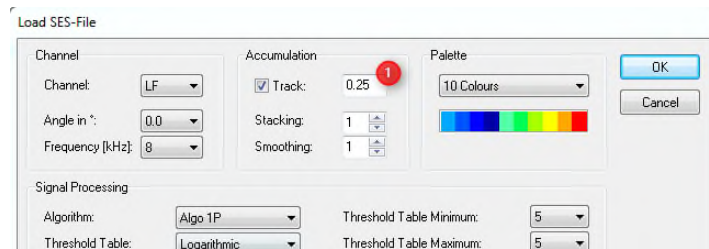


Before equidistant echo plots can be created a few notices should be considered.

1. Before applying the track accumulation the coordinates have to be *interpolated*.
2. It is recommended to use metric coordinates.

During the data open dialog the track accumulation can be enabled.

- ① Enable the track accumulation and set a distance. All pings within the selected distance will be used for stacking. This will result in a constantly scaled plot in horizontal direction. The track accumulation can be combined together with the standard ping accumulation (stacking).

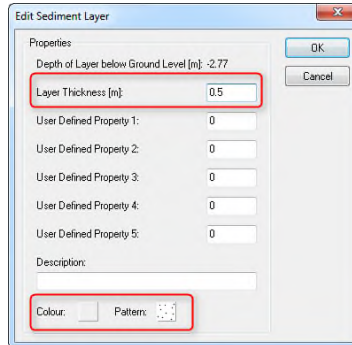


How to overlay a sediment probe to an echo plot

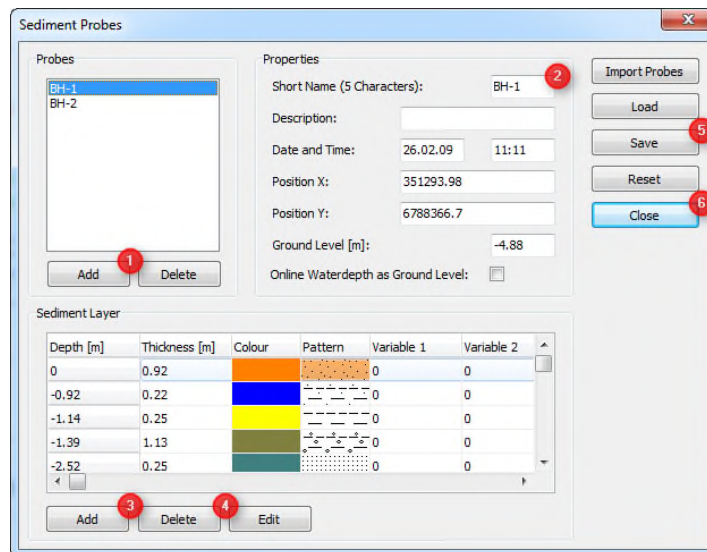
In order to overlay sediment probes to the echo data, the samples have to be created with the sediment probes editor. The editor can be found under **Probes** → **Sediment Probes...**

- ① Add a probe to the list view and mark the probe to be edited.
- ② Fill in the needed information into the text fields. It is recommended to use the online water depth (if spikes were removed already) to locate the probe in vertical direction.

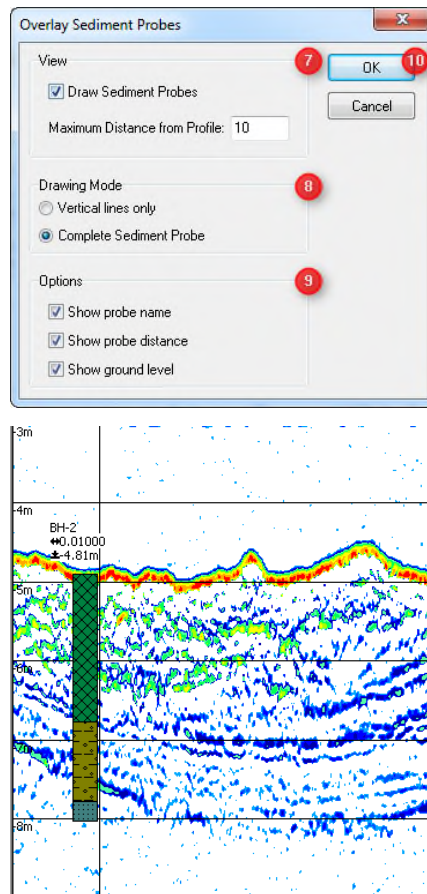
- ③ Add a thickness of a layer within the upcoming window. Furthermore set a color and use the given pattern for a better differentiation of the units. Repeat this for each sample/layer/unit within the probe.



- ④ Use for deleting or editing the marked sediment layer.
- ⑤ Save the sediment probes in a file for later use.
- ⑥ Close the sediment probes editor and select **Probes** → **Overlay Echo Plot with Sediment Probes...**



- ⑦ Enable **Draw Sediment Probes** in order to overlay the probes data base. Set a maximum distance to the profile to exclude samples which are too far away.
- ⑧ Visualize the probes either as vertical lines only or as complete sediment probes.
- ⑨ Enable the desired tick boxes to add labels to the probes.
- ⑩ Confirm with **Okay** to overlay the probes to the echo plots.



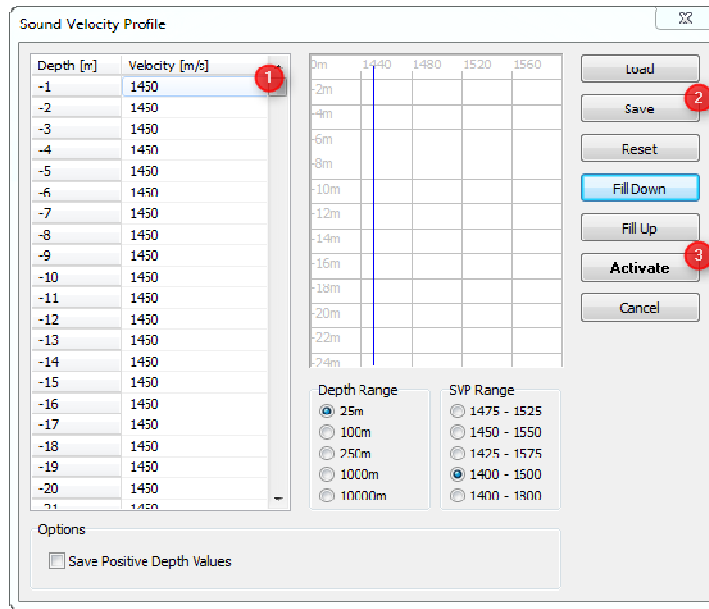
How to apply different speed of sounds to the water column and to the sediment body

During the online data acquisition it is possible to enter an average of the speed of sound only. This speed of sound is used to process the vertical way units for the entire profile. In order to improve the accuracy of the distances of the vertical way units, it is possible to apply a speed of sound profile for the water column and to adjust separately the value for the speed of sound of the sediment body. The speed of sound editor can be found under **Probes** → **Sound Velocity Profile**.

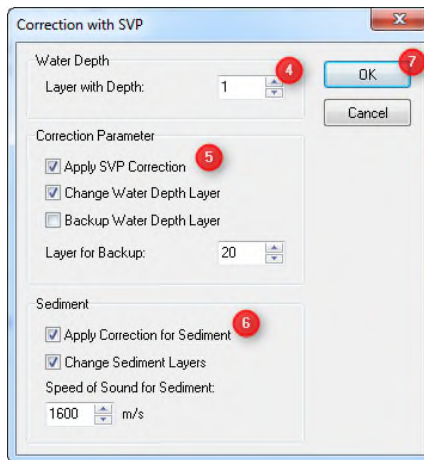


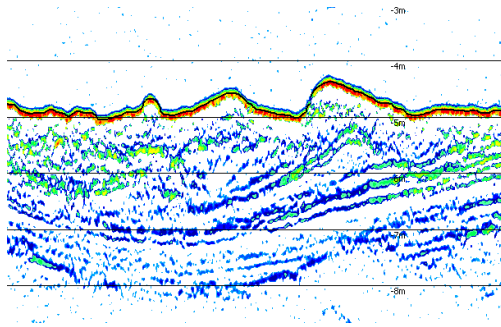
The correction of the water column works until the sediment body begins. Therefore it is necessary to *load* a valid seabed layer.

- ① Enter the values for the speed of sound according to the depths.
- ② Save the entered profile for future use.
- ③ Press **Activate** to apply and select **Probes** → **Correct Echo Plot with Sound Velocity Profile...**

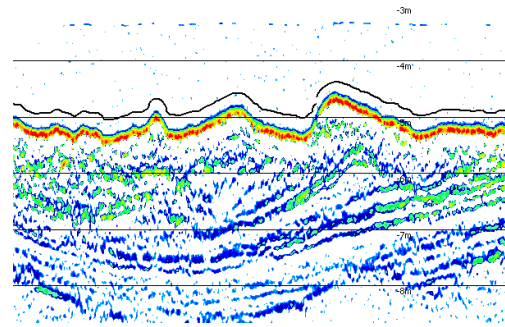


- ④ Select the layer number which contains the seabed layer.
- ⑤ Enable the SVP correction. Optional enable Change Water Depth Layer to correct the seabed layer also.
- ⑥ Enable to correct sediment body with chosen sound velocity. If the interpretation of layers is already done, enable **Change Sediment Layers** to move the layers as well.
- ⑦ Press **Okay** to apply SVP correction to the echo plot.






Without SVP correction



With SVP correction for water column and sub bottom

How to work with the GIS module

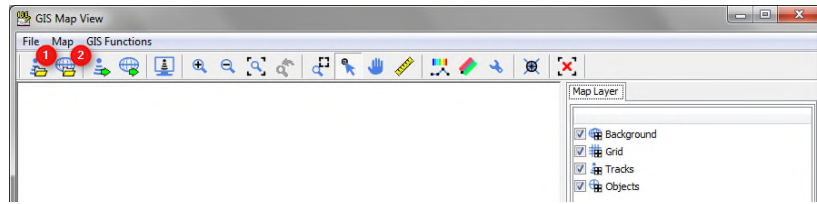
The GIS module is primarily used for georeferenced interactions and should be used for loading data files. For the functionality overview the section *The GIS Tool Box* should be read. The dialog can be opened by clicking the  button of *The Main Tool Bar* or by checking the **GIS Map View** under **Options** → **Toolboxes**.

- ① Open *The Gis Map View Loading Dialog* to load the files which shall be used. It is possible to open SES-2000 files in both formats, the *.ses (envelope data) and the *.raw (full waveform signals).
 - 📌 The starting point of each track line (first coordinate) is indicated in the GIS Map View by a bold black marker.

Latitude/Longitude coordinates must be in decimal degrees, any formats with degrees, minutes and seconds or decimal minutes are not supported.

- ② Open one or multiple background images.
 - 📌 It is possible to open background data in various formats, such as GeoTiff, IHO S-57, MapInfo, AutoCad DXF, DWG or ArcView SHP. In most cases the coordinate system of the background data will be recognized automatically and proposed to the user. Some file formats, such as BMP, may not contain coordinate information and will use counted pixels as coordinates instead. Once a background map is opened, the full extent of the map window will be adjusted and the grid lines and grid points will be calculated accordingly. The display order is the same as the order they were opened.

The transparency for each background layer can be changed individually via a right mouse button popup menu.



The **Scale** bar and **North Arrow** are with a valid coordinate system only.

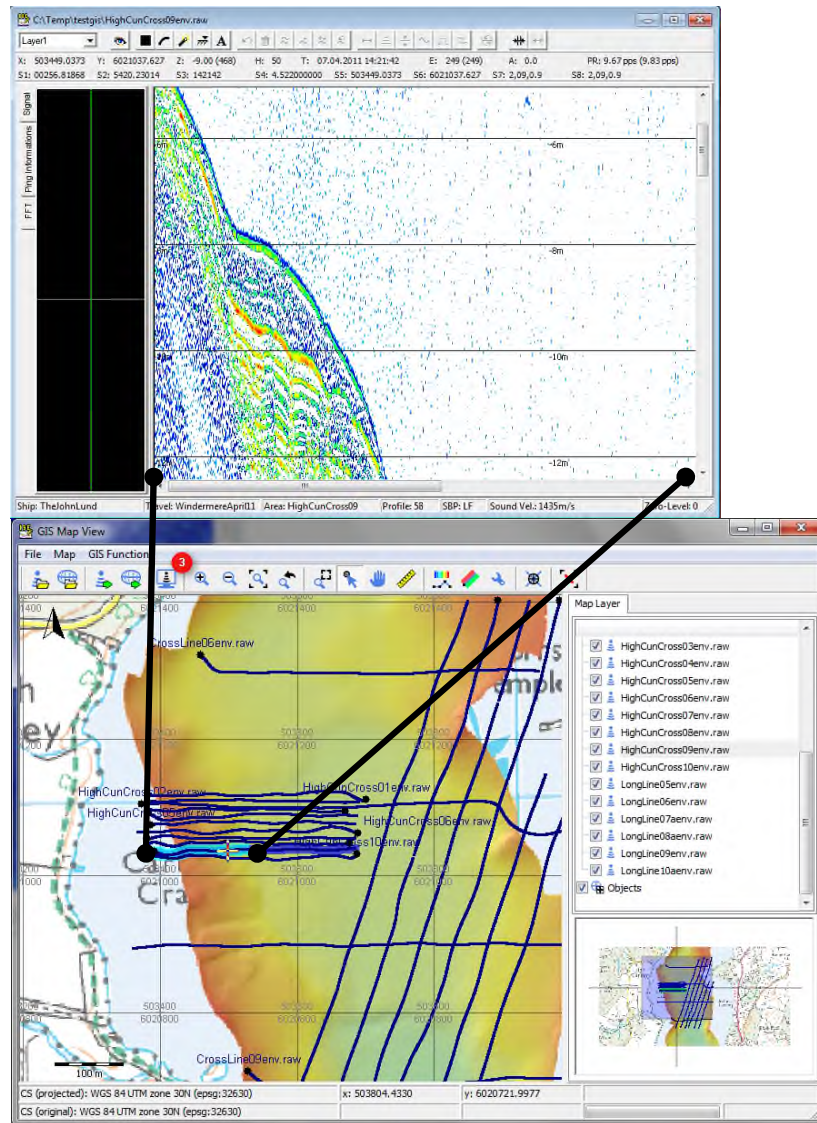
When loading SES-2000 tracks or background files you should define a valid coordinate system, either by its name or by its EPSG code.

③

The related SES-2000 data file can be opened in an ISE interpretation window either by choosing **Open Echo Plot** from the right mouse button popup window menu or by clicking the button **Open selected Track** on the button bar.



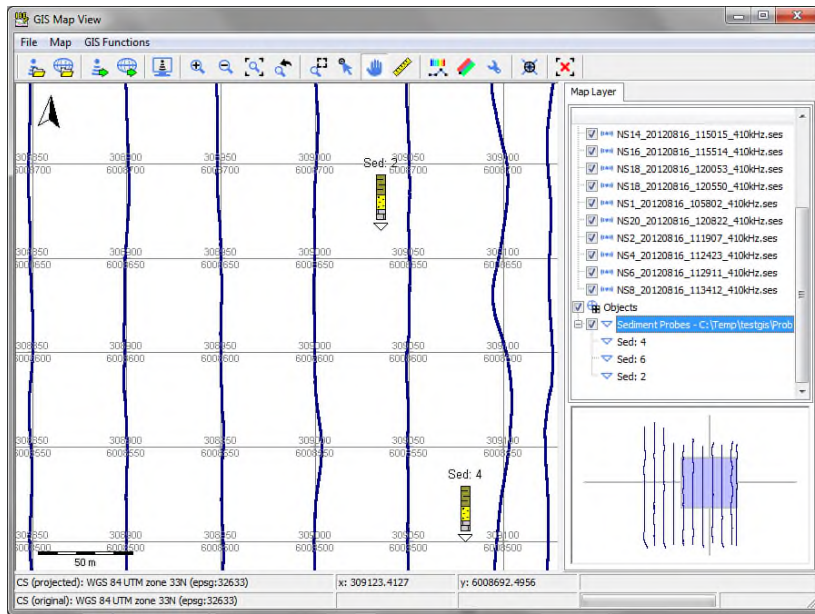
The visible part in the interpretation window is additionally highlighted in the main window of the GIS Map View and the cursor position in the interpretation window is indicated by a bold cross in the map view. The highlighted visible echo plot region and the cursor position are updated automatically during user changes and scrolling in the interpretation window.



The figure shows the GIS Map Window with some SES-2000 track lines and a background map in GeoTiff format. The selected coordinate system is WGS-84 UTM zone 30N, which is internally represented with its EPSG code 32630. The highlighted area in the overview window represents the visible part of the entire map data in the main window. Accordingly, the two bold cross lines refer to the centre point of the main window. Grid lines and Grid points have been added to the scene automatically and will change with different zoom levels. The cursor mode is set to the “Select Mode” per default. You can either choose a filename from the map layer window or click directly into the main window in order to select a single track. The selected track becomes highlighted.

It is possible to load sediment probes and numerical probes. The data have to be loaded as described under *How to overlay a sediment probe to an echo plot*. Each sediment probe or numerical probe will be represented by a symbol and with its ID in

the main window. The coordinate of the probe is the tip point of the lower triangle. Any changes in the probe data base will update the map view as well.

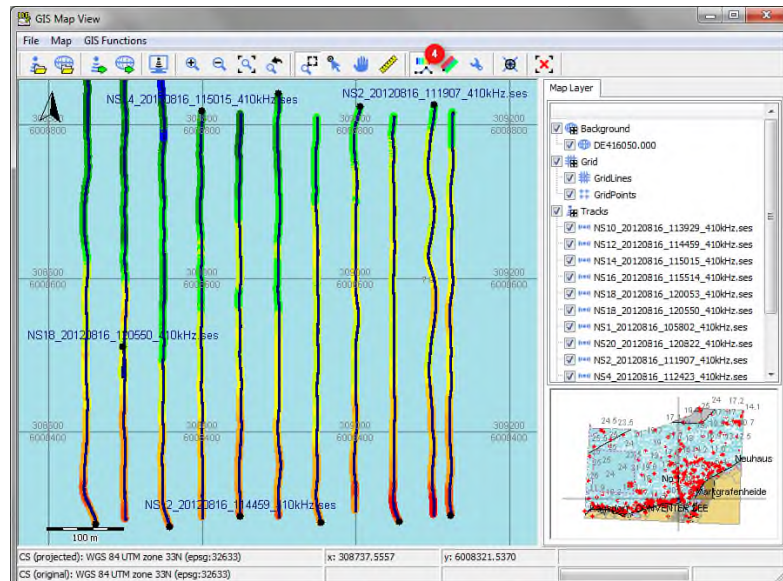


Gis Tools

Bathymetry

- ④ The SES-2000 track data contains water depth information which can be shown in the GIS Map View by clicking the button **Show Depth Colours**.

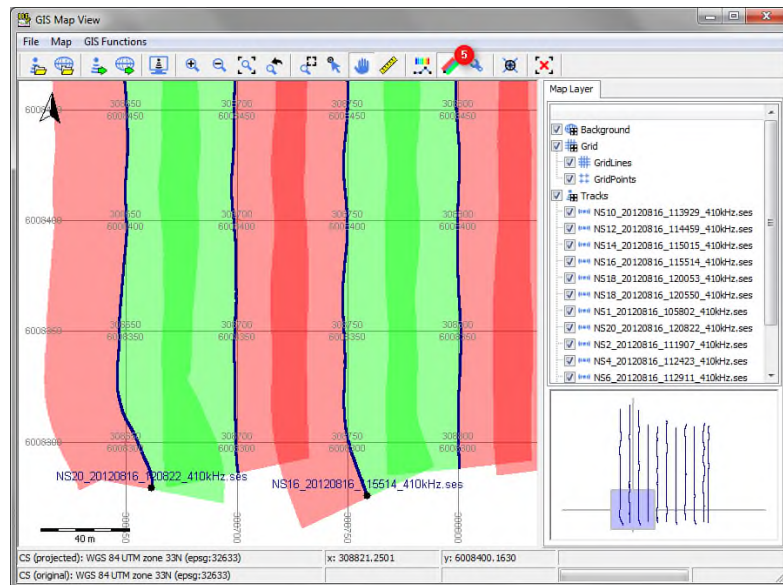
The depth source can be either the HF channel (high frequency) or LF channel (low frequency), if available.



Side Scan Coverage

- ⑤ If the SES-2000 track data consist of side scan files it is possible to show the coverage in the GIS Map View by clicking **Show Side Scan Coverage**.

The covered areas on the port side are colored in red; the covered areas on the starboard side are colored in green. The GIS Map View uses transparency in order to make overlapping parts recognizable by increased color strength or a mix of red and green colors.

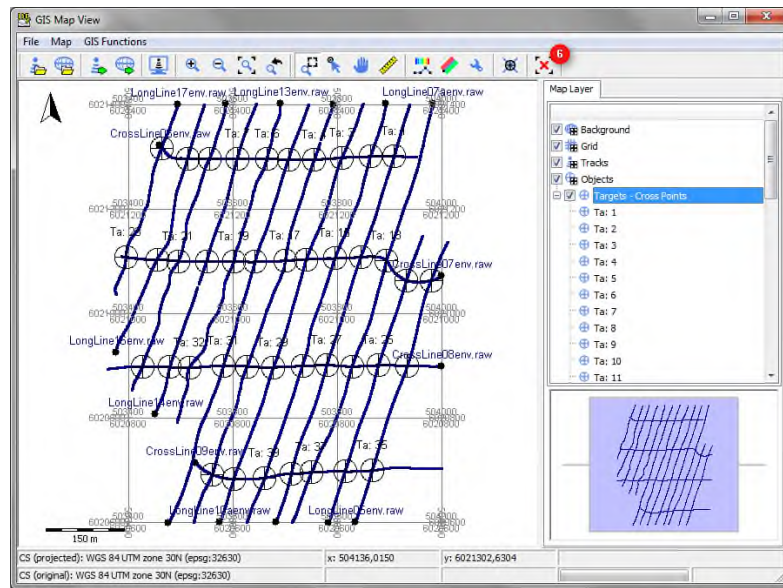


Cross Point Calculation

- ⑥ The GIS module provides the functionality to calculate cross points for all track lines within the GIS Map View by clicking the button **Calculate Track Cross Points**.

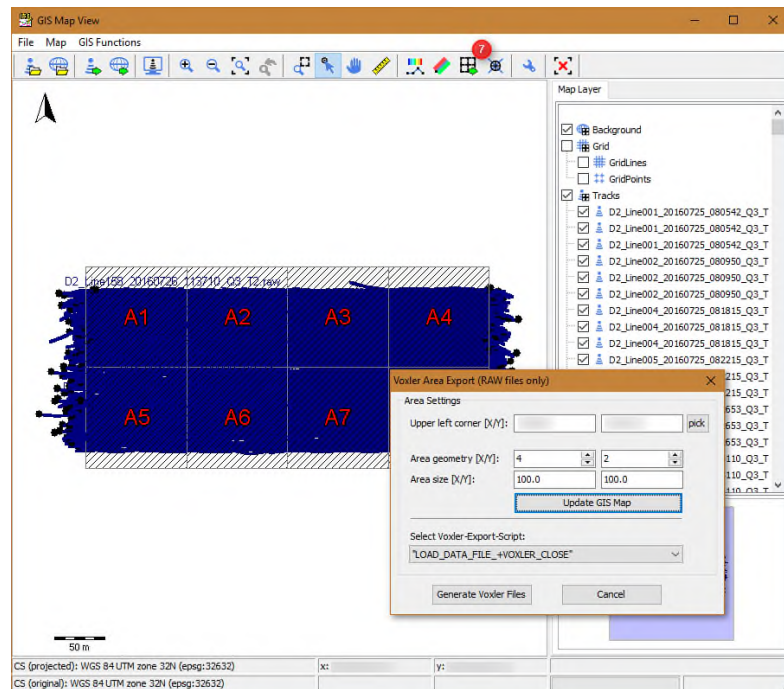
All calculated cross points appear in the Map Layer window under the target list and are labelled automatically by counted numbers. In the GIS Map View all targets are shown as circles with a centered cross, indicating the target position.

A file dialog will ask for a file name to store the cross points as a text file. The text file contains the cross point coordinate, a place holder for z-values (set to '1' and not used in the GIS module), the target ID and the two names of the track lines which relate to the cross point. This text file can be imported in the ISE software directly under **Probes** → **Overlay Echo Plot with Sediment Probes...** in order to show all cross points as vertical line markers in opened interpretation windows.



Export Voxler Data

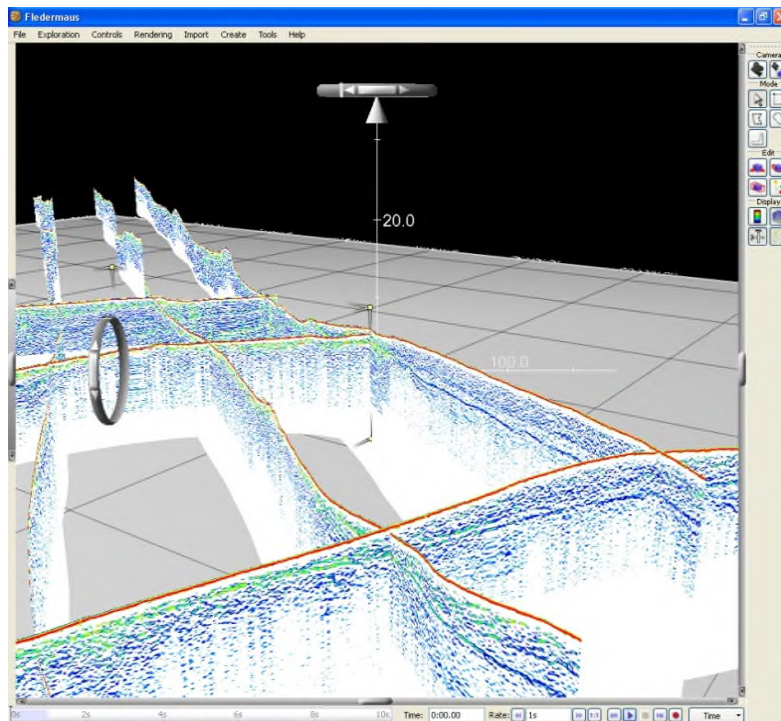
- ⑦ The Voxler Area Export helps to export raster orientated point cloud data. The button will open a little dialog window, where the upper left corner has to be selected by entering a coordinate manually or either by using the mouse pointer in combination with the pick button. It is also needed to enter a size for the tiles and entering the number of tiles in X and Y direction in order to cover the entire area. The geometry can be check by clicking on the “Update Gis Map” button. If everything is okay a script can be selected from the pull down list and can be started by clicking the “Generate Voxler Files” button. Only visible data files will be used for the export.



How to export Fledermaus curtains

It is explained how to export IVS Fledermaus SD files from the ISE software to be visualized as SBP curtains or fence diagrams in the Fledermaus software or the free available IVS iView3D/iView4D tools. Therefore select **File** → **Export Fledermaus Curtain**.

The ISE software allows the export of individual SD files for each SES-2000 profile, but allows the combination of several SES profiles within a single SD file as well. Such combined file gives an immediate display of a so called fence diagram.



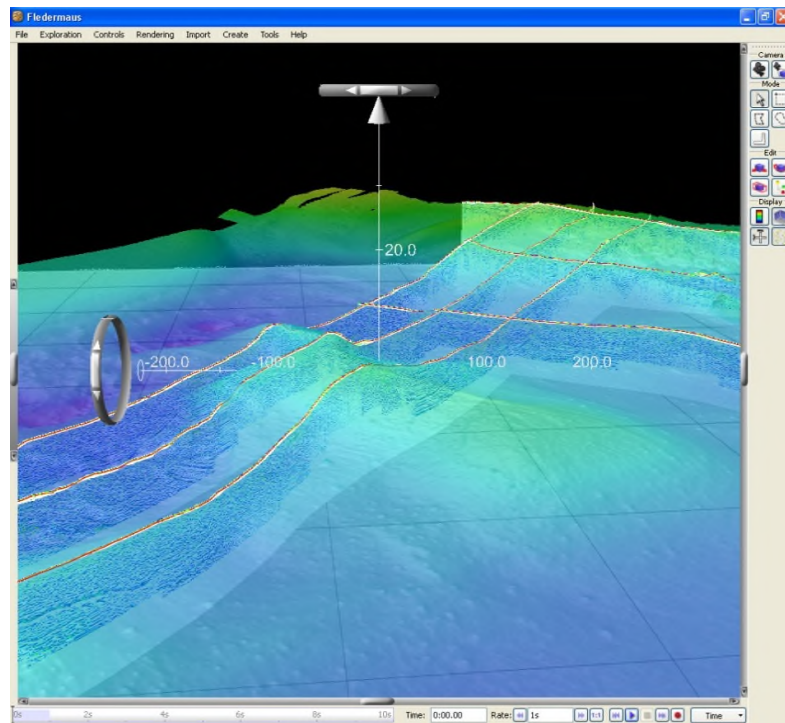
During the export the user has the choice between files written as shown in ISE (i.e. with no transparency), but also with a transparent water column, a transparent background color or a combined transparency.

For the visualization it can be useful to remove the horizontal ruler lines and/or all vertical marker (i.e. track marker, event marker) because the IVS Fledermaus software provides labels and axes with coordinates and depth information. Before exporting SD files it is necessary to interpolate the coordinates within the SES-2000 data files because it is required that each ping has its own coordinate. This will result in an accurate track and accurate projection of the echo plot onto the usually not linear but curved curtain. Any differences in speed and lateral scale of the echo plot will be automatically removed by the projection into real world coordinates.

Visualisation of SD files in IVS Fledermaus and the free IVS iView software

The free IVS iView3D/iView4D tools allow the import and display of single SD files, but do not show several files at once. In order to combine several SES-2000 profiles the ISE export function to extend previously created SD files can be used. In order to combine SES-2000 curtains with MBES surfaces and/or side scan imagery you need the have a license of the IVS Fledermaus package.

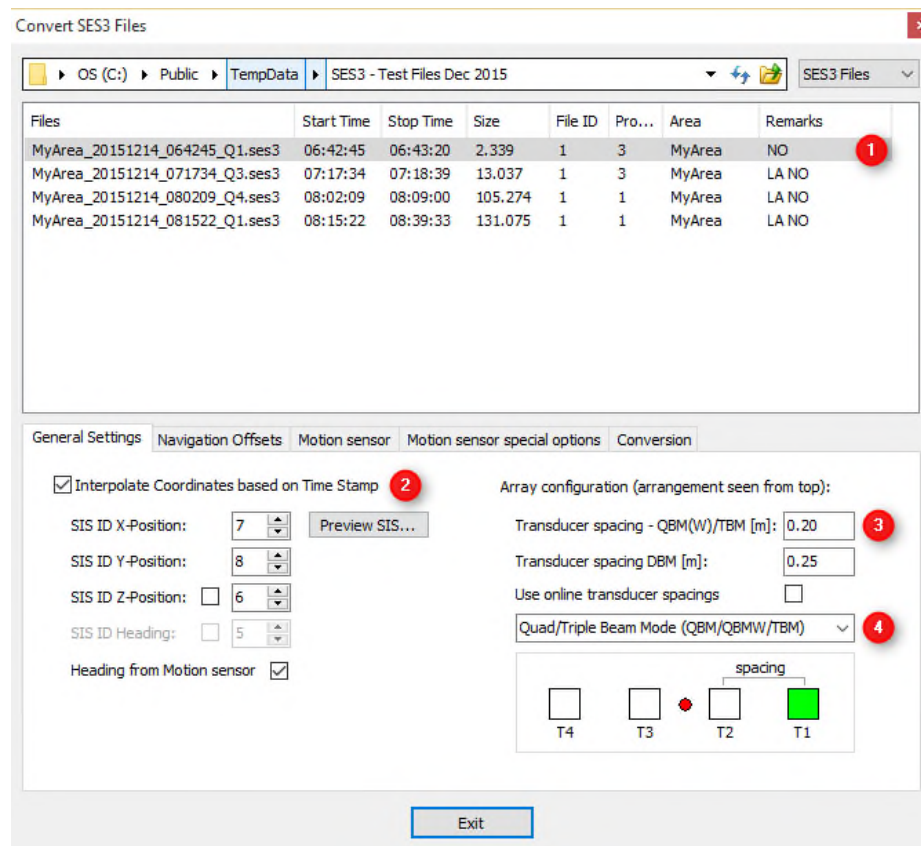
The Fledermaus software with a view of several composed SES-2000 profiles can be combined with an additional Multi-Beam Echo-Sounder (MBES) surface.



How to convert SES3 files

This guidance explains how SES3 files are converted into RAW files for SES-2000 quattro systems. To do the conversion open **Tools** → **Convert SES3 Files....**

- ① Selection of the desired files which shall be exported
 - ⓘ A selection of files with different corrections applied to apply again the offset correction is not recommended.



- General Settings

- ② Use the recommended coordinate interpolation to ensure gaining correct positions for the generated RAW formatted track files. The heading information is needed for the interpolation to correct the coordinates in a correct manner with the **Navigation Offsets** and **Coordinates Interpolation**.
- ③ Set the correct spacing for the transducer configuration.
- ④ Select the correct transducer type.

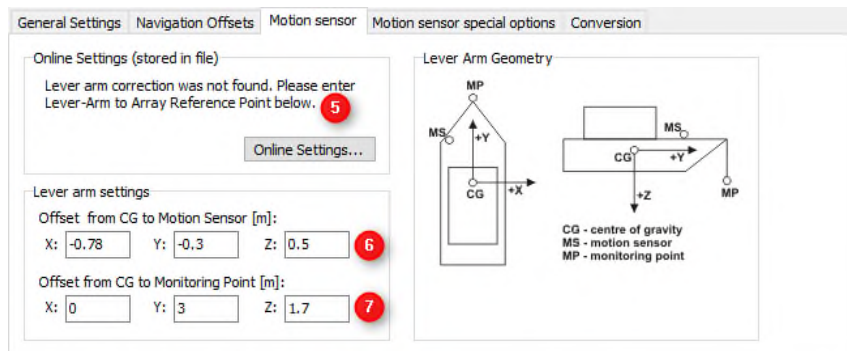
- Navigation Offsets

In this example one file is used with online applied navigation offset which is referred by the **Remarks** entry NO (at ①). Therefore the antenna offsets of **Navigation Offsets** will be leave as zero.

- Motion sensor

In this example the lever arm correction has to be done. As it's seen at ①, the three other, not selected files have the additional entry LA at **Remarks**. This tells that the lever arm correction and the navigation offset are already done online.

- ⑤ The information tells that the selected file needs a lever arm correction.
- ⑥ Enter the offset from the center of gravity to the motion sensor.
- ⑦ Enter the offset from the center of gravity to the SBP transducer.

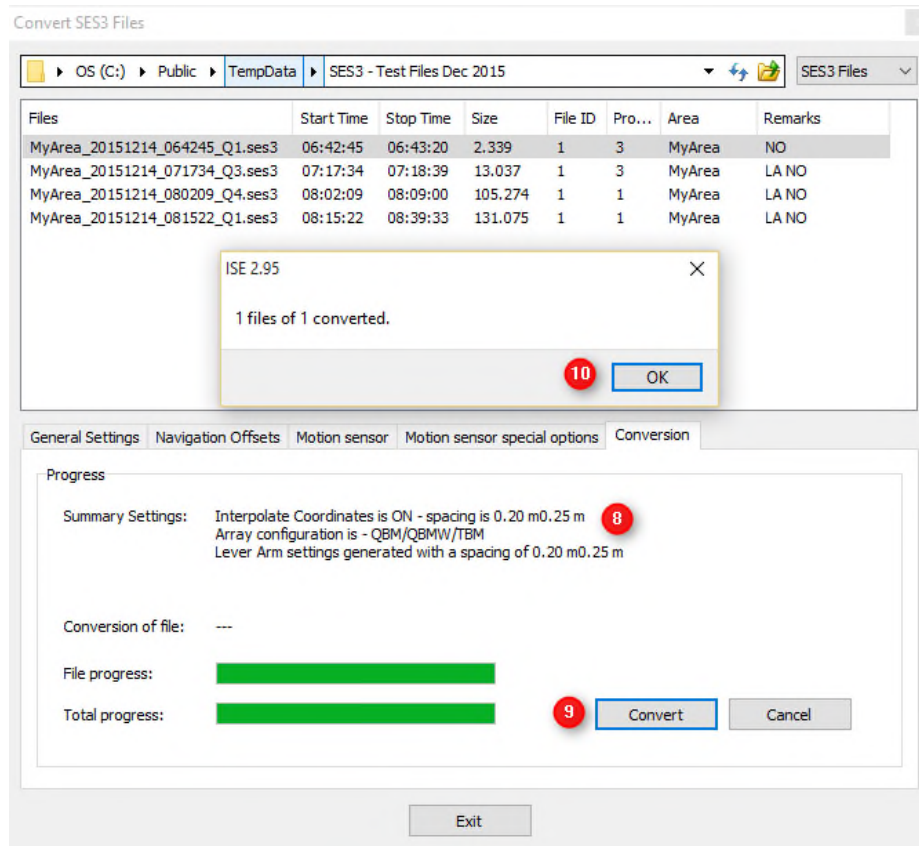


- Motion sensor special options

In this example we do not need any special options.

- Conversion

- ⑧ Information give an overview to the done settings in order to check if everything is correct selected.
- ⑨ Execute the conversion.
- ⑩ Finish the conversion.



How to generate voxel files out of SES files

This guidance explains how the voxel can be generated out of the SES files, to be able to view the recorded data in 3D.



If **SES3** files shall be processed these files have to be converted into RAW files before the processing could be started. The conversion processing is explained under ***How to convert SES3 files.***

The processing itself consists of following two main parts:

- ① Export of the recorded data as x, y, z, s file
 - ⌵ Before the recorded data is to be exported, it has to be processed as usual (i.e. coordinate interpolation or filtering).
- ② Loading and processing the exported data into the **SESGridder**. After processing the data with the tool it will generate the voxel grid file.
 - ⌵ The **SESGridder** allows during the processing a view into the generated voxel grid.

Export recorded data in required format

The following steps have to be considered to export the data after all desired files are processed. Select **Tools** → ***Process Script....*** There exists a raster orientated export inside the GIS module which is called ***Voxler Area Export***, too.

- ① Select a **command** to export the voxel format:
 - LOAD_DATA_FILE_+VOXLER_CLOSE
 - will load all selected files, export the data with corresponding coordinates of every selected file into a separate file and close all selected files.
 - LOAD_DATA_FILE_+Waterdepth+VOXLER_CLOSE
 - will load all selected files, determine the water depth, export the data with corresponding coordinates of every selected file into a separate file and close all selected files.
- ② Load all files which shall be exported by clicking **Insert** and then by browsing and selecting the desired files.
- ③ By pressing the **Start** button the ***Load Data Dialog*** will open once for the selected files.

- ④ Make settings within *The Voxler Output Settings Dialog* and execute the exportation scripting by pressing **Ok**.
 - ⓘ Under the assumption of the usage of the **SESGridder** for the voxel grid generation remember the entered scaling because this is important for the vertical voxel spacing. Further it is recommended not to use the stacking. Because this will generate data gaps in vertical direction which probably cause unwanted empty planes.

Generate the voxel grid with the exported data

The following explained processing steps, which is marked with red digits, has to be passed to generate the voxel file. Optional steps are marked with orange digits. Bordeaux colored digits or characters are outside of the processing steps.



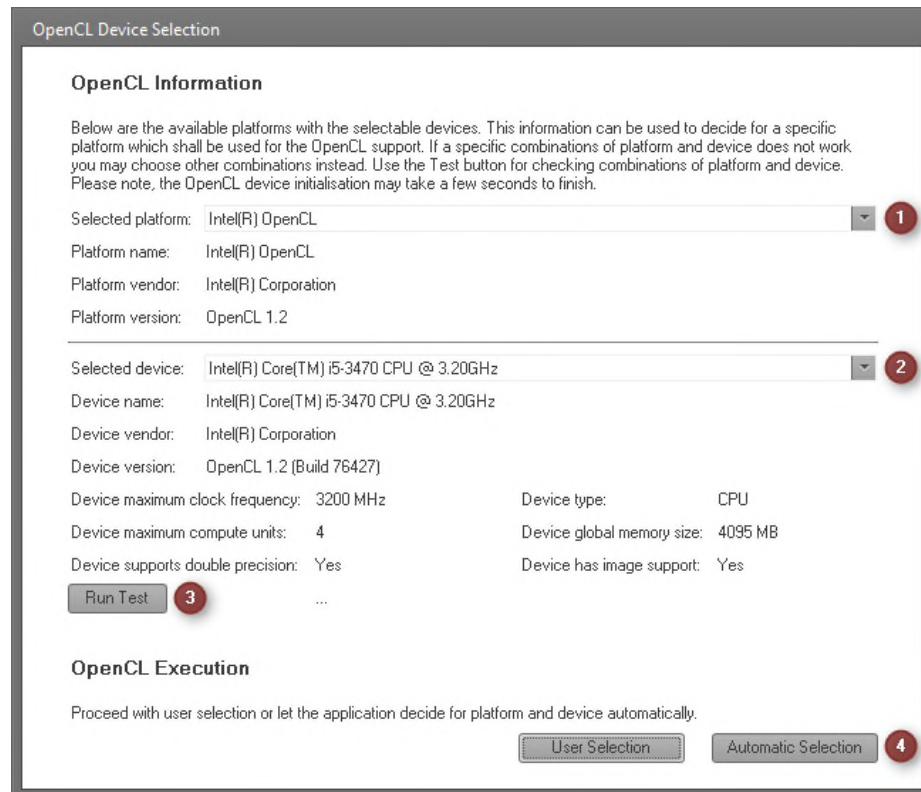
Not all possible settings are described here. The **SESGridder** interaction possibilities are almost self-explanatory.

Described version of the **SESGridder** is 1.0.1.6 from December 2016.

- First usage

During the first execution of the **SESGridder** the user have to decide which of the available devices shall be used for OpenCL calculations. This can be changed under the tab **Options**.

- ① Select a platform to which several OpenCL capable devices may be assigned to.
- ② Select an OpenCL capable device which shall be used.
- ③ Test whether the selected OpenCL capable device fulfills the **SESGridder** software specifications.
- ④ Use the elected device or let the **SESGridder** choose a device.

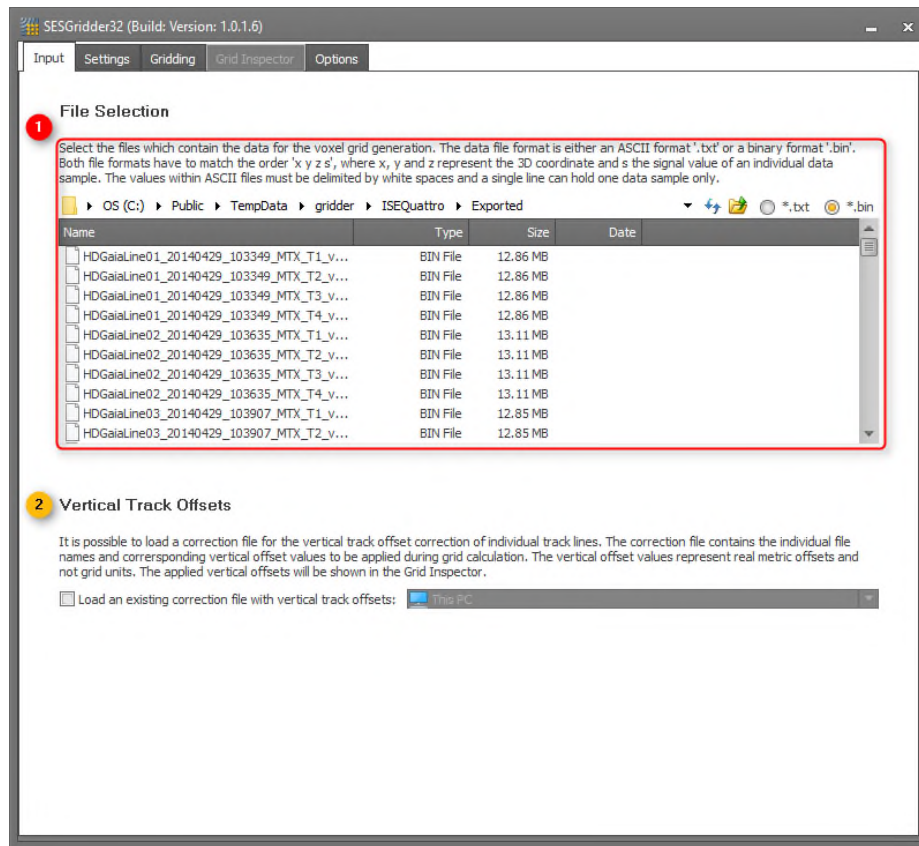


- Input

- ① Load special formatted files are structured as following: x y z s
The x, y and z represent a coordinate with a corresponding signal value s.

Select all files from the folder which shall be used for the voxel grid generation. All files have to be of type .txt for text files or .bin for binary files.

ⓘ The x, y and z are floating point values. The s is an integer value. They have to be separated by single spaces and every entry has to be in a separate line. By contrast to this text files the binary files are without any separator or new line. For the binary formatted files x and y have to be double precision floating point (64-bit) values, z has to be floating point (32-bit) and s has to be of signed short type (16-bit).
- ② For experienced user it is possible to adjust the voxel grid during the usage of **Grid Inspector**, which is a processing part of the **SESGridder**. Possible existing correction files, which may be saved during this special adjustment, can be loaded again as well.



- Settings

- ③ If some suitable setting for the selected data files is chosen, then all settings done and saved to a previous date will be loaded.

As mentioned entered settings can be saved for re-use. Open the managing dialog by clicking **Manage Griddler Settings**.

Further it is possible to take a snapshot of this tab with **Snapshot Griddler Settings**.

- ! Best moment to save settings is during voxel grid generation is running, because this will usually need some time, primary dependent on the data amount. Or save the settings before saving the generated voxel grid. This will ensure saving the last state which may has changed during the usage of the **Grid Inspector**.

- ④ The most important setting for the voxel grid generation step, is entering the boundary limits of the voxel volume.

The boundaries defined by all selected files can be determined by clicking **Execute Boundaries Calculation**.

The coordinate boundaries have the same unit as your input data.

Further the voxel dimension has to be entered. Optionally the spacing of a voxel can be entered which refers to the unit of the input as well. The entered spacing will automatically provide a voxel size.

- ⑤ The calculation settings are essential for the grid generation as well as for any recalculation.

They can be changed after the grid generation step has finished.

Enter search radii for the x and y axes. If a generated voxel does not contain any coordinate, a value may be interpolated according to this radii and the weighting factor.

Single empty planes, which may occur through a too low spacing in z direction, can be interpolated as well.

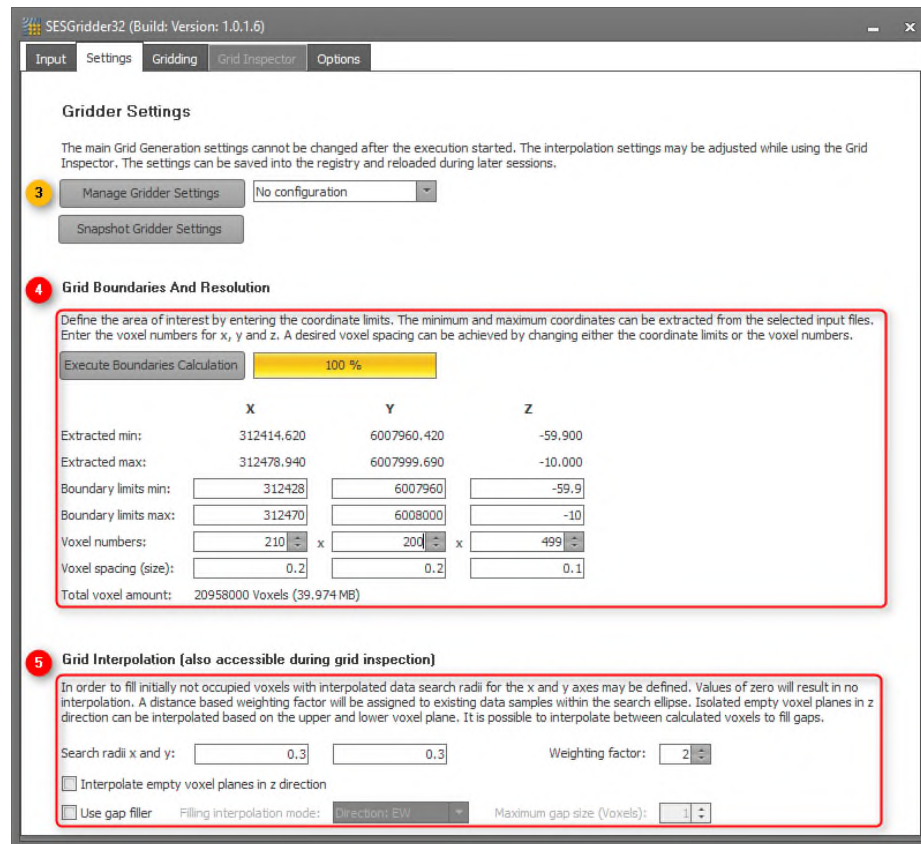
The gap filling feature fills empty voxels with values dependent to the adjacent voxels. The number of voxels of a gap which will be interpolated has to be defined as well as the interpolation direction (horizontal or vertical or both).

- ⓘ Careful with stacking in z direction during data exportation. This may lead to not compensable multiple empty planes.

For experienced user: To do a fast first calculation to get a more or less fast preview in the **Grid Inspector** let the search radii being zero. As mentioned before these values can be manipulated again later.

As advice the search radii should be a factor between 1 and 2 of the corresponding spacing.

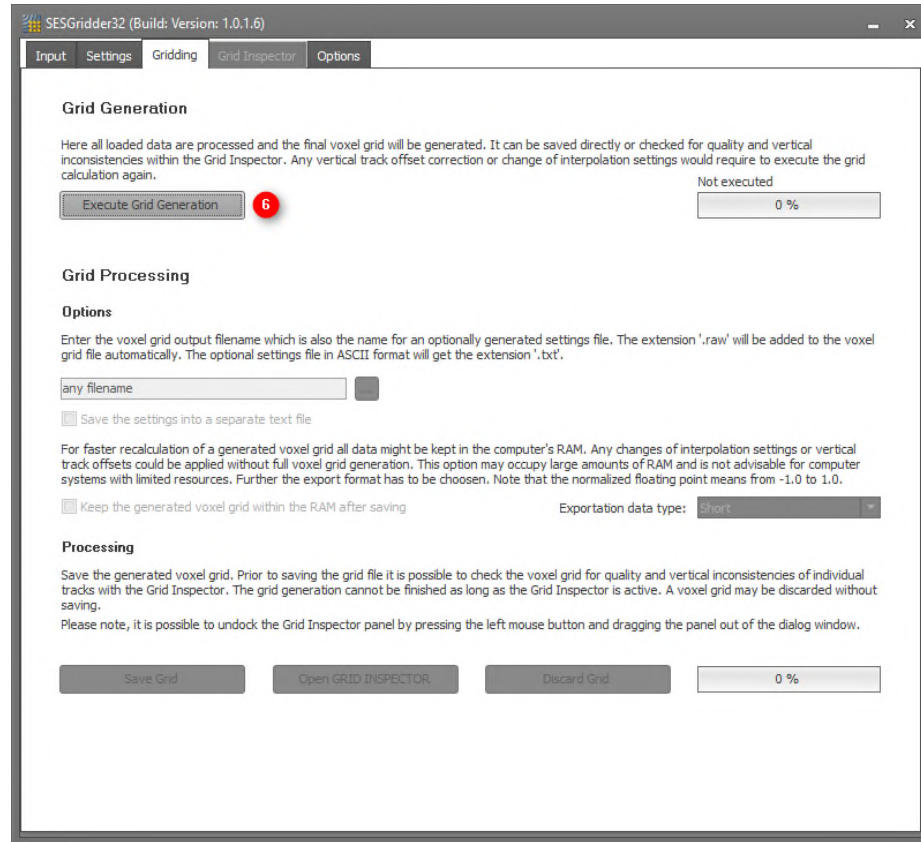
Note that for the data example of the screenshots the full range without zero offsets and a scaling of -0.1 was used for the data extraction. With a scaling of one the proposed boundary limits would be from 100 to 590.



- Gridding

The grid has to be generated before further interactions are available.

- ⑥ Execute the grid generation and wait until all substeps have finished.



- ⑦ Enter a filename for the output or browse and select an existing text file.

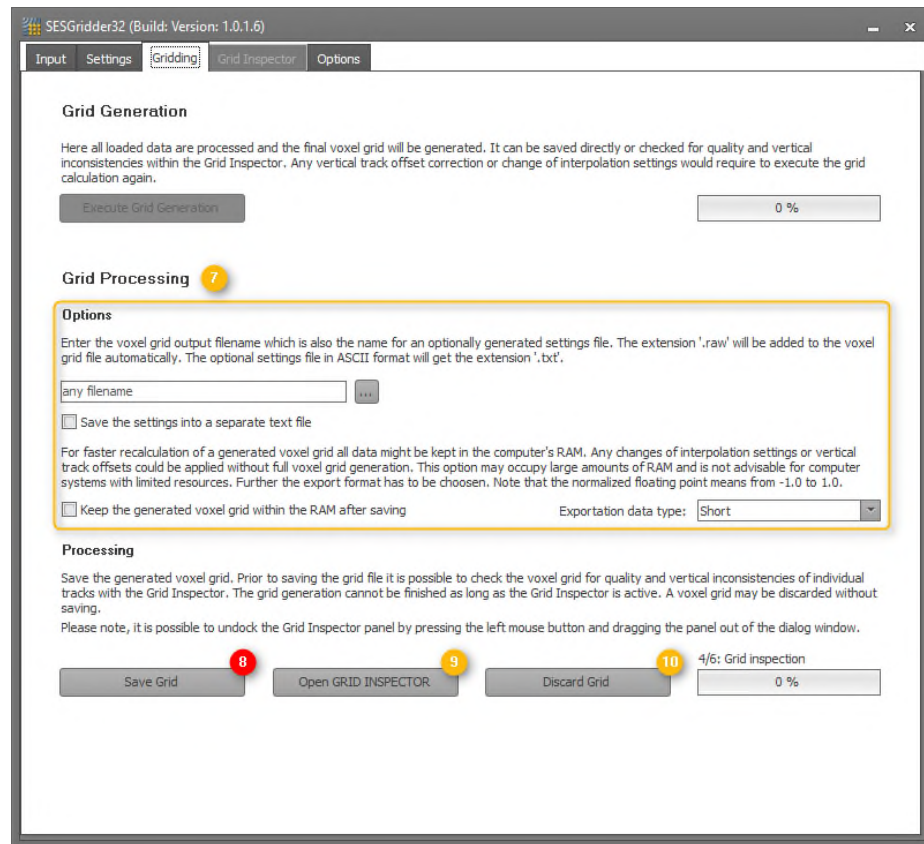
Decide whether a separate text file shall be written including the done settings.

The generated voxel grid can be kept into RAM after the grid is saved. This allows more or less quickly generating another voxel grid file with changed calculation settings or another vertical track offset which can be changed within the **Grid Inspector**.

Choose the exportation data type (signed short 16-bit or floating point 32-bit with or without normalization between -1.0 and 1.0)

- ⓘ If no file name is entered before the **Save Grid** button is pressed, the output filename will have the same name as the first entry of the selected file list, except the extension.

- ⑧ Save the generated voxel grid. If for the voxel grid a relevant change has occurred, then the user will be asked for recalculation before saving.
- ⑨ Open the **Grid Inspector** to view into the generated voxel grid and for applying vertical track offset changes.
- ⑩ Discard generated voxel grid without saving which allows to change the essential settings or to change file selection.

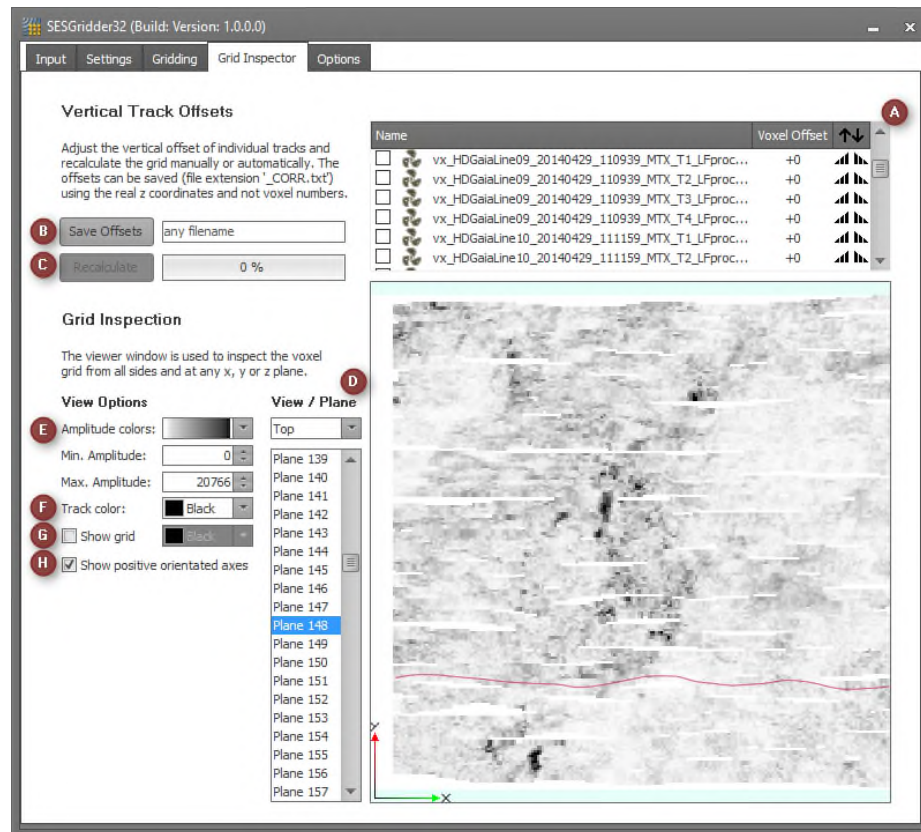


- Grid Inspector

The inspector allows not only to get a view into the generated voxel grid but to change the vertical track offset for single files. Accordingly loading single files representing only one recorded track allows more flexibility in changing than a combined data file.

The view options for the **Grid Inspection** offer a lot of opportunities.

- Ⓐ The vertical track offset correction is done by clicking on the increase or decrease signs at the right of the list view. The current selected file will be shown as a red line strip if the selected view is top or bottom. The ticked files are shown as well in this both views with the selected color of **Track color**.
Further is for each file shown which vertical track offset correction is currently applied to its data in the voxel grid.
- Ⓑ The current applied vertical track offsets to all files will be saved to the entered output filename by pressing **Save Offsets**.
- Ⓒ If the available setting for automatic recalculation, which can be found under **Options**, is ticked then all done vertical track offset changes are recalculated and applied to the voxel grid automatically. Otherwise this is done manually by clicking **Recalculate**.
- Ⓓ **View: Top, Bottom, Front, Back, Left, Right**
 - The **View** means the direction looking at the voxel grid. Assumptions are that the **Bottom** has a lower value than the **Top** and that **Front** as well as **Left** have lower values than **Back** respectively **Right**.
- Plane: 1..n**
 - The plane means the current shown voxel grid plane dependent on the selected **View**.
- Ⓔ **Amplitude colors** mean the color spectrum which is used to draw the voxel of the voxel grid with the chosen range of amplitude values. The range is defined by the entered minimum and maximum amplitude.
- Ⓕ The **Track color** specifies the drawing color for the ticked files.
- Ⓖ If **Show grid** is ticked the voxel grid its voxel borders are drawn with the selected color.
- Ⓗ If **Show positive oriented axes** is ticked the coordinate system axes determined by the current selected **View** are shown.



There are several interaction possibilities for the viewing window. Most important are moving by pressed left mouse button, zooming by scrolling the mouse wheel, position and zoom reset by clicking middle mouse button (mouse wheel button) and plane switching by key up or down pressing.

- Options

The options provide different information. The device selection for the OpenCL usage can be changed, which is only needed for the **Grid Inspector**. Further possible and changeable options are the color scheme and the option for the automatic or manually recalculation when a vertical track offset adjustment will be done, which is relevant only for the **Grid Inspector**.

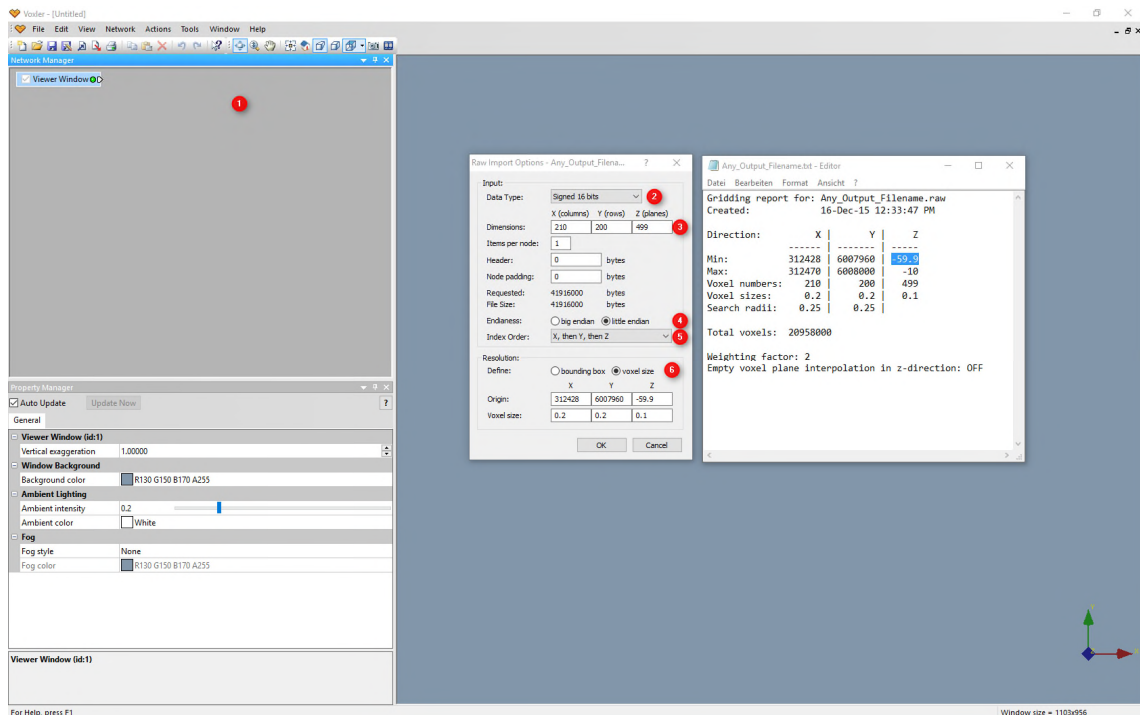
Usage of the generated voxel file

This example explains how to load the generated binary data file by the **SESGriddy** into third party software which is in this case the **Voxler®**.

In this case the settings were saved into a separate text file, from which it is easy to get the necessary loading input for the **Voxler®**.

It is only described how to load the data into the **Voxler®** but not how to go further to get the view. For example the volume renderer has to be added to visualize the volume.

- ① Execute right click to open popup menu and click on **Import**. If it is done the setting dialog for the file loading occurs after selecting the generated binary file.
- ② Leave the signed short type.
- ③ Enter the voxel dimensions.
- ④ Leave the little endian format.
- ⑤ Leave the index order x, y and z.
- ⑥ Enter spacings and optionally the origin (minimum coordinates) to get a correct axes labeling.



Appendix A - File Formats

During the work with the ISE software different file formats are used. The SES-2000 data format will be processed automatically and is not described here, but some other formats, e.g. the tide data file format, are important for the user of the software.

The SES-2000 Data File Format

The SES-2000 data format is a binary format which contains the digitized echo signals, the information from navigation systems, the data from motion sensors and different system parameter settings. The file size is set to 128 Mbyte by default within the online acquisition software. The maximum file size can be modified.



Do not edit SES-2000 data files manually. This can cause errors during further processing and operation with the files.

The Tide Data File Format

Tide data files can be imported by the ISE software. These files have to be ASCII files with the following structure:

Column	Description
1	The date as a string in the form 01.01.2015
2	The time as a string in the form 12:05
3	The tide level as a number in cm like 315.0

Every minute must be defined in the file. If no tide data are available for specific times of the day, the tide level value can be set to zero. The columns have to be separated by space characters. Common file extensions are "asc" and "tid".

The Layer Data File Format

This is also a binary format. The file size depends on the size of the layer information included in the file. Layer files can also be loaded into data windows with different data files than the ones they were created from. Layer files contain information about the digitized features, the colors and the manually added annotation.



Do not edit layer data files manually. This can cause errors during further processing and operation with the files.

The standard file extension is "sch".

The Layer Definition File Format

This binary format contains all preferences from the layer editing. It is useful to save the selected pen colors and pen widths into a file. So these preferences can be reloaded to other files for easy editing set up. The standard file extension is "sdd".

The SIS File Format

This file format will be used within the SIS Replace function. If the SIS data strings were exported and recalculated with external software, they can be inserted into the data files again. The number and sorting order of the columns are variable but the maximum number of columns is limited to 8. The SIS files are text files with the following typical structure:

Column	Description
1	The time as a string in the form 10:05:20
2	The X position as a floating point number
3	The Y position as a floating point number
4	The Z value as a floating point number

The Sound Velocity Profile File Format

This ASCII file format contains a list with all speed of sound values and the regarding depth. The depth can be positive or negative, depending on the given option during the saving operation. Both formats will be loaded by the ISE software. The standard file extension is "svp".

Column	Description
1	The depth in meters as a integer number
2	The speed of sound in meter per second as a floating point number

The Numerical Profile File Format

This is a binary format. The file size depends on the number and size of the included density profiles. The standard file extension is "den". Each numerical profile data base consists of one or more numerical profiles. To add a single profile, the user has to import ASCII files with the following structure:

Row	Description
1	The unique profile ID as an integer number
2	The X and Y coordinate values separated by a space character
3	The number N of the following numerical values

4 to (3+N)	The list of numerical values, where each row contains a depth and a floating point number, separated by a space character (N stands for the value of row 3)
------------	--



Do not edit density profile files manually. This can cause errors during further processing and operation with the files.

The Sediment Probe File Format

This is a binary format. The file size depends on the size of the probe and layer information included in the file. The standard file extension is “sed”.



Do not edit sediment probe files manually. This can cause errors during further processing and operation with the files.

The Sediment Probe Import File Format

This is an ASCII format. The ASCII based file structure allows the import of several sediment probes without manual editing in the Sediment Probe Dialog. Dialog The file size depends on the number of probes to be imported. The standard file extension is “txt”. A single row contains all information about one sediment probe. The ASCII file has the following structure:

Column	Description
1	The unique probe ID as an 5 character ASCII string
2	The X coordinate value
3	The Y coordinate value
4	An optional ASCII text field for a short probe description (no spaces allowed).
5	An optional Date field for the probe collection date with the format DD.MM.YYYY
6	An optional Time field for the probe collection date with the format hh.mm
7	The ground level of the probe given in meters. The value has to be negative for a typical depth below a water level of 0.00 m.
8	The number N of the following sediment layers
9 to (8+N)	The list of numerical values, where each column contains the thickness of a sediment layer, given in meters.



The import file format does not contain information about the sediment type and color for the graphical overlay of the probe. These data need to be edited manually after importing the probe information.

The Target File Format

This is an ASCII format. The ASCII based file structure allows the import of several targets. The standard file extension is “txt”. A single row contains all information about one target. All columns are separated by a space or by a tab. The ASCII file has the following structure:

Column	Description
1	The X coordinate value
2	The Y coordinate value
3	The Z coordinate value
4	An ASCII text field for a ID of the target
5	An ASCII text field for a short information or description of the target.

The Bitmap File Format

This is a standard binary Windows® Bitmap format. It is palette orientated and contains 256 different colors. In the exported bitmaps the echo plot from the screen as well as the header and the coordinates are included. It is the same appearance as in the printed echo plots. The standard file extension is “bmp”.



Instead of using Bitmap files it can be more efficient to export the graphic into GIF files. These GIF files are created with a compression algorithm without any loss of quality, based on 256 colors and high compression rates.

The GIF File Format

This is a standard binary GIF format. It is palette orientated and contains 256 different colors. In the exported graphic the echo plot from the screen as well as the header and the coordinates are included. It is the same appearance as in the printed echo plots. The standard file extension is “gif”.



The GIF file format is the recommended format to be used for graphics export. It has the best compression rate without a loss of data and detail. Bitmap files are very big and JPEG files create artefacts within the echo plot due to the compression algorithm.

The JPEG File Format

This is a standard binary Windows® JPEG format. It is true color orientated and uses data compression techniques to save space on a storage medium. In the exported JPEG files the echo plot from the screen as well as the header and the coordinates are included. It is the nearly the same appearance as in the printed echo plots, only due to the data compression some pixel artefacts may appear. The standard file extension is "jpg".



Instead of using a JPEG file it can be more efficient to export the graphic files into GIF files. These GIF files are created with a compression algorithm without any loss of quality, based on 256 colors and high compression rates.

The SVG File Format

This is an ASCII file format following the XML specification to describe scalable vector graphics. SVG files can be created during the export of layer data. One or more edited and visible layers are exported with relative coordinates to the upper left corner. Additionally a link to the background echo plot may be part of the SVG file if selected during the export. SVG files can be opened and edited by several graphic programs. The standard file extension is "svg".

The CODA File Format (Custom Format)

This is a user specific ASCII file format following the scheme of the CODA processing suite. CODA files can be created during the export of layer data. One or more layers can be written into a single output file. The layers are divided into segments with Start (S), Intermittent (I) and Stop (E) indicators. Position information and other data, e.g. Time and KP values are exported too, if available. The following table shows the column structure and one small segment as an example. Each row in the CODA file represents a single coordinate and one segment must have at least two rows (with S and E indicator). Some columns are not used and set to zero. Delimiter is per default a Tabulator character.

Date	Time	Layer	KP	X value	Y value	Z value	No Use	ID
15.06.2015	081218.0	Layer2	0.010	4526.66	0415.42	36.46	0.0000	S
15.06.2015	081219.0	Layer2	0.012	4526.65	0415.35	36.47	0.0000	I
15.06.2015	081220.0	Layer2	0.015	4526.65	0415.29	36.48	0.0000	I
15.06.2015	081221.0	Layer2	0.017	4526.64	0415.24	36.46	0.0000	E

The PIPE File Format (Custom Format)

This is a user specific ASCII file format following the same scheme as for the CODA file format. PIPE files can be created during the export of layer data, especially when

pipeline reflectors are digitized. The seabed and the top of the pipeline can be written into a single output file or separate files may be exported. The layers are divided into segments with Start (S), Intermittent (I) and Stop (E) indicators. Position information and other data, e.g. Time and KP values are exported too, if available. The following table shows the column structure and one small segment as an example. Each row in the PIPE file represents a single coordinate and one segment must have at least two rows (with S and E indicator). Some columns are not used and set to zero. Delimiter is per default a Tabulator character.

In contrast to the CODA file format the Layer description is fixed to the strings "seabed" and "topofpipe".

Date	Time	Layer	KP	X value	Y value	Z value	No Use	ID
15.06.2015	081218.0	topofpipe	0.010	4526.66	0415.42	36.46	0.0000	S
15.06.2015	081219.0	topofpipe	0.012	4526.65	0415.35	36.47	0.0000	I
15.06.2015	081220.0	topofpipe	0.015	4526.65	0415.29	36.48	0.0000	I
15.06.2015	081221.0	topofpipe	0.017	4526.64	0415.24	36.46	0.0000	E

The ASCII Convert & Export File Format

This is an ASCII file format which is used during the ASCII conversion of SES-2000 data and during the export of signal traces. The table below shows the structure of the file. The converter will create files containing several pings, during the export of signal traces individually files for each ping will be written.

The default file extensions are “asc” and “txt”.

Row Number	ASCII Data Description
1	Time
2	SIS Field No. 1
3	SIS Field No. 2
4	SIS Field No. 3
5	SIS Field No. 4
6	SIS Field No. 5
7	SIS Field No. 6
8	SIS Field No. 7
9	SIS Field No. 8
10	Range Start [m]
11	Range Length [m]
12	Frequency [kHz]
13	Pulse Length [μ s]
14	Sample Frequency [Hz]
15	Number of following samples [n]
16	Sample No. 1
...	...
16 + (n - 1)	Sample No. n

GIS Module File Formats

Import Formats

The GIS Map View can display an overlay of multiple data files. The following classes of files are possible to import, not geo-referenced raster data files (i.e. pixel format), geo-referenced raster data files (i.e. pixel format), grid files (i.e. point data sets) and geo-referenced vector data files (i.e. vector format).

Not geo-referenced data files are raster data files, such as Windows Bitmap files, where the format does not include any coordinate information. Such files may be imported as background data, but the coordinate system will be based on pixels rather than real world coordinates.

Geo-referenced data files are raster data files, such as GEO TIFF, where the format includes coordinate information. Such files may be imported as background data with real world coordinates. Table 2 shows a selection of the most widely used and supported data formats. The list may be extended in future, so please contact Innomar for updated information.

Raster Formats	
*.BMP	Windows Bitmap Format
*.GIF	Graphic Interchange Format
*.IMG	ERDA IMAGINE Image File Format
*.JPG, *.JPEG, *.JP2	JPEG and JPEG 2000 File Interchange Format
*.PNG	Portable Network Graphic Format
*.SID	LizardTec MrSid File Format
*.TIF, *.TIFF	Tag Image File Format, GEO TIFF Format
Grid Formats	
*.ADF, *.ASC, *.FLT	ArcInfo Binary, ASCII and Float Grid Format
*.DEM	Digital Elevation Model ASCII Format
*.DT0, *.DT1, *.DT2	Digital Terrain Elevation Data Format
*.GRD	Golden Software Surfer Grid Format
Vector Formats	
*.CSV	Comma Separated Values point layer Format
*.DGN	MicroStation Native Format
*.DXF, *.DWG	AutoCAD Format
*.KML	Google Earth Keyhole Markup Language Format
*.OSM	Open Street Map Format
*.SHP	ArcView Shape File Format

*.XYZ	XYZ Lidar Data Format
*.000	IHO S-57 ENC Format

Export Formats

From the GIS Map View it is possible to export either the track data in vector format or the entire scene in raster format (Table 3). The export can be started via two buttons in the button bar or via the File menu. Track data are always exported geo-referenced. The scene is exported as a raster file with coordinates stored in separate World Files. TIFF raster files will contain embedded geo-reference information.

Track Export Formats	
*.DXF	AutoCAD Format
*.KML	Google Earth Keyhole Markup Language Format
Scene Export Formats	
*.BMP	Windows Bitmap Format
*.JPG	JPEG File Interchange Format
*.PNG	Portable Network Graphic Format
*.TIF	Tag Image File Format, GEO TIFF Format

Appendix B -

Simple Side Scan Processor (Option)

If a SES-96 or SES-2000 system is equipped with a side scan transducer and the relating software, it is possible to record 100 kHz side scan data. The side scan data are stored within normal SES-96/SES-2000 data files. The online software allows the replay of these data files, but an extended processing might be helpful for a coordinate referenced digitization of targets and structures. For this reason a special tool is provided, which allows the generation of Bitmap graphics containing a coordinate referenced chart of different side scan profiles, slant corrected and processed with some signal and picture processing methods. These referenced Bitmaps are usable for any chart as a base map for further digitization or plotting with external software packages, for example Surfer from Golden Software or Arc View GIS from ESRI or others. The software is not real Mosaic software, but it is a handy tool to get some mosaic like output of side scan profiles.

The Side Scan Processor Software

The Side Scan Processor has no real time display or preview of the generated Bitmap graphics, due to the possible big size of the files, which may overflow the graphics resources of older Windows® versions. Therefore it is a dialog orientated tool, where to define the input data, to process the data and finally to generate and store the output data as a Bitmap file.

The following graphic shows a flow chart of all necessary steps to generate a useful output. Already during the recording and before using this tool it is necessary to fulfil some requirements.

- Side Scan data files must contain heading information in one SIS field, coordinates in a metric system and the coordinates have to be already interpolated for each ping (which can be done within the ISE software). The heading information will be interpolated and smoothed temporarily within the Side Scan Processor.

Use the Side Scan Transducer and record Side Scan Data with Coordinates and Heading stored to the SIS fields.

(Optionally a course may be calculated with ISE, but a true heading is preferred)



Eventually convert the coordinates into a metric system, if not already recorded and calculate the heading from the coordinates, if not already recorded. The ISE software provides a SIS Extract and SIS Replace function, as well as a tool to calculate the heading from ASCII coordinate files.



Interpolate the coordinates, so every ping has its own coordinate. This step is necessary, because typically one position per second is available, but there are up to 30 pings per second generated with the echo sounder system. The ISE software has a tool for interpolating the coordinates within the SES data files.



Optionally a digitization of the bathymetry can be done with ISE and these depth data should be stored at one SIS field with the SIS replace tool. This procedure increases the quality of the near nadir region during mosaicking.



Start the Side Scan Processor software and select the data files to be processed (multiple files are selectable and a graphical preview is available too).



Define the input parameters, especially where to read the coordinate and heading information from the SES data files.



Define the output size of the generated Bitmap and scale the input data depending on the area to be processed and visualized and depending on the survey speed and the achievable ping rate during the survey.



Define some signal processing parameters to enhance the generated output, like TVG and heave correction. Additionally some picture processing parameters, like pixel smoothing and the overlay of grids are available.



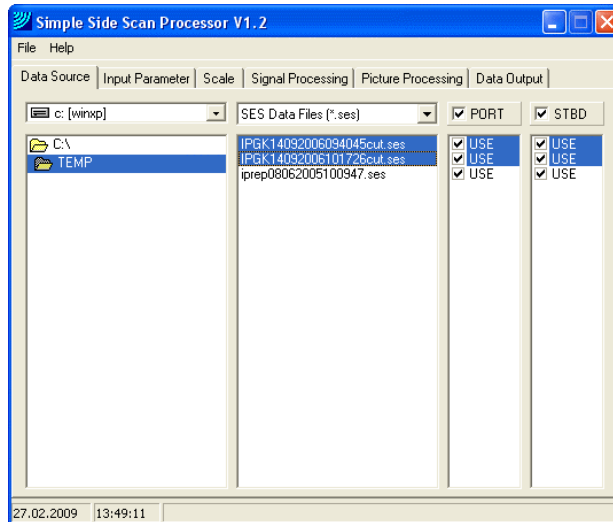
Define the output file and destination and start the processing which may take a while, if large data sets are processed.



Use the generated output Bitmap file within third party software for charting, digitization of structures and plotting. The Bitmap files are normal MS Windows® bitmaps with 256 colors and compatible with all available picture processing and visualization and charting software.

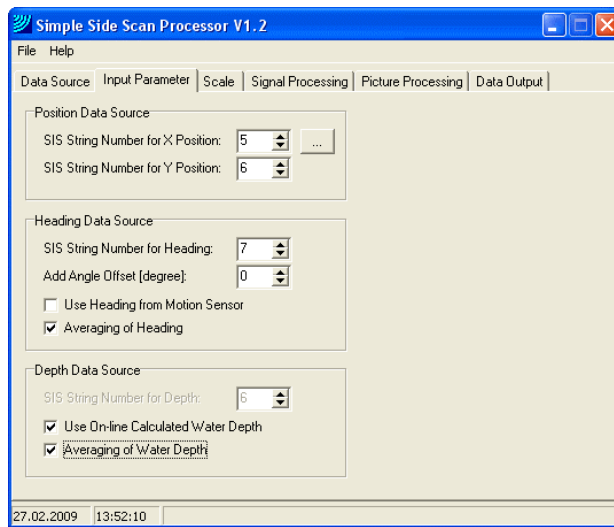
The Data Source Dialog

Within this dialog it is possible to select one or more SES data files for the processing. Browse to the source directory and select the files by marking them with the mouse. Also the port and starboard channel are selectable independently of each other. That might be useful in order to avoid too many overlaid Side Scan data within the mosaic. At least one file must be selected.



The Input Parameter Dialog

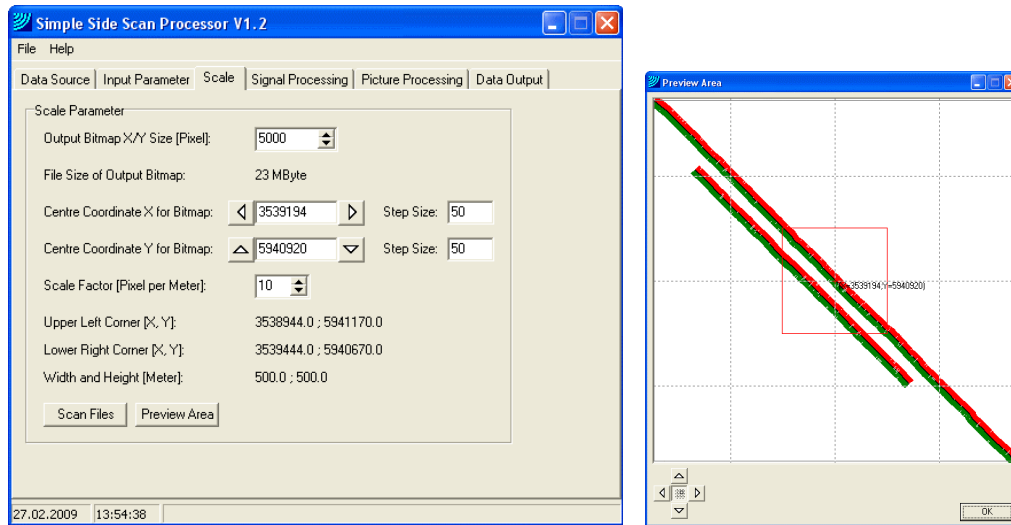
Select the SIS string number for the X and Y coordinates within the eight SIS fields of the SES data files. Additionally one field must contain the Heading information. It is recommended to use the averaging of the heading data to improve the output quality of the processing. The heading data normally has too large steps compared to the number of pings between each heading value and the resulting smaller change of the heading from ping to ping in reality. For the depth data source either the on-line calculated depth or a depth value from one of the SIS field may be used. An averaging of the depth data may increase the quality of the near nadir region during the mosaic calculation.



The Scale Dialog

This dialog is responsible for all settings relating to the output size of the Bitmap and the area to be visualized within. The bitmap itself is always quadratic and can have a maximum size of 10000 x 10000 pixels (which results in a file size of 100 Mbyte). The resulting output file size is calculated and given. Use the Scan Button to get read through all selected files and to find the center coordinate within the boundary rectangle of the side scan profiles. The center coordinates can be changed and defined manually, if specific section from the selected data set is of primarily interest. The preview window gives an overview about the vessel's track. The red area displays the backboard side and the green area displays the starboard side and both together are representing the coverage of the side scan track. The area of interest can be selected directly by clicking the mouse into the preview chart. The buttons shown down on the preview window can be used to create a grid according to the size of the output bitmap. The arrow buttons are used to move the selected window to the area of interest. This is very useful if more the one bitmap is necessary to cover the area. It makes sure that bitmaps can be created without any gaps in between.

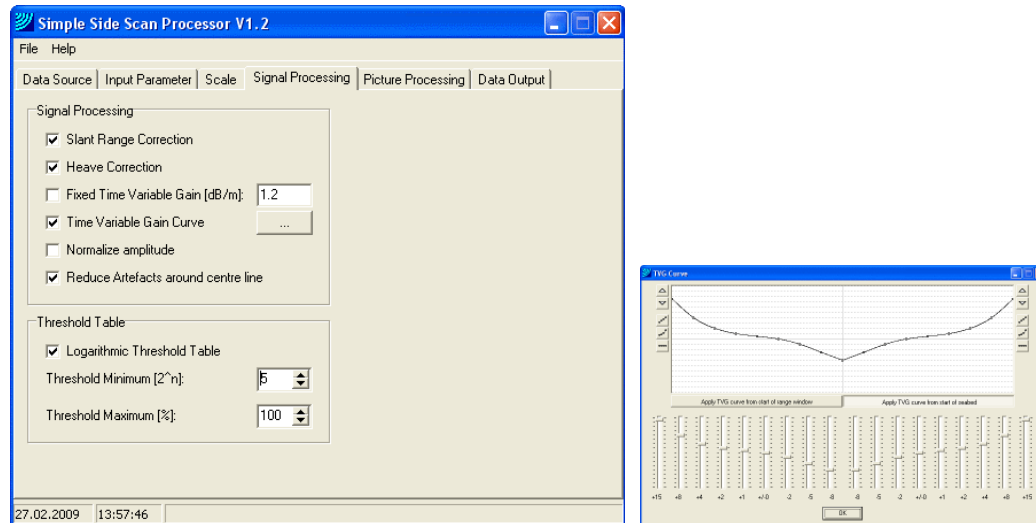
Furthermore the Scale factor is given in Pixel per Meter. Depending on the ping rate and the survey speed it might be necessary to decrease the number of pixels per meter, due to less coverage of the surveyed area with transmitted pings. On the other side the visualized area changes by changing the number of Pixel per meter relating to the output bitmap size. For this reason the processed boundary and size of the area is always recalculated and given on the lower part of the dialog.



The Signal Processing Dialog

Several processing steps are available. If during the survey a motion sensor was attached to the SES system, the heave information can be used for a heave correction. The averaging of the water depth can decrease errors during the TVG and the slant correction, if the bottom was not flat below the transducer or stones were on the bottom. A fixed time variable gain can be adjusted in dB/m to correct the received signal for energy losses due to geometrical and normal attenuation. There is also a possibility to create an own time variable gain curve. The gain curve can be adjusted for both sides separately. The amount of amplifying the received signal depends on the survey condition and must be found by manual trials. An automatic TVG calculation is not available at this time. The slant correction is necessary to get true distances of the reflectors from the survey line positions. Slant Range correction means the recalculation of the travel time to the true horizontal distance, when the height of the transducer over the bottom is known. The area near the center of the survey line is not as detailed as with higher distance due to less data points per change of distance, but this is normal for this processing method. For this reason side scan data plots sometimes are better interpretable without slant range correction, but for really coordinate referenced plots it is necessary to do. One signal processing method is included to compensate the received signal for changes of the signal strength due to directivity and other influences. The amplitude normalization will produce an output with a normalized signal level over the whole received signal. Small variations due to reflections from objects and structures on the seabed are not affected, but if the size of such reflectors is too large or the seabed characteristic changes constantly, the normalization may produce wrong amplification levels on these areas. A special algorithm is selectable for the signal processing, which is able to reduce artefacts around the center line of the profile (nadir region). Finally a threshold table can be applied to the processed signal to convert amplitude levels to a color or grey scale value for the final picture. This threshold table can have linear or logarithmic steps. A logarithmic table will have more steps in the lower amplitude range and will therefore improve the visibility of small changes of the signal. The

minimum value is used to remove the background noise from the generated picture. A higher value for the threshold minimum results in a bigger value for the starting point of the threshold table and all amplitudes below will be removed from the picture output. The maximum value for the threshold table is given in percent of the total dynamic range. A smaller value than 100 percent will decrease the total size of the threshold table and will result in more steps for the generated threshold table for the given signal amplitude range and therefore in better visible variations of the signal amplitude.



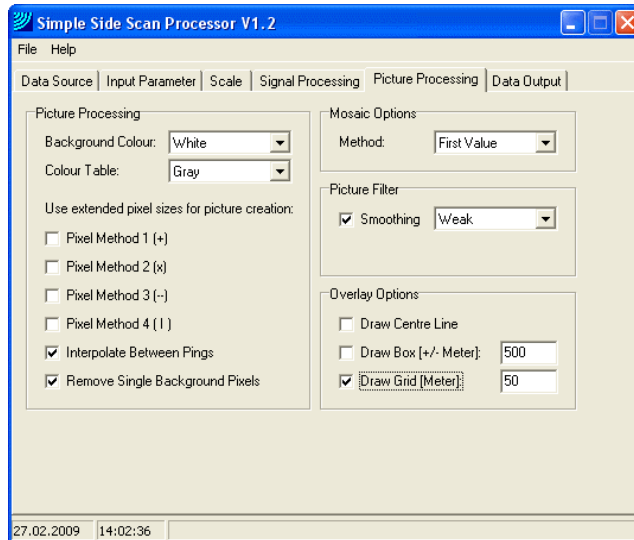
The Picture Processing Dialog

The picture processing is done after the signal processing. There are several options available for the improvement of the output pictures. A selection of different color tables and background colors can produce positive or negative pictures (shadows are light or dark). Extended pixel sizes are used, to fill blank areas between pings, when the ping rate was too low or the survey speed too high for the selected scale factor. There are different and combinable options for the pixel extension, which may be used depending also on the survey direction. For example a North / South profile may be filled with vertical pixel extensions only, to keep the original resolution in East / West direction. There is a limit to use the pixel extension, if the blank areas between the pings are getting too big. For that reason a function for the interpolation of data between the pings is available. This is the preferred method to produce graphics without blanked parts between single pings. If the scale factor is selected too big it is possible that still some blank pixels are visible on the plot. A function to remove such single pixels is selectable for that reason.

The generation of mosaics means the combination of several single profiles within one output plot. A few different methods for the combination exist. When a pixel will be written to a position, where a pixel was already put before, they may be combined with the following options: the first pixel will be the final pixel, the last pixel will be the final pixel, the maximum amplitude will be used, the minimum amplitude will be used or an average of the amplitudes will be calculated.

The final picture can be smoothed with a gauss filter of a selectable strength to improve the signal to noise ratio and the quality of the output.

Three overlay functions are available, first the drawing of the center line of the single profiles, second the drawing of a box with a fixed dimension around the center coordinate and third the drawing of grid lines, where the center coordinate is the center for the grid. The line distance is adjustable depending on the processed area.

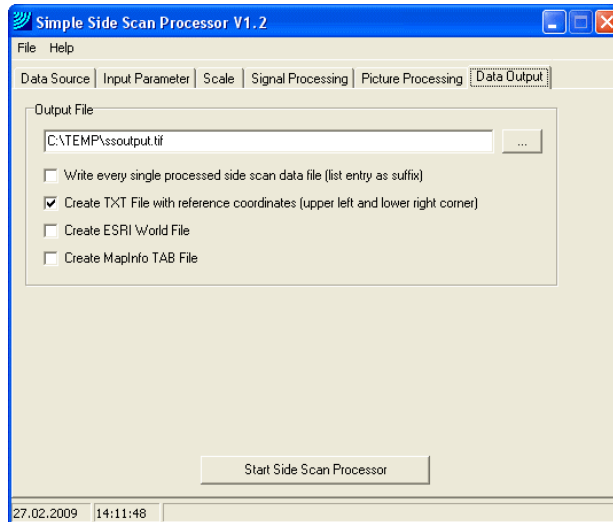


The Data Output Dialog

Finally the target directory, which is per default the data source directory, and the output file name have to be defined. To select another directory than the default a button to start a directory selection dialog is available.

Optionally a geo-referenced picture will be created for every single profile, which was selected and for the final mosaic, or the mosaic only will be written to disk. The generation of a text files with reference coordinates of the output pictures will make the import into third party charting software more comfortable.

By pressing the Button Start Side Scan Processor the processing will begin. The status bar of the software informs about the progress of the processing. Large data sets may require some time to finish. All of the dialogs are not accessible during the processing.



Example of Output Graphic

The following picture is a typical output of the Side Scan Processor Software. All options are enabled, like heading averaging, slant correction, TVG, pixel extension and smoothing. The grid line distance is 50 meters.

