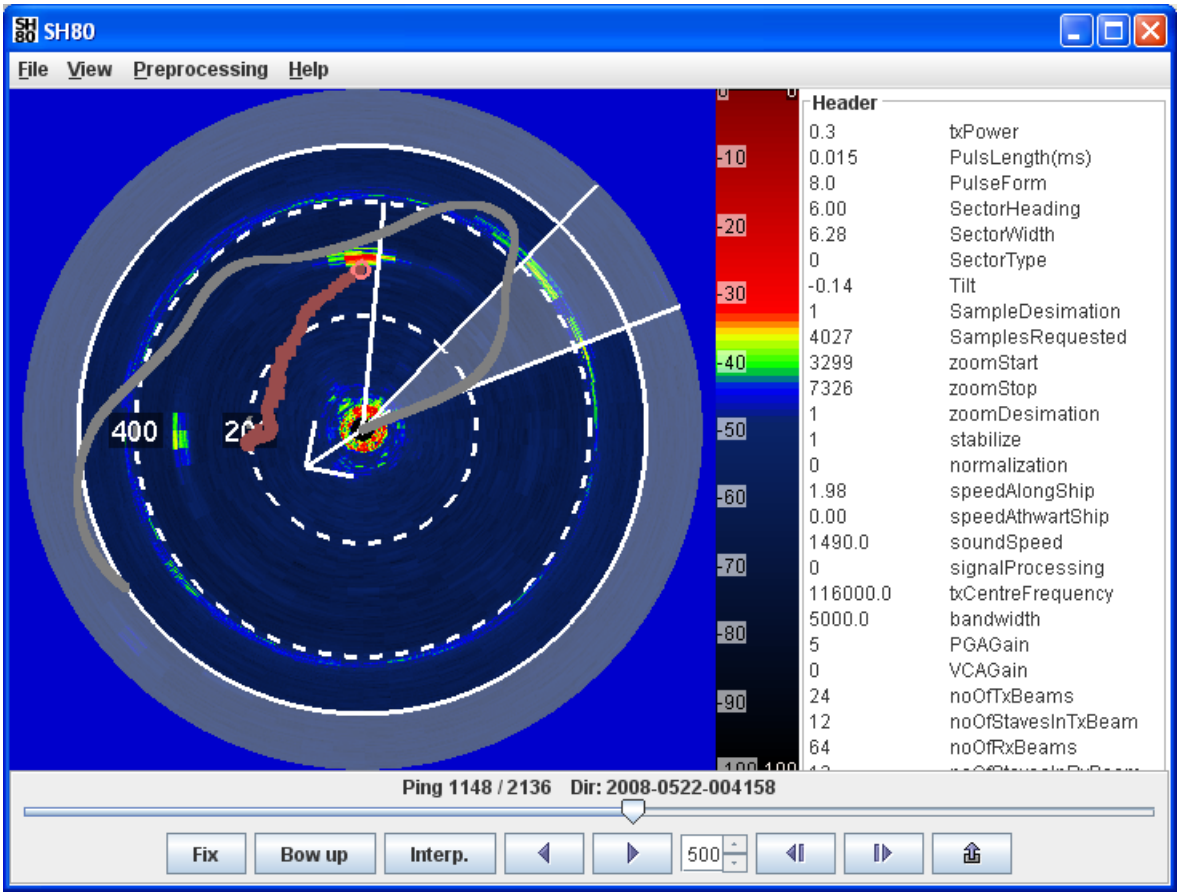



# PROFOS

## User Guide

Version 2.4.0

August 30, 2018

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# Profos

LSSS allows for working with Profos data through new views, and new overlays to existing LSSS modules.

# Working with Profos

This section gives a description of some of the typical tasks when working with Profos.


- Working modes
- Creating and editing schools
- Saving schools to work files
- Exporting school parameters
- Definition of school parameters

# Working modes

There are 3 different modes. The Tab key changes working mode.

## Navigation mode

Dragging the mouse moves the Profos data.

## Selection mode

Dragging the mouse draws a selection rectangle. Pressing the Esc key cancels the selection. If the Ctrl key is pressed down the selection is inverted.

The selectable objects are:

- *Schools*
  The selected schools are shown by the school box overlay on the map.
  The selected schools can be merged, or assigned acoustical categories.
- *School centers*
  The selected center points are shown by the school track overlays on the map and on the echogram.
  The selected school centers can be used for editing schools.
  Note: If a school is selected by clicking, and not dragging a selection rectangle, then all centers of that school are also selected.
- *Targets*
  The selected targets are shown by the target track overlays on the map and on the echogram.
  The selected targets can be used as seed points for growing a school.

## Edit mode

Dragging the mouse edits the school definition. The mouse cursor changes between:

- a paintbrush  when the cursor is inside a school. Dragging the mouse from here will expand the school mask.
- an eraser  when the cursor is outside all schools. Dragging the mouse from here will erase school masks.

The size of the paintbrush / eraser can be changed using the keys + and -.

# Schools

A school is defined by a mask on samples of one or more pings. A sample on a ping is thus either completely inside or completely outside any given school. Different schools are not allowed to overlap on the same ping, although they are allowed to overlap geographically on different pings.

Schools are created by selecting a seed point and growing a school. Schools can be edited in the edit working mode, and merged and deleted through the context menu of the Profos omni display.

## Growing schools

A new school can be created by selecting a seed point and growing a school.

- *Selecting a single seed point:*
  This can be done by locating the mouse pointer on the desired seed point and then choosing 'Grow new school' from the context menu.
- *Using multiple targets as seed points:*
  This can be done by first selecting the desired target points and then choosing 'Grow new school for all targets with ID: xx' from the context menu.

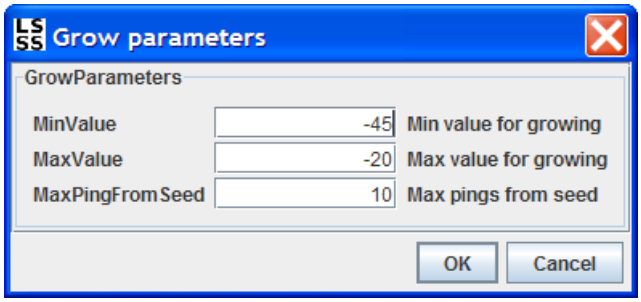
The growing algorithm works by starting with the selected seed point and then advancing to all neighbouring samples that satisfy the following criteria:

- The sample must be compatible with the grow parameters:
  - *MinValue:* The sample value must be greater or equal to this threshold.
  - *MaxValue:* The sample value must be less than this threshold.
  - *MaxPingFromSeed:* The sample must be on a ping maximum this distance from the ping containing the seed point.
- The sample must be outside of the blind area configured in the transducer parameters.

After growing, the school mask is shrunk so that all samples is above a shrinking threshold calculated this way:

1. For each ping calculate:
   - $S_{v,90}$: The 90-percentile of the sample values of the school.
   - $S = 2\sqrt{(A/\pi)}$, where A is the school area. This is the size (diameter) of the school assuming a circular school.
   - SNR: Signal to noise ratio.
2. Apply a 5 ping wide median filter to $S_{v,90}$, S and SNR.
3. Shrinking threshold = $S_{v,90}$ - (4.4 + 0.013 S + 0.1 SNR)

The grow parameters can be edited in the following dialog that can be accessed from the context menu.




## Editing schools

Schools can be manually edited in the edit working mode.

The school mask cleared on the pings of selected school centers.

Several selected schools can be merged into one by choosing 'Merge selected schools' from the context menu.

A school can be extended to neighbouring pings by selecting 'Grow continued school (school id xx)' from the context menu.

## Deleting schools

A school can be deleted by selecting 'Delete school' from the context menu for that school. Note that the entire school is deleted, and not only on the currently selected data files.

# Work files

Each school is saved in a separate work file. These work files are located in the subdirectory named `sh80` in the main work directory defined in [Survey configuration - Data files].

The work file contains:

- *Mask definition*
- *School parameters*
- *Acoustic categories*

Each work file spans multiple pings and might even span multiple data files in the selected data files. This can lead to that some schools are only partly contained in the pings of the selected data files. In this case the entire school is loaded, but the parts that are outside the selected data files cannot be seen, and thus cannot be edited. However, if the school is deleted the entire school is deleted, and not only the visible part.

# Export

The school parameters can be exported. These exported files are located in the subdirectory named `profos` in the main reports directory defined in [Survey configuration - Data files].

Two files are created. The date and time in UTC, `yyyy-mmdd-hhmm`, corresponds to the first ping of the first school that is exported.

- `yyyy-mmdd-hhmm-ps.txt`
  This file contains one line per school.
  The columns correspond to the per school parameters.
- `yyyy-mmdd-hhmm-pp.txt`
  This file contains one line per ping for each school.
  The columns correspond to the per ping parameters.

The export can be previewed from the context menu of the Profos omni display.

# School parameters

A set of parameters is calculated for all schools. Some parameters are defined for the entire school on all pings while others are defined for each ping of the school. These parameters are saved in the school work file and can be exported .

## Per school parameters

These are the parameters defined for the entire school on all pings.

### Id

The school id per school is defined as:

- *Id:* The school id.

Displayed in the tool tip, the Profos omni display and the map.

### Matching id

The matching id per school is defined as:

- *MatchingId:* The school id of the school of the other type (omni or vertical) with the most geographical overlap.

Displayed in the tool tip.

### Time

The time per school is defined as:

- *StartDate:* With format `yyyy-mm-ss`.
- *StartTime:* With format `hh:mm:ss.xx` where `xx` denotes hundredths of a second.
- *StopDate:* With same format as StartDate.
- *StopTime:* With same format as StartTime.

### Bounding box

The geographical bounding box per school is defined as:

- *Box.lon.min:* Minimum longitude.
- *Box.lat.min:* Minimum latitude.
- *Box.lon.max:* Maximum longitude.
- *Box.lat.max:* Maximum latitude.

The bounding box is not rotated.

Displayed in the Profos omni display and the map.

### Depth

The depth per school is defined as:

- *Depth.mean:* Mean value of center depths per ping.

### Mean Sv

The mean value per school is defined as:

- *Sv.mean:* Mean value of mean Sv per ping.

The mean value is in dB, but the computation is done on linear values.

Displayed in the tool tip.

### Area

The area per school is defined as:

- *Area.mean:* Mean value of area per ping.

Displayed in the tool tip.

### Pings

The ping count per school is defined as:

- *Pings:* Number of pings where school is defined.

Pings between school start and stop where the school is not defined (empty school mask) are not counted.

### Motion

The motion per school is defined as:

- *Speed:* Speed in m/s.
- *Heading:* Heading in degrees.

Both speed and heading are calculated using the first and and last center points. If the school is defined on only one ping, these values are marked as N/A.

Displayed in the map.

### Height

The height is only calculated for the vertical display.

- *Height.mean:* Mean value of height per ping.

### Width

The width is only calculated for the vertical display.

- *Width.mean:* Mean value of width per ping.

### Size along beam

The width is only calculated for the omni display.

- *AlongBeamSize.mean:* Mean value of size along beam per ping.

### Size along beam

The width is only calculated for the omni display.

- *AlongRingSize.mean:* Mean value of size along ring per ping.

# Per ping parameters

These are the parameters defined for each ping of the school.

## Id

The school id per ping is defined as:

- *Id:* The school id.

## Time

The time per ping is defined as:

- *Date:* With format `yyyy-mm-ss`.
- *Time:* With format `hh:mm:ss.xx` where `xx` denotes hundredths of a second.

## File

The file per ping is defined as:

- *File:* Name of file containing data for this ping.

## Center

The school center per ping is defined as:

- *Center.lon:* Longitude of the center.
- *Center.lat:* Latitude of the center.
- *Center.dep:* Depth of the center.

The center point is calculated by weighting each sample with $s_V$ and does thus represent the center of mass of the school. The center depth is calculated assuming perfectly straight beams.

Displayed in the Profos omni display, the Profos vertical display, the echogram and the map.

## Bounding box

The geographical bounding box per ping is defined as:

- *Box.lon.min:* Minimum longitude.
- *Box.lat.min:* Minimum latitude.
- *Box.lon.max:* Maximum longitude.
- *Box.lat.max:* Maximum latitude.

The bounding box is not rotated.

The per ping bounding box is not displayed anywhere, but the per school bounding box is.

## Mean Sv

The mean value per ping is defined as:

- *Sv.mean:* Area weighted mean value of all samples in the school.

The mean value is in dB, but the computation is done with linear values.

Displayed in the tool tip.

### Area

The area per ping is defined as:

- *Area:* The total area of all samples in the school.

The area is not corrected for beam width or sample length.

Displayed in the tool tip.

### Ship info

- *Ship.lon:* The longitude ship gps position.
- *Ship.lat:* The latitude ship gps position.
- *Ship.speed:* The speed alongship. (Does not include the speed athwartship.)
- *Ship.heading:* The ship heading.
- *Trans.tilt:* The transducer tilt.

### Height

The height is only calculated for the vertical display.

- *Height:* The vertical height of the school. Calculated by estimating a box preserving the area.

### Width

The width is only calculated for the vertical display.

- *Width:* The horizontal width of the school. Calculated by estimating a box preserving the area.

### Size along beam

The size along beam is only calculated for the omni display.

- *AlongBeamSize:* The maximum size along beam for all beams.

### Size along ring

The size along ring is only calculated for the omni display.

- *AlongRingSize:* The maximum size along a ring for all rings. This size is measured curved, along a circle segment.

# Profos preprocessing examples

This section lists some examples of preprocessing profos data.

## Pencil/inspection beams

- Example file: ProfosModuleSetup_example_PENCIL.cds
- Purpose: Convert RAW2 pencil/inspection beams to "ordinary" echosounder data.

Modules:

1. Pencil converter: Converts RAW2 pencil/inspection beams to "ordinary" echosounder data.

This processing setup can also be used on the fly.

## Vertical beams

- Example file: ProfosModuleSetup_example_VERTICAL_BEAMS.cds
- Purpose: Convert some of the RAW1 beams from vertical pings to "ordinary" echosounder data.

Modules:

1. Beam mode filter: Keeps the vertical pings and removes the omni pings.
2. Channel removal: Keeps some channels and removes the other channels.
3. Complex to real: Converts the complex data in RAW1 datagrams to real data ("ordinary" echosounder data).

# Profos calibration

This section explains the profos modifications to the calibration.xml.

See technical details for how these parameters are used in formulas for $S_V$ and TS.

## Simple example

```
<?xml version="1.0" encoding="UTF-8"?>
<calibration>
   <default g="22.4" equivalentBeamAngle="-17.9" ro="3" tauEff="0.004" tau="0.004" frequency='
</calibration>
```

If the default element is present, then it will apply to all channels without a separate case element. If a separate case element is specified for a channel then none of the information from the default element is used.

All attributes, except from channel, are optional.

| Attribute | Unit | Description | Default value |
|---|---|---|---|
| channel | | The channel number | |
| g | dB | Gain | RAW1.gainTx + RAW1.gainRx |
| equivalentBeamAngle | dB | Equivalent beam angle | RAW1.equivalentBeamAngle |
| ro | m | Range offset | 3 |
| tauEff | s | Effective pulse duration | RAW1.pulseLength |
| tau | s | Pulse duration | RAW1.pulseLength |
| frequency | Hz | Frequency | RAW1.frequency |
| beamWidthMode | | Beam width mode for horizontal pings. Used only for generating warnings if the data does not match the calibration.<br>Possible values: 0 (Normal), 1 (Narrow), 2 (Wide) | |

## Separation of omni and vertical pings and multiple time intervals

```
<?xml version="1.0" encoding="UTF-8"?>
<calibration>
   <type name="omni">
      <calibration begin="2010-01-01T12:00:00Z" end="2010-02-01T12:00:00Z">
         <case channel="1" g="22.1"/>
         <case channel="2" g="22.2"/>
      </calibration>
      <calibration begin="2010-03-01T12:00:00Z" end="2010-04-01T12:00:00Z">
         <case channel="1" g="22.3"/>
         <case channel="2" g="22.4"/>
      </calibration>
   </type>
   <type name="vertical">
      <calibration begin="2010-01-01T12:00:00Z" end="2010-02-01T12:00:00Z">
         <case channel="1" g="22.5"/>
         <case channel="2" g="22.6"/>
      </calibration>
      <calibration begin="2010-03-01T12:00:00Z" end="2010-04-01T12:00:00Z">
         <case channel="1" g="22.7"/>
         <case channel="2" g="22.8"/>
      </calibration>
   </type>
</calibration>
```

# Profos technical details

## Formulas for Sv and TS

### For RAW1 datagrams

$S_v$ for sample index `i` is calculated according to this formula:

$$S_v[i] = power[i - RAW1.offset + sampleOffset] + tvg - constant$$

where

- $power[j] = 10 * \log_{10}( | \sum \text{complex values in RAW1 for sample } j |^2 )$
  $sampleOffset = round(ro_{cal} / sampleDistance)$
  $sampleDistance = RAW1.sampleInterval\ c / 2$

- $tvg = max(0, 20 * \log_{10}(r) + 2\ \alpha\ r)$
  $r = i * sampleDistance$

- $constant = 10\ \log_{10}(P_t\ \lambda^2\ c\ \tau_{eff} / (32\ \pi^2)) + G + 40\ \log_{10}(\cos(RAW1.beamTilt * \pi / 180)) + \Psi$
  $\lambda = c / f$
  $\tau_{eff} = tauEff_{cal}$
  $G = G_0 + G_c(f, \tau) - G_c(frequency_{cal}, tau_{cal})$
  $G_0 = g_{cal}$
  $G_c(f, \tau) = 3.69 \times 10^6 / f - 53.9 \times 10^9 / f^2 - 6.49 \times 10^{-3} / \tau - 43.2$

Quantities from the RAW1 datagram:

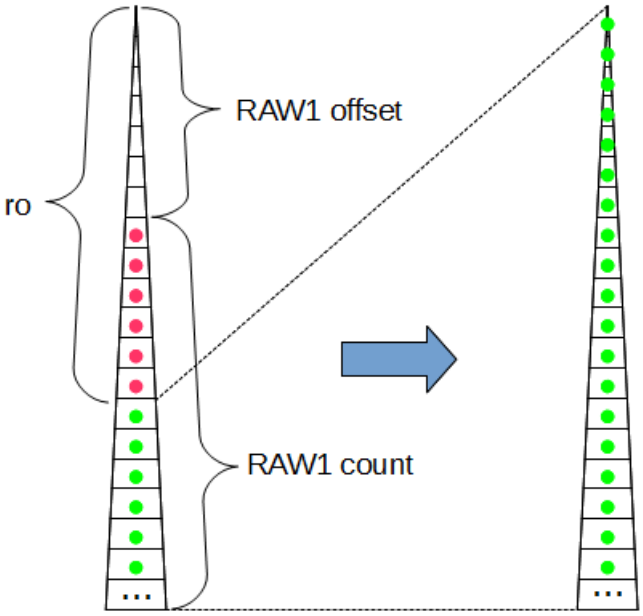
$\alpha$ = Absorption coefficient
$c$ = Sound velocity
$f$ = Frequency
$\tau$ = Pulse length
$\Psi$ = Equivalent beam angle
$P_t$ = Transmit power

Quantities with subscript `cal` are optionally specified in calibration.xml.

TS is calculated similarly as $S_v$, but with:

- $tvg = max(0, 40 * \log_{10}(R) + 2\ \alpha\ R)$
- $constant = 10\ \log_{10}(P_t\ \lambda^2 / (16\ \pi^2)) + G + 40\ \log_{10}(\cos(RAW1.beamTilt * \pi / 180))$
  $G = g_{cal}$

The figure below illustrates how samples in a beam are shifted as a result of $ro_{cal}$.




### For RAW2 datagrams

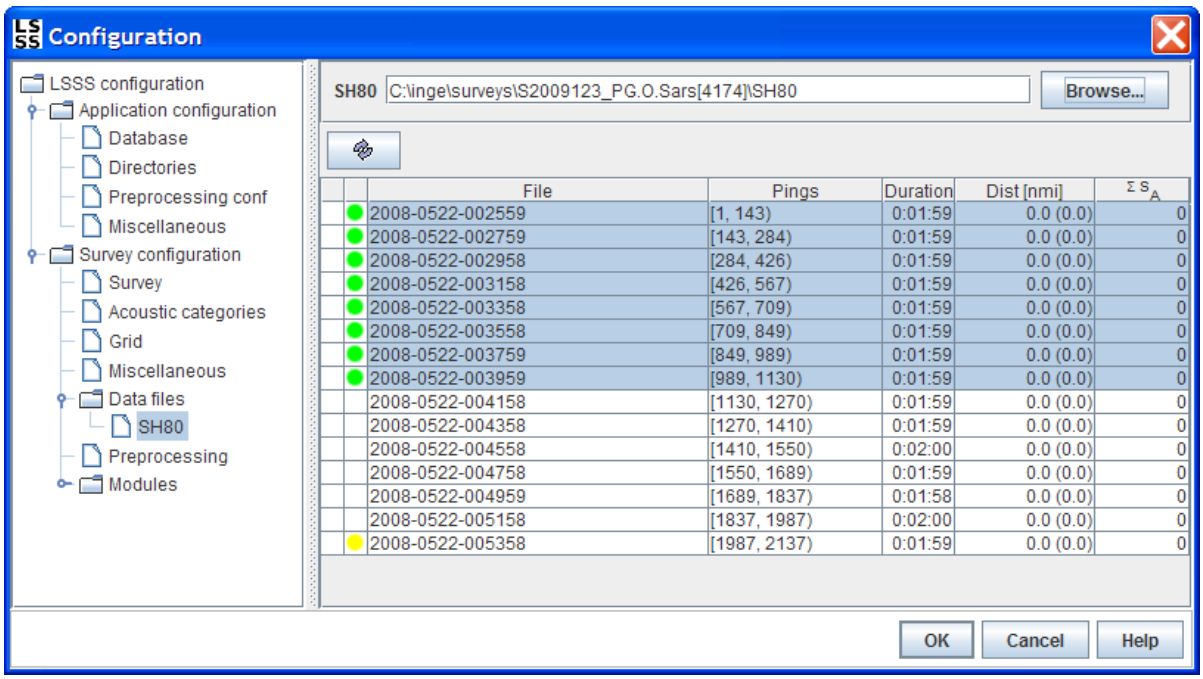
To be described later...

# Profos Configuration

## Main data directory

The default location of the Profos data directory can be changed in the optional advanced configuration of [Application configuration - Directories]. If this option is left blank then the Profos data directory will be set to the subdirectory named `sh80` in the survey directory when creating a new survey.

## Data files

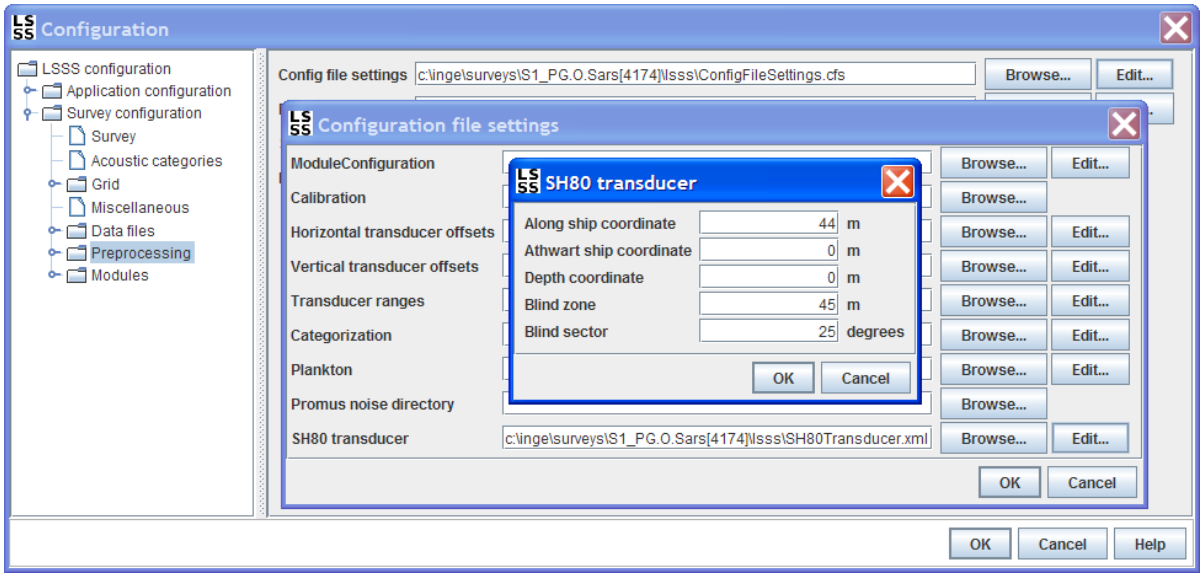



The default settings for the directories are based on configuration settings in [Application configuration - Directories] and the survey number and the name of the platform configured in [Survey configuration - Survey]. When a valid data directory has been selected, the data files will appear in a list below.

The selection of files in this list is synchronized with the selection of echo sounder data files in the following ways:

- When echosounder files are selected in [Survey configuration - Data files]. the corresponding set of Profos files is automatically selected. This will select Profos data files that overlap in time with the selected echosounder files.
- When Profos files are selected the set of selected echosounder files is kept as is. It is however possible to right click on the Profos file table and choose to select echo sounder files based on the current selection of Profos files. This will select echosounder data files that overlap in time with the selected Profos files.

## Transducer parameters




- *Alongship coordinate:* Alongship coordinate in meters of the PROFOS transducer relative to GPS.
- *Athwartship coordinate:* Athwartship coordinate in meters of the PROFOS transducer relative to GPS.
- *Depth coordinate:* Depth coordinate in meters of the PROFOS transducer.
- *Blind zone:* Range in meters of the blind zone.
- *Blind sector:* Blind sector in degrees behind the ship.
- *Sampling range:* The effective sampling range.
- *Vertical blind sector:* Blind sector downwards for vertical pings.
- *Vertical min depth:* Minimum depth for vertical pings.
- *Vertical max depth:* Maximum depth for vertical pings.

The blind area consists of:

- The blind zone.
- The blind sector.
- The area outside the sampling range.
- For vertical pings: The area above the minimum depth and below the maximum depth.

The blind area is displayed in the omni display and the vertical display and is excluded when growing schools.

# Views

These are the Profos views available in LSSS.

Profos omni display
This module displays omni data.

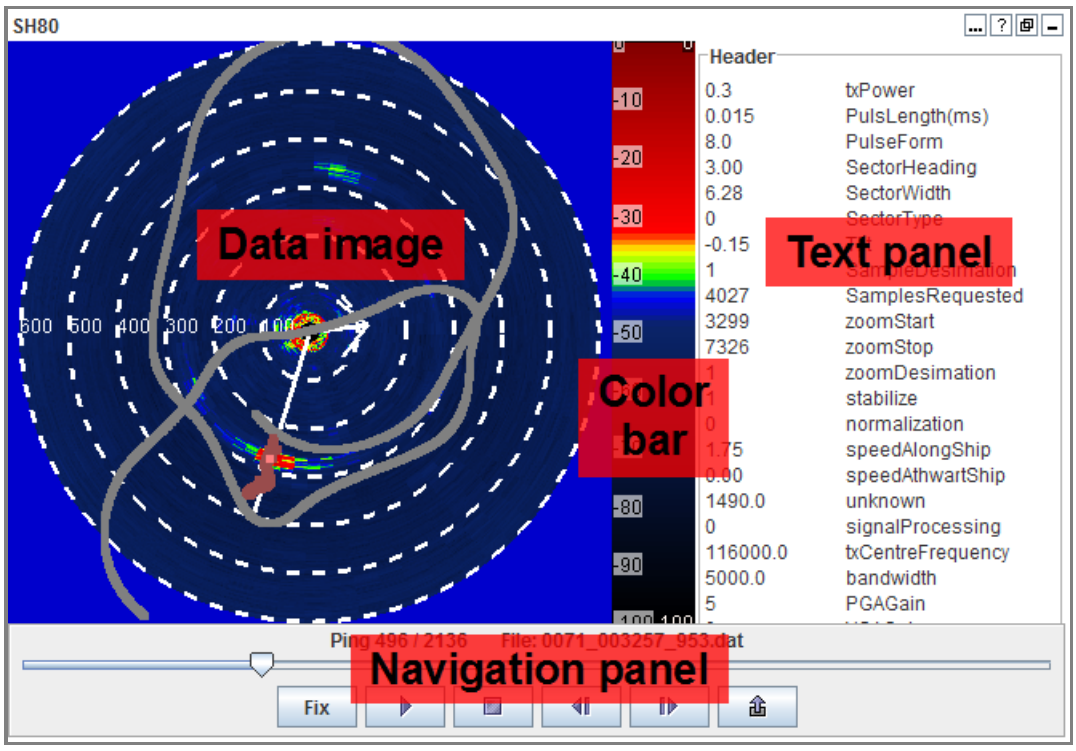
Profos vertical display
This module displays vertical data.

Profos interpretation
This module displays a table for assigning acoustic categories to Profos schools.

Profos trend
This module displays the range dependent trend for the current ping.

# Profos omni display

This view displays omni Profos data.




## Data image

The data image contains a number of overlays described in more detail below. A number of keyboard shortcuts are associated with this display.

## Colorbar

The colorbar can be used to change the lower and upper thresholds and to change the colormap. The colormap can be changed by clicking the right mouse button.

## Text panel

The text panel to the right of the data image is hidden by default in LSSS. This can be changed in the configuration [Survey configuration - Modules - Profos].

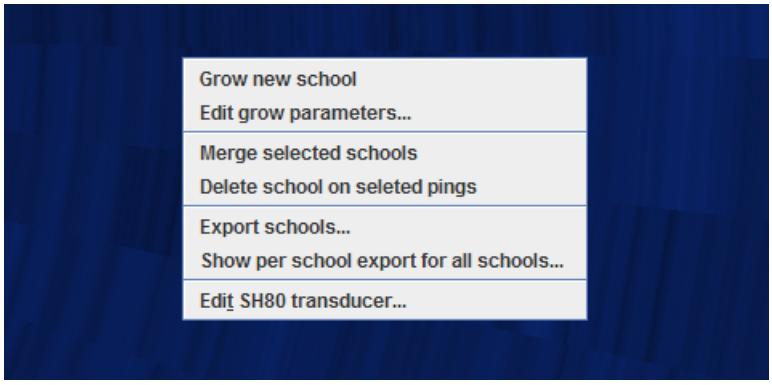
## Navigation panel

The navigation panel, located under the Profos data image, contains a slider and several buttons.

- The slider can be used to select which ping to be displayed. This can also be done by dragging the ping marker overlay in the map or the echogram.
- The Fix-button toggles between keeping geographical coordinates fixed (when the button is pressed) and keeping the transducer stationary (when the button is not pressed).
- / Toggles animation of the Profos data.
- Stops the animation and selects the first ping.
- Selects the previous omni ping.
- Selects the next omni ping.

- Exports Profos data to a text file.

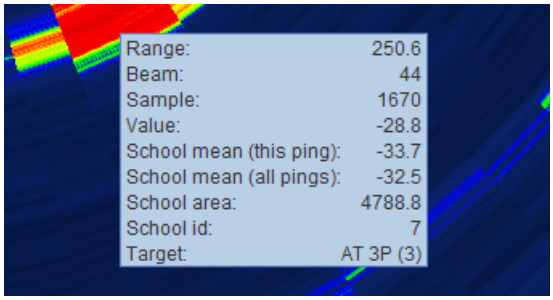
## Context menu




The data image context menu contains various functionality, including manipulation of schools, previewing export and editing transducer parameters.

The exact content of the context menu depends on the location where it is invoked, such as, inside a school, outside a school, on a target, etc.

## Tool tip



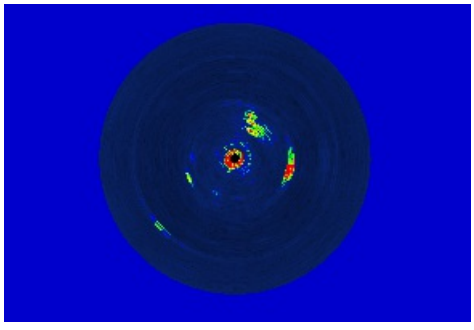

The data image can display a tool tip with information about the location pointed to by the mouse. The tool tip is toggled on an off by the tool tip toolbar button in the same way as for the echogram.

The tool tip contains information about the sample pointed to and about some of the school parameters.

## Overlays

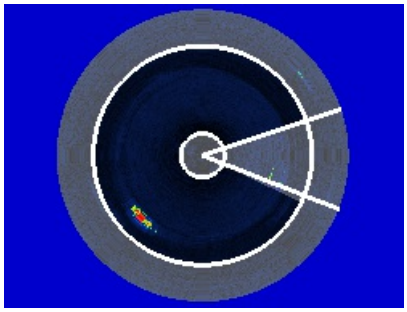
The data image contains number of overlays. These overlays can switched on and off in the configuration [Survey configuration - Modules - Profos].

### Data texture



This overlay displays the Profos sample data in omni pings. The colorbar can be used to change the lower and upper thresholds and to change the colormap.

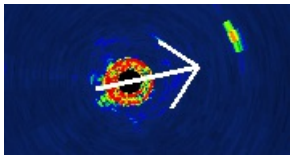
### Blind area



This overlay displays the blind area defined by the transducer parameters.

The blind area is excluded when growing schools.

### Ship direction



This overlay displays the ship direction.

### Vertical slice indicator



This overlay displays the orientation of the corresponding vertical ping.

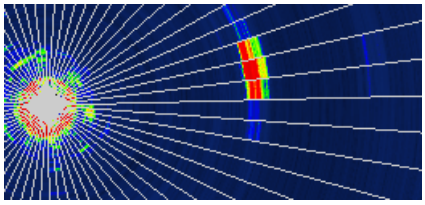
The thick path of the line corresponds to the thick line in horizontal range in the vertical display.

### Range rings



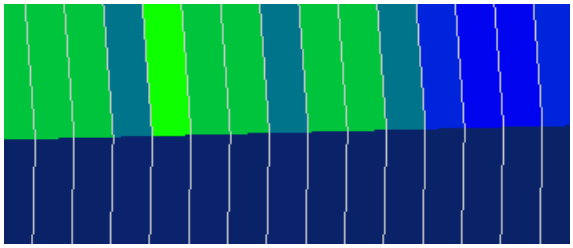

This overlay displays distance in meters from the ping center.

### Grid beams



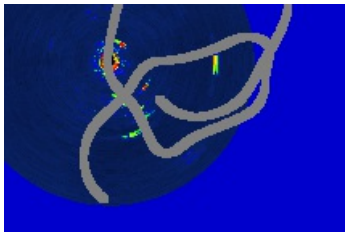
This overlay displays the beams of the Profos grid.

### Grid rings



This overlay displays the rings of the Profos grid.

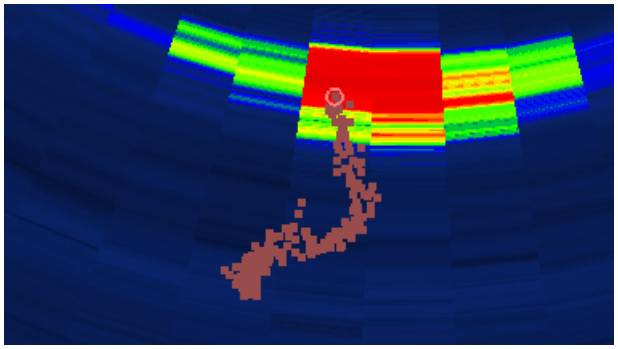
### Ship track



This overlay displays the ship track.

The ship track is also displayed on the map.

### Target track



This overlay displays the accumulation of target positions. The target in the current ping, if any, is indicated with a lighter colored ring. Selected targets are displayed in green. Targets from future pings are not displayed.

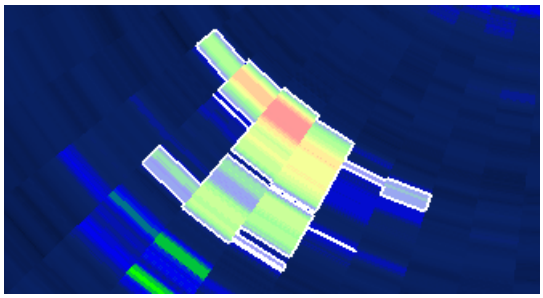
The target track is also displayed on the echogram and the map.

### Mouse position



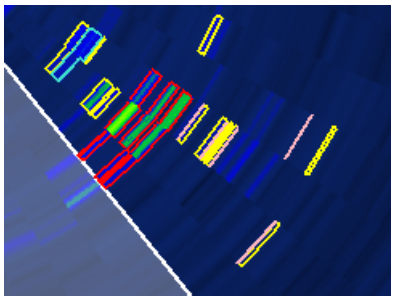
This overlay displays the corresponding geographical position when the mouse is on the echogram or the map.

### School outline



This overlay displays the school mask for each ping. Selected schools are displayed in green.

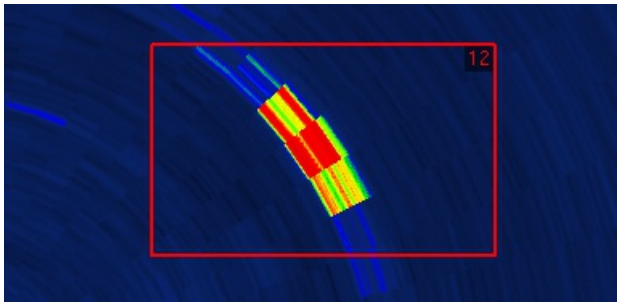
### Rejected school detections



This overlay displays the outline of automatically detected schools that were rejected. The color of the outline indicates the reason for rejection:

- Yellow: The area is too small or too large.
- White: Maximum Sv in school is too small.
- Red: The school touches the blind area.
- Pink: The aspect ratio is too large.
- Turquoise: School is present on too few pings.

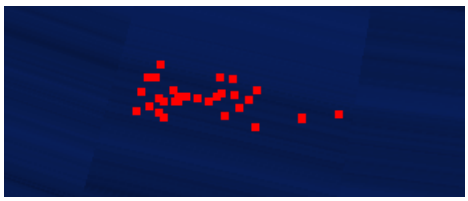
### School bounding box




This overlay displays the bounding box for the all pings of a school. The id is displayed in the upper right corner. Selected schools are displayed in green.

The school bounding box is also displayed on the map.

## School track

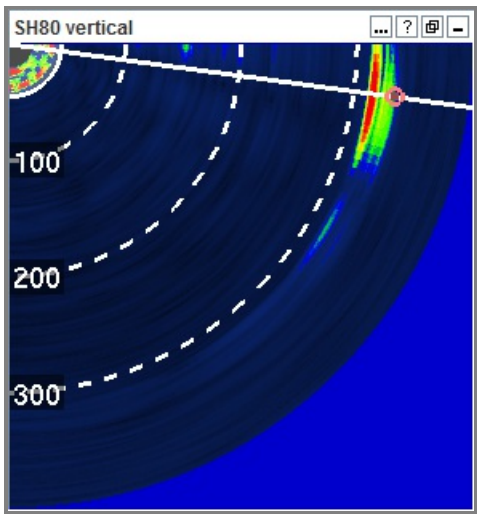


This overlay displays the center points for each ping of a school. Center points in the current ping, if any, are indicated with lighter colored rings. Selected center points are displayed in green.

The school track is also displayed on the echogram and the map.

# Profos vertical display

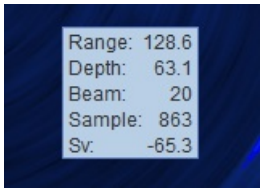
This view displays vertical Profos data.




## Data image

The data image contains a number of overlays described in more detail below. A number of keyboard shortcuts are associated with this display.

## Tool tip

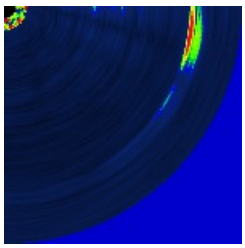



The data image can display a tool tip with information about the location pointed to by the mouse. The tool tip is toggled on an off by the tool tip toolbar button in the same way as for the echogram.

## Overlays

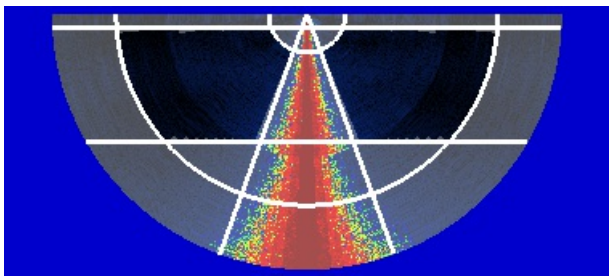
The data image contains number of overlays. These overlays can switched on and off in the configuration [Survey configuration - Modules - Profos vertical].

### Data texture



This overlay displays the Profos sample data in vertical pings.

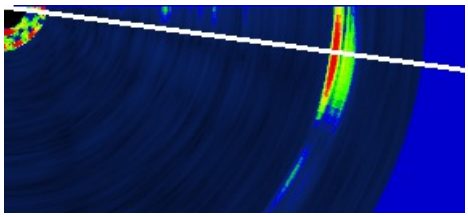
### Blind area



This overlay displays the blind area defined by the transducer parameters.

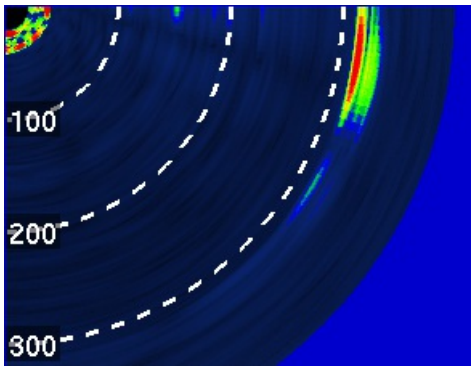
The blind area is excluded when growing schools.

### Omni slice indicator



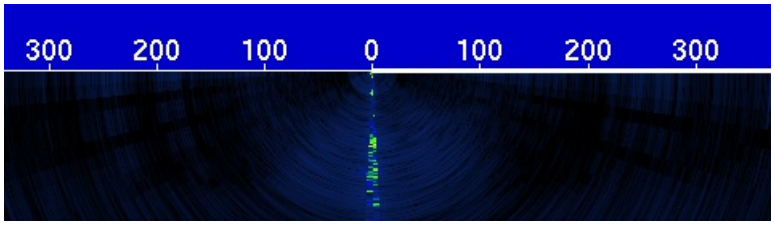
This overlay displays the location of the corresponding omni ping.

### Range rings




This overlay displays distance in meters from the ping center.

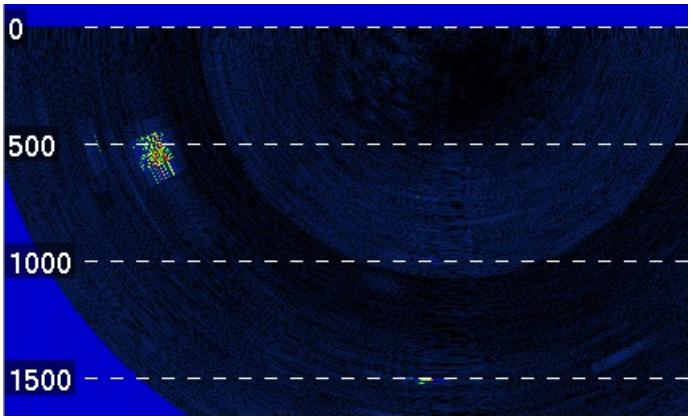
### Horizontal range




This overlay displays horizontal range in meters from the ping center.

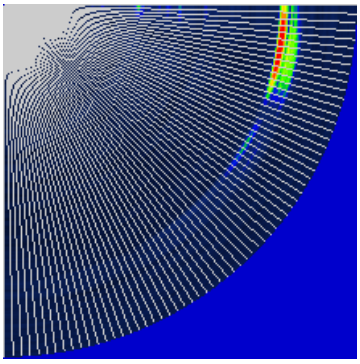
The thick line (to the right) corresponds to the thick part of the vertical slice indicator in the omni display.

### Depth range



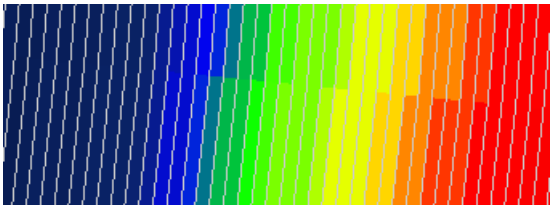

This overlay displays depth in meters.

### Grid beams



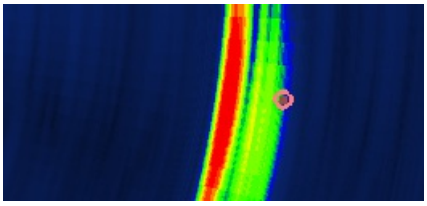
This overlay displays the beams of the Profos grid.

### Grid rings



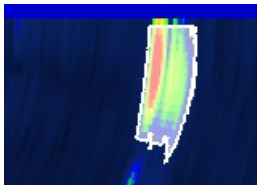
This overlay displays the rings of the Profos grid.

### Target track



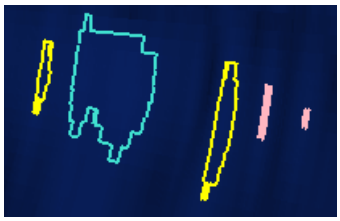
This overlay displays the target in the current ping, if any.

### School outline



This overlay displays the school mask for each ping. Selected schools are displayed in green.

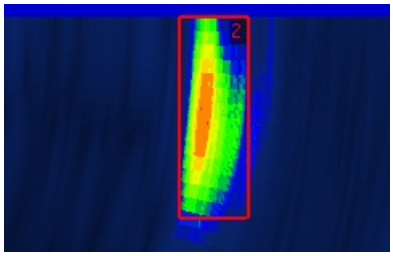
### Rejected school detections



This overlay displays the outline of automatically detected schools that were rejected. The color of the outline indicates the reason for rejection:

- Yellow: The area is too small or too large.
- White: Maximum Sv in school is too small.
- Red: The school touches the blind area. Touching the vertical min depth is allowed.
- Pink: The aspect ratio is too large.
- Turquoise: School is present on too few pings.

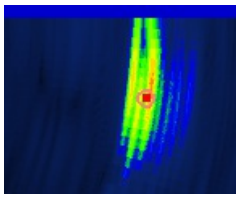
### School bounding box




This overlay displays the bounding box for the current ping of a school. The id is displayed in the upper right corner. Selected schools are displayed in green.

The school bounding box is also displayed on the map.

### School track

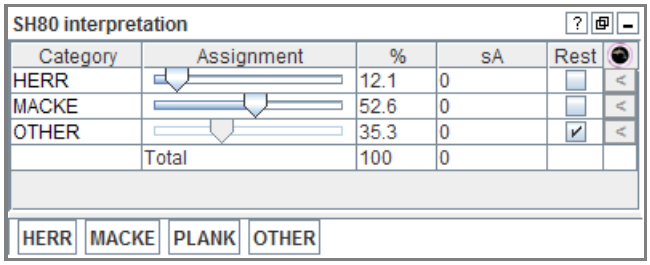


This overlay displays the center point for the current ping of a school. Center points in the current ping, if any, are indicated with lighter colored rings. Selected center points are displayed in green.

The school track is also displayed on the echogram and the map.

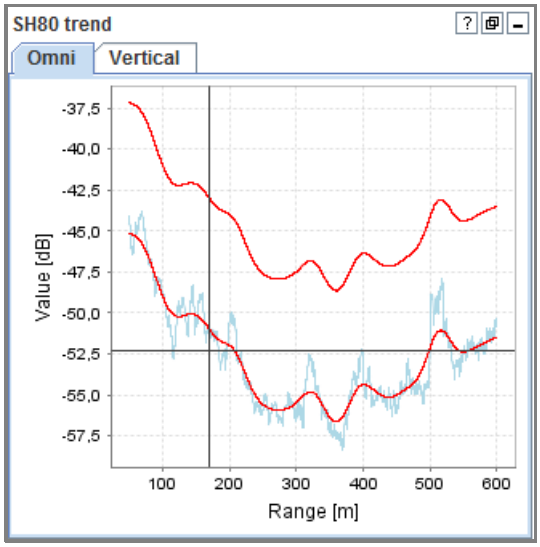
# Profos interpretation

This view displays a table for assigning acoustic categories to Profos schools. It works similarly as the LSSS interpretation module.



# Profos trend

This view displays the range dependent trend for the current ping. The trend is computed by first finding the median of the samples in each ring, then applying Gaussian smoothing. The trend computation does not use samples in the blind area.




- Blue curve: The non-smoothed trend
- Lower red curve: The smoothed trend
- Upper red curve: Threshold for growing = The smoothed trend + AdaptiveThreshold
- Vertical black line: Range corresponding to mouse position
- Horizontal black line: Sample value corresponding to mouse position

# Profos overlays

These are the Profos overlays added to the existing LSSS views.

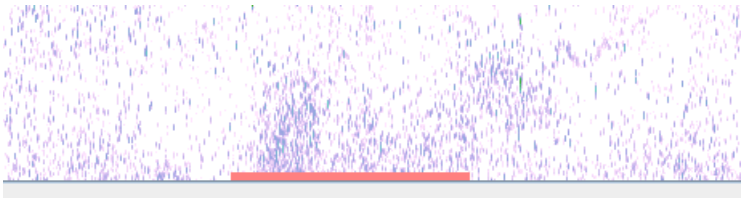
Profos echogram overlays
Additional overlays to the standard LSSS echogram view.

Profos map overlays
Additional overlays to the standard LSSS map view.

# Profos echogram overlays

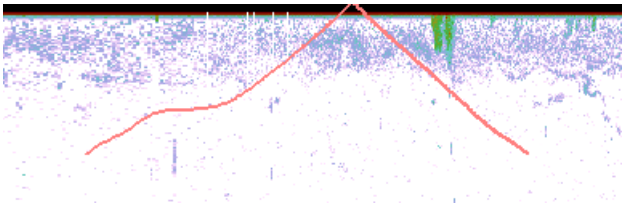
These are the Profos overlays added to the existing LSSS echogram overlays.

## Profos data marker



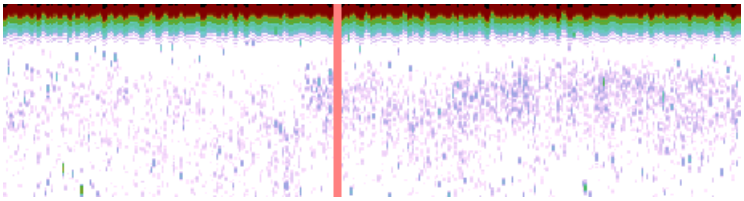
This overlay displays where Profos data are available.

## Omni slice marker



This overlay displays the depth profile of the omni ping data displayed in the Profos omni display. It is assumed that the beams are straight lines.

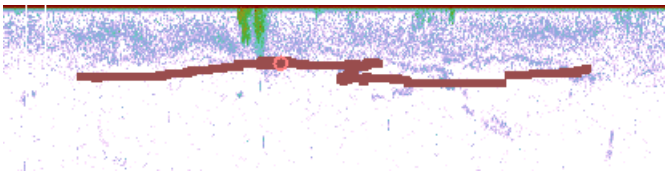
## Profos ping marker



This overlay marks the location of the current Profos ping.

The current ping is also displayed on the map.

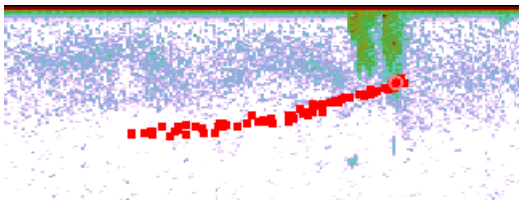
## Target track



This overlay displays the accumulation of all target positions. The target in the current ping, if any, is indicated with a lighter colored ring. Selected targets are displayed in green.

The target track is also displayed on the Profos omni display and the map.

## School track



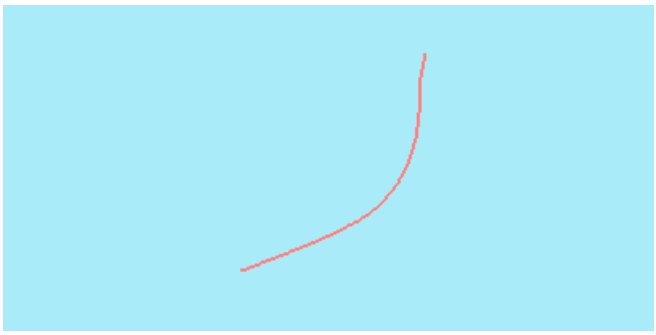
This overlay displays the center points for the school for each ping. Center points in the current ping, if any, are indicated with lighter colored rings. Selected center points are displayed in green.

The school track is also displayed on the Profos omni display and the map.

# Profos map overlays

These are the Profos overlays added to the existing LSSS map overlays.

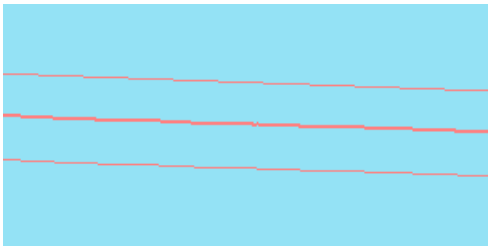
## Profos survey line



This overlay displays the ship track for the Profos data.

The ship track is also displayed on the Profos omni display.

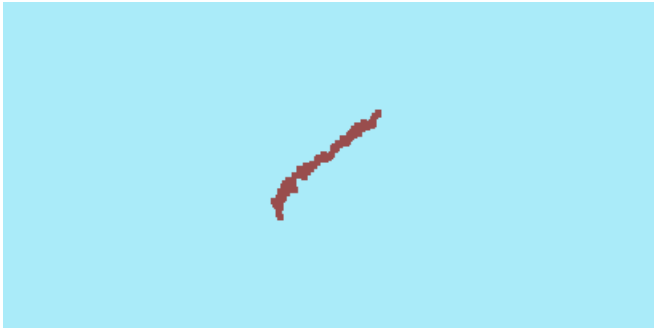
## Sampling range



This overlay displays the sampling range as thin lines on both sides of the thicker survey line.

The sampling range is configured in the transducer position, and is also displayed as a circle in the Profos omni display. The area outside the sampling range is excluded when growing schools.

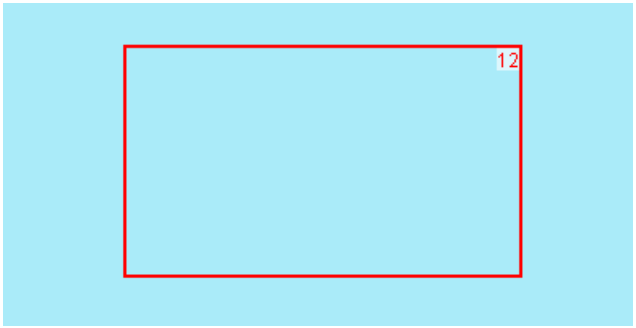
## Target track



This overlay displays the accumulation of target positions. The target in the current ping, if any, is indicated with a lighter colored ring. Selected targets are displayed in green.

The target track is also displayed on the Profos omni display and the echogram.

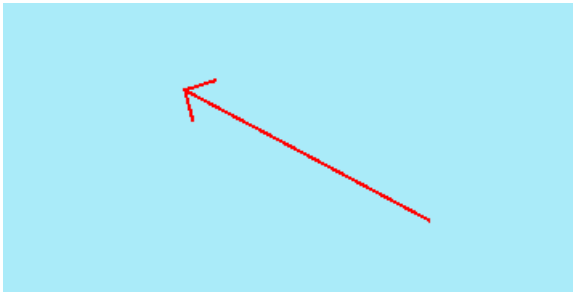
## Omni school box




This overlay displays the bounding box for the school on all pings. The id is displayed in the upper right corner. Selected schools are displayed in green.

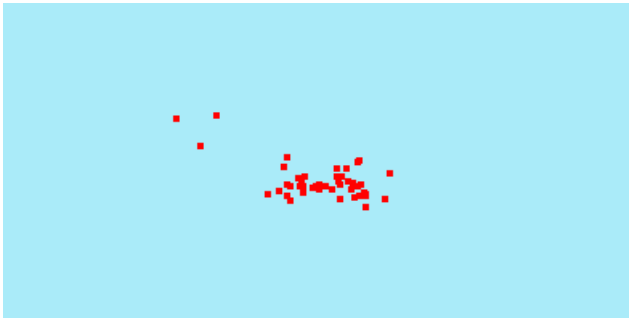
The school bounding box is also displayed on the Profos omni display.

## Omni school direction



This overlay displays the school motion. Selected schools are displayed in green.

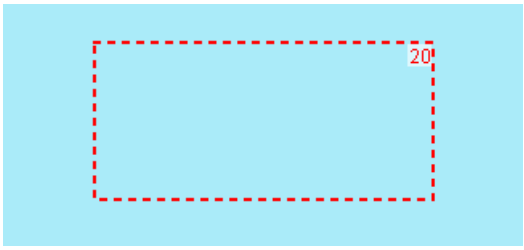
## Omni school track



This overlay displays the center points for the school for each ping. Center points in the current ping, if any, are indicated with lighter colored rings. Selected center points are displayed in green.

The school track is also displayed on the Profos omni display and the echogram.

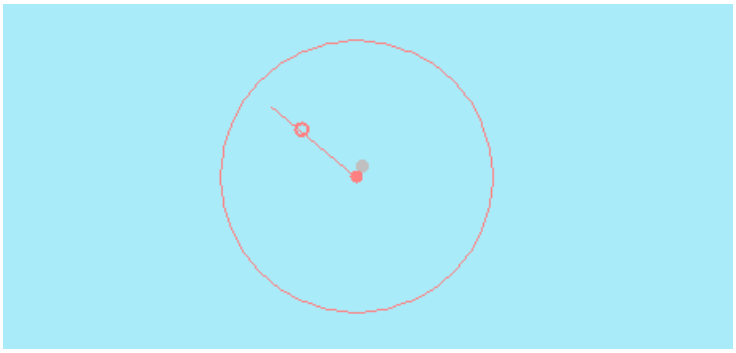
## Vertical school box




This overlay displays the bounding box for the school on all pings. The id is displayed in the upper right corner. Selected schools are displayed in green.

The school bounding box is also displayed on the Profos vertical display.

## Profos ping marker



This overlay displays the location of the current Profos ping.

- The gray point displays the ship gps position.
- The pink point displays the transducer position.
- The big circle displays the maximum range of the ping.
- The small circle displays the position of the target, if any, in the current ping.
- The straight line displays the orientation of the corresponding vertical Profos ping.

The current Profos ping is also displayed on the echogram.

# Keyboard shortcuts

This is a summary of keyboard shortcuts in Profos. Some of the keystrokes can be seen in menus and tool tips.

## Profos omni display

| Keystroke | Description |
|---|---|
| Tab<br>Shift + Tab | Change to next / previous working mode |
| Esc | In selection mode when drawing selection rectangle: Cancel selection |
| Home | Reset zoom |
| Left<br>Right | Go to previous / next ping |
| Up<br>Down | Toggle between play forward / backward and pause |
| Delete | Delete schools on pings of selected center points |
| +<br>- | In edit mode: Change size of paintbrush / eraser |
| A | Select all visible schools, school centers and targets |
| B | Toggle display of grid beams |
| F | Toggle geographical fix mode |
| M | Merges selected schools |
| R | Toggle display of grid rings |
| Ctrl + Z<br>Ctrl + Shift + Z | Undo / redo last school edit |
| Scroll wheel | Zoom |
| Shift + Scroll wheel | Go to previous / next ping |

## Profos vertical display

| Keystroke | Description |
|---|---|
| Tab<br>Shift + Tab | Change to next / previous working mode |
| Home | Reset zoom |
| Left<br>Right | Go to previous / next ping |
| Up<br>Down | Toggle between play forward / backward and pause |
| Delete | Delete schools on pings of selected center points |
| A | Select all visible schools, school centers and targets |
| B | Toggle display of grid beams |
| M | Merges selected schools |
| R | Toggle display of grid rings |
| Scroll wheel | Zoom |
| Shift + Scroll wheel | Go to previous / next ping |