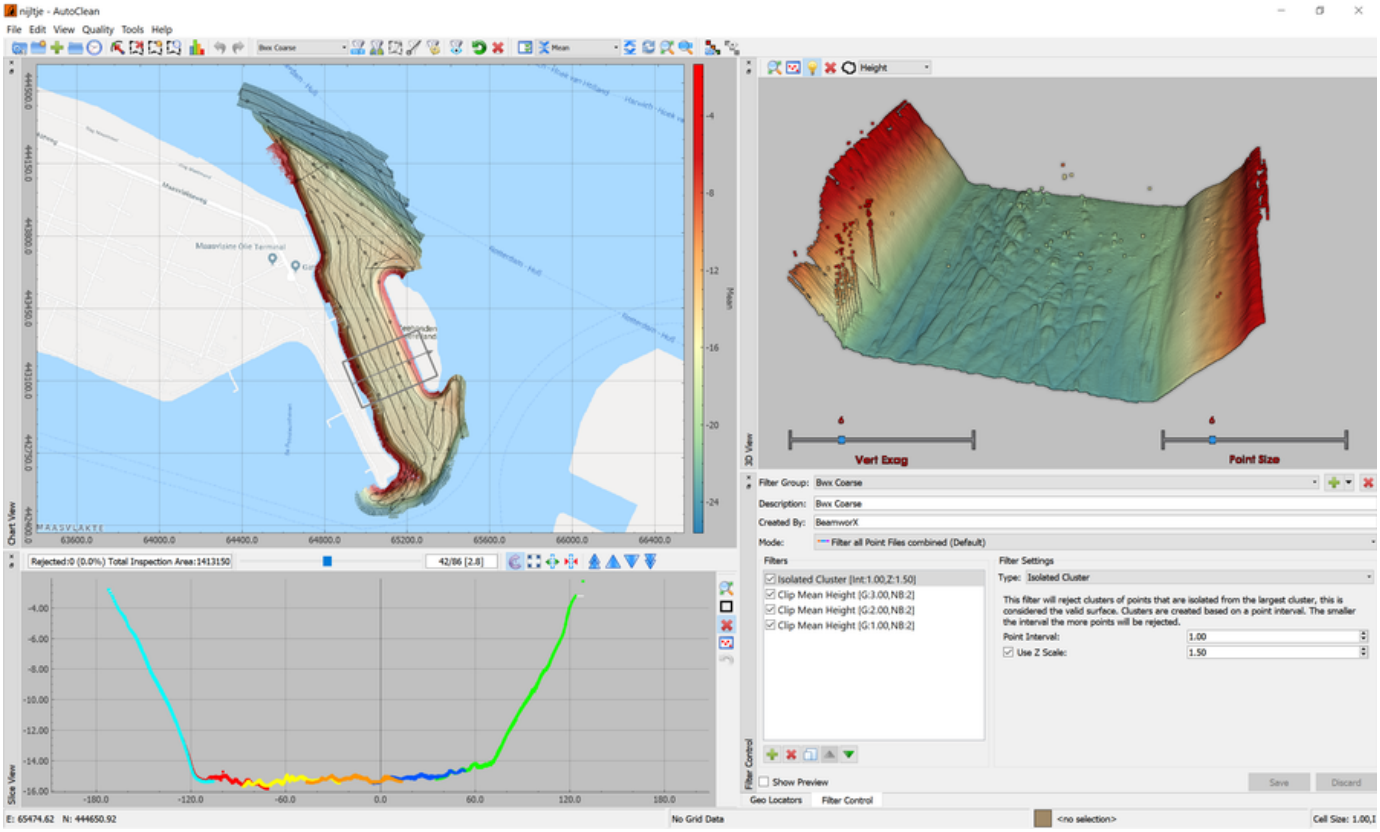
AutoClean Manual

Introduction

AutoClean is designed to quickly process point data sets. It can automatically load and clean data. Various reporting tools assist the user to verify the data quality.
This manual is written for hydrographic surveyors and a basic hydrographic knowledge is presumed. The software is made for Windows 64-bit operating systems supported with Windows 7(SP1), 8, 8.1, 10. The threaded design gives the user high performance on multi-processor hardware. For smooth operation a minimum of 8GB memory and minimum 4 processor cores are advised. It is preferred to use an SSD disk.



The main program functionality is described hierarchically in the following chapters:

Main Menu

Toolbar

Views

Statusbar

Geo Locators

Automatic Filters

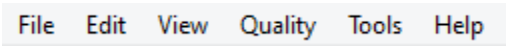
Supported Point File Formats

Supported Grid Export File Formats

Supported Raw Import Formats

Auto Script

Main Menu



The main menu contains the following sub menus:

File

Edit

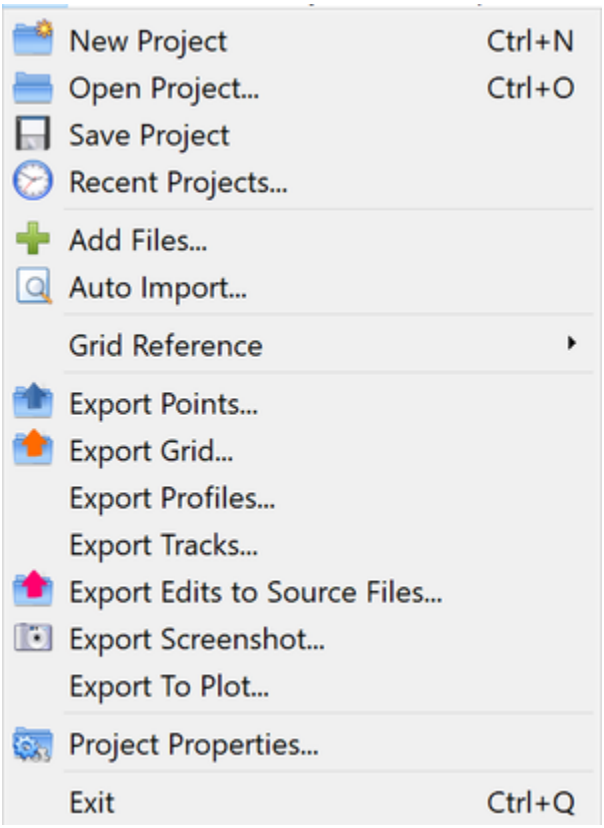
View

Quality

Tools

Help

File



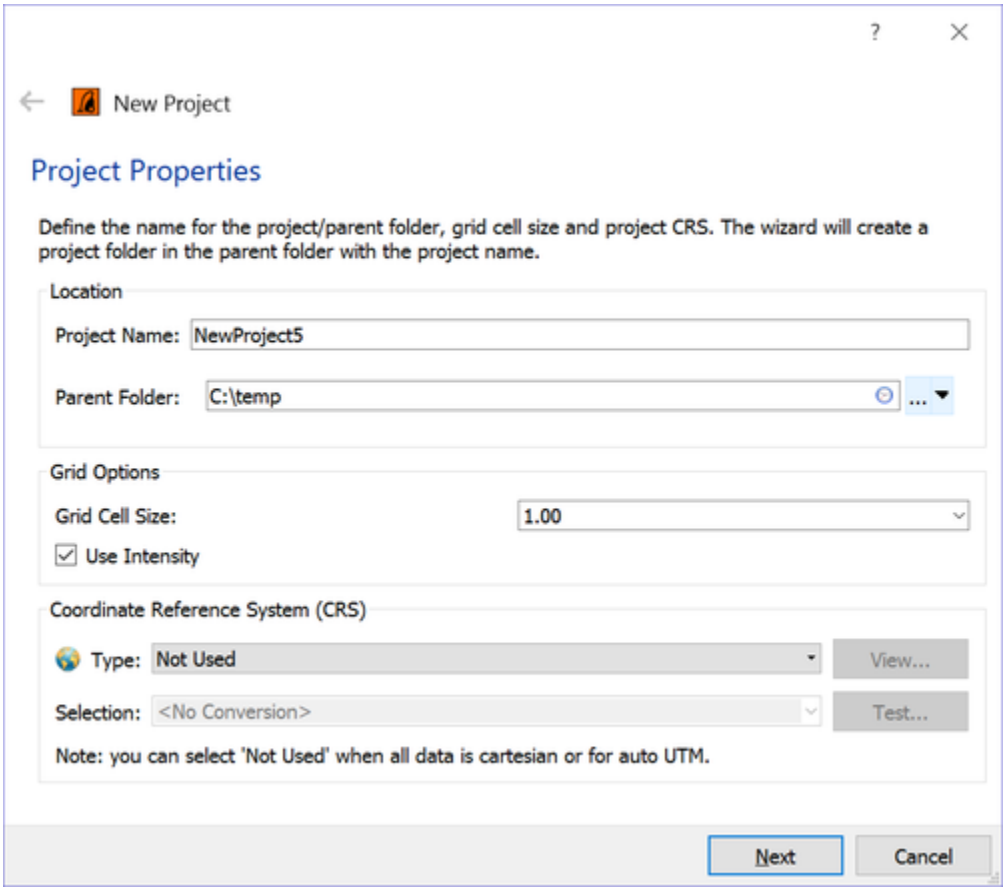
Menu	Description
New Project	Create a new project.
Open Project	Open an existing project, browse to the Spatial Index File and select it.
Save Project	Save all open project files to disk. This includes Selected Areas, Point Files, Geolocators and the Grid.
Recent Projects	Select and open an existing project from a list of recently used projects.
Add Files	Follow the same steps as the "New Project" without the ability to set the project properties. Select files in the supported formats and click Finish. Various formats are supported, see this page for a comprehensive list.
Auto Import	Monitor a folder for new files created by the Acquisition Software, AutoClean will automatically import the new files.
Grid Reference	Import/Remove Data into the Grid Reference Layer.
Export Points	Export point data, supports various formats (FAU, XYZ, GSF, LAS, LAZ).
Export Grid	Export to a Grid-type file.
Export Profiles	Export Grid data to profile files.
Export Tracks	Export transducer tracks to file(s).

Export Edits to Source Files	Export the edited data back to the source files from which the points were imported.
Export Screen Shot	Capture one of the views or the color scale and export it as a picture or copy to the Windows Clipboard..
Export To Plot	Export/Create Plot to an image.
Project Properties	Project file overview with the ability to change project settings or files.
Exit	Quits AutoClean.

New Project

The new project wizard will be started. Follow the steps to create a new project on disk.

Step 1: Project Properties



In this first page the project properties can be defined. The properties consist of a project name and folder, grid cells size and an optional CRS. Note that this page is not shown when Adding Files to project.

Item	Description
Project Name	Name of the new project, a sub-folder with this will be created in the Parent Folder. Note that project can be renamed after they are created.
Parent Folder	Existing folder, the new project folder will be a sub-folder of this folder. The smart browse button allows you to quickly load another folder location.
Grid Cell Size	Set the desired grid cell size. The grid size can be changed at all times in the Project Properties dialog.
Use Intensity	Enable this to add an Intensity Layer to the grid. Useful when source files contain valid point backscatter values. Note that this costs slightly more memory (10-15%).

Coordinate Reference System (CRS)	Set optionally the CRS that represents the input point data geodetic system. For projection based (cartesian) formats e.g. fau, XYZ, las etc.) the code can be left to "Not Used". If you leave it to "Not Used" and you are importing a file with Geographical coordinates (e.g. GSF or ALL) then a WGS-84 UTM projection will be used, the UTM number will be based on the first decoded position. *For northern hemisphere the CRS/EPSG code will be: 32600 + UTM Zone number. For southern hemisphere: 32700 + UTM zone number.* ℹ This is required for importing GSF, Kongsberg ALL and WASSP wmbf files because these files use internally (WGS-84) Geographical coordinates. For more information see on changing the CRS see this page.

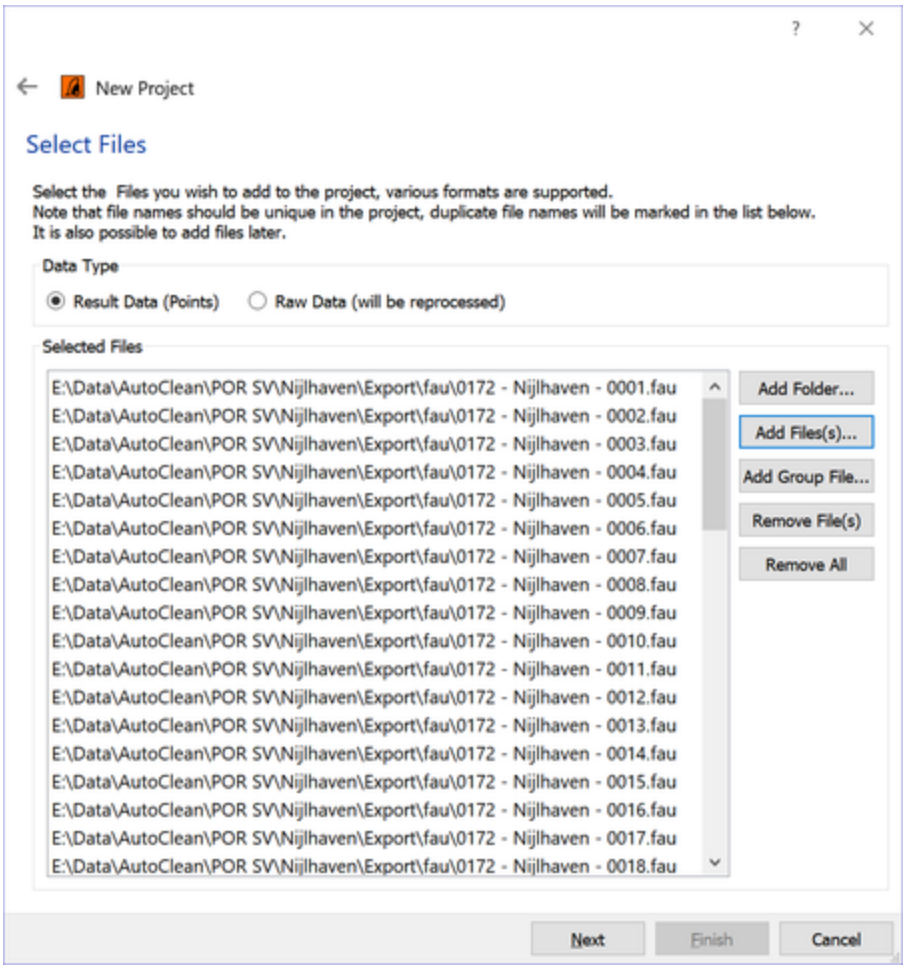
Step 2: Select Files

Select files that should be imported into the project. Selecting the files is optional, you can always add the files later after the (empty) project is created.

AutoClean can import result data (points) or unprocessed Raw Data, which are fully processed to result point data during the import.

✓ Importing Raw Data is a license option on the Dongle, it will only be visible when this option is licensed!

For more info on Raw Data Processing refer to this page.



There are three ways to add files:

- By selecting a complete folder, all files will be selected that are located inside the folder.
- By selecting one or more files, multiple selection is supported.
- By selecting a group file, this is an ASCII file that contains the name of multiple point files. The file can contain only filenames with or without a sub-folder.
  The names should be relative to the folder where the group file is found. Currently support for a Hypack Catalog file or a PDS sub file. But you can also create your own in a text editor.

  Lines that start with '#' or '[' are ignored. Warning is shown when not all files are found on disk. Content of file is relative to the location of the group file.

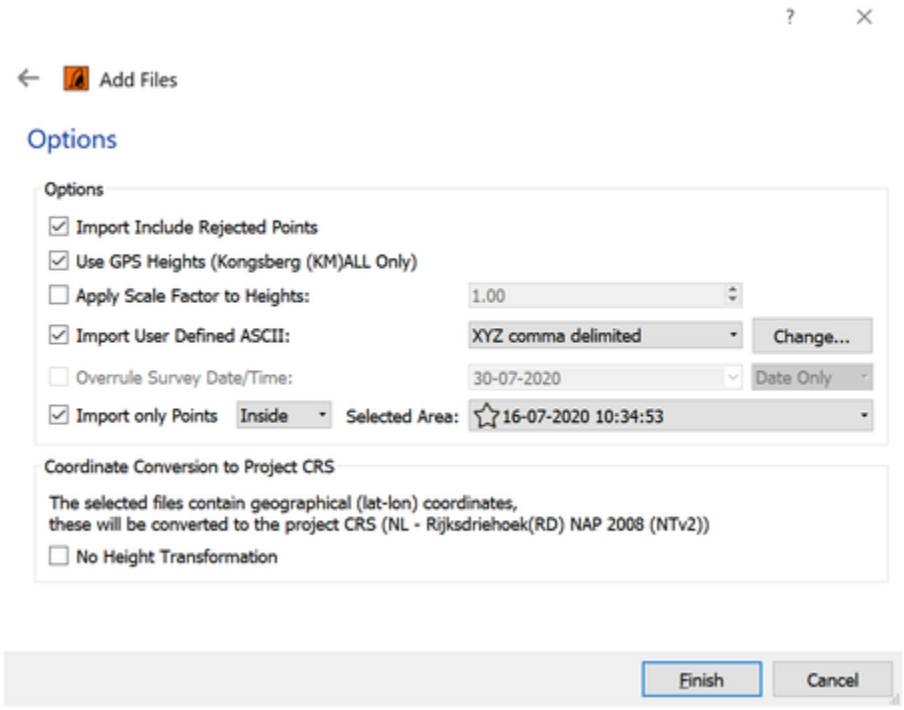
  Note that the group file is not remembered, it will just read the filenames and add it to the list.

Selected files that have the same file name as a file that is already part of the project or already is found in the list are presented with a red marker in front.

E:\Data\AutoClean\POR SV\Nijlhaven\Export\fau\0172 - Nijlhaven - 0019.fau

These so-called duplicates are not allowed and need to be removed or renamed. AutoClean will present an Automatic rename function to rename the SOURCE file to a non-existing name by adding a post-fix number to it. This will be presented after the Finish button is pressed. Note that for Raw Data this is allowed, in that case the previous files will simply be overwritten.

Step 3: Import Settings



On this page the import options are presented.

Item	Description		
Import Includes Rejected Points	Import points that are marked as "rejected" in the source files, e.g. these points were already recognized as bad points by the acquisition software. Note that these points will show up as rejected Points (Original Rejection) in AutoClean. The rejected points can always be "re-accepted" later in AutoClean if required.		
Use GPS Heights	Kongsberg ALL, KMALL Only. When checked, the positions are assumed to be from RTK, height is used/		
Apply Scale Factor to Heights	Optional. When the option is enabled the user defined scale factor will be applied to the imported heights. This can come in handy to convert e.g. Depths to Heights, in that case just enter -1.00 as a scale factor. Note that this option should be unchecked for GSF and Kongsberg ALL because the importer hard-coded converts depths to height for these formats.		
Import User Defined ASCII	Enable this option if you wish to import user defined ASCII Files. The selected format can be changed with the combo box. With the "Change..." button a formatting dialog is launched. Here the format can be modified, created and removed. The formats are shared with the Export points option. For more information on the user defined formats check theExport Points#UserDefASCIIfile formats page.		
Overrule Survey Date/Time	This option is available for some formats that do not contain a date and or time, for example the Hypack HS2X format or XYZ file. Options are: **Date Only** Format is expected to contain at least a time since midnight, the entered date will be added, or it will replace the original date. **UTC Time** The entered date & time are treated as UTC (GMT +0). All imported pings will get this date/time. **Local Time** The entered date & time are treated as Local Time. All imported pings will get this date/time.		
Import Area	Only Import points when they lie inside or outside (user selectable) a selected Area. Files from which all points are ignored are not imported at all. This option can only be selected when files are added to an existing project.		

No Height Transformation	This is only shown when the selected point files contain geographical (lat-lon) coordinates. When this option is selected then it is guaranteed that the original heights from the file are shown in AutoClean without any modification. If this option is disable the any datum transformation is done in a 3D fashion, so Height may also be changed. Note that whether heights are changed by the transformation depends on the used CRS. Th "Auto UTM" CRS/EPSG will not modify the height. When using Edits to source for GSF/WASSP then you should always enable this option, otherwise the wrong height may be written back to the source file.		

Clicking finish will start the import process.

- Various point formats are supported, see this page for a comprehensive list.
- The import process will recognize the format of the file by their extensions. Based on the import file's extension the correct importer is started. XYZ and PTS files are assumed to be simple XYZ files with 3 columns when the User Defined ASCII Import is disabled, when Enabled it is assumed to have the selected user defined format.
- When the User Defined ASCII Import is Enabled all unknown formats (and XYZ and PTS files) are attempted to be imported with the user defined importer.
  Note that all well-known formats are still imported with their respective importer.
- When BwxRes files are chosen a simple copy is made to the target folder. When the project is created in a folder with bwxres files and these file are chosen for import no copy is carried but files are added to the project directly.
  When BwxRaw files are encountered with the same name as the bwxres(except for extension) then these are copied to the project too. This is done to make it easier for single beam users to manage the files.
- Note that the importing can be cancelled at all times.

The import process will read all the points from the input files, and places them into our internal spatial file structures. all the accepted points are also loaded into the grid file.
During import AutoClean will automatically group the points into pings (swaths). The source files are untouched by AutoClean.

The point file names (without folder) must be UNIQUE in the project, this is done to keep a link with the original data in case an export of edits is required.

The point data read from the selected files are imported into our internal format. The source files are not touched nor modified. After editing it is possible to export the edits back to the source files for most formats.

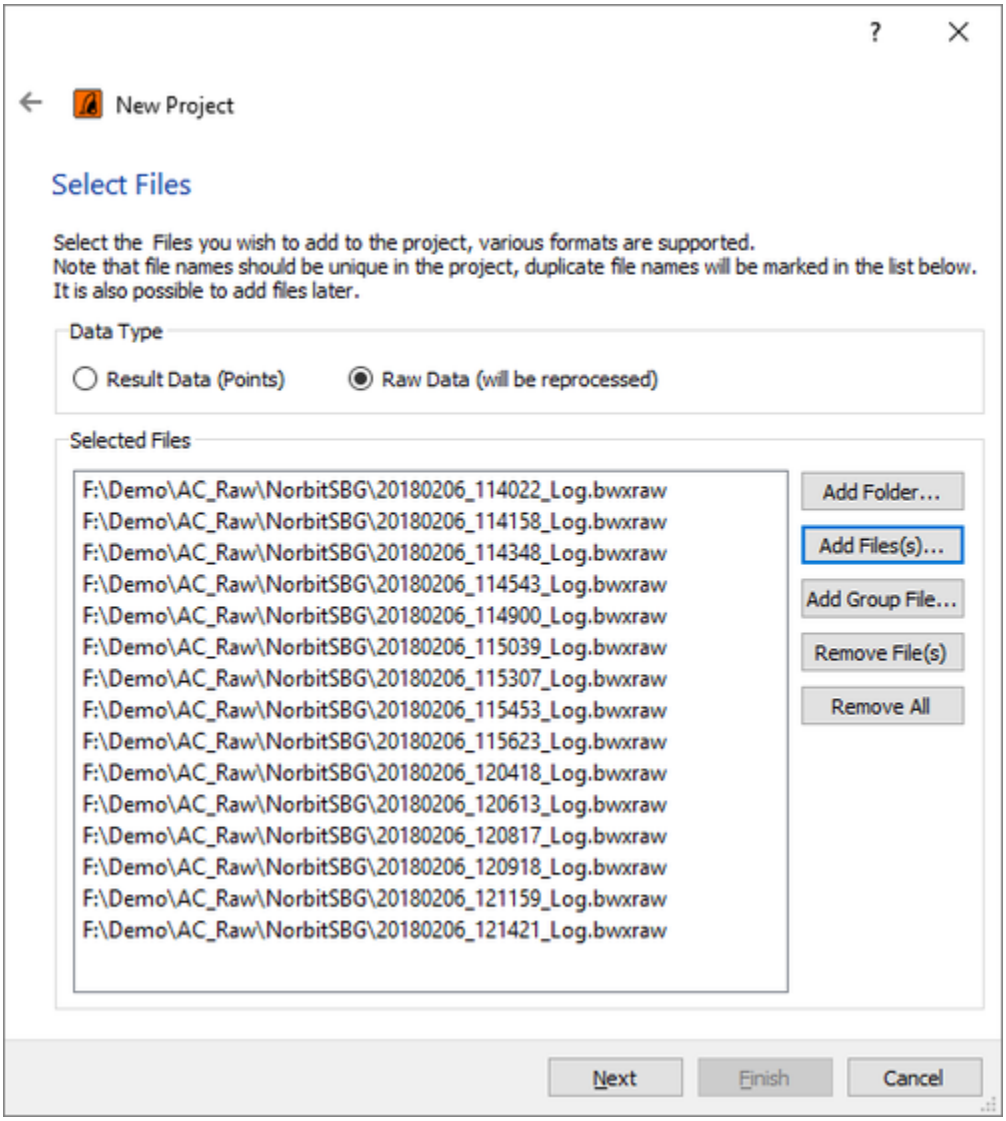
Raw Data Import

AutoClean can re-process Raw Data files to result footprints from various data formats.

The Raw Data processing is only visible when the "Raw Data" License option is available on the dongle.

Step 1: Select Files

Start by selecting the raw data files:

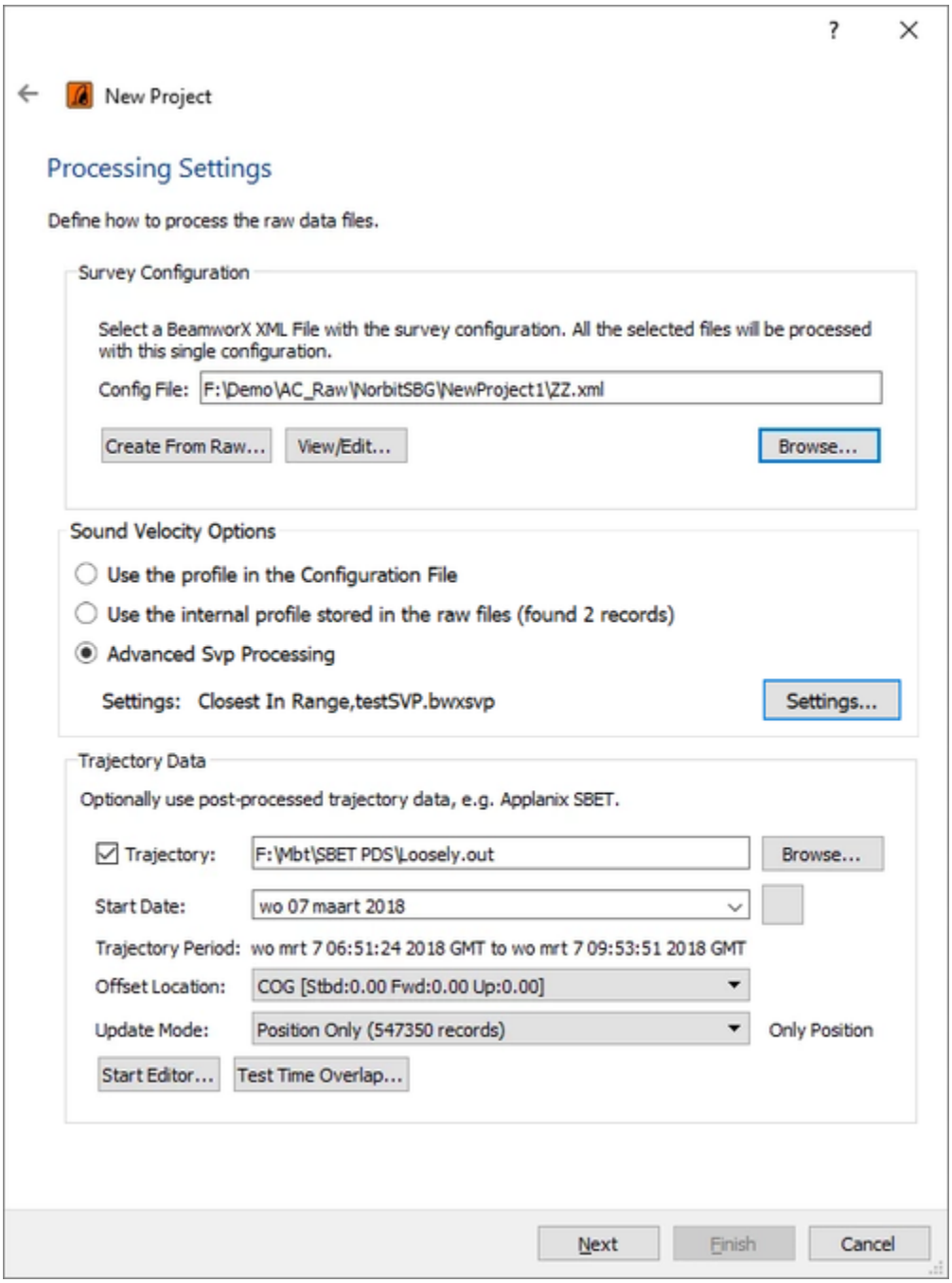


All raw formats supported in AutoPatch are also supported in AutoClean, various formats are supported including Hypack HSX, Kongsberg All, PDS, XTF, BwxRaw etc.

Step 2: Processing Settings

On this page various settings that are required for data processing should be selected.

Setup a Survey Configuration



The config XML file contains Geodetic Settings, Vessel and System Configuration, Computation Settings, E/S Blocking Parameters and Sound Velocity Profile.

The config XML must originate from the Raw Data Files or else the import/processing will fail.

- With "Create From Raw.." the config can be extracted from a raw file, preferably from one of the selected files. After the extraction, check the settings with "View/Edit".

- With "View/Edit..." the config can be changed, for example to change mounting angles of the multibeam system. Or to setup proper Geodetics Settings when raw format does not support it.
- Use "Browse" to re-use an existing config file.

The selected config file overrules any configuration info in the Raw Data Files, with the exception of SVP profile, that can optionally be used from the Raw Data (see below).

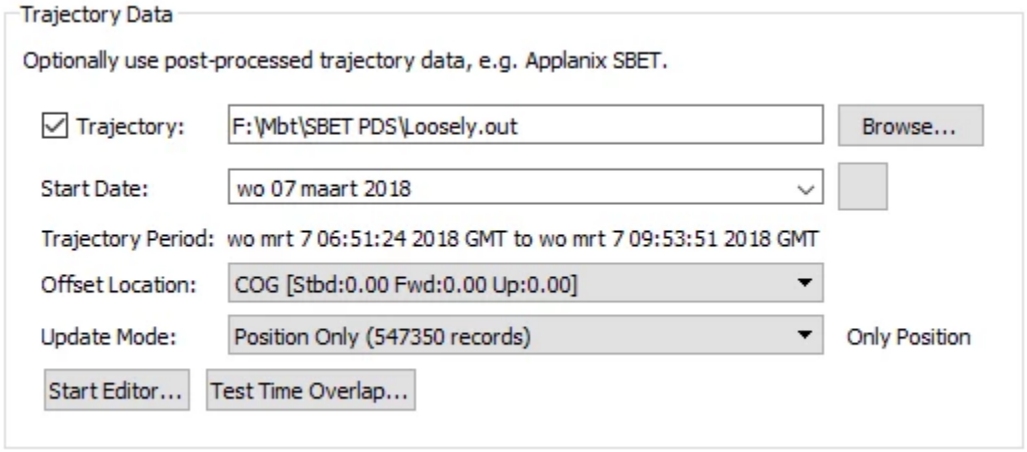
Sound Velocity Options

In order to reprocess echosounder data a Sound Velocity Profile (SVP) is always required, currently it supports three options:

- Force a single SVP on all the raw data files. The SVP should be available in the XML config file. You can change the SVP by editing the config file and import it in the Survey Configuration Editor.
- Use different SVP profiles from the Raw files when they are available, the SVP inside the Raw Data file is re-used, this means that the SVP can be unique for every Raw File.
- Use an advanced form of processing, with multiple Profiles stored in a BeamworX SP collection (BwxSvp) file. For more info refer to this page.

Trajectory

AutoClean can reprocess the positioning system data in the raw files and use that to calculate the transducer positions but it is also possible to overrule this by selecting a so-called "Trajectory File".



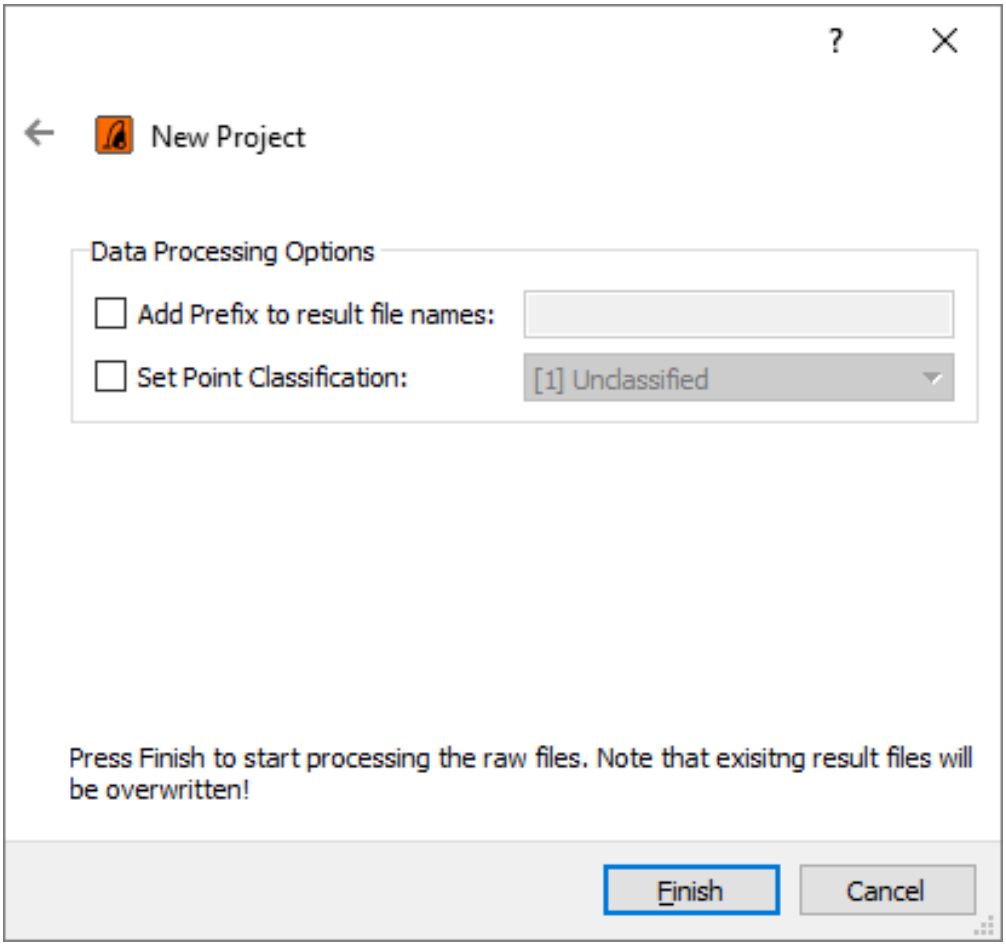
- Select an SBET file.
- Use a "User Defined ASCII file".
- Use an edited *.bwxtrj Trajectory file from the Trajectory editor.

With SBET and "Used defined ASCII" set the applicable "Offset location" and "Update Mode".

Trajectory files(*.bwxtrj) are computed from and always applied to the Center Of Gravity(COG).

The "Test Time Overlap..." provides a dialog that overviews the raw data times versus the selected Trajectory times.

Step 3: Data Processing Options



The prefix option and "Classification" assist in distinguishing the imports of the same files in different ways.
This is handy to review different processing settings for the same file so they can be compared.

The "Prefix" option will add a user defined string to the name of the result file.
When unchecked the result file name will be identical (except extension) to the raw name.

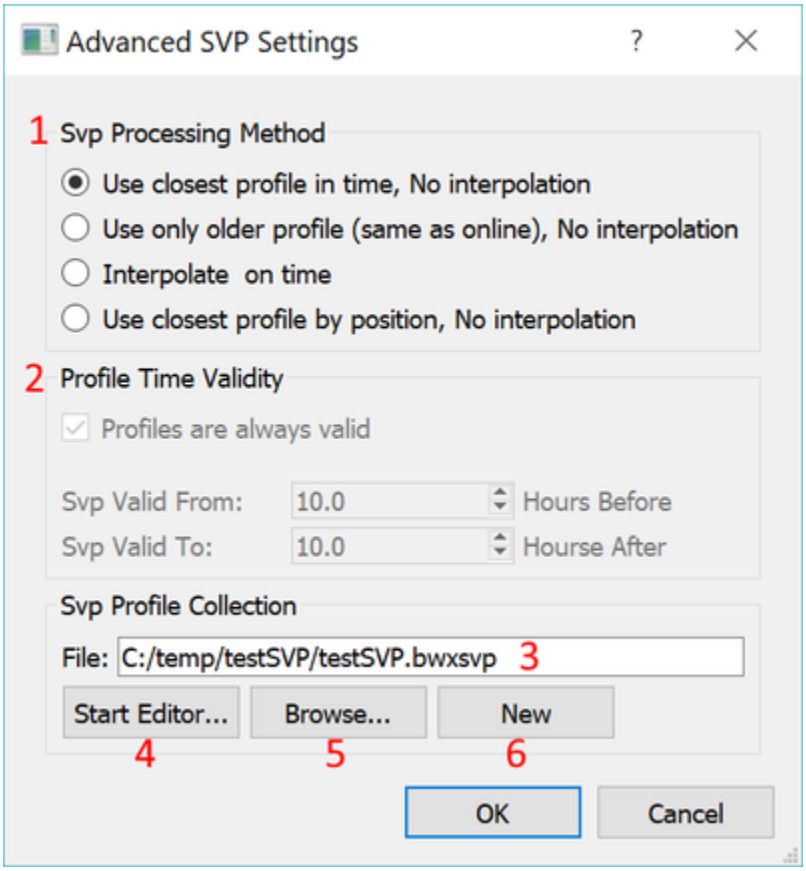
The Classification option, when checked, will set each point classification to the specified classification. When unchecked the points will have class "unclassified", 0.

Any existing Result files will be overwritten when the same Raw Data File is imported again and no unique prefix was used.

The advanced SVP Settings allows you to improve the usage of the sound velocity profiles when processing multibeam data. For each ping in the data the optimal SVP will be selected or calculated depending on the chosen method.
This virtual profile can be interpolated or selected from a list of many profiles.

The input of the processing is the so called "SVP Collection". This is an XML file (extension: bwxsvp) format created by BeamworX to store multiple Sound Velocity Profiles along with position and date/time.
The selected SVP Collection should contain all the profiles that were used during the survey. The timestamp (and/or position) should be correct because processing relies on it.
Note that only selected SVP files are used.

The options are explained below:



1 Svp Processing method

Method	Explanation
Use closest profile in time	Profile that lies closest in time to the ping time are selected. Only a single SVP is used at the time. No interpolation is done.
Use older profile (same as online)	Profiles that lies closest to the ping time but is still older is selected. This can be used to replicate the online results.
Interpolate on time	Create a virtual SVP profile based on interpolation. When ping time lies between older and newer svp the profile point are created by using time difference to older and newer as weights. When the ping time is older than the oldest profile or newer then newest then the closest profile is chosen, so no extrapolation is carried out.

Use closest profile by position	Based on the transducer position and the positions in the profile the closest profile is picked and used. Note that when profiles have a WGS-84 coordinate the are converted to local grid position.

2 Profile time Validity
Not yet used, for future release. Currently the profiles are always valid.

3 Svp Profile Collection

This shows the selected SVP file for processing.

4 Start Editor

When the button is clicked the SVP Editor will load the selected file. The Editor allows you to create profiles manually but also to import from ASCII and raw files (e.g. Bwxraw, HSX, kongsberg All etc.).

5 Browse...

Select an existing SVP Collection

6 New...

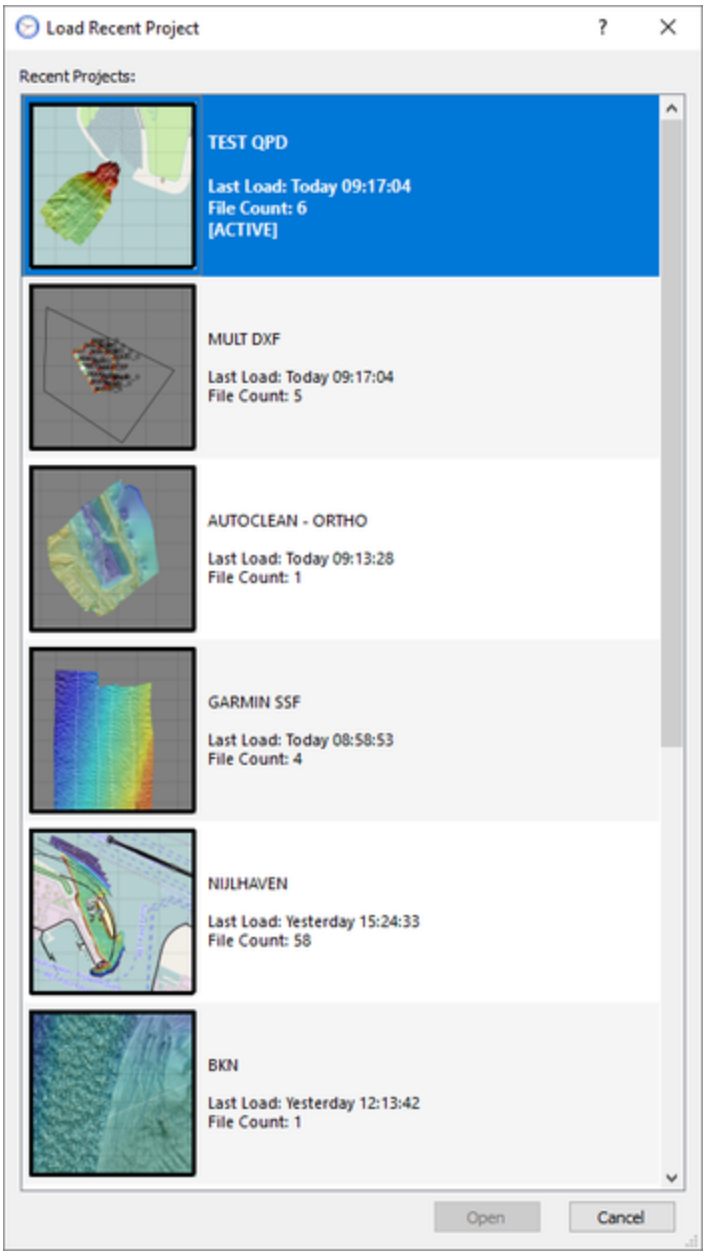
Create a new bwxsvp file on disk. After creation it can be further edited with the SVP Editor.

Recent Project

Select the required recent project and click the open button or double click on the project that needs to be opened. The selected project is highlighted blue. The project that is already open is highlighted with the word "[ACTIVE]".
A thumbnail is show that represents the project. This screenshot is taken from the Chart View every time the project closes. The project thumbnail is written to the project folder as a PNG file with the same name as the project.

The list shows only projects that currently exist. Projects that do not exist are still kept in the list so when for example a project is on a removable hard drive it will become available again once it is re-connected.

You can remove an entry from the list by clicking on the item with the right mouse button, a pop-up menu will appear with a remove option, when clicked upon the item is removed.
Note that only the reference to the project is removed, but the project itself will remain untouched.

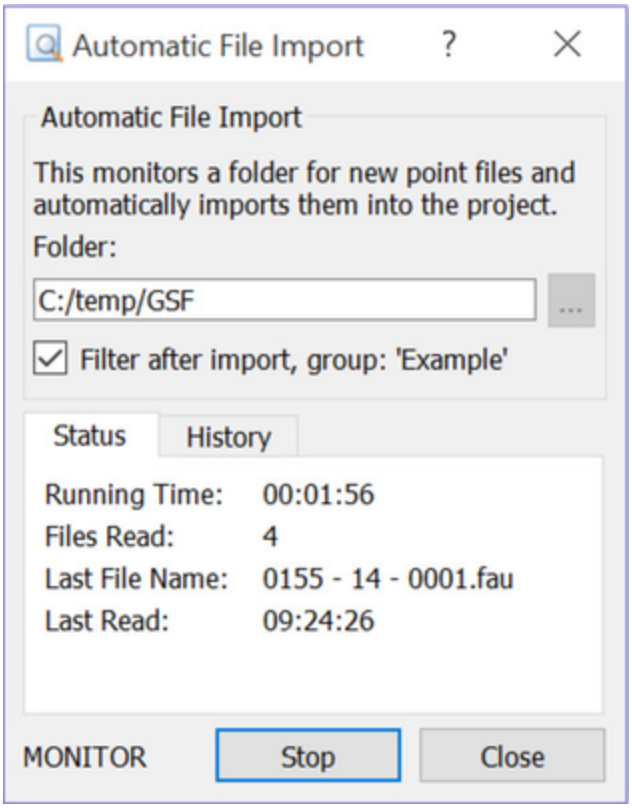


The list shows the project thumbnail, the name of the project, the last time is was opened (in local time) and the number of points. The active project is decorated with the term "[ACTIVE]".

Auto Import

AutoClean contains an automatic import option for point files. When activated this monitors a user selected folder for new point files. When a new file is detected it will automatically be imported (and optionally filtered) in the current project.

This feature can be useful on board of a survey vessel to validate the point files that are created by the data acquisition software.
Auto Import can be found in menu item File|Auto Import. Launching it will show the import dialog (see below). Note that while the Auto Import dialog is shown the user interface of AutoClean is not available.



Select a folder to monitor. Also specify if filtering should be executed on the imported files. The currently selected filter group, as selected in the filter toolbar and the Filter Control, can optionally be applied after import. Note that filtering is executed in file by file mode.

The Automatic import dialog shows a tab with Status information and a tab with a History log. The first contains information on which files where imported, the latter an overview of the activities of the import. The text in the lower left corner will show MONITOR when the auto import is active, IDLE when not active and IMPORT when a point file import action is in progress.
Pressing the Start button will start the monitoring. On start the monitor folder is scanned. If it finds point files that are not yet part of the project it will ask to import those as well. Pressing No will ignore these files. AutoClean will scan the folder every second for new files.
When the monitoring is in progress the "Close" button will change "Hide". When the button is pressed the entire application will be minimized. The application can be restored like any other windows application, by clicking on it's icon in the task bar.

A Point File is imported into the project when it:

- Is not opened for writing by another program.
- Has a unique name that is not yet found in the project point files (without extension).
- It did not yet exist on start-up.
- Is a supported file format. Find the complete list of supported formats here.

Note that at any moment the monitoring can be cancelled and resumed.

When Importing a file format that contains geographical coordinates (GSF, Kongsberg ALL) the project EPSG code will automatically be selected from the first read lat-lon position when it was not set yet.

Grid Reference

The grid that AutoClean currently supports five layers, the main layer for the bathymetry, the intensity (backscatter) layer, the layer for Slope Corrected Confidence, the so-called "Reference Layer" and "Design Layer". These layers can contain for example a design or an in-survey. The Reference/Design Layers can be shown in the background of the Chart View. But it can also be used to show the Cell Height Difference Attribute (e.g. Mean minus Reference).

The Reference and Design Layers are stored inside the grid file. When the grid is rebuild with a smaller cell size then small effects may become noticeable.

When you rebuild the grid to ANOTHER grid cell size then the reference/design layer is cloned as accurate as possible but the quality of the data could be affected. If you doubt the new Reference/Design layer quality you should re-import the external data into the reference layer. This is especially important when you a land xml design as an input.

Import From File(s)

Supported are import from point file(s) or a LandXML Design file or a GTX Geoid file .

Select one or more point files to import in the Reference Layer of the grid. All the supported (except the QPD) point formats can be selected.

It is also possible to import a design from a LandXML File. Select a single LandXML file. AutoClean imports the triangles from one surface inside the LandXML. For each cell center that lies inside the triangles a point is imported into the layer.
It is also possible to import a GTX file. This can be an interesting option if you would like to review the Geoid. Note that a CRS must be defined because GTX is always in lat-lon WGS-84.

If the Reference Layer already contains data this will be removed.

Designs inside Trimble Terramodel and AutoCad Civil 3D can easily be exported to LandXML.

Fill

The Reference layer can also be filled with manual height values. As an input the visible chart view, one or more selected areas or Geo Locators can be used.
The height can be a single user defined value or it can be calculated with triangulation from the height of the area. For that purpose it is required that the used area (Selected Area of Geo Locator) contain coordinates with a valid height value.

Delete Grid Reference

The grid Reference layer can be removed too. When a Selected Area is active then it is possible to delete only the cells that lie inside this area. The attributes Reference and Difference will no longer be available after it is completely removed.

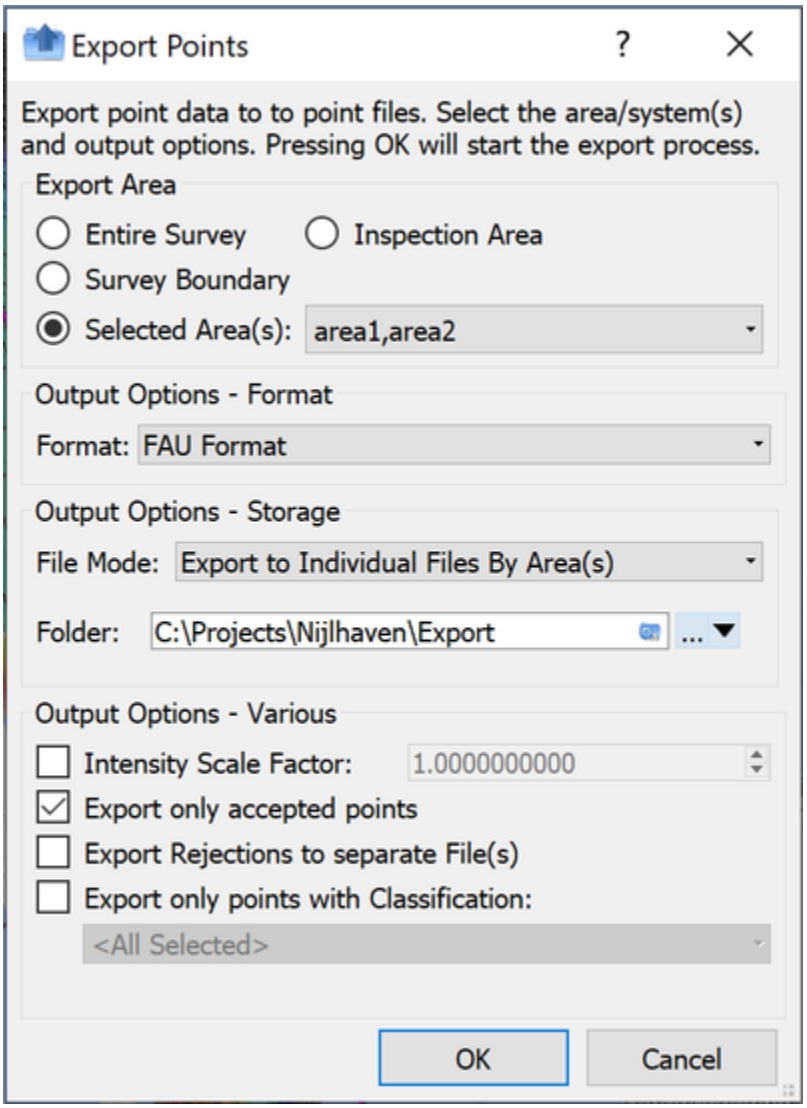
Load From Mean

With this function the data from the mean grid layer is copied into the Reference Layer. This can be a handy work around when QPD files are to be imported into the reference.

Export Points

A selection or all of the points can be exported to one or more point files, various formats are supported, see this page for a comprehensive list. Accessible via menu option File|Export Points.

This will show the following dialog:



Export Area

Before the export can be started you must select what exactly is to be exported:

Area	Description
Entire Survey	All points are eligible for export
Inspection Area	Points that lie inside the current Inspection Area are eligible for export. This option is grayed out when Inspection Area was not selected.

Survey Boundary	Points that lie inside the selected Survey Boundary are eligible for export. This option is grayed out when the survey boundary was not selected.
Selected Area (s)	Points that lie inside one or more selected areas are eligible for exported. This option is grayed out when no areas defined yet.

Output Options

Item	Description
Format	Select the format of the export files. Currently supports: FAU, XYZ comma delimited, GSF, LAS, LAZ, User Defined ASCII.
Fields /Change...	Only visible when format "User defined ASCII (TXT)" is selected. A predefined format can be selected from the lists. With the change button the format can be modified to your needs.
XML Folder	Only visible when format "WSV Binary MBES" is selected. This is the folder where the original XML Files are stored that contains the WSA quality info as generated by QINSy. When this folder is filled in properly the meta data from the xml's are imported and written to the newly exported mbes files. Note that this option is disabled when opted to export to a single file, in that case the created mbes file will only contain limited meta data.
File Mode	This selects how the output files are created: ***Export to Individual Files*** For every point file an export file is created. Names will be cloned from the point files that are exported. ***Export to a single file*** All points are exported to a single file. ***Export to Individual Files By Area(s)*** For every selected area the files that overlap it are exported. File Name convention is fixed to <AreaName>_<Point File Name>.<extension>. Illegal file characters in Area Name will be ignored in the name creation. ***Export to Area(s)*** For every Selected Area the points are exported. File names are based on the area names, convention is <AreaName>.<extension>. Illegal file characters in Area Name will be ignored in the name creation.
Folder	Select the destination folder for the export.
File Name	This is the file name for single file export. The complete path will be <project folder>\Export\<filename>. For rejected points the path will be <project folder>\Export\<filename>.rejected.<ext> Note that when the "multiple file" export mode is used the output file path will be: <project folder>\Export\<base name input file>.<ext> and for the rejected file: <project folder>\Export\<base name input file>.rejected.<ext>
Export only accepted points	Activate this options when only accepted points are exported. The rejected points are NOT exported when enabled. Disable this options when the rejected points are to be exported too.
Export Rejections to separate File(s)	Outputs the rejections to separate file(s). These files will get the same name as the export file with the accepted points but with .rejected between file name and extension. Note that when the option "Export only accepted points" is disabled and the format supports it the exported file will also contain the rejected points.
Export only points with Classification	Select the classes for the export.

Existence Check

Before the actual export process is started the target files will be checked for existence. If one or more files already exists the the user will be prompted.

Meta Data Check (Only WSV Binary MBES)

Before the actual export is started it is checked if required meta data files exist on disk. This is currently used only for "WSV Binary MBES" format. When individual files are exported and the folder is selected properly then the xml's as generated by online software (QINSy) are used to populated the mbes files meta data header. The associated xml is found based on the file name, these should be identical except for the extension. You will be warned when such a file is missing. The warning can be ignored but then no meta data is written, only defaults are used.

Export Grid

Abstract

AutoClean can export grid data to a file. Various types of grid formats are supported. The Entire Survey can be exported to grid or a user definable area. Note that some formats will add empty padding cells to make the area rectangular, e.g. Arc/Info ASCII Grid will do this.

Exporting of grid data is done in two different ways, either directly from the project grid or by re-gridding the accepted points in the project to a temporary grid and then export that.. The first is much faster, the latter is slower, because it will take more time to build a temporary grid. Which way is used depends on the "Use Alternative Cell size and Alignment", when this is not checked then then export is done straight from the project grid, first option but when checked the temporary grid is built, second option.

The export dialog is started through menu File|Export to Grid.

See below for the export dialog and the settings.

For an overview of the supported formats see this page.

Export Grid

AutoClean can export grid data to a file. Various types of grid formats are supported.
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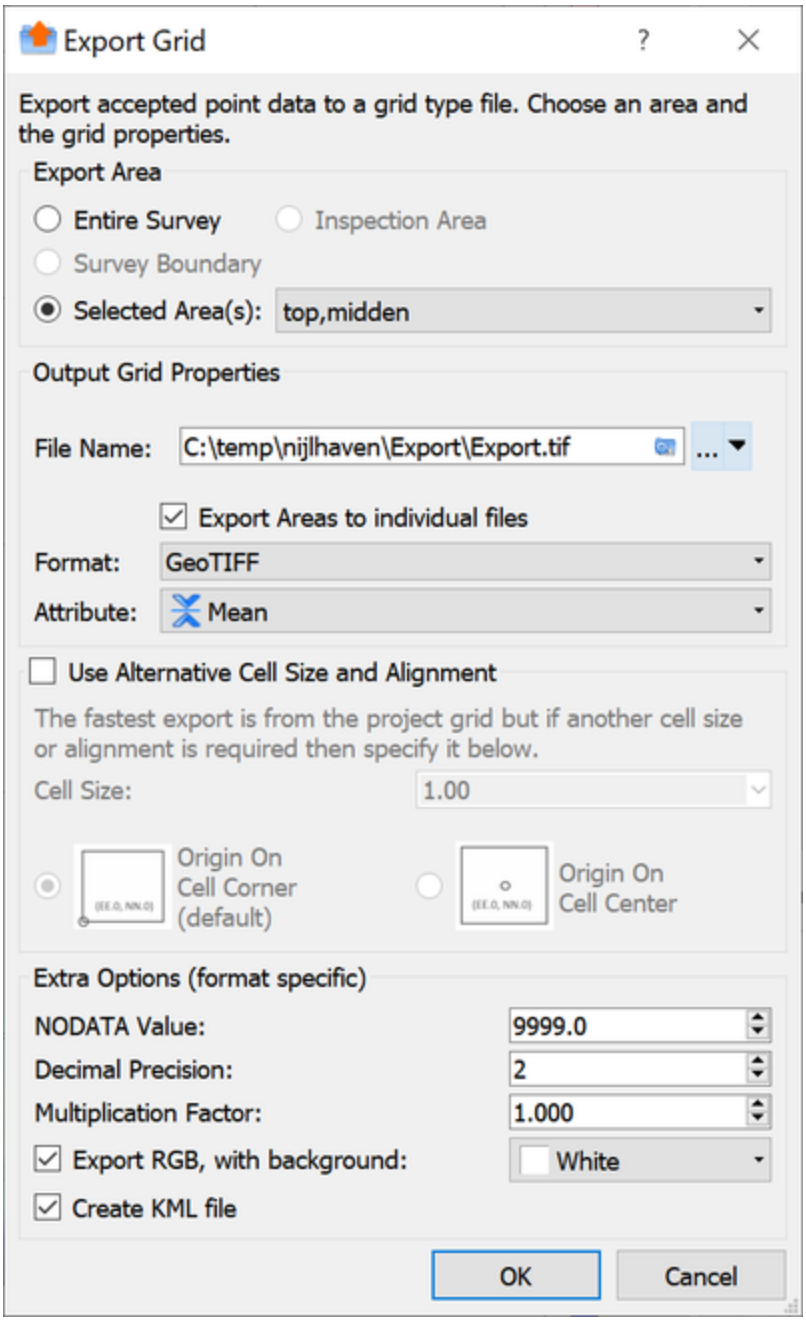
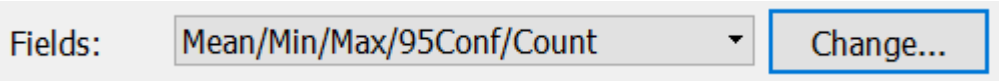


A note to ESRI ArcGIS Users: Version 10 has much better grid import support than version 9. For example Erdas Imagine grids that are generated by AutoClean can seamlessly be imported into ArcGIS 10, while in version 9 it can be problematic if the datum is not recognized.

Item	Description
Export Area	Selection of which area is to be exported, can be the entire survey, or user definable area(s). Note that grid cells outside the selected areas are never exported. Multiple Selected Areas can be selected, when option "Export Areas to individual files" is checked then each area is export to its own file else export is done to one large file.

File Name	File name of the grid file to which is exported.
Export Areas to individual files	Only shown when area selection is set to "Selected Areas". When checked: each area will be export to its own file, filename is created from grid file name and and area name as a suffix. When unchecked: all area data is exported to a single file.
Format	Select the output format of the exported file. A great number of export formats are available, some ASCII formats, a user definable ASCII format, and various other formats including images. See this table for an overview of the formats.
Attribute	The cell attribute to be exported, for example mean,min max height. Only available to some formats.
Fields	This row is only visible when format "User Defined ASCII" is selected. You can select a pre-created format here. When Change button is pressed the format dialog is launched. When the description is changed the format is automatically saved under a new name. 
Use Alternative Cell Size and Alignment	Unchecked: Export straight from the project grid (fastest). Checked: Export from temporary created grid, allows alternative cells size and alignment (slower).
Cell Size	Enter the cell size of the output grid. When disabled the project grid cell size is used.
Cell Alignment	By default AutoClean align the cells with its bottom left corner to the origin, but this can be set to the center of the cell also. For example consider a cell size of 1 meter, and the cursor hovers over the center of the cell, now when alignment is On Corner the cursor world position would show EEE.5, NNN.5 whereas if the alignment would be On Center it would show EEE.0, NNN.0. Another example, for a grid cell size of 2 meters this would show odd numbers (e.g. EE1.0, NN3.0) over center for alignment On Corner and even numbers (e.g. EE2.0, NN4.0) over center for alignment On Center.
NODATA Value	Most grid formats require a value to represent an empty cell, this is usually 9999 or 99999 but you can set it to any value here.
Decimal Precision	Number of digits behind the decimal separator in the grid file. For example for ASCII type data 1 decimal would format Heights as HH.H, 2 as HH.HH etc.
Multiplication Factor	Height scale. Leave at 1.0 when no scaling is required. Enter -1 here when depths are to be exported instead of heights. Note that AutoClean typically uses the Z values as Height, positive upwards.
Export RGB, with background	Enable this option when a "real" colorized image should be created. This option is only applicable to the image type formats GeoTiff, JPEG JFIF and Portable Network Graphics. The back ground color (incl. Transparent") of the output image should be selected. Pixels that represent empty cells or area outside of the selection will be filled with the background color.
Create KML File	When Checked a KML file is created with the same name as the exported file but with a different extension, ".kml". Note that this option is only enabled when a project CRS was defined.

When "User Definable ASCII" format is chosen the fields that are related to the reference layer can not be exported.

Creation of pictures

It is also possible to export the grid data to a "real" picture. The following image formats are supported: GeoTiff, JPEG JFIF (JPG), Portable Network Graphics (PNG). .
Make sure to enable Extra Option - Export RGB. When enabled, true 32 bit Images are created, with 4 color bands (R,G,B,Alpha), when disabled the height values are written as floats with in one color band.
The rendering of the image is done with the current "View Properties", the output image will look the same as on the screen. The background color of the image has to be selected in the options. When a non-rectangular selection is exported the image will contain background color for cells that lie outside the selection.

Pixels that represent empty cells or area outside of the selection will be filled with the background colors.

Each base grid cell will be exported to one pixel.

The Image export may consume a lot of memory when exporting very large areas. When faced with a very large area consider exporting to multiple sub-area images.

Format Overview

Image Format	Geodetic Info	Supports transparent background
GeoTiff	Embedded Tags/ TFW World file	Yes
JPEG JFIF (JPG)	External PAM aux.xml file	No
Portable Network Graphics (PNG)	External PAM aux.xml file	Yes

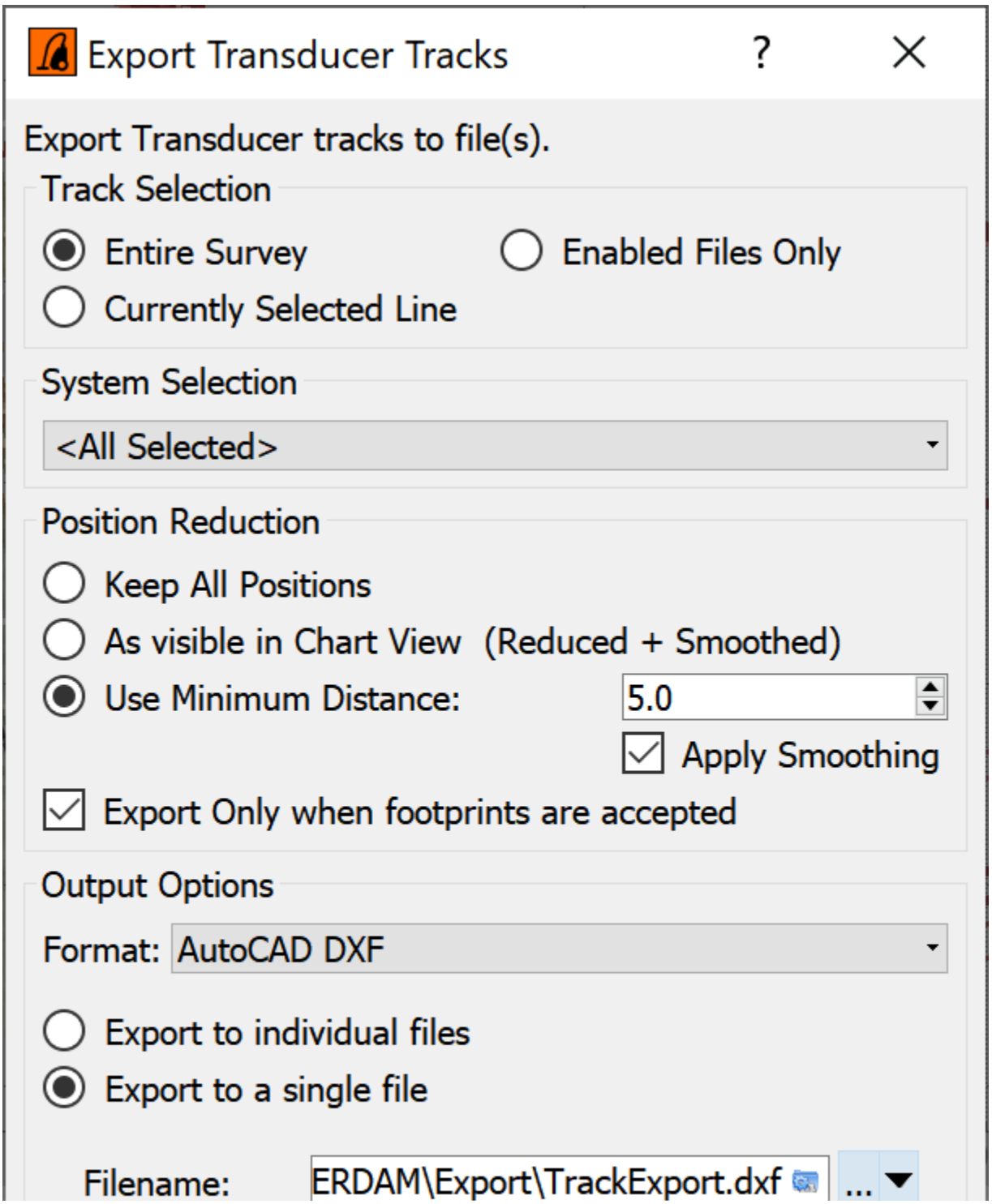
Calculation help
Question: I have to deliver GeoTiffs with a maximum size of 50 MB, my cells size is 0.5 meter, what will be the maximum area?

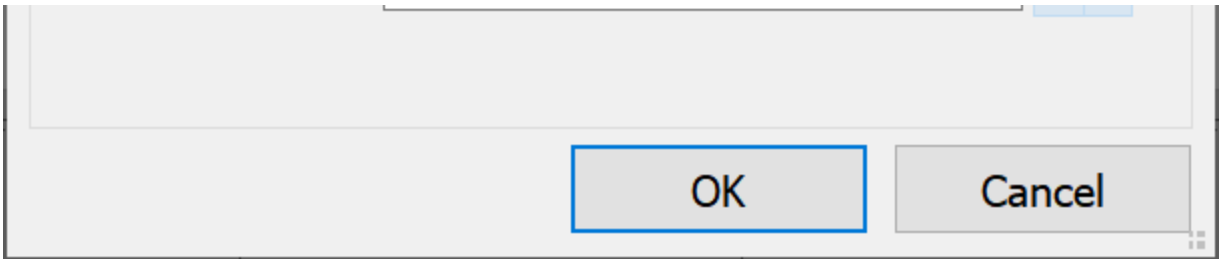
Answer: A GeoTiff with image data contains 4 bytes per pixel, so 4 bytes per exported base cell. 50 MB is 50x1024x1024 bytes, so this is enough space for 50x1024x1024 / 4 = 52.428.800 cells.When we take the square root from this we calculate the number of cells per side, SQRT(52.428.800) = 7240 cells. Because the cell size is 0.5 meter the maximum area becomes: 3620 x 3620 meter or 1810 x 7240 meter.

Export Tracks

Export the transducer position tracks to a CAD (polylines) or ASCII Text file. See below for options.

Note that the transducer position for some input point formats is an approximation (e.g. for pts and fau).





Item	Description	Options
Track Selection	Choose files to export track for.	*Entire Survey:* All lines, also the disabled lines. *Enabled Files Only:* All enabled lines, see project properties to enable/disable lines. *Currently Select Line:* Only the line that is selected in the Chart View.
System Selection	Select which system the track should be exported for.	Select All, or individual system.
Position Reduction	Reduce number of exported transducer positions.	*Keep All Positions:* No Reduction used. *As visible in Chart View:* An exact reproduction of the track visible on screen. Note that this is reduced and smoothed). *Use Minimum Distance:* Enter distance between Polyline points. Use optionally a smoothing (averaging).
Export only when footprints are accepted	Only export only the transducer position when at least one footprint of the ping is accepted.	N/A
Output Format	choose which Cad/ASCII format to export to.	Various Cad/ASCII formats including DXF and DGN. Note that for KML/GML a valid CRS must be selected in the project properties.

Overview of supported ASCII Text Formats:

Name	Format

EIVA ETR	ASCII Format, separator space.
	Header = # Date Time X Y Z
	Record = DD-MM-YYYY HH:MM:SS.SSS X Y Z
	
	`# Date Time X Y Z`
	`27-10-2021 14:50:21.380 533705.845 6077160.126 -0.592`
	`27-10-2021 14:50:25.580 533706.953 6077155.189 -0.574`

Export Edits to Source Files

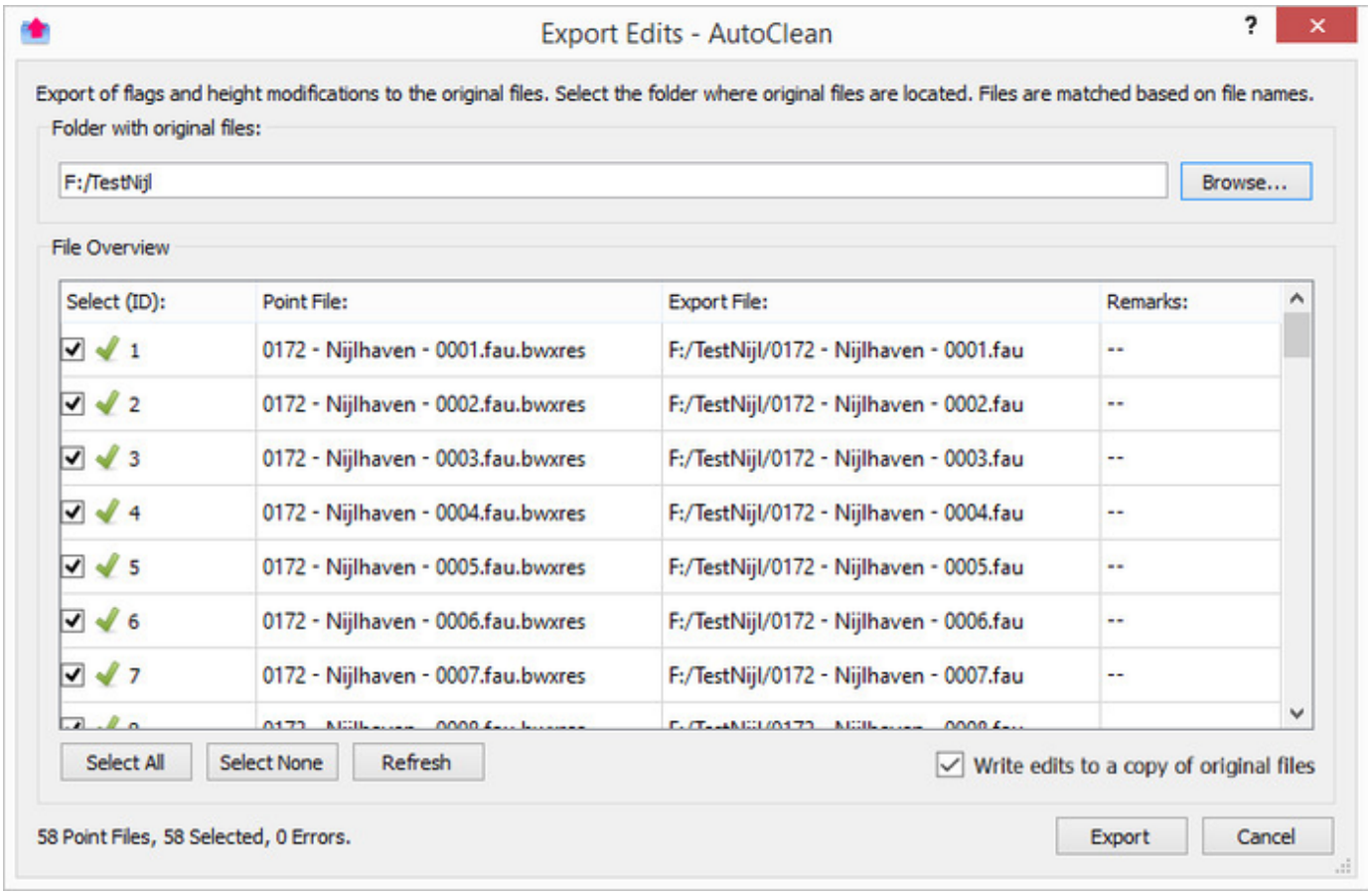
AutoClean imports point data from source files into its own internal file system. Usually the processed point data is immediately export to newly created point files or grid-type files. But it also possible to write the point status (accepted/rejected) and height modifications **back** to the **original** source files. This is especially useful for file formats that contains a lot of meta data or even raw data like GSF and Kongsberg All formats.

Export of Edits to XYZ files is not supported at this moment.

Procedure to export the edits:

Start Export Edits option. This will launch the dialog below. Select the folder location (Browse...) where the original source files are stored. AutoClean will automatically pair the internal files with the original files based on the file name. Note that duplicate file names are not allowed otherwise the matching will not work. If the source files are located in different folder then either move them to a single folder or run the export edit multiple times.

The dialog will show a green "V" icon in front when it finds a proper match, if the match can not be made it will show a red cross icon.



The Refresh button will redo the matching, this is useful after you copied more source files to folder.

Now select the file(s) you wish to update.

The "Write edits to a copy of original files" option allows for more protection of the original source data files. When enabled the original source file is copied to a file in the same folder named "EDIT_<original name> . The the edits are exported to this file instead of the original file.

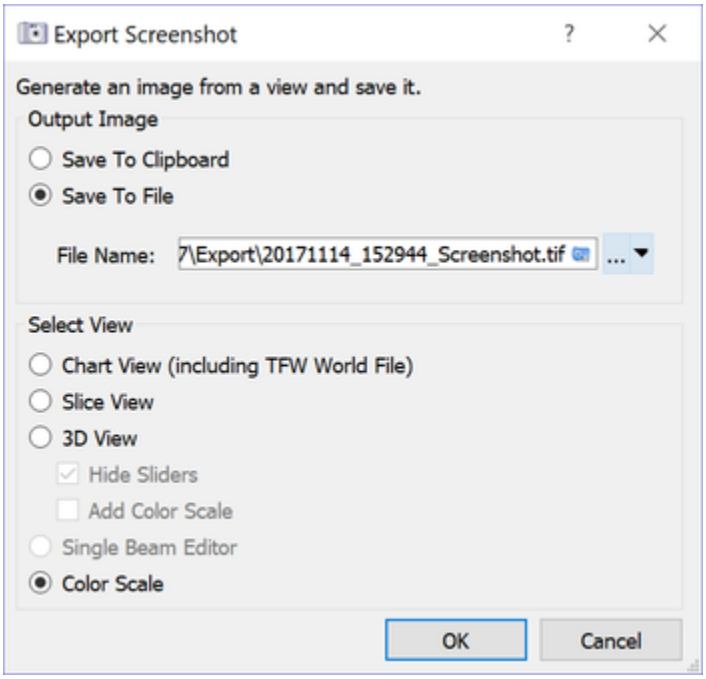
For some formats (e.g. LAS/LAZ) the "Write edits to a copy of original files" must be enabled.

Finally press Export button to start the updating process. Exporting will not start when there are matching errors selected. The updating can take some time, all the edits and or height modifications will be written to the source files.

For a list of supported formats and export of edit specifics refer to this table.

Export Screen Shot

The various views of the program can be exported to either the Windows Clipboard or a file.
The following image formats are available for export: TIFF, JPEG, BMP, PNG.



When saved to a file the proposed file name format equals YYYYMMDD_HHMMSS_Screenshot.extension.

The following views can be selected:

View	Remarks
Chart View	Export includes a TFW (World) file of the current boundary. This allows correct spatial positioning of the image in 3rd party software.
Slice View	N/A
3D View	Optionally you can hide the scale and point size sliders, optionally add the color scale to the right side of the image*.
Single Beam Editor	Export the view of the SB Edit Dialog. Note that this option is only available when SB Edit is visible.
Color Scale	This Element of the Chart View can be exported separately to a file or clipboard. This can be handy for a report.

*) 3D View Color Scale can only be added when the 3D View "Auto-range colors" is unchecked in the View Properties. The color scale image is used at it's current size. Make sure it is less high than the 3D view.

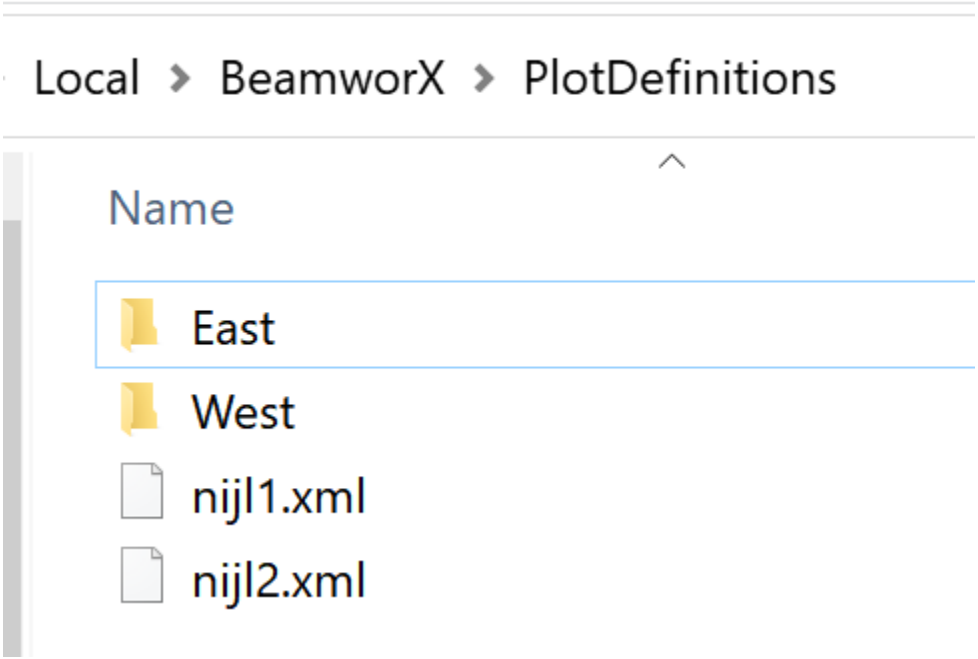
Export To Plot

With this option you can generate Plots/Charts. These can be saved to a GeoTiff image or PDF.
Note that this function is not suited to send a chart directly to a printer or plotter, instead a GeoTiff image file is created. For each GeoTiff (with embedded CRS info tags) also a KML and TFW World file is created.
The resulting Tiff can be send to a printer (with other software) but can also be loaded as background information in other software or even in AutoClean or NavAQ.

The so-called “Plot Definitions” will define the chart area in easting/northing and bearing, the size, scale, resolution and the layers including its settings that should be plotted. Each plot can contain one or more layers. The plot definitions are stored outside the regular project folder and have no dependency on it. This allows you to use it in several different AutoClean project loaded with different bathymetry data, e.g. for an annual port survey.

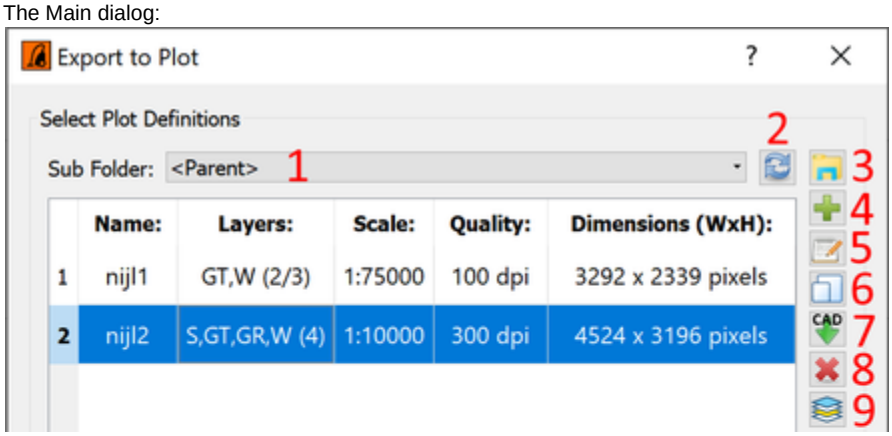
A Plot definition can be edited by pressing the ‘Edit’ button (5) or double clicking in the list.
The plot definitions are stored in xml files in location:
<Users>\<Current User>\AppData\Local\BeamworX\PlotDefinitions

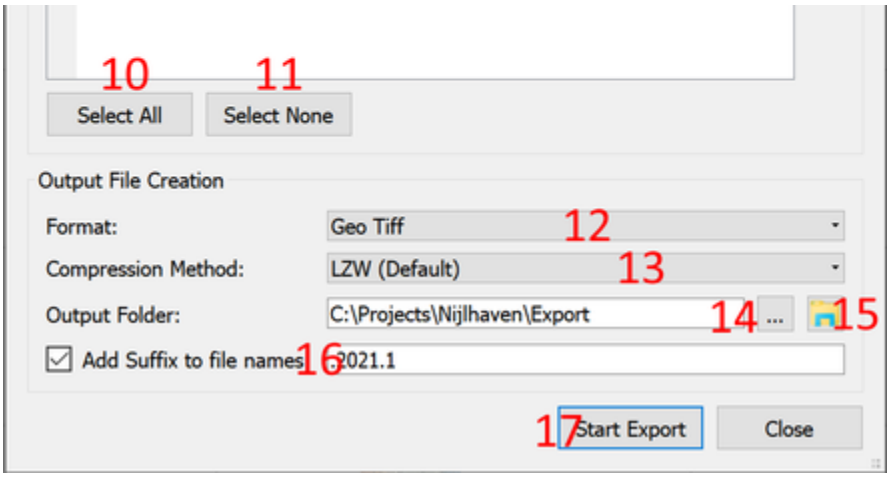
It is possible to create subfolders (manually in Explorer) to organize them. You can select a subfolder with the ‘Sub Folder’ combobox (1).



Example of sub folder definition.

The Main dialog:



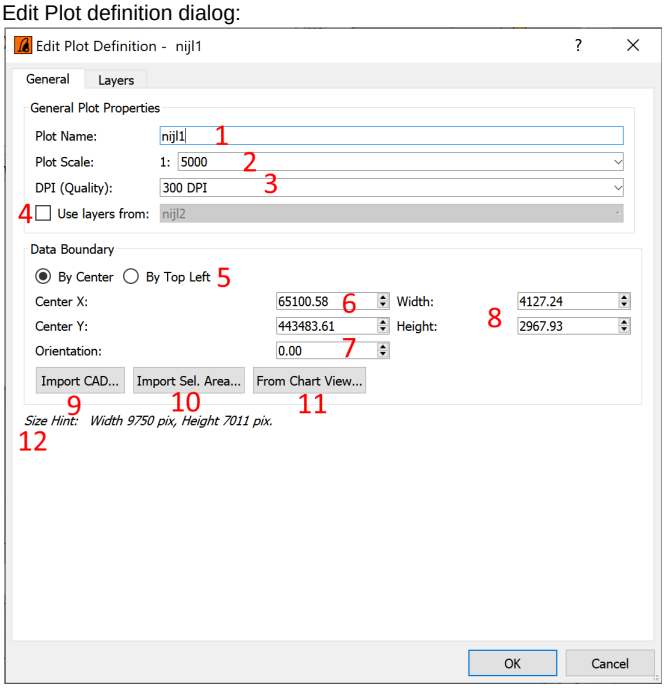


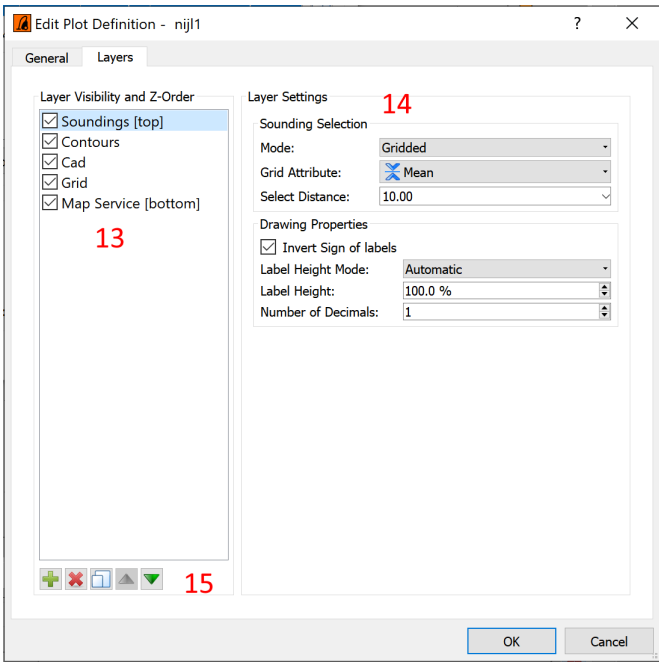
	Item	Description
1	Sub Folder	Selected plot definition sub folder. This is used to keep the definitions organized. Create folders manually in File Explorer.
2	Reload	Reload the definitions from disk and re-scans the folder structure. Any unsaved data is saved before reloading.
3	Explore Definition Folder	Start Windows Explorer in order to view the plot definition (sub)folder.
4	Create New definition	Creates a new plot definition.
5	Edit Definition	Launches the “Edit Plot Definition” dialog (below more details). Here you can change the properties of the plot definition. Note that double-clicking the row will also launch it.
6	Clone Definition	Copy the selected definition to a new definition.
7	Import From Cad	Import Area from CAD file (various formats). Multiple polygons can be selected, for each an import is done. The layer data is cloned from the selected plot definition.
8	Remove Definition(s)	Remove the selected plot definition(s). A confirmation is requested.
9	Clone Layers from Chart View	Copy all the layers that are active in the chart view including their settings into the selected plot definition. Existing layer info is overwritten.
10	Select All	Select all plot definitions
11	Select None	Clear selection of plot definitions
12	Output Format	Select which format to export to: -GeoTiff -PDF (with embedded image).
13	Tiff compression method	Choose between various compression methods: No Compression/Packbits/LZW/Deflate/JPG. The generate GeoTiff plot will be compressed with this method.
14	Output Folder	Folder where plots are written to.
15	Explore Output Folder	Start Windows File Explorer to inspect the selected output folder.
16	Add suffix to filename	When this option is activated some user definable text is added to the filename. The exact place is after the filename but before the dot of the extension.

		This allows you to make a unique set of plot files. File Name becomes: <PlotName><Suffix>.tiff
17	Start the export	Start the generation of the selected plot images.

The plot definitions can be modified by double clicking its row or by pressing the Edit Button.

Edit Plot definition dialog:





	Item	Description
1	Plot Name	The name of the plot definition. Used for the creation of the output plots.
2	Plot Scale	Scale of the plot. depends on DPI Settings. 1:XXX means 1 meter of plot image represents XXX meter in real world.
3	DPI	Output image resolution in Dots Per Inch. Determines with the scale the resulting image pixel size. See Size Hint (12).
4	Use Layers from	When selected the layers are read from another plot definition. This allows you to make plots of different areas but with all identical layer settings.
5	Data Boundary Anchor	The entered position can be from top-left corner or center.
6	Data Boundary Position	Position of the chart in local grid coordinates, either from top-left corner or center.
7	Data Boundary Orientation	Bearing of the plot in degrees. 0 means align with local Y axis. Positive bearing rotates the boundary box clock wise. Relatively the data rotates counter clock wise when you would look at it on paper.
8	Width and Height	Width and height of the boundary box in local gird units, e.g. meter.
9	Import CAD	Import a boundary box from a CAD file. Multiple boundaries can be imported at the same time. Note that for non-rectangular polylines a best fit bounding box is applied.
10	Import Selected Area	Import a boundary box from selected areas. Same rules as for CAD import.
11	From Chart View	Import the current Chart View viewport as the boundary.

12	Size Hint	Provides a preview of the output image. Refreshed automatically whenever boundary, scale or DPI changes. Note that images larger than 23000 pixels width or height are not supported.
13	Layer Visibility/Order	Various layer can be plotted. The order of plotting is how they are presented in the list. A Logical order is ENC's and GeoTiffs at the bottom, Then grids, Soundings and Contours on top. When the checkbox in front of the layer is unchecked then the layer is not plotted.
14	Layer Settings	Settings of the selected layer

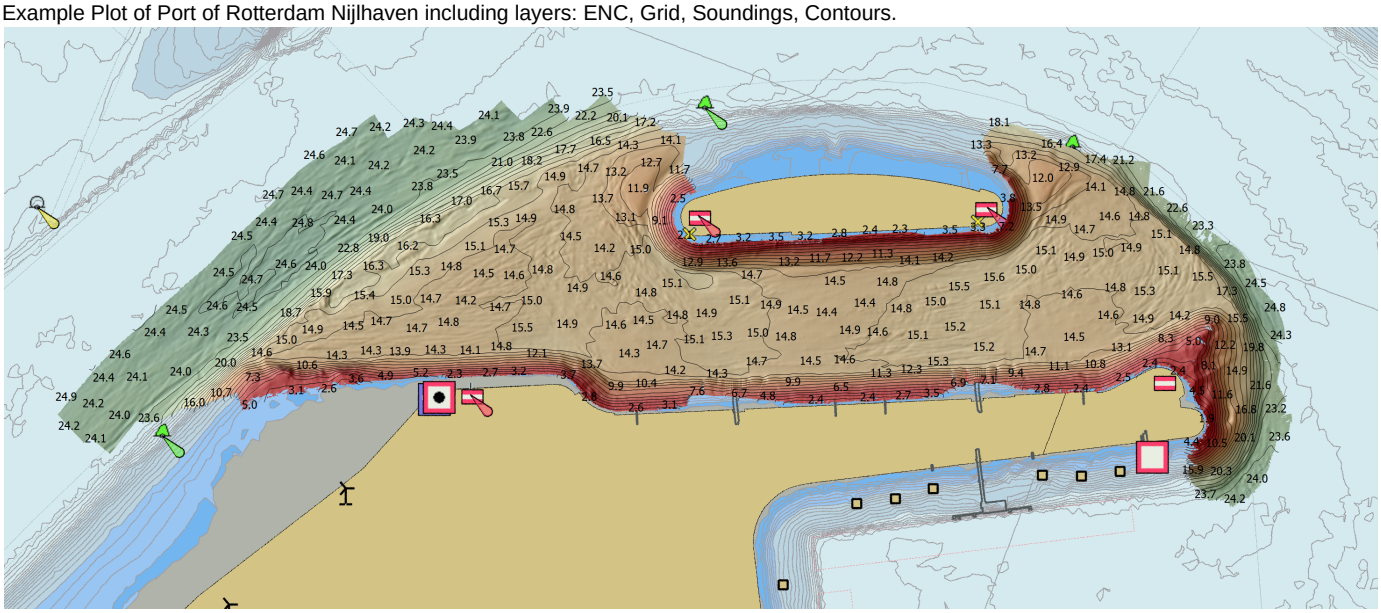
⚠ Plot Images larger than 23000 pixels height or width are not supported.
So the maximum image size that can be generated is 23000x23000 pixels.

The following layer types are available:

Layer Name	Layer Description	Abbreviation
Grid	Colorized + shaded grid cells	GR
GeoTiff	Geo Tiff image	GT
Cad	CAD Vector data, e.g. DXF	CD
Map Service*	WMS/TMS/WMTS Service, e.g. Google maps	W
S-57 ENC*	S-57 000 cell data.	E
Soundings	Numerical depth/height values	S
Contours	Depth/Height Contours	CN

*) Note that the correct CRS (Geodetic Settings) should be entered in the Project Properties.

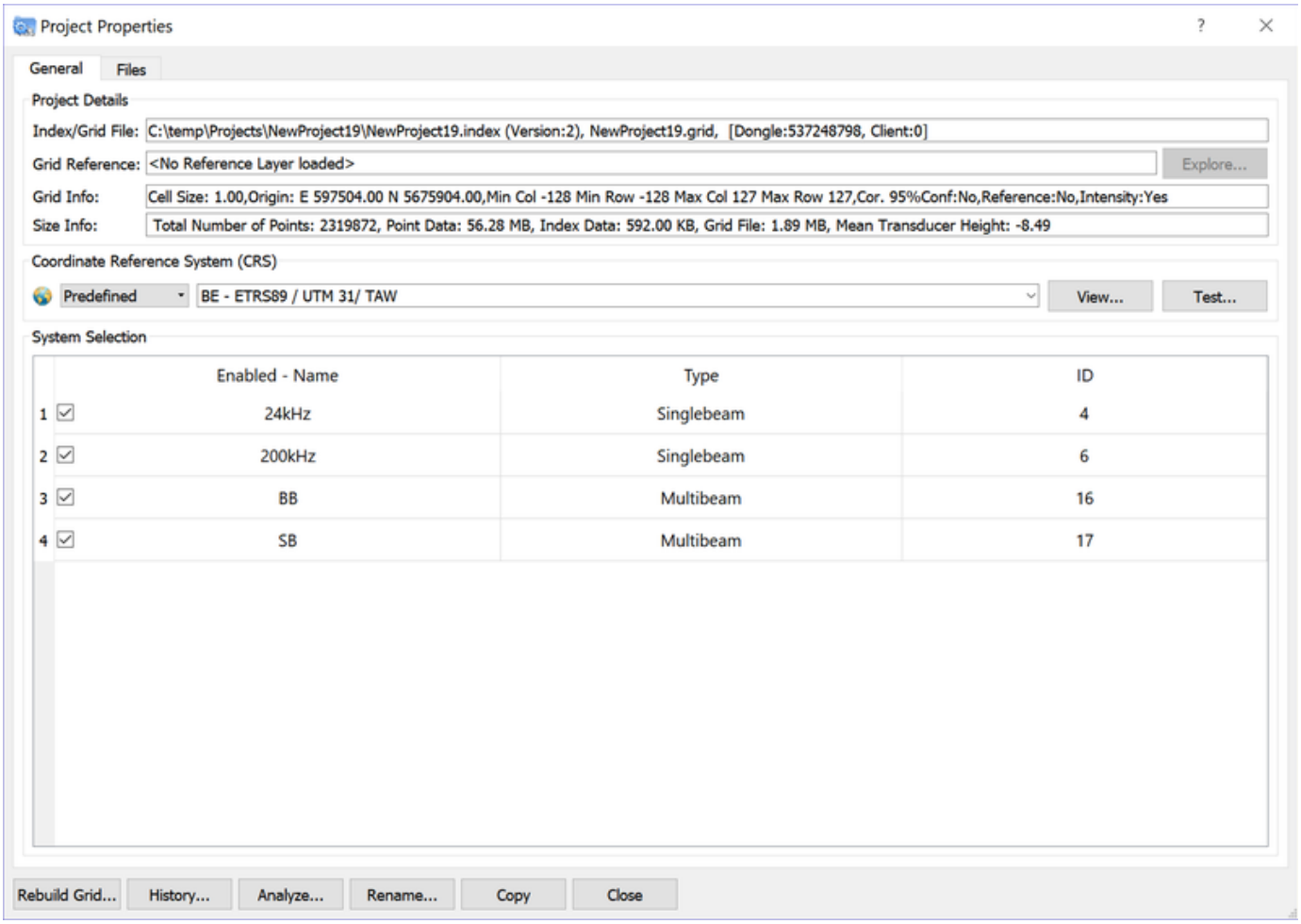
Example Plot of Port of Rotterdam Nijlhaven including layers: ENC, Grid, Soundings, Contours.



Project Properties

This dialog presents a complete overview of the project files and its properties. The dialog contains two tabs, the "General" Tab with the general properties and the available systems. The second tab "Files" gives you an overview of all the available files in the project. This dialog can be used to rebuild the grid, disable/enable point files, remove point files and inspect/analyze the project. When a track line was selected in the Chart View, the corresponding row is selected/highlighted in the "Files" table.

General Tab

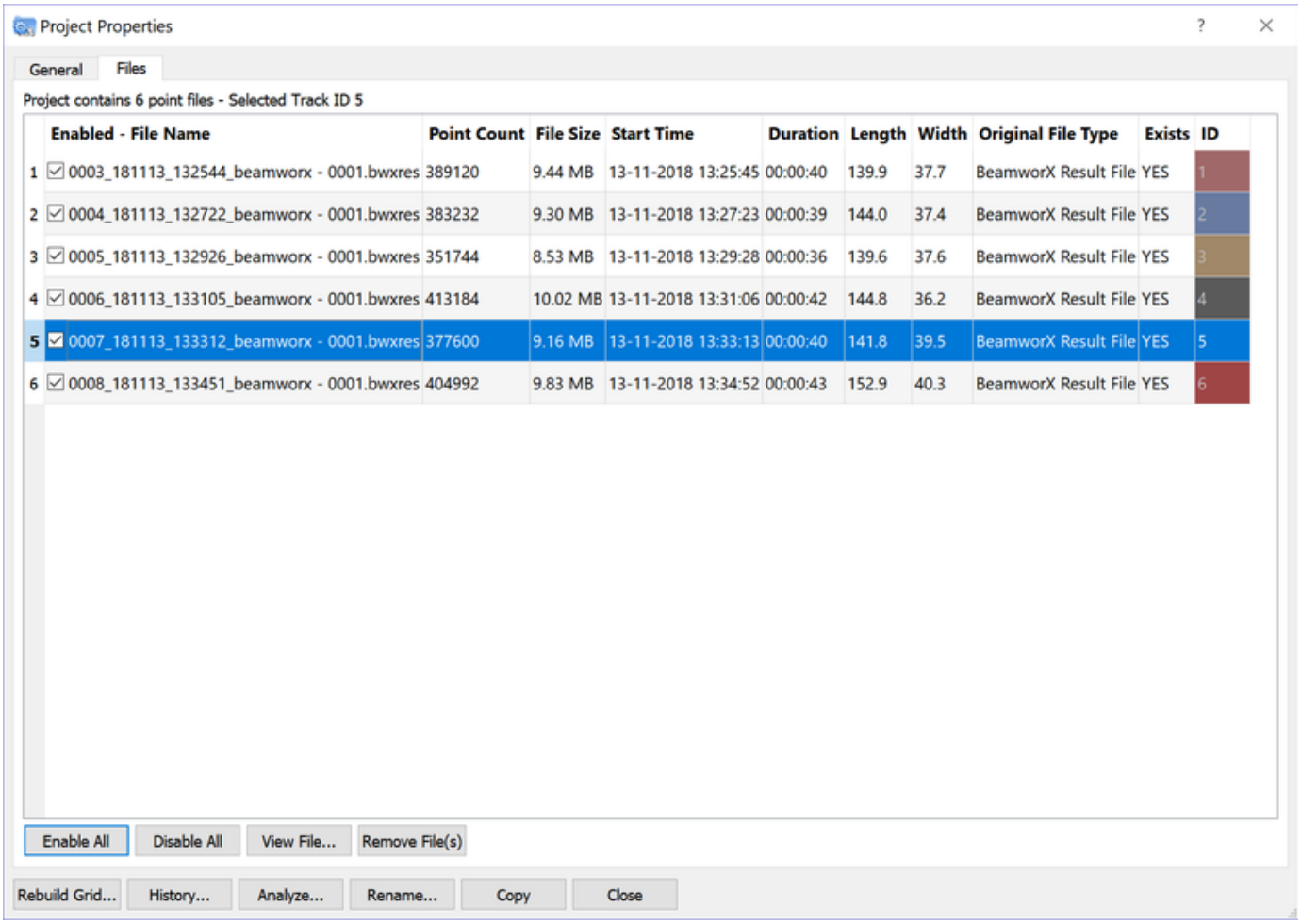


The upper pane contains the following information:

Row	Description
Project File	Shows the main index project file. Between brackets the dongle info is shown that was used during creation of the project.
Grid file	The project grid file.
Grid Info	Shows Cell Size of grid, origin of grid, (position of lower left corner of grid origin cell). minimum/maximum cell row/column index (relative to origin)
Size Info	Shows total point count in project, the total size of all the point files, the total size of all the index files, the size of the Grid file and the overall mean transducer depth of all point files.

Coordinate Reference System	The project "datum and projection can be defined here. It is possible to setup a full transformation from WGS-84. The usage of this is optional, most projects will be in projected cartesian coordinates already and then this is not required. But for importing lat-lon coordinates from files like GSF or Kongsberg ALL this is required. Also for KML import and export this must be set. For more info refer to this page.
System Selection	Shows the found systems in the project. When a system is disabled here it will no longer be visible in the project nor will it be processed anymore. Note: this is only supported for certain file types that contain this info. There will be no systems when point data originate from FAU files.

Files Tab



When the dialog is closed, the selected file will also be selected in the Chart View.

The table shows the bwxres point files that are part of the project, with the following columns:

Row	Description
Enable/ Disable	File can be enabled or disabled inside the project. Disabled files are not used nor displayed, nor filtered. This can be handy to temporarily disable files in the survey for filtering etc.

File Name	Full file name of point file.
Point Count	Total number of points in the file.
File Size	Size of point file.
Start Time	Time of first oldest point in file. Can be 1-1-1970 when time is not supported.
Duration	Duration (delta time) of the file, determined from newest point time - oldest point time in file.
Length	Length of the best fitting bounding box around the points, in survey units (usually meters). Marked red when invalid or larger than 30 Kilometers.
Width	Width of the best fitting bounding box around the points, in survey units (usually meters). Marked red when invalid or larger than 30 Kilometers.
Original File Type	Description of the original file type , for example FAU of Kongsberg ALL.
Exists	YES when index file for the point file exists, No when not.
ID	This is the ID as used internally in the project file. Note the the color is the specific color assign to this file. Used for example in the Slice View to show points.

The following buttons are available:

File Buttons

Button	Description
Enable All	Enable all the files inside the project. Changes will be updated when project properties dialog is closed. Note: This button changes its function to "Enable Selection" when multiple rows are selected, in that case only the selected files are enabled.
Disable All	Disable all files inside the project. Changes will be updated when project properties dialog is closed. Note: This button changes its function to "Disable Selection" when multiple rows are selected, in that case only the selected files are disabled.
View File	Inspect the selected point file, this will start a new dialog.
Remove File	Remove unwanted file(s) from the project. Multiple selection is allowed in the table to remove multiple files at once. For each point file, multiple files exists, e.g. an index file, a track file the bwxres file. All these files are moved to the Windows "Recycle Bin" so ti is always possible to "un-delete" them.

Project buttons

Button	Description
Rebuild Grid	Force a rebuild of the entire grid. Optionally with a different cell size or different grid attributes. A rebuild will always use the same origin.
Hist	The project history contains an ASCII log file of some significant user actions, for example all edit actions, e.g. manual point clipping or filter actions are logged. The log file can be viewed to see what actions were taken in the current project.

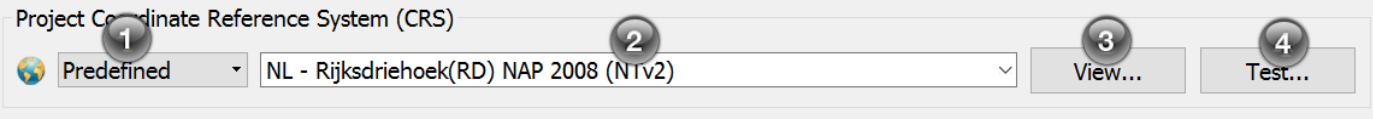
ory	
Analyze	Analyze the project, checks if all point data and index files are found.
Rename	Rename The Project. This option will show a dialog where a new project name can be entered. After pressing OK the project will shortly be closed and all relevant files renamed. The containing folder will also be renamed but when the folder already exists then this step is skipped. After the renaming the project is re-opened. Note that the inspection area will have to be selected again.
Copy	This copies the content of the file table to the Windows Clipboard. This can be pasted into a text document or a spreadsheet.
Close	Closes the dialog. Any changes to the file enabled/disabled will be updated now. The grid will be rebuild in the relevant areas.

Coordinate Reference System (CRS)

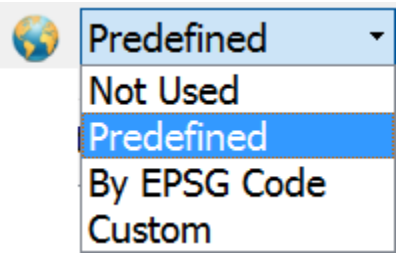
The project Coordinate Reference System (CRS) defines the geodetic projection of the project and its relation to WGS-84. AutoClean will always work with projected cartesian coordinates.
For the import of geographical (lat-lon) coordinates that are used in formats like GSF, Kongsberg ALL and WASSP wmbf format it is required to have some sort of datum transformation.
But the CRS is also used for example for export of Google's KML format.

The CRS of the project can be changed in the Project Properties with the control that is shown below. The project CRS definition is stored on disk along with the other project properties.

A CRS can either be defined by an EPSG code or based on a "Proj4" definition.



1) Mode selection, this selects how the CRS is defined.



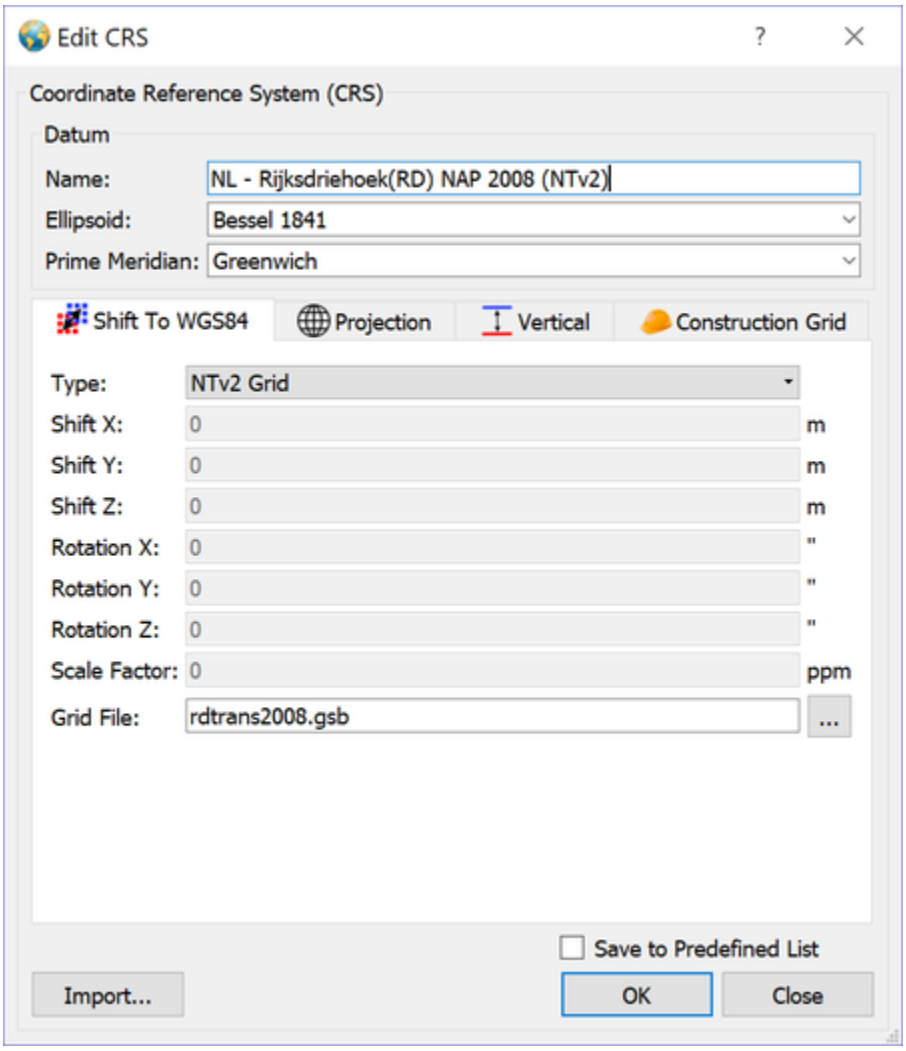
Mode	Description
Not Used	No CRS Defined (or Auto UTM). This is suitable when only cartesian point files are imported (e.g. fau, xyz), then no datum transformation is required. Note that when a point file is imported with geographical coordinates (lat-lon), e.g. Kongsberg ALL, GSF, WASSP, then automatically a UTM on WGS-84 CRS is selected prior to the import.
Predefined	A CRS from the predefined list can be selected. This is a list with various CRS definitions, loaded from two files, "ProgramData/BeamworX/BwxPredefinedCRS.txt and ../UserPredefinedCRS.txt. These files contains various proj4 datum definitions, created by BeamworX and the user respectively. The first is created during installation, the second file contains the user saved CRS definitions. Each entry will contain a full proj4 definition string.
By EPSG Code	The CRS will be defined by an EPSG code. the GDAL library is used to retrieve the proper CRS definition. An entire list with EPSG code and names is available in the combobox. When you start typing you will automatically find the correct entry.
Custom	Fully customizable CRS definition. The view button (3) will change into "Edit". This allows you to modify the CRS definition in the "Edit CRS" dialog.

2) Combo box that shows the name of the selected CRS definition.

In mode "Predefined" and "By EPSG Code" this show a list with available definitions.
In mode EPSG code you can either select an entry from the drop list or just type in the code, the latter will be quicker.

3) View/Edit

When this button is pressed the View/Edit CRS dialog is launched, this allows you to inspect or Edit (mode Custom only) the CRS definition. Note that in mode "View" the dialog will show up with disabled controls and no modifications are allowed. Below the various functions will be described.



The various dialog items are explained below:

Datum

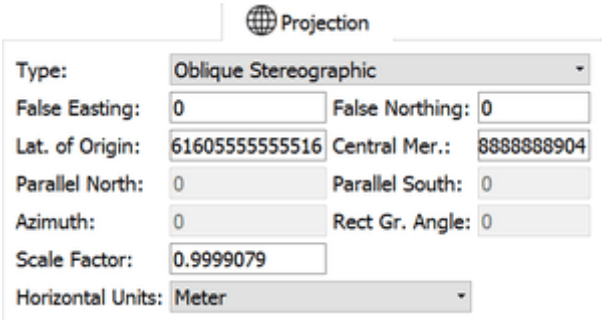
Item	Description
Name	Name of the definition. This must be a unique name.
Ellipsoid	Select the used Ellipsoid for the datum. Example: Bessel/WGS84 etc.
Prime Meridian	Select which reference longitude is to be used, By default this is Greenwich (0).

Shift To WGS-84 Tab

Item	Description
Type	How is relation to WGS-84 Datum established: None - not defined. Molodensky - only a translation is defined. Bursa-Wolf - 7 parameter transformation is defined. NTv2 Grid File - Uses grid shift file (gsb)
Parameters	Molodensky/ Bursa wolf parameters.
Grid File	File name of the NTv2 grid file (gsb). Please select only files that are in folder "ProgramData/BeamworX/gdal-data/grids. New gsb files should be added to this location.

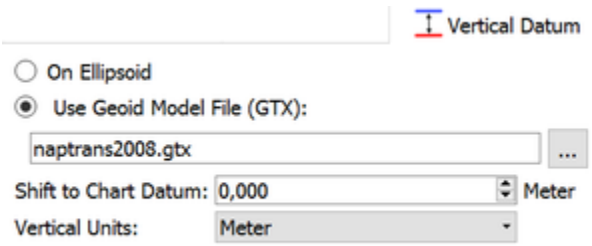
Projection Tab

- Various projection types can be selected here, for example Transverse Mercator, UTM, Lambert etc.
- For each type of projection a unique set of parameters must be entered.
- The horizontal units can be changed to any unit, vertical units should be entered in "Vertical Datum" tab.



Vertical Datum Tab

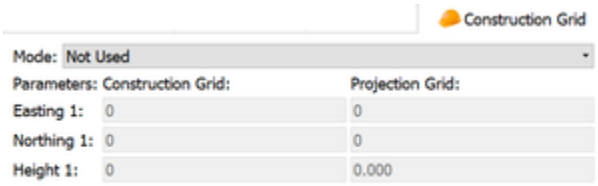
- Defines how the height is handled.
- This can be on Ellipsoid, then no further modifications to the height are done after the transformation.
- Or use a Geoid Model file (GTX). Note that selected file must be from ProgramData/BeamworX/gdal-data folder.
- Shift to Chart Datum: Extra height shift always applied. Use this to implement an extra shift, leave to zero when not used.
- The vertical units can be set to any kind of unit.



Construction Grid Tab

- Can be used to define a local construction grid. This is an extra re-projection of the projection grid coordinates to a local construction grid.
- Optional step, most user will never use this, default this will be not used.

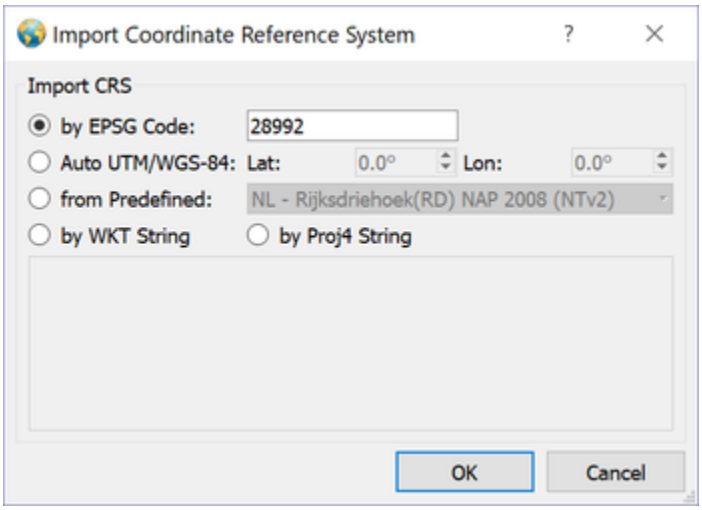
- Can be defined by two modes:
  "Defined by Two Points": by entering two points in both systems the translation, rotation and scaling are automatically calculated.
  "Defined by One Point and Azimuth" : by entering a single point and an azimuth (bearing), defined in both systems and scale factors.
- Note that only 1D height shift is supported, no scaling, so the projection grid and local construction grid can be defined by two parallel planes.



Import

The import function is available when a custom CRS definition is used. This can be used to import from various sources, an EPSG code, from the predefined list, EPSG Auto UTM/WGS-84 code based on Geographical Position,
a custom Proj4 string or a custom WKT string.

For the latter two you can just copy/paste a definition string from an other source, for example the website http://spatialreference.org/.



After the OK button is pressed the import is executed, the controls of the Edit dialog will be filled.

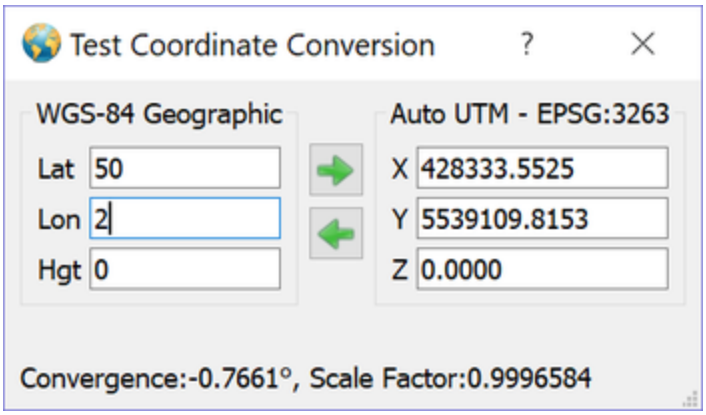
Save to Predefined

When this option is checked then the definition will be saved to the predefined list when the OK button is pressed. This allows you to remember this definition for future projects.
Make sure that the name of the definition is unique, duplicates are not allowed.

4) Test Option

This launches the test dialog. Here you can test the transformation. It will also display the Grid convergence and Scale Factor.

Note that lat/longs need to be entered in decimal degrees.



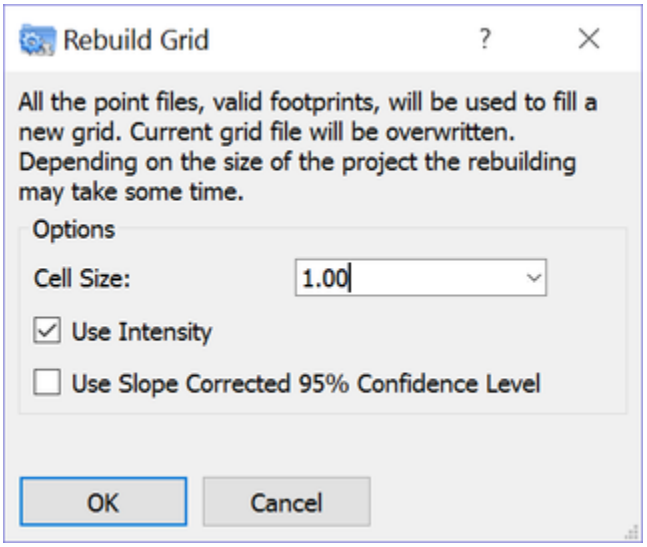
Currently only from WGS-84 to CRS and back can be tested.

Rebuild Grid

Rebuild the entire grid, all the point data of the ENABLED files inside the project are imported into the grid.

Optionally use an alternative cell size.

Note: the Grid origin will not be changed.



Use Intensity

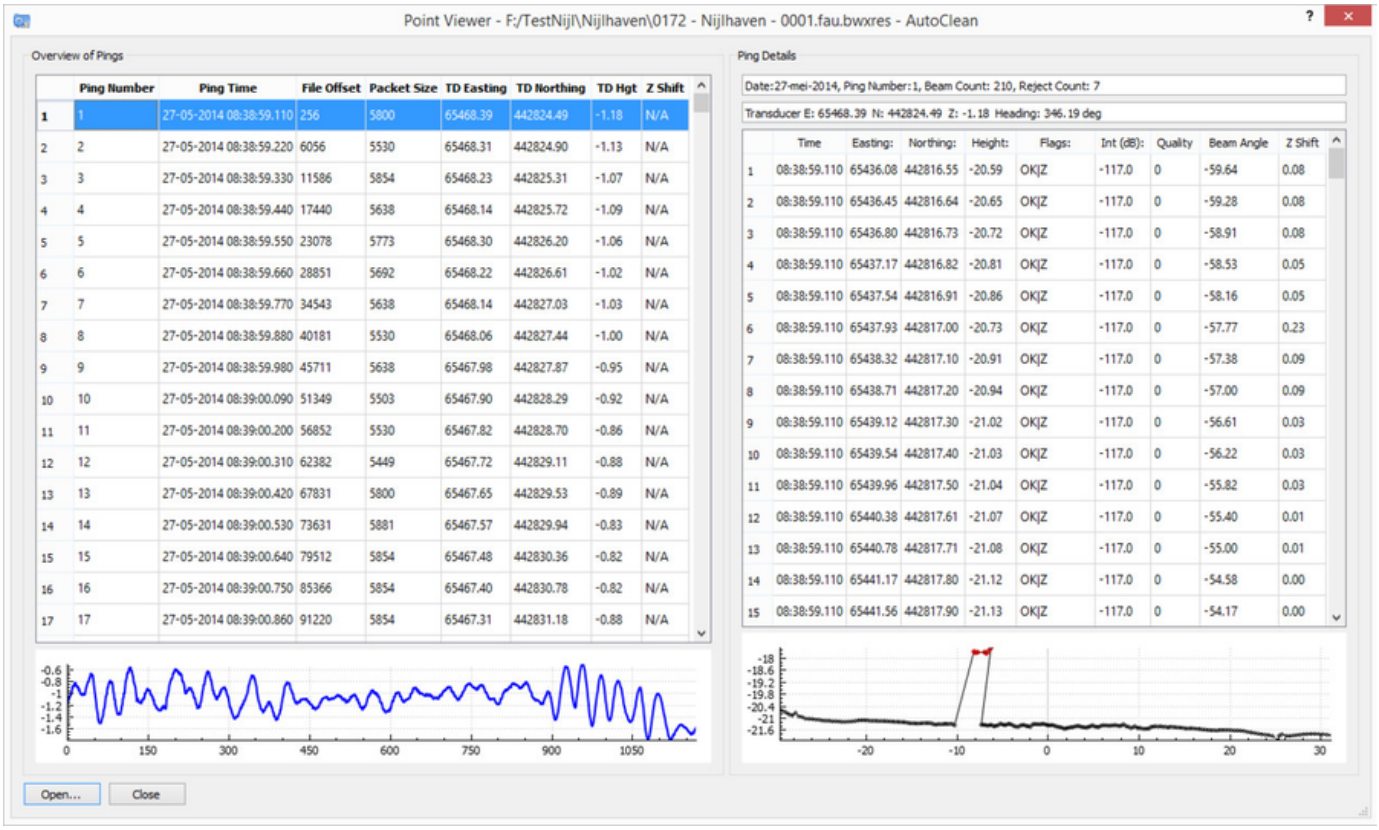
When this option is enabled the Intensity is loaded into an extra grid layer. This will allow you to inspect the intensity (backscatter/echo signal strength) of the footprint.
The availability and magnitude of the intensity depends on the used source files. The downside of using the intensity is a slightly larger memory usage of the program.

Use Slope Corrected 95% Confidence Level

When this option is enabled the "Corrected Confidence" Attribute will be activated. This requires an extra layer in the grid (which requires extra memory) and some extra grid building time.

View File

This dialog allows you to inspect a point file and all of its points and pings.



Left Table

All the pings (swaths) inside the file is shown, some ping meta data is presented here as well. A single ping can be selected from the list.

Right Table

A listing of all the points of the selected ping is shown. Various point properties are presented here. At the top some common ping properties are shown.

Bottom Left Graph

Presented in blue color. Shows the transducer height versus ping number.

Bottom Right Graph

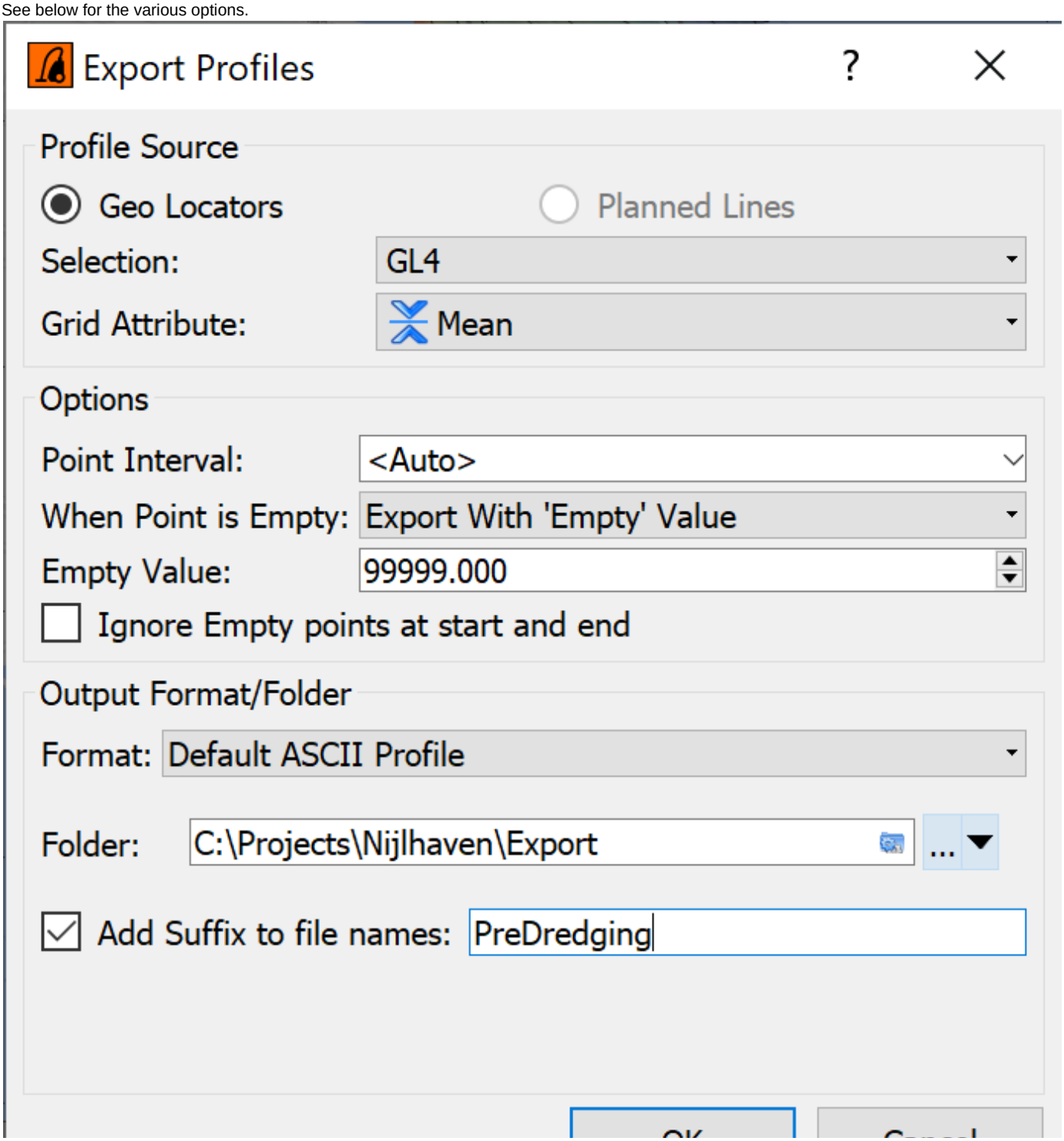
Presented in black color, This shows all the points inside the ping, Rejected points are colored RED, accepted points BLACK.

Export Profiles

Export grid cell data as a profile. Profile “cut” is defined by one or more Geo Locators (or in future Planned Lines of bwxres files). For each Geo Locator one file with profile data is created. Name of output files are created from Geo Locator name and the optional suffix.

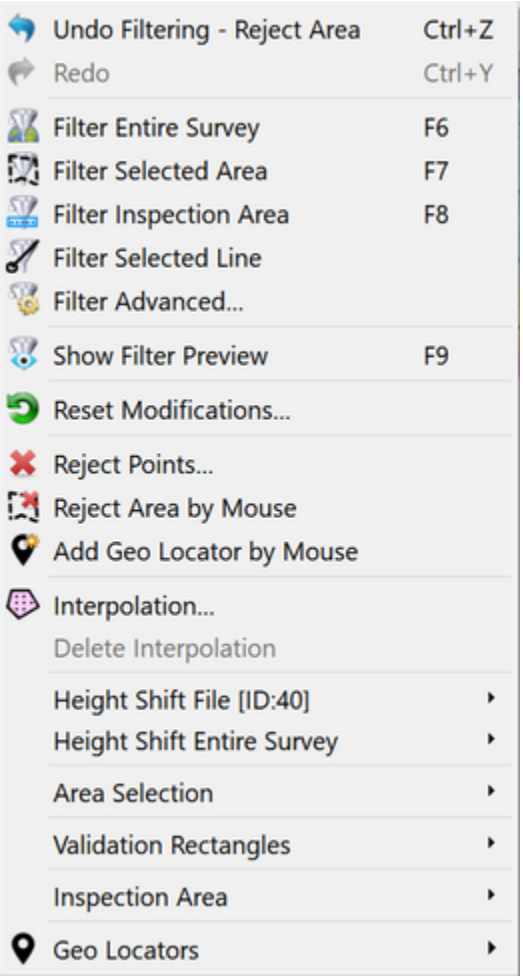
File name format: <GLNAME><Suffix>.<Extension>

See below for the various options.



Item	Description	Options
Profile Source - Geo Locators	Input line over which profile is cut out is of type Geo Locator.	*One or more Geo Locators can be chosen. The Geo Locator geometry should be a line or route that is used as the base for the profile.*
Profile Source - Planned Lines	Input line over which profile is cut out is of type Planned Line. Note that point file should be of type “bwxres” and contain a survey line.	Not yet supported.
Point Interval	The step size used to generate the profile. “<Auto>” means current grid cell size divided by 3.	<Auto> = automatic based on cell size. (step = cell size/3).
When Point Is Empty	How to handled that the found profile point /grid cell is empty?	**Export with Empty Value** The point is exported but the Z values becomes the user-specified “Empty Value”. **Do Not Export** The profile point is not exported at all. **Export Interpolated Value** The Point is exported but the Z value is interpolated from surrounding values. Note that when data is not found at very beginning and end these are not filled.
Empty Value	See option above. Replacement Z value when point is empty.	N/A
Ignore Empty Points at beging and end	When option is active the points at start and end of line that do not have cell data are not exported.	N/A
Format	Format of the generated profiles.	Currently hardcoded to “Default ASCII Profile”
Folder	Select Folder where profile files are written too.	N/A
Add suffix to filename	When option is active the generated file names are made unique with this suffix.	N/A

Edit



Menu Edit	Description
Undo/Redo	AutoClean remembers the last 3 Edit actions. They can be used to "Undo" and Redo.
Filter Entire Survey	Use the selected filter group to filter the entire survey.
Filter Selected Area	Use the selected filter group to filter the currently Selected Area.
Filter Inspection Area	Use the selected filter group to filter the Inspection Area.
Filter Selected Line	Use the selected filter group to filter the selected line.
Filter Advanced...	Launches the Filter Advanced Dialog, this allows for an advanced area and file selection.
Show Filter Preview	Preview the result of the selected filter in Inspection Area in all views.
Reset Modifications...	Restore rejections or height edits of selected points.
Reject Points...	Reject points inside or outside the Inspection Area or Selected Area.
Reject Area by Mouse	Chart View Reject by polygon mode.

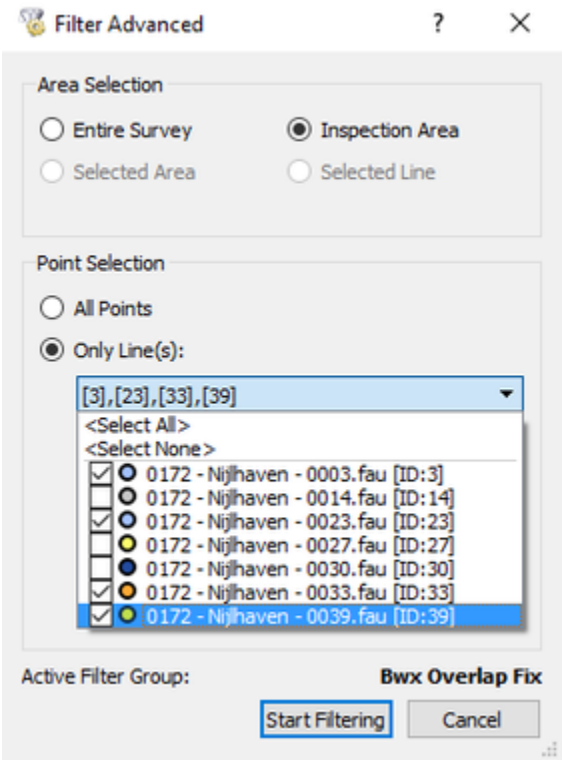
Add Geo Locator by Mouse	Starts mouse mode, it is now possible to create a GeoLocator by clicking in the view. Right mouse click will show the save dialog.
Interpolation...	Fill-in Holes in the Grid by Interpolation
Delete Interpolation	Remove the Interpolated points file and rebuilds the grid.
Height Shift File	[Selected Track ID] Apply various Height Shifting functions on the selected track.
Height Shift Entire Survey	Various Height Shifting functions on all the files in the project.
Area Selection	Various Area Selection functions.
Validation Rectangles	Setup and use Validation Rectangles.
Inspection Area	Use SHIFT + arrow keys to move it North, East, South and West.
Geo Locator	Various Geo Locator functions.

Filter Advanced

This dialog presents a complete overview of all available filtering options, but its main purpose is to filter specific lines (files) inside an area (Inspection Area or Selected Area).

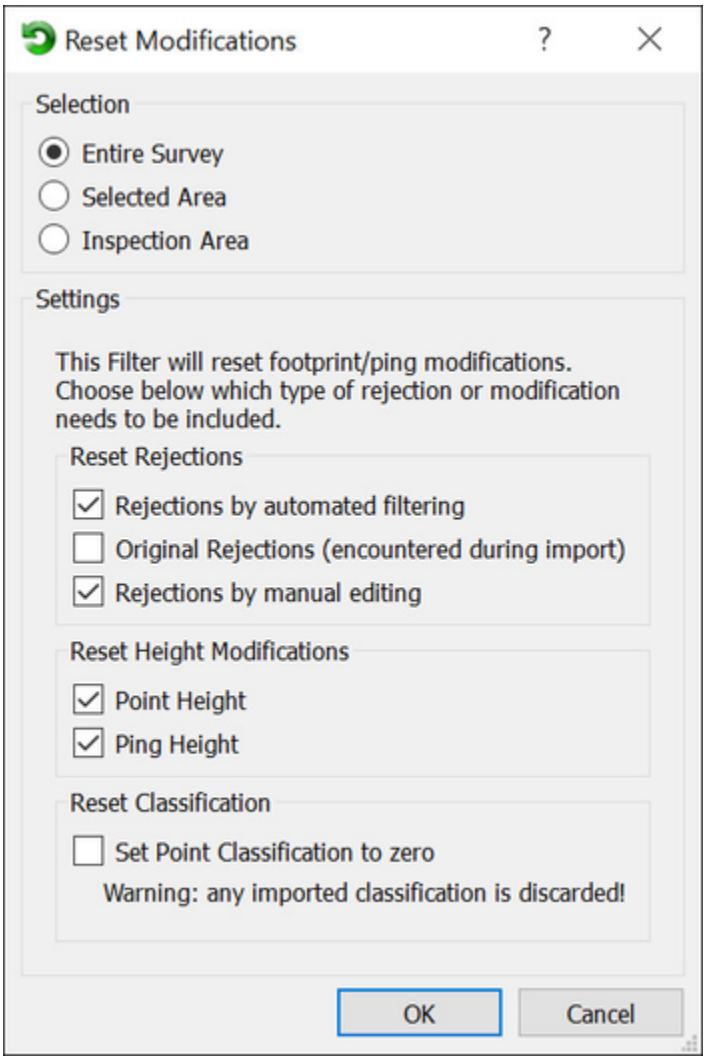
If you wish to filter all data in the area then select "All Points".
But if you wish to further refine the selection then select "Only Line(s)".
The selection box will show which lines are overlapping with the area. You can now select one or more lines that should be filtered.

Pressing the "Start Filtering" will close the dialog and run the filter.



Reset Modifications

This function will reset modifications that were made to the points, these comprise of either rejection/acceptation/height shifting/ping, height modification or classification change. This function can also be added to a filter group.



AutoClean modifies points based on the action taken. The different modifications are:

- Rejected by Automated Filter.
- Rejected Manual Editing.
- Original Rejections. These flags were set by the survey software during recording.
- Height Modifications set by a height modifying filter e.g. the "Overlap Fixer"(3.4.3.8).
- Ping Height Modifications. This originates from Height Shift File or Auto Height Fitting.
- Classification

Resetting the Classification will overwrite all point classification information, the original values can not be restored after this reset.

When the OK button is pressed, all the points in the selected area will be evaluated.

- When the point is rejected and and the rejection reason coincides with the selection it is RE-ACCEPTED.

- When the point contains a height modification, and this is selected in the settings then this height shift value will be REMOVED.
- When the ping contains a height modification, and this is selected in the settings then this height shift value will be REMOVED.
- When the Reset Classification is selected, for each point the classification is set to 0 (zero).

Note that it is currently not possible to re-reject accepted original rejections.
The rejected reason flags, auto,manual,original are kept when the point is re-accepted, this way it can still be distinguished as a previous rejection.

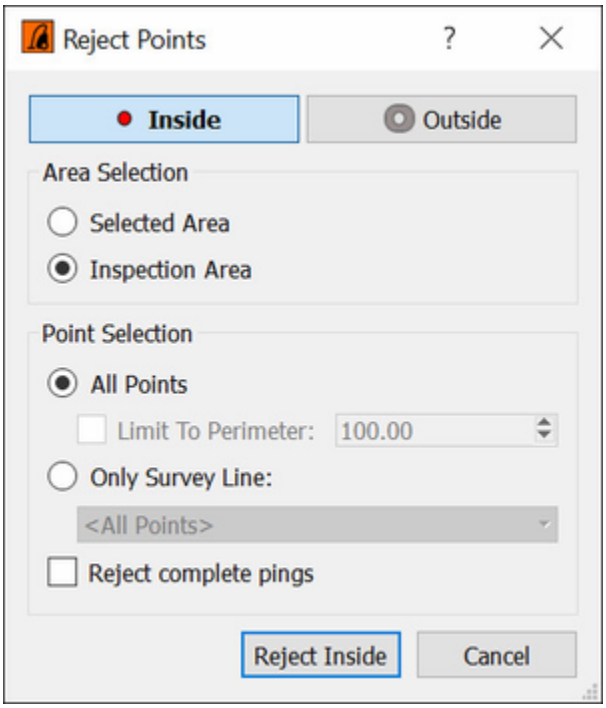
Every point in the AutoClean data set is either ACCEPTED or REJECTED. Beside this main flag each point also contains some flags that contain the reason for rejection.
Flags are also set when a point or a transducer position height has been modified (shifted) by AutoClean. The original height values are always remembered to so it can always be reset to the original state.

Reject Points

Reject points in Area. This option can only be used when an Inspection Area or Selected Area is selected.

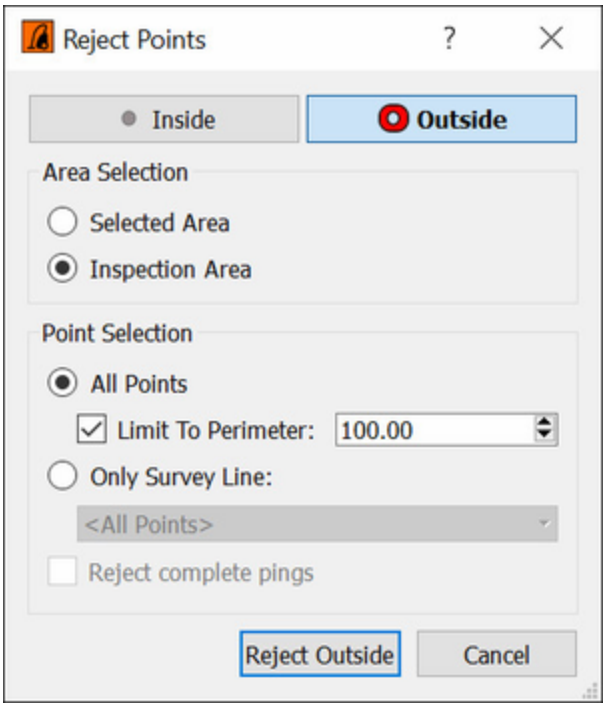
All accepted points inside an area or outside an area can be rejected. Variuos options are available to fine tune the selection.

Inside



Option	Description
Area Selection	Select either the Selected Area or the Inspection Area for the input
Point Selection - All Points	When activated all the points located inside the area are rejected.
Point Selection - Only Survey Line	When activated only the points belonging to the selected Survey Line are rejected. Note that the Selected Line is highlighted with its file color. Only Survey Lines that have an overlap with the Area are shown in the list.
Point Selection - Reject complete pings	When activated for every point that lies inside the area the entire ping is rejected. this includes points that are located outside of the area.

Outside



Option	Description
Area Selection	Select either the Selected Area or the Inspection Area for the input
All Points	Rejects all points outside the area. The area can be limited with the optional Perimeter value.
Limit to Perimeter	-When option is enabled only the points located between the Area and the Area blown up by the Perimeter distance are rejected. This can be handy when the survey consists of multiple "islands" of data. -When disabled ALL points outside the area are rejected.
Only Survey Line	When activated only the points outside the area AND belonging to the selected Survey Line are rejected. Only lines that overlap the current area are available in the list.

Reject Area by Mouse

This is a mouse mode for the Chart View to quickly reject data in the Chart View.

When this option is activated the cursor changes to the following shape:

This option allows you to quickly reject data in the chart view. With the left mouse button a polygon can be selected. The right mouse button will execute the reject action.
The rejection action can be reverted with the Undo function.

Identical to the "Select Area" mouse mode:

-Left mouse button adds a point to the selection

-The right mouse button click also adds a point to the selection

-Escape key cancels the selection

-Backspace key removes the last point

-Use the middle mouse button (the Scroll Wheel!) to pan the view.

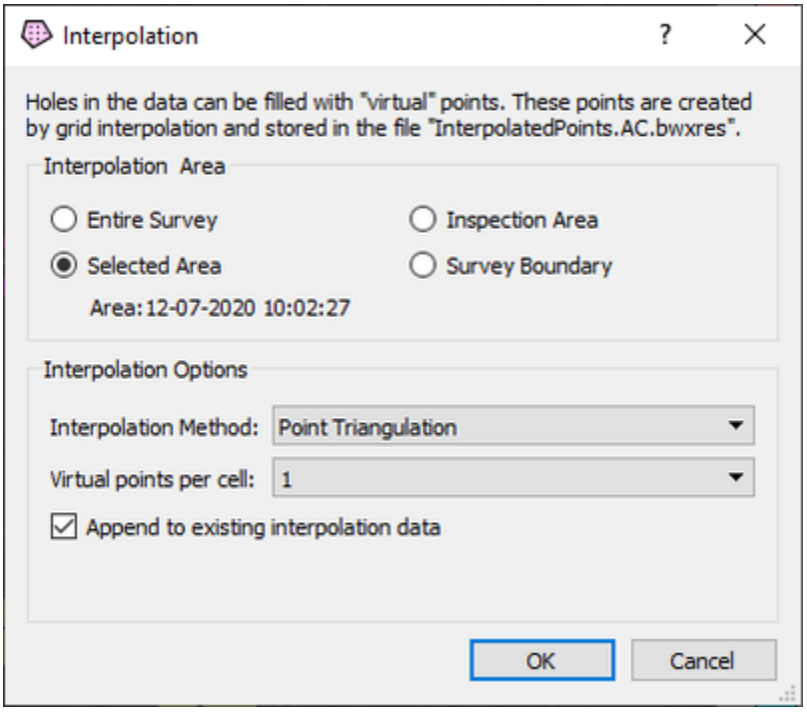
The mouse mode can be cancelled by pressing the toolbar button again or by unchecking the mouse mode in the Chart Views pop-up menu.

Interpolation

Fills holes in the grid with "virtual" points. The virtual points are created by interpolation based on neighboring grid cells. The generated points are stored in the file "InterpolatedPoints.AC.bwxres" and ADDED to the project. This way it is possible to continue updating/editing the grid. The point file is treated like any other point file in the project. You can export it, edit it, remove it from project etc. A quick way to remove the interpolated points is with menu option Edit|Delete Interpolation.
When a project supports "System Selection" (depends on source data) then a pseudo system "Interpolated-Points (ID:9999) is used for the interpolated points.

It is possible to Interpolate the Entire Survey Area or a selected area.
When a limited area is chosen ALL the empty cells inside the area are filled. For Entire Survey Area only empty cells are filled that are "surrounded" by filled cells.

To interpolate Single Beam data, set a survey boundary(in the "Quality Settings dialog") and use the method "Point Triangulation".



Item	Description
Interpolation Area	Select area to interpolate.
Interpolation Method	Inverse distance or Triangulation
Virtual points per cell	Number of points that are generated for the empty cell, this can be 1/4/16 /64. The points are equally divided over the cell. When "1" is chosen only one point is generated for the center of the cell.
Search Range (cells)	Number of cells that is maximum search for a filled neighbor.
Append to...	On: Existing interpolation points are kept. Off: All interpolation is refreshed. (only visible when existing interpolation data is found in project)

The Interpolation algorithm will look up the closest neighboring cells in each direction (N,NE,E,SE,S,SW,W,NW) in the grid and calculate a mean value based on distance weighting. The search range is limited by the user defined search range.

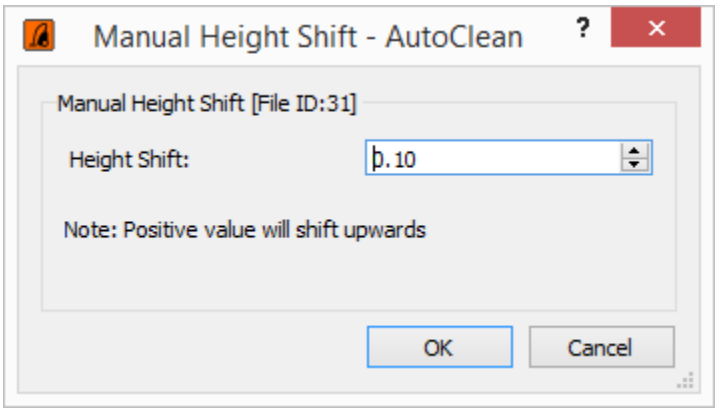
Height Shift File

The Height Shift sub menu is only available when a Track is selected and tracks are visible, see View Properties.

The shifts are applied to the transducer height, so the entire ping will be shifted vertically. Note that the original transducer height is not changed, the shifts are stored in the Bwxres file as a delta height.

Item	Description
Shift Pings to Neighbors	The selected track is shifted to its neighbors by using a best fit algorithm. This will work only when some overlap exists with the neighbors.
Shift Pings to Neighbors (Inspection Area)	The selected track is shifted to its neighbors. This will only apply to the pings inside the Inspection Area.
Reset Shifts	The applied height shift is removed.
Reset Shifts (Inspection Area)	The applied height shift is removed. This will only apply to the pings inside the Inspection Area.
Manual	Shift with a user defined value. See below.
Manual (Inspection Area)	Shift with a user defined value. This will only apply to the pings inside the Inspection Area. See below.

Manual Height Shifting



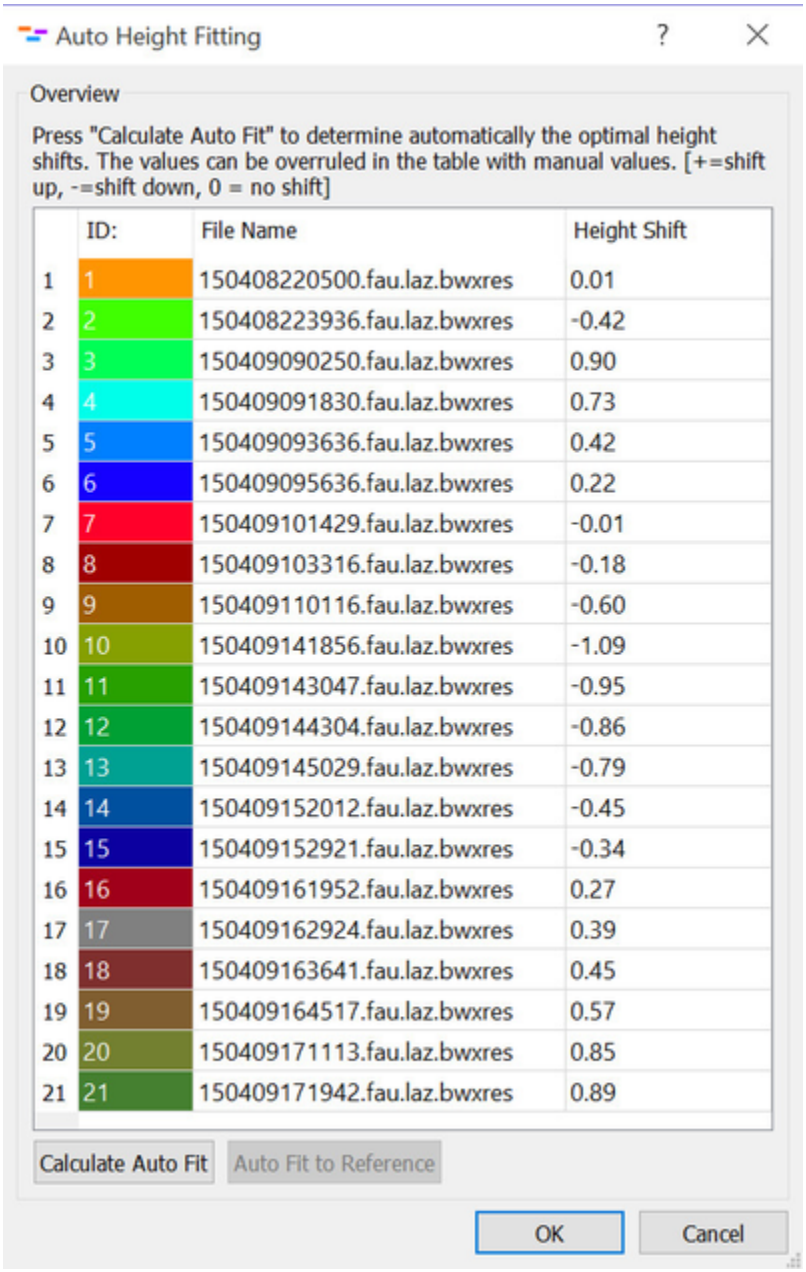
The height shifts are applied as an offset to the actual shift!

Auto Height Fitting

This options allows you to height shift all the files in the survey to a common (arbitrary) Height. This is handy when data was recorded with "unreliable height", e.g. when non-rtk GPS was used or USBL or affected by Tide.
There are two height fit methods, Auto Fit and Auto Fit To Reference, the latter shift all files to a grid reference layer.

A single height offset per file is calculated and applied to all the pings in the file.

When the dialog is started it will always be filled with zero's. Pressing the "Calculate Auto Fit" or "Auto Fit to Reference" button will start scanning files and the best fitting height per file is calculated.
Note that this can take a while but it can be cancelled at all times. After the calculation is done then the calculated shift values are shown in the table.



	ID:	File Name	Height Shift
1	1	150408220500.fau.laz.bwxres	0.01
2	2	150408223936.fau.laz.bwxres	-0.42
3	3	150409090250.fau.laz.bwxres	0.90
4	4	150409091830.fau.laz.bwxres	0.73
5	5	150409093636.fau.laz.bwxres	0.42
6	6	150409095636.fau.laz.bwxres	0.22
7	7	150409101429.fau.laz.bwxres	-0.01
8	8	150409103316.fau.laz.bwxres	-0.18
9	9	150409110116.fau.laz.bwxres	-0.60
10	10	150409141856.fau.laz.bwxres	-1.09
11	11	150409143047.fau.laz.bwxres	-0.95
12	12	150409144304.fau.laz.bwxres	-0.86
13	13	150409145029.fau.laz.bwxres	-0.79
14	14	150409152012.fau.laz.bwxres	-0.45
15	15	150409152921.fau.laz.bwxres	-0.34
16	16	150409161952.fau.laz.bwxres	0.27
17	17	150409162924.fau.laz.bwxres	0.39
18	18	150409163641.fau.laz.bwxres	0.45
19	19	150409164517.fau.laz.bwxres	0.57
20	20	150409171113.fau.laz.bwxres	0.85
21	21	150409171942.fau.laz.bwxres	0.89

Optionally you can overrule the found shifts by manual values. Pressing OK will apply the shifts. to the files.

Auto Fit Method

This algorithm uses a least square adjustment to calculate the shifts. It will try to obtain the best possible overall fit with the least amount of Height shifting.

It relies on overlaps so in order to make it work a good portion of overlap between the lines should exist.

Auto Fit will work best if your survey data includes some cross lines.

Auto Fit To Reference Method

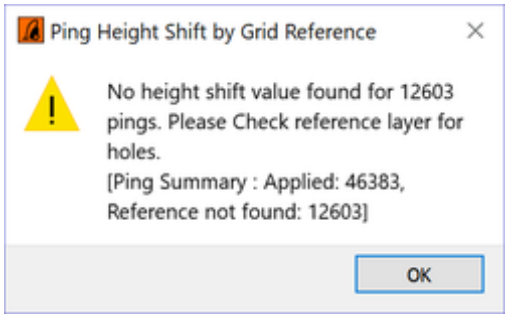
This method calculates the mean difference between the file and the grid reference layer. This mean difference will be presented as the shift value. When the shift is applied the file heights should be close to the reference layer's height.
Note that the button will be disabled when no reference layer is available in the grid.

The shifts are internally applied per ping, but in this case each ping in the file will be shifted with the same amount.

The found shifts value are corrections on earlier applied shifts. So when the the shift is calculated a second time the resulting shifts will be around zero.

Height Shift Entire Survey

This menu contains ping(!) height shifting function that apply to the entire survey (all files in project).
A ping is a collection of footprints so when the ping is shifted, this applies to all underlying footprints.

Option	Description
Auto Height Fitting	Calculates a best fit height shift value for all files.
Manual	Apply a single height shift to all pings. Note that the applied shift is a cumulative value, it is added to the existing shifts.
By Tide File	Shift all ping height by value from file, the value in the file is found by the ping time.
By Tide Stations	Shift all ping height by value from various tide stations/files.
By Grid Reference	Shift all ping heights by height value as read from the grid reference layer at the ping position. Note that the applied shift is a cumulative value, it is added to the existing shifts. A warning is generated after the shift operation when not all pings were shifted, this implicates that grid reference layer was not completely filled.  This operation is only possible when the grid contains a reference layer!
Delayed Heave	Apply a BeamworX delayed Heave file (.bwxhve). Here you can apply the difference between realtime and delayed heave directly to the transducer positions. This is only useful obviously when survey was done in Height Mode "Use Height Sensors" !!!
Reset Shifts	Sets all ping height shifts of all files back to zero.

Shift By Tide File

This options allows you to height shift all the files in the survey with a tide value from a Tide File. Currently only a single tide file is allowed. The file can contain actual tide levels or tide correction values, you can select add or subtract in the user interface.
It is expected that the heights of the points and the tide file have the same units, also is expected that they are both in the same time zone, this zone is arbitrary and depends on the imported point format but usually this is UTC.
If there is a discrepancy in the time zone, an offset in hours can be used.

Height shifts are only applied to files that are enabled in the Project Properties.

When the original, imported point file format does not contain support for ping time (e.g. XYZ, some LAS formats) this operation will not work

Dialog

The following dialog is shown, an explanation can be found below.

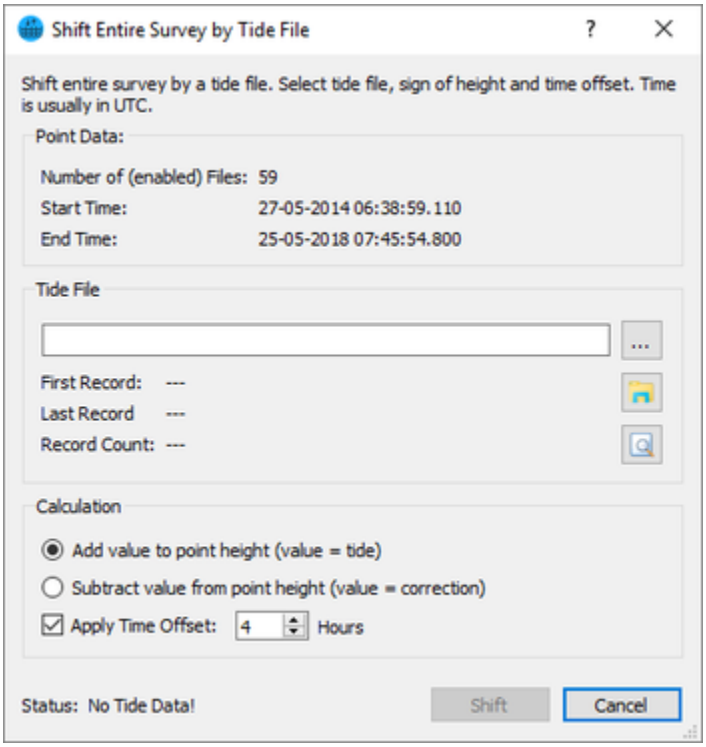


Figure: Shift By Tide Dialog

Gui Item	Description
Point Data	This shows the number of enabled files in the project, the smallest time found in all the points and the largest time found in all the points.
Tide File	This shows the name of the selected file. With the Browse button (...) you can change the file. File is loaded immediately when selected. When a file is loaded the first and last records in the file are shown as well as the number of record in the file.

	With the "Explore" button you can launch the windows explorer in the folder of the tide file. With the "View" button a new dialog is launched which shows the tide curve. See below for the dialog.
Calculation	Values in tide file can either be added or subtracted to the point heights. When the tide file contains the actual water level then select subtract. When the tide file contains a correction value, then select the add option. When point data and tide data are in different time zones then this can be compensated for by entering a time offset. The offset will be added to the tide times in the shift calculation.
Status	The Status label in the lower left of the dialog is an indicator of the time ranges of the data. It will show: OK - Tide times overlap the point data times. Tide Too New! - The point data is older than the oldest tide record. Tide Too Old! - The point data is newer than the newest tide record. Note that this label is updated when the time offset changes.

Preview Dialog

You can view the tide curve by clicking the  button. This will launch the dialog below.
Note that the chart shows the raw data from the tide file, no time or tide corrections are applied.

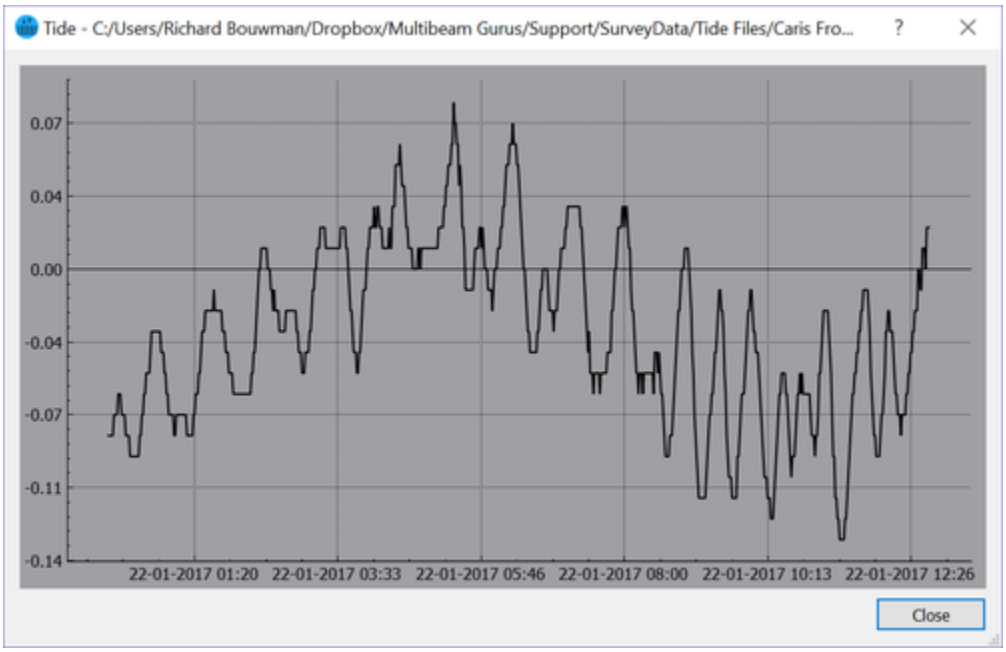


Figure:Tide Preview Dialog

Execute the shift

When the "Shift" button is pressed AutoClean will compare the tide time range against the point data range and generate a warning when the tide times do not overlap the point times. You can overrule this warning and apply the tide anyway.
When the shift is finished and problems were found then this is reported in a dialog. When the tide correction is not satisfactory you can undo and retry with other options or files.

Formats

The following formats are supported (currently just four).

Format	Description	Format
Caris or Hypack TID File	ASCII Text file as used by Caris/Hypack	Caris Dialect: YYYY/MM/DD<SPACE>HH:MM:SS<SPACE>DD.DD<CR/LF> Hypack Dialect: YYYY/MM/DD<SPACE>HH:MM<TAB>DD.DD<CR/LF>
QINSY Tide File	ASCII Text file as used by QINSy	DD/MM/YY<SPACEorTAB>HH:MM:SS<<SPACEorTAB>>DD.DD<CR/LF> DD/MM/YYYY is also supported.
Hypack TDX File(new)	ASCII Text file as used by Hypack	HH:MM:SS<SPACE>DD.DD<SPACE>MM/DD/YYYY<CR/LF>
OceanWise ASCII Delimited	ASCII Text File, TAB separated, extension txt	"idSite" "Site Name" "Date Time" "Observed" "Predicted" "Surge" "MSL" "Residual" "StdDev" "Status" "Quality" "Quality Flag"3105 Albert Dock 2021-10-13 00:00:00 5.686 5.82 -0.134 0 100 0 Note:Only "Observed" column is decoded.

Note that the date separation character is flexible, this can be either '/', '-', or omitted.

The shifts are internally applied per ping, the shifts are applied in a cumulative manner, it will not replace an existing ping shift value but simple add to it. You can at all times use undo to discard the tide shift.

Shift By Tide Stations

This option allows to height shift all the (enabled) files in the survey with an interpolated tide value that originates from multiple stations. For each station one or more tide files can be assigned.
It is expected that the heights of the points and the tide file have the same units!

Height shifts are only applied to files that are enabled in the Project Properties.

When the original, imported point file format does not contain support for ping time (e.g. XYZ, some LAS formats) this operation will not work

Dialog

The following dialog is shown, an explanation can be found below.

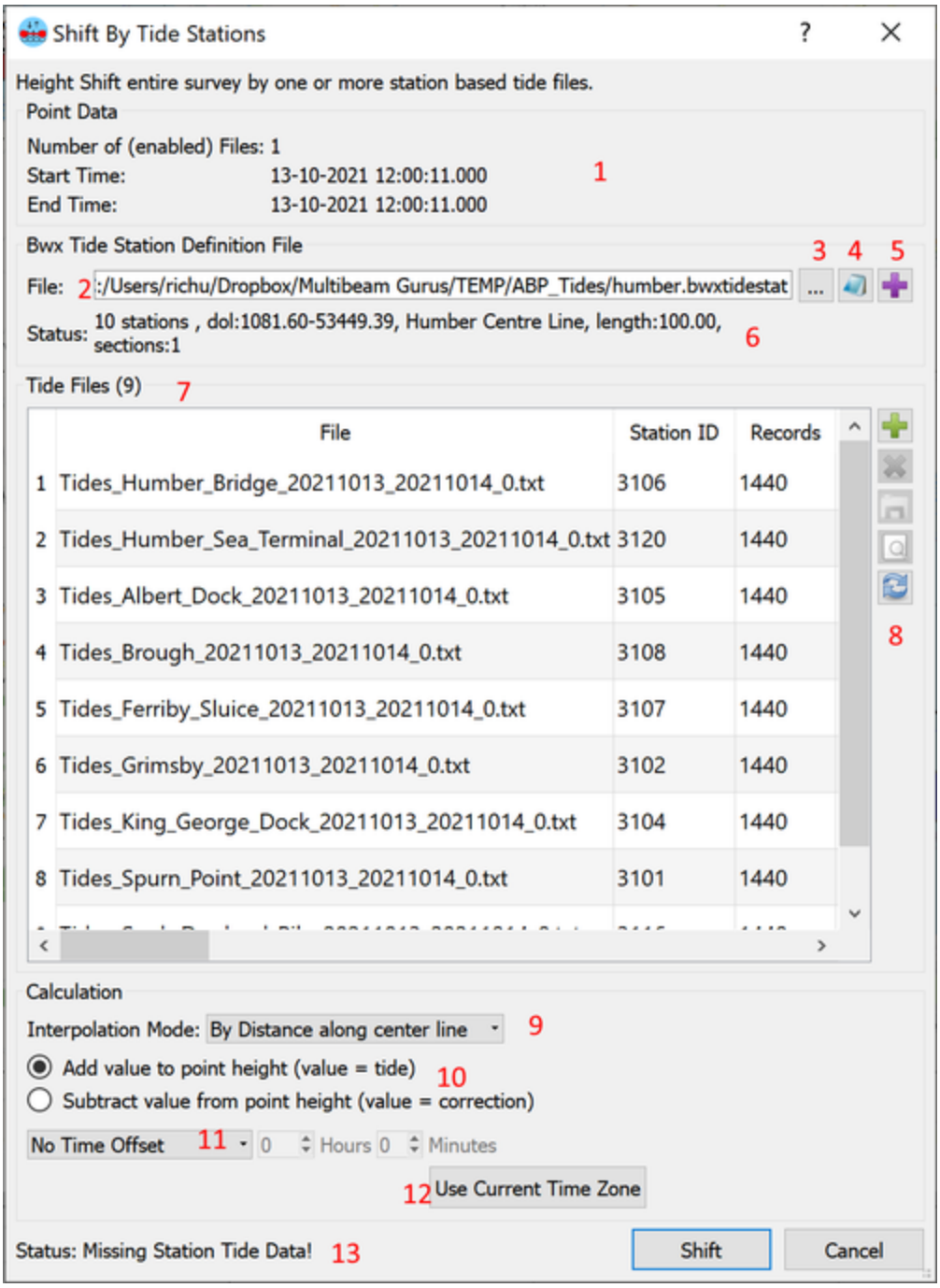


Figure: Shift By Tide Stations Dialog

#	Gui Item	Description
1	Point Data	This shows the number of enabled files in the project, the smallest time found in all the points and the largest time found in all the points.
2	Tide Station	

	File	This shows the name of the selected BeamworX tide stations file (.bwxtidestat). This ASCII file contains the tide stations definitions and the optional center line of the river. Note that there is no editor for this file you must edit it in notepad or other ASCII editor, check status message(# 6) for any problems in reading the file. You can import any BeamworX Tide Stations File (bwxtidstat) into the Geo Locators. This will show stations AND Center Line.
3	Browse	With the Browse button (...) you can change the file. File is loaded immediately when selected. When a file is loaded the status message(see #6) is updated. Check this status to see that the contents were read successfully.
4	Edit in Notepad	Press to open selected stations def file in notepad. Note that when you edit/save notepad you should browse to it again and select it so its contents are reloaded.
5	Create New	Press to create a new default station definition file. This file can be used as a starting point for your own station file.
6	Tide Stations Status	This label shows the currently loaded tide stations. It shows the number of stations, the minimum and maximum distance Along Line (Chainage) of the stations, the Center line name, length and number of sections.
7	Tide Files	Table of tide loaded tide files shows file name tide station ID and number of records. The Station ID is essential!! This ID links a tide data file to a station and can not be zero. **If Station ID is not supported by the file format you can assign it manually by double clicking on the cell in the table!**
8	Tide File Controls	Use buttons to: add (multiple) files, remove, browse to location, view Tide File curve, rescan all files.
9	Interpolation Mode	How tide is interpolated: **By distance along center line** For each ping position the Distance along the Centerline (Chainage) is calculated, then based on this the two adjacent tide stations are found. Next the tide is looked up by ping time in each tide station file. Then the two found tides are interpolated based on the distance along line(weight = 1/distance). When ping is located before the first station or past the last station then only that respective station is used. **By weighted inverse distance** For each station file the tide is looked up by ping time in each tide station file. For each ping position the horizontal ranges to all stations are calculated. Then the found tides are interpolated based on these ranges (weight = 1/distance).
10	Calculation	Values in tide file can either be added or subtracted to the point heights. When the tide files contain the actual water level then select subtract. When the tide files contain correction values, then select the add option. When point data and tide data are in different time zones then this can be compensated for by entering a time offset. The offset will be added to the tide times in the shift calculation.
	Status	The Status label in the lower left of the dialog is an indicator of the time ranges of the data. It will show either OK or an error message. When there is an error you can press the "Shift" button. Then an error message is shown with more exact information on the problem.

Preview Dialog

You can view the tide curve by clicking the  button. This will launch the dialog below.
Note that the chart shows the raw data from the tide file, no time or tide corrections are applied.

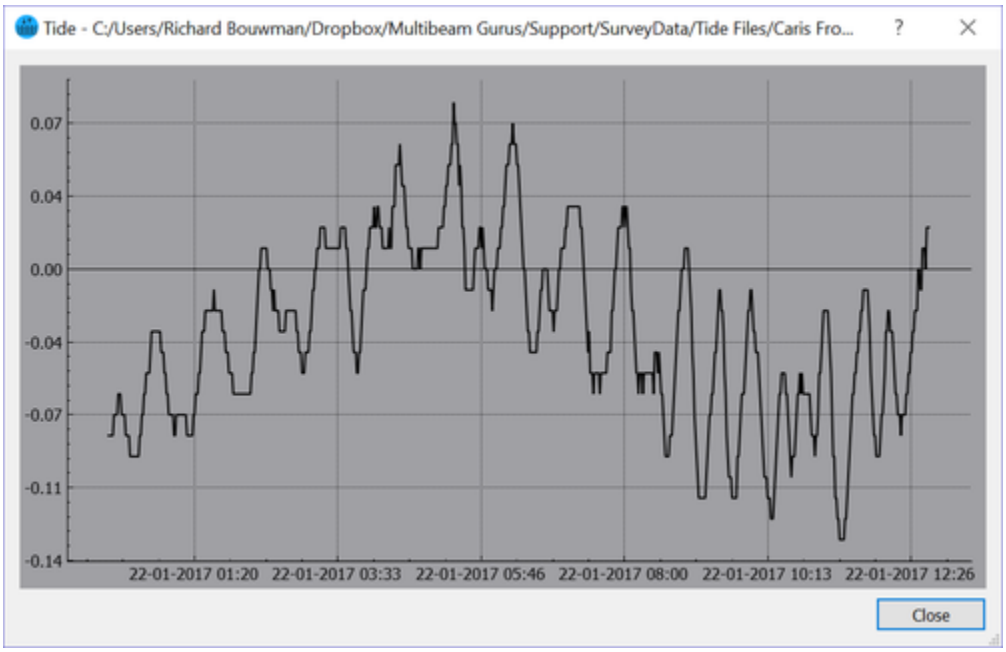


Figure:Tide Preview Dialog

Execute the shift

When the "Shift" button is pressed AutoClean will compare the tide time range against the point data range and generate a warning when the tide times do not overlap the point times. You can overrule this warning and apply the tide anyway. Only the stations are used that have data!

Each Tide file must have a non-zero station ID assigned to it. You can edit the station ID in the file table when required (double-click cell). Currently only the OceanWise format supports station ID, other file formats need manual assignment.

When the shift is finished and problems were found then this is reported in a dialog. When the tide correction is not satisfactory you can undo and retry with other options or files.

Formats

The following formats are supported (currently just four).

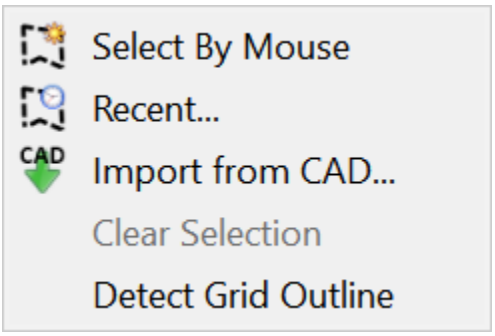
Format	Description	Format
Caris or Hypack TID File	ASCII Text file as used by Caris/Hypack	Caris Dialect: YYYY/MM/DD<SPACE>HH:MM:SS<SPACE>DD.DD<CR/LF> Hypack Dialect: YYYY/MM/DD<SPACE>HH:MM<TAB>DD.DD<CR/LF>
QINSY Tide File	ASCII Text file as used by QINSy	DD/MM/YY<SPACEorTAB>HH:MM:SS<<SPACEorTAB>>DD.DD<CR/LF> DD/MM/YYYY is also supported.

Hypack TDX File(new)	ASCII Text file as used by Hypack	HH:MM:SS<SPACE>DD.DD<SPACE>MM/DD/YYYY<CR/LF>
OceanWise ASCII Delimited	ASCII Text File, TAB separated, extension txt	"idSite" "Site Name" "DateTime" "Observed" "Predicted" "Surge" "MSL" "Residual" "StdDev" "Status" "Quality" "Quality Flag"3105 Albert Dock 2021-10-13 00:00:00 5.686 5.82 -0.134 0 100 0 Note:Only "Observed" column is decoded.

Note that the date separation character is flexible, this can be either '/', '-', or omitted.

The shifts are internally applied per ping, the shifts are applied in a cumulative manner, it will not replace an existing ping shift value but simple add to it. You can at all times use undo to discard the tide shift.

Area Selection



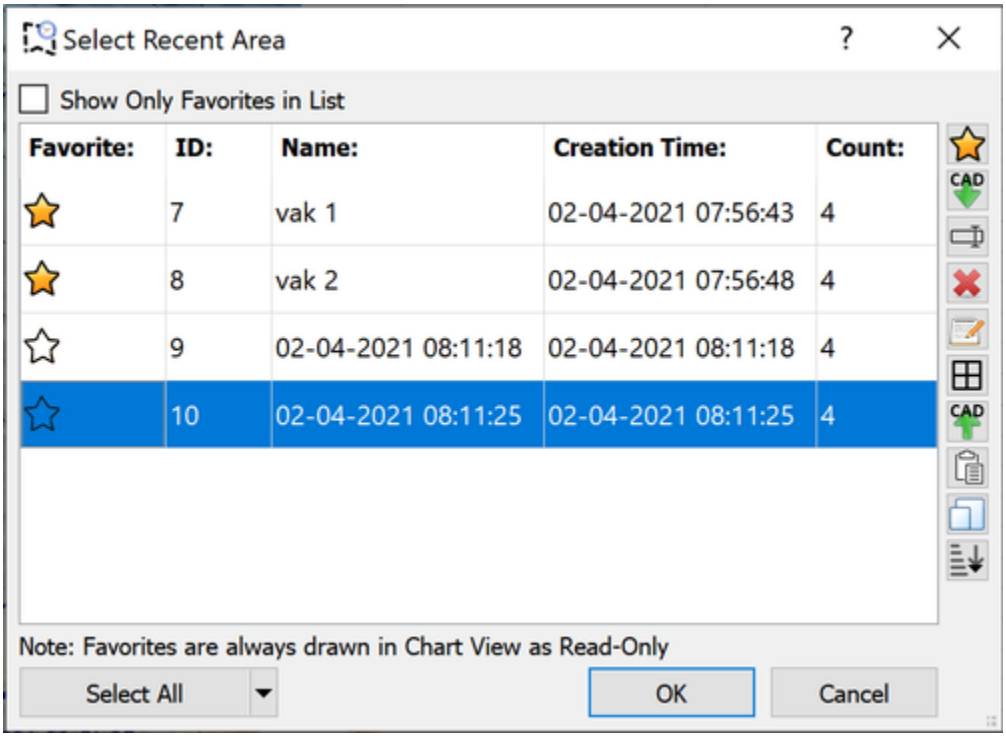
Menu	Description
Select By Mouse	Click the button and select an area in the Chart View with the LEFT mouse button. The last point is entered by using the RIGHT mouse button. The operation cancels with the "Escape" key. The last clicked point can be removed with the "Backspace" key.
Recent...	Select an area from the recently used areas. Also to manage the recently used areas.
Import from CAD...	Import areas from a CAD file, various formats are supported, e.g. AutoCAD DXF, ESRI Shape files, KML etc. Also our internal Selected Areas(*.bin) format is supported.
Clear Selection	Resets the selection, the selected area will be removed from the chart view.
Detect Grid Outline	Detect the outline of the grid and creates a selected area from it.

Recent

This dialog shows a list with recently used "Selected Areas". When a new polygon is selected in the chart view it is automatically shown here. Also imported areas are presented here.

Note that when pressing the cancel button, any changes will be discarded. When pressing OK any changes are saved and when the selection was changed a new area is selected in the Chart View.

The selected and all the favorites are always shown in the chart view. The non-favorites count is limited to 9999. When you are making many areas please set them as favorite to avoid loss of areas.



The current "Survey Boundary" is highlighted green and the current selected area is blue.
Use the checkbox to view only the favorites.

Buttons

 Toggle favorite status. The favorites can be used when there are a lot of areas. Note that favorites are always drawn in the Chart View.

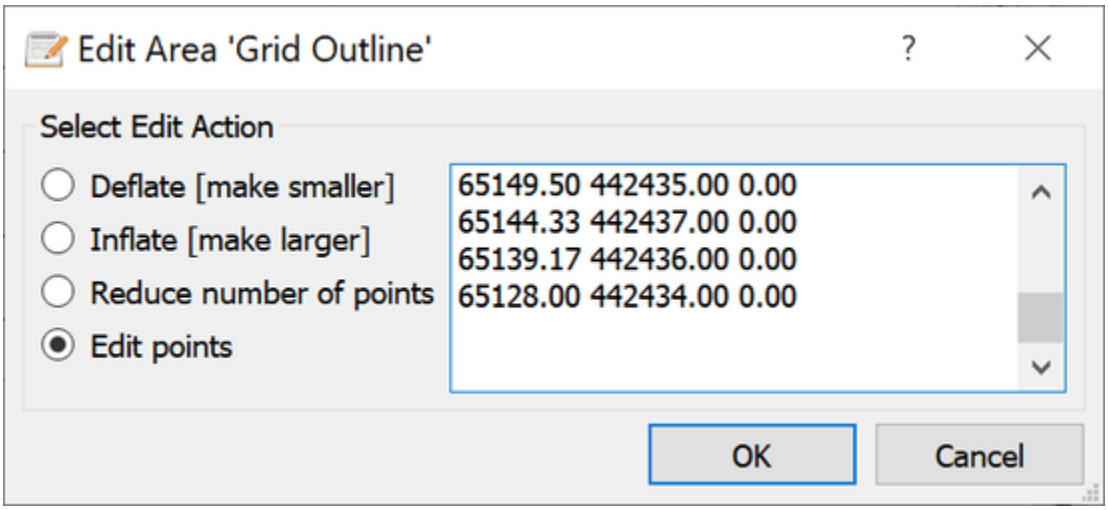
Launch Import CAD dialog to import Selected Area from various CAD formats (DXF, Esri Shape etc.)

It is also possible to import Selected Areas from another project here, just import the "SelectedAreas.bin" file from the other project folder.

 Edit Name. Click the button to edit the name of the selection. The name can also be double clicked to start the name edit mode.

 Delete the selected area{s).

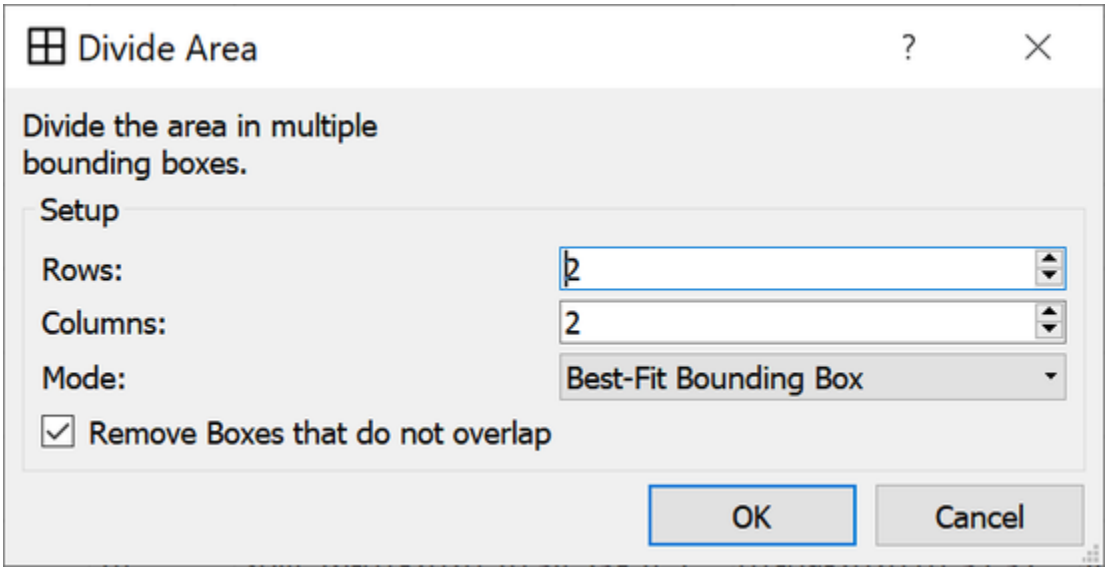
 Edit the selected area(s).



Select function: Deflate, Inflate, Reduce or Edit function. Also enter the desired amount or number of points (vertices). The Edit points function will show the complete list of coordinates, these can be fully edited. and press OK.

 Divide Area in multiple bounding boxes

This function can be used to split an area in multiple areas in a matrix style. This way you can divide a large survey area in several smaller parts for example.



Enter the number of rows (horizontal direction) and columns (vertical direction). The mode is either Best-Fit or north oriented box.

The Remove options will remove boxes that do not overlap with the source Selected Area.
The resulting boxes will be added as favorite selected areas to the bottom of the list.

Export to CAD File.

Export one or more selected areas to a CAD file. This uses GDAL functionality. Note that only a limited number of formats are currently supported.
The supported formats are: Atlas BNA, AutoCAD DXF, GML, Microstation DGN, Google KML, ESRI Shape File.
For the google KML you must have specified a Project EPSG code in the Project Properties because the KML contains WGS-84 coordinates and hence require datum conversion.
The "Selected Area" Color, see View Properties, is assigned to the exported cad objects.

Note: Text Labels are not exported.


Export to Clipboard.

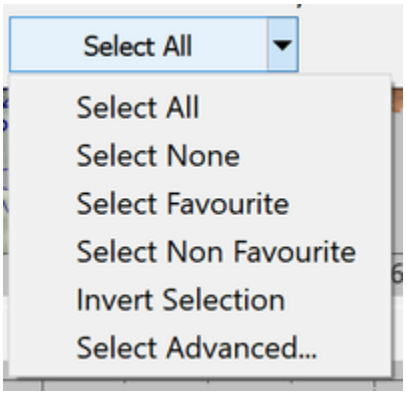
The coordinates of one or more selected areas are placed on the Windows Clipboard. You can paste them in text editor, excel etc.


Clone.

A clone is created with the name "Clone". This is useful to maintain clip edges with identical edges.

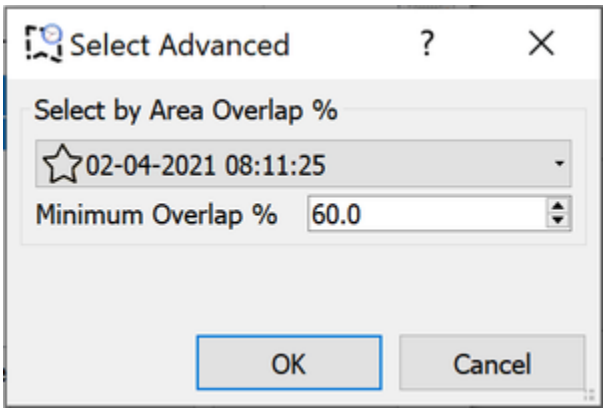

Sort Areas.

This sorts the areas in the list. Different methods are provided.



Selections in the list can be done with this button.

The Advance Option can be used to select areas that overlap to a certain percentage to the selected area:



Import CAD

Use this option to import Areas from an external CAD file. Various formats are supported through the GDAL/OGR Library (e.g. AutoCAD DXF, ESRI shape files, S-57 etc).

Also our internal Selected Areas(*.bin) format is supported.

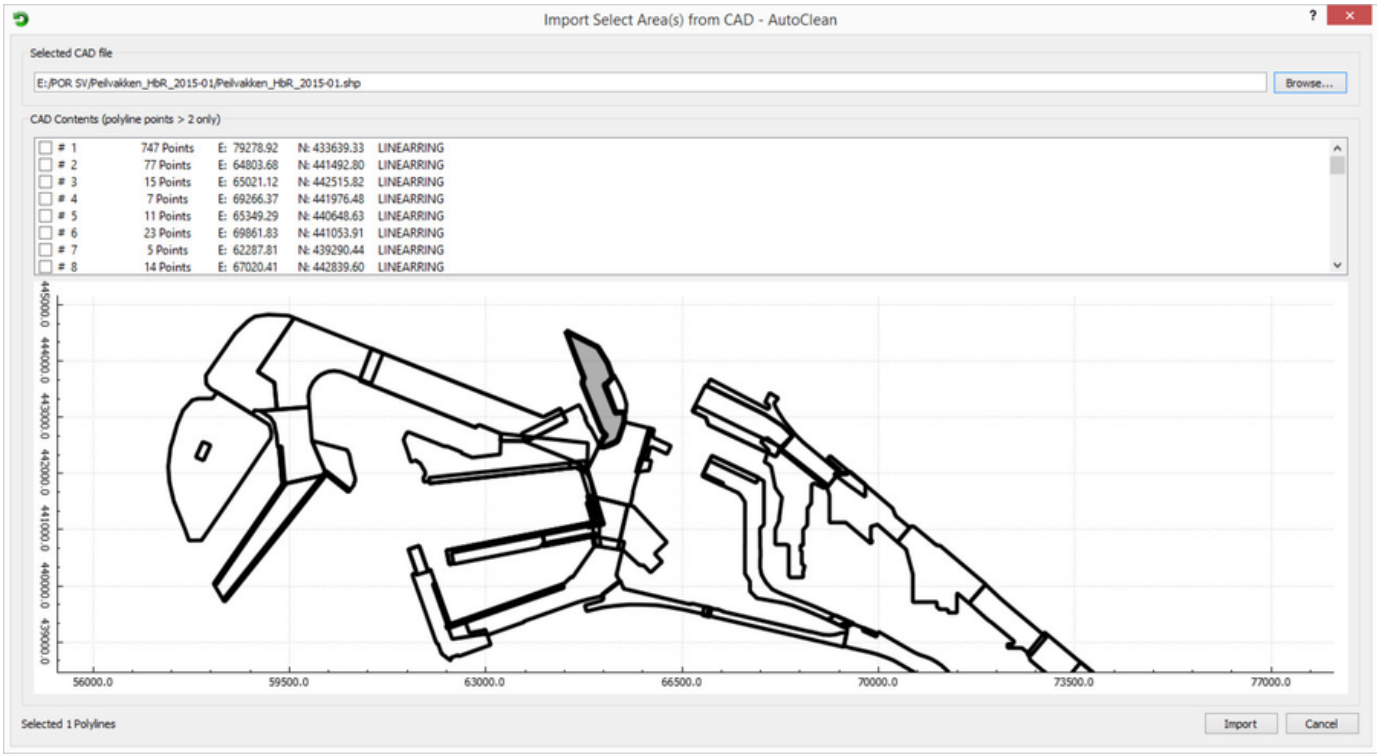
The imported points can only be used for "Selected Areas". Not as sounding points.

When importing formats that contain geographical coordinates (lat-lon), for example GML or KML, then the coordinates will be converted to the project CRS automatically during the import.
Make sure to select a proper Coordinate Reference System (CRS) in the Project Properties. When no CRS is used then the coordinates will import in lat-lon.

First Browse to a CAD file. After selecting the file will be read. The resulting polylines are displayed in the list.

Select one or more polylines. The selection can be done either with the checkboxes in the list or with mouse clicks in the chart. It is possible to click on the line of the area in the chart with the left mouse button, this will select the area.

After selecting one or more lines press the import button. AutoClean will now automatically select the imported line and them to the "recent selected areas".



Detect Grid Outline

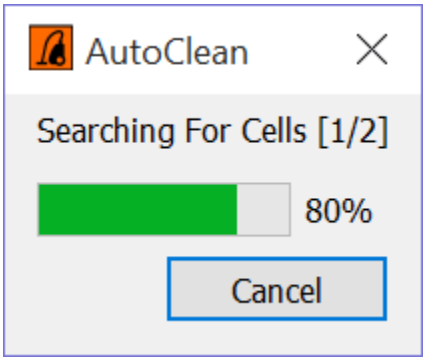
AutoClean can generate a Selected Area from the grid cells.

Procedure

1) Click the menu item, cursor icon will change to a cross.

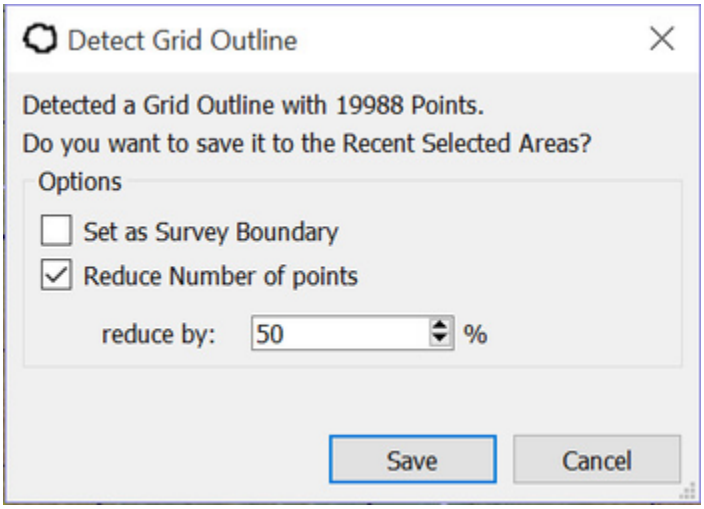
2) Then click on the filled(!) grid cell area that you would like to create an outline around. If the grid consists of two "islands" each island should be detected independently.

3) Now the detection procedure is executed. This can at all times be cancelled.



When the detection is finished a dialog is shown with the results.

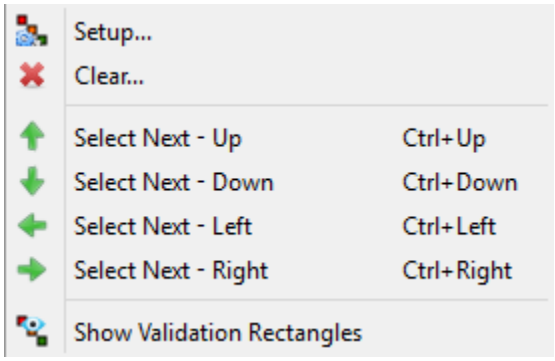
4) Save the detected grid outline



The Dialog shows the number of points in the detected outline.

- Optionally the Polygon can be set at the Survey Boundary.
- Optionally the number of points can be reduced by a percentage, 60% reduction means in this example 0.6 x 19988 = 11192 points left.
- Pressing Cancel will discard the polygon completely.
- Pressing Save will save the polygon to the recent selected areas, name is "Grid Outline".

Validation Rectangles



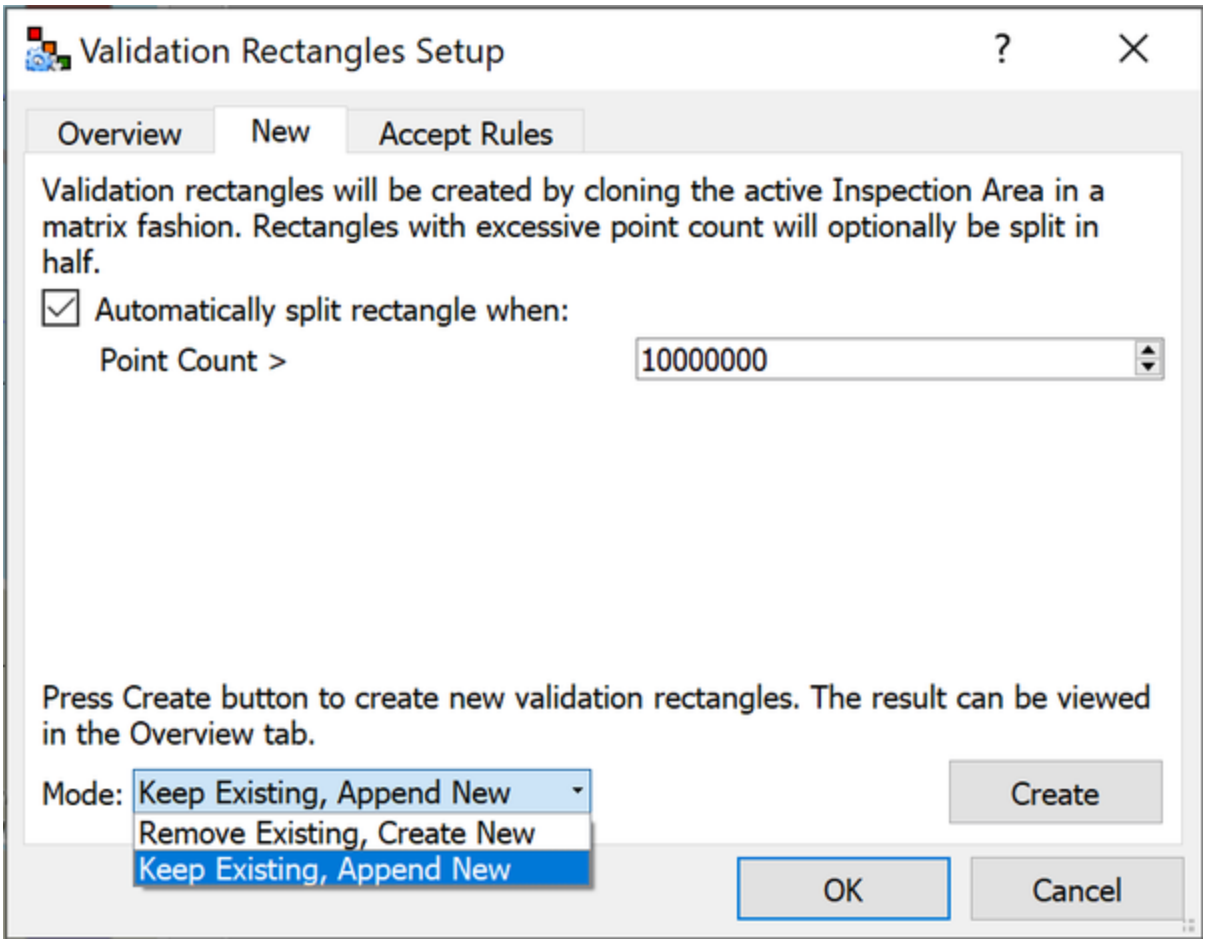
Validation rectangles can be used to assist the user with the (manual) cleaning process.

It allows a big survey area to be split in manageable smaller areas, the validation rectangles.
These individual areas can easily be navigated through and the progress of it can easily be tracked.

Creation

In order to use the validation rectangles they should be created first.
The first step is to select an Inspection Area in the Chart View. This area will form the reference of all the validation rectangles, it will be cloned in a matrix type fashion, in such way that the entire survey is covered by these rectangles.
So make sure that the inspection area has the appropriate width, height and azimuth.

Next start the Setup Dialog through menu Edit|Validation Rectangles|Setup.



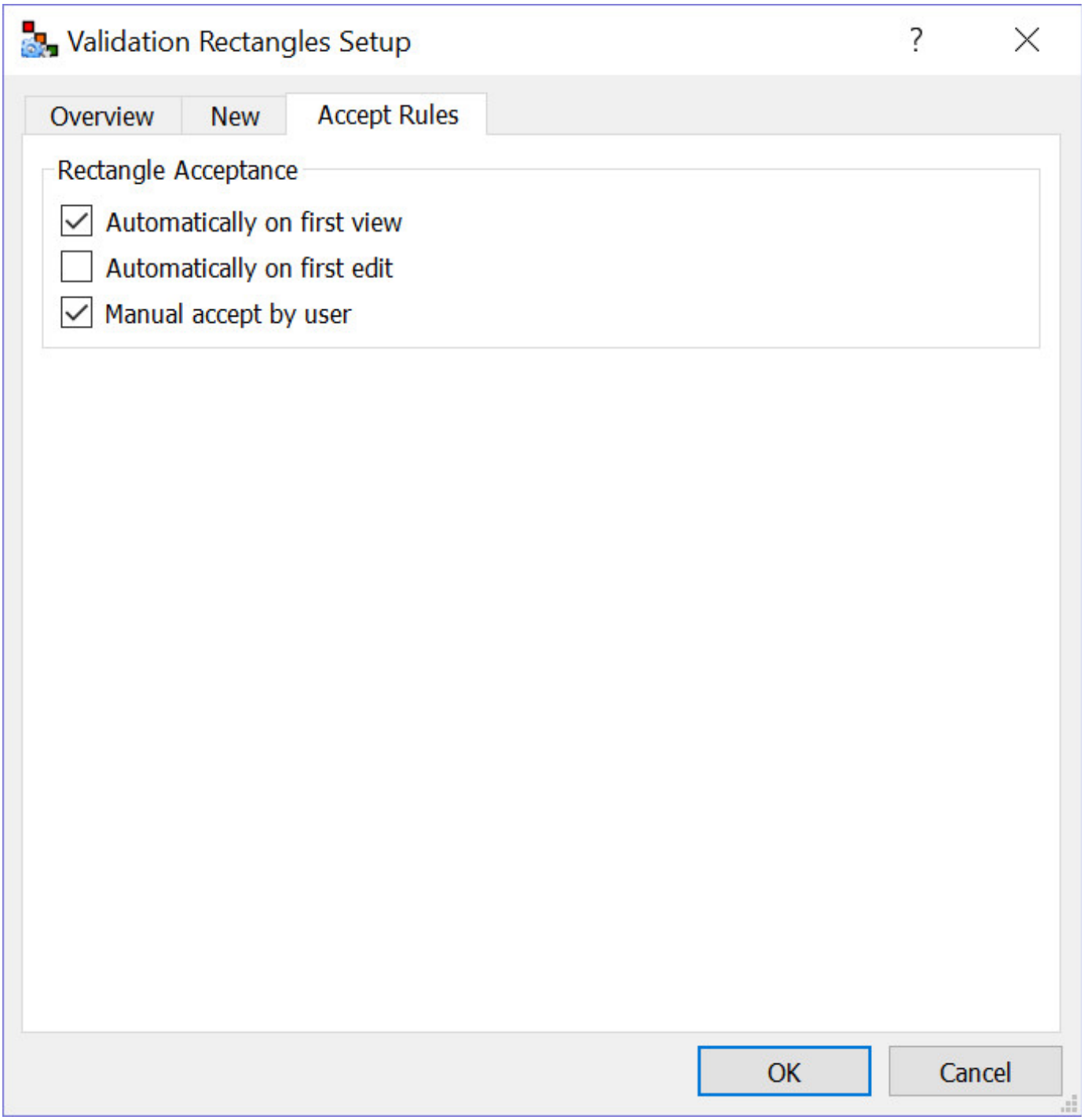
Use the New tab to create new rectangles. An optional maximum point criterion can be set. When the created validation rectangle exceeds this number of points than it will be split in two equal parts.
This will continue as long as the maximum point count is exceeded.

The mode allows you to either create completely new rectangles or append new to the existing set. The latter can be handy when new data was added to an existing project. Note that in mode "Keep existing" the previous validation rectangle size is used.
Note that in this mode existing rectangles will be removed when it is not covered by data anymore!

Press the Create button, now all the rectangles are created and visible in the Overview Tab. Optionally set also the accept rules on the next tab.
Press OK in the dialog to keep the validation rectangles.

Accept Rules

A Validation rectangle can have a "To Do" status (drawn in red color) or an "Accepted" status (drawn in green).
Depending on certain events and these accept rules, the validation rectangle status can change to "Accepted".

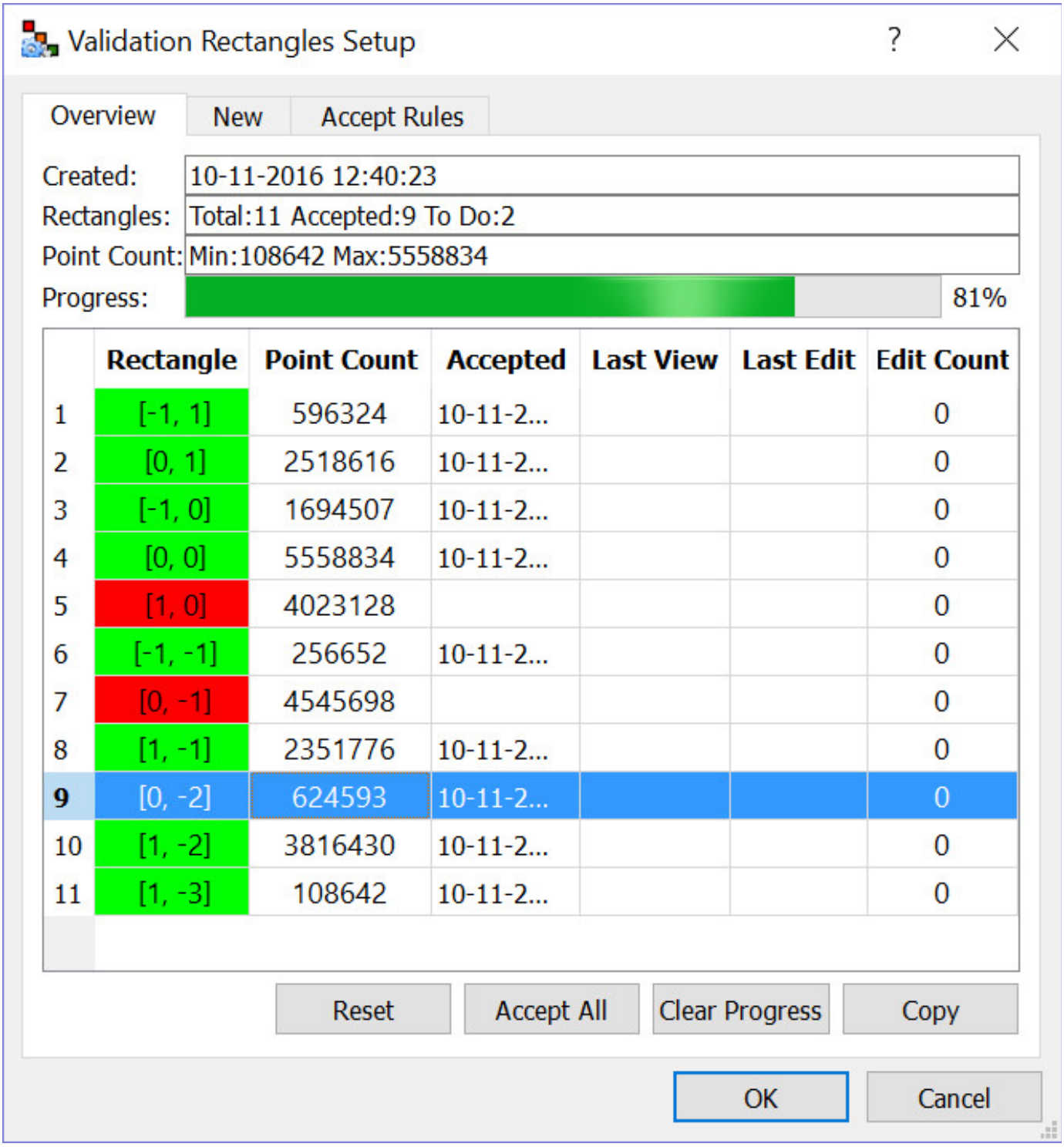


Rule	Accept when
Automatically on first view	When the points inside the validation rectangle are loaded into the inspection area.
Automatically on first edit	When at least one point that lies inside the rectangle is modified (manual or automatically).

Manually accept by user	Usef select right mouse button context menu, "accept rectangle".

Overview

The overview Tab provides some data on the creation of the rectangles and the progress

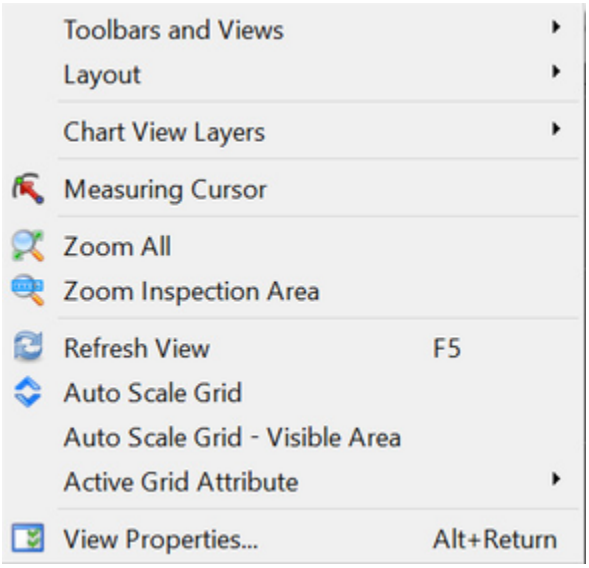


	Rectangle	Point Count	Accepted	Last View	Last Edit	Edit Count
1	[-1, 1]	596324	10-11-2...			0
2	[0, 1]	2518616	10-11-2...			0
3	[-1, 0]	1694507	10-11-2...			0
4	[0, 0]	5558834	10-11-2...			0
5	[1, 0]	4023128				0
6	[-1, -1]	256652	10-11-2...			0
7	[0, -1]	4545698				0
8	[1, -1]	2351776	10-11-2...			0
9	[0, -2]	624593	10-11-2...			0
10	[1, -2]	3816430	10-11-2...			0
11	[1, -3]	108642	10-11-2...			0

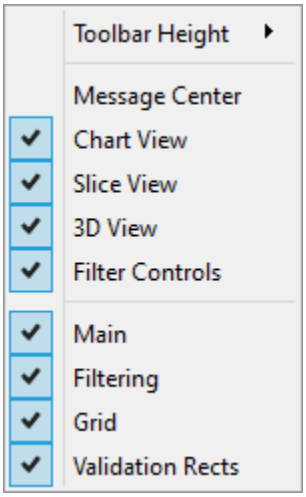
The Progress bar shows th percentage of completed rectangles.

The list shows all the validation rectangles and some of the meta data.
The Reset button allows you to reset the accept status of the selected rectangle.
The Accept All button will accept all the rectangles.
The Clear Progress reset all the rectangle statuses to "To Do"

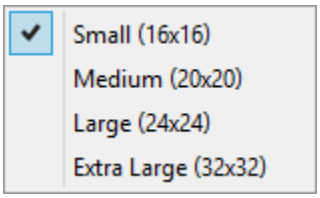
View



Toolbar and Views

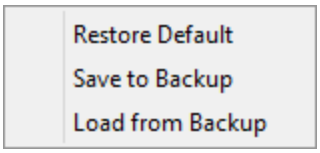


Toolbar Height



Layout

When the user made his own preferred screen settings it is advised to save them. Then when something accidentally goes wrong it can be retrieved from the backup.

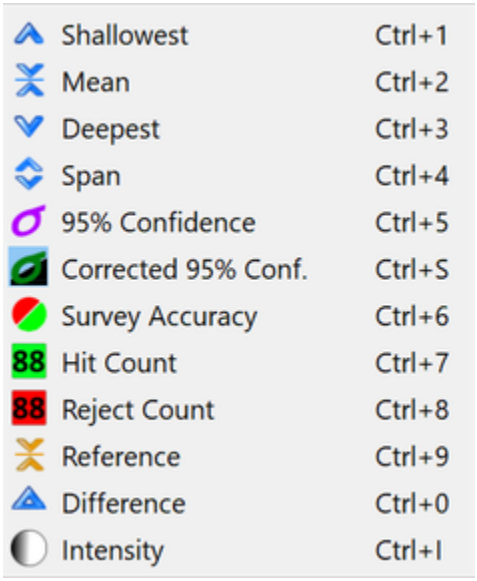


Menu Layout	Description
Restore Default Layout	Restores the layout to the defaults from installation.
Save to Backup	Saves the current screens settings to a backup.
Load from Backup	Loads the screens settings from the backup.

Chart View Layers

This menu contains three menu items that allows for quickly enable and disable all the Cad/GeoTiff/Web Map Layers.

Active Grid Attribute



Menu Active Grid Attribute	Description
Shallowest	The grid will show the shallowest values
Mean	The grid will show the mean values.
Deepest	The grid will show the deepest values.
Span	Displays the difference between Min and Max point height in each cell.
95% Confidence	The grid will show the 95% confidence values.
Corrected 95% Confidence	The grid will show the slope corrected 95% confidence level. (Only Visisble when enabled in grid properties).
Survey Accuracy	The grid will show the survey accuracy values. See Quality Settings how this is calculated.

Hit Count	The grid will show the count values.
Reject Count	The grid will show the reject count values.
Reference	Show Reference Layer. (Only visible when grid contains a Reference Layer).
Difference	Show Mean - Reference. (Only visible when grid contains a Reference Layer).
Intensity	Show Mean Intensity. (Only visible when enabled in grid properties).

Menu View	Description
Measuring Cursor	Once activated the measuring cursor can be used to measure distances in the Chart View and Slice View.
Zoom All	Zoom all contents in the Chart View
Zoom Inspection Area	Chart view zooms to the Inspection Area
Refresh View	Refreshes all views.
AutoScale Grid	Auto scales the current grid attribute to its minimum and maximum. When the SHIFT key is pressed only the visible area is used.
AutoScale Grid - visible Area	Auto scales the current grid attribute to its minimum and maximum, uses the area that is visible in the Chart View.

The View Properties and Views description are on a separate page.

View Properties

This tabbed dialog represents all possible View Properties for the various views.
The tabs are presented below.

General

This tab allows you to set some global colors and determine the visibility of points.

Colors:

Item	Description
Background	Background color for all views
Inspection Area	Color of inspection are in Chart View

Selected Area	Color of selected areas, survey boundary and measuring cursor in Chart View.
Grid Holes	Color of grid holes in Chart View
Rejected Points	Color of the rejected points in Slice and 3D Views

Point Visibility:

Points can optionally be hidden when the condition for rejection and classification are not met. By default all points will be visible. These settings apply to the Slice View and 3D View.

Item	Description
Reject Reasons	Rejected points will be displayed when "Show Disabled Points" option is enabled AND the reject reasons meet these conditions.
Classifications	Accepted/Rejected points will only be shown when their classification is enabled in this control. In order to hide points with a certain classification, unselect that class in this control. This makes sure they are hidden.

By default All Rejected reasons and classes are enabled. Only disable the selection if you intend to hide a subset of points.

Chart View

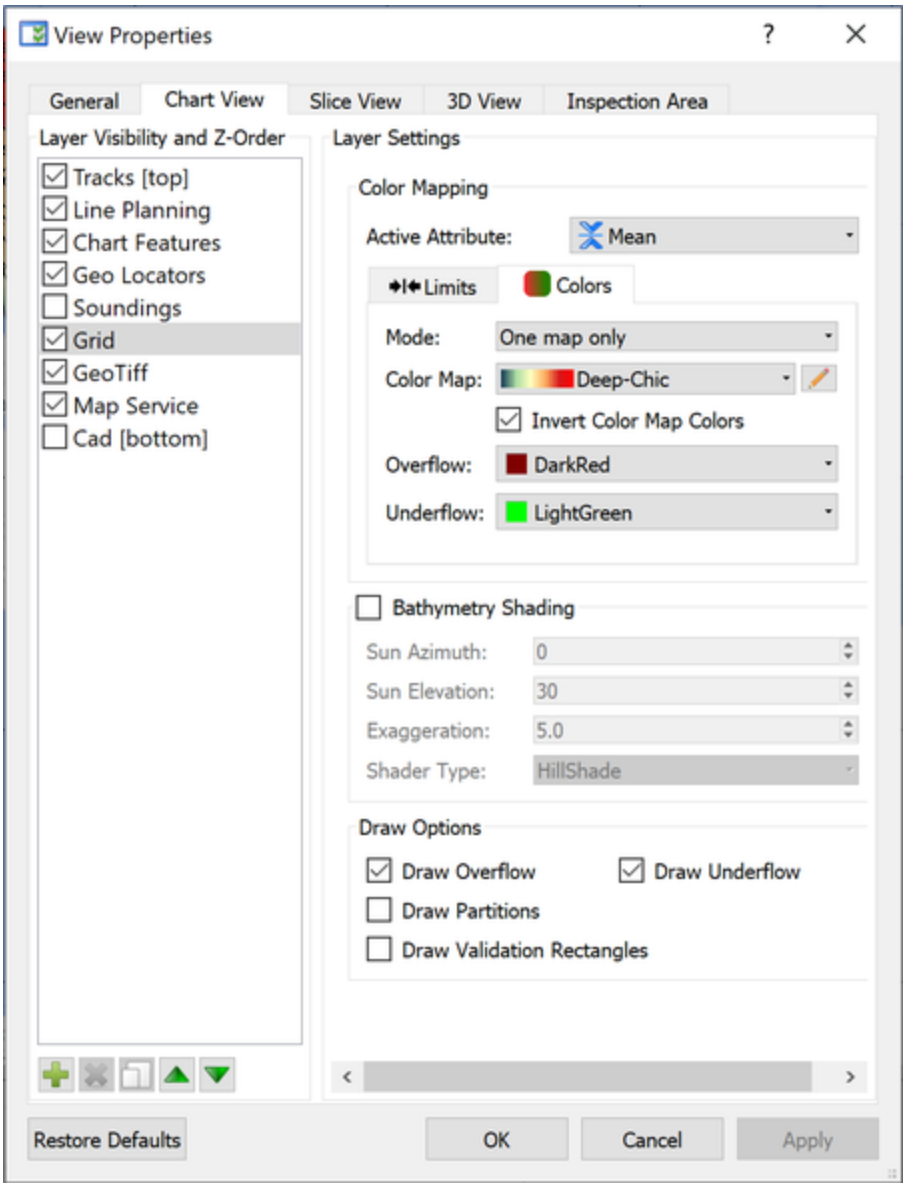
The Chart View tab is a presentation of the available layers. Layers can be changed on the left side.
Properties of the selected layer can be changed on the right.

The layer order can be changed with the navigation buttons on the bottom left side. New GeoTiff, CAD Soundings, Map Service and S-57 ENC layers can be added.
Layers presented on the top of the list are drawn last, this means that they appear on top.

New layers are added at the bottom but can easily be move up the list.
The checks in front of the entries decide the visibility of the layer, checked means visible.

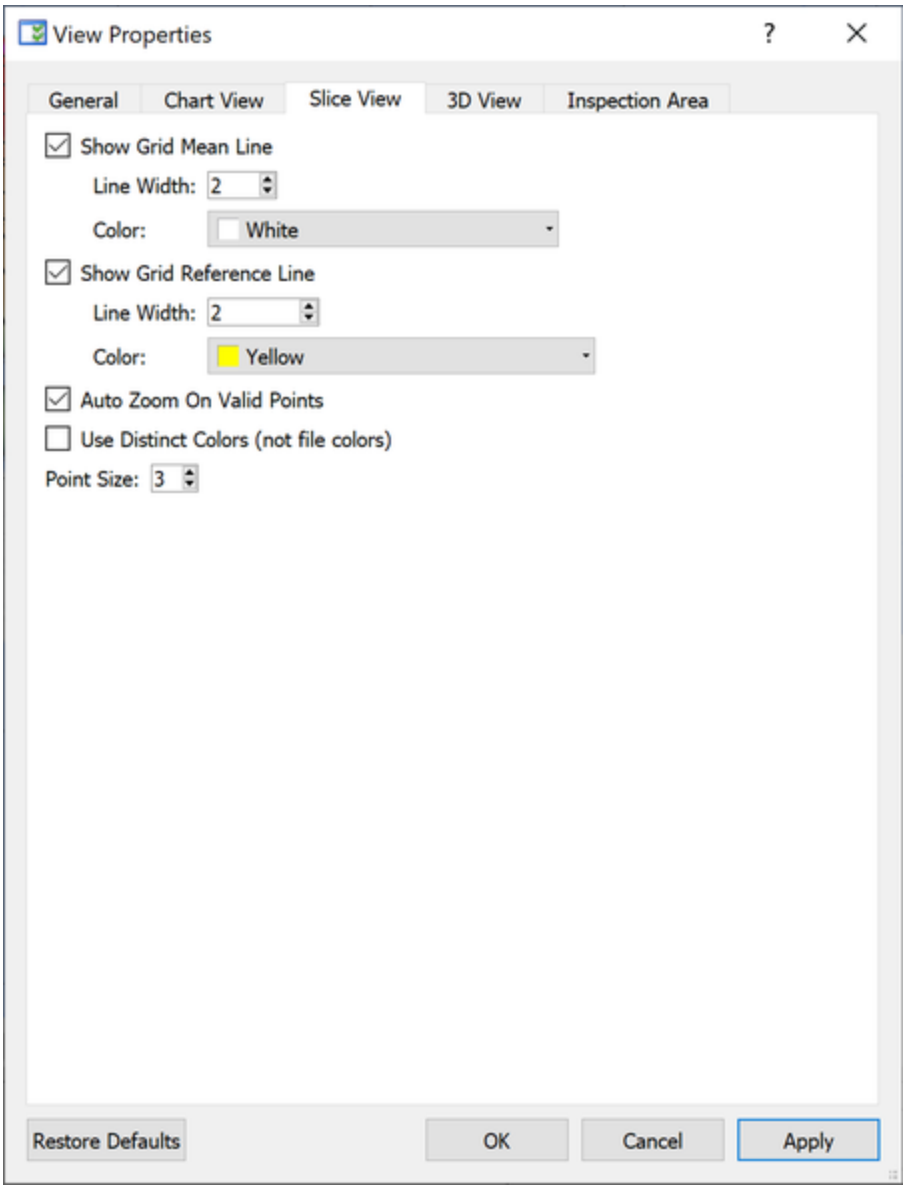
Most layers can not be removed, only one can exist like Grid and Tracks layer. But layers like Cad, GeoTiff, can be shown multiple times.

For more information of the layers go to Chart View Layers.



Note that intensity min/max in the Grid Limits is only shown when Intensity is enabled in Project Properties.

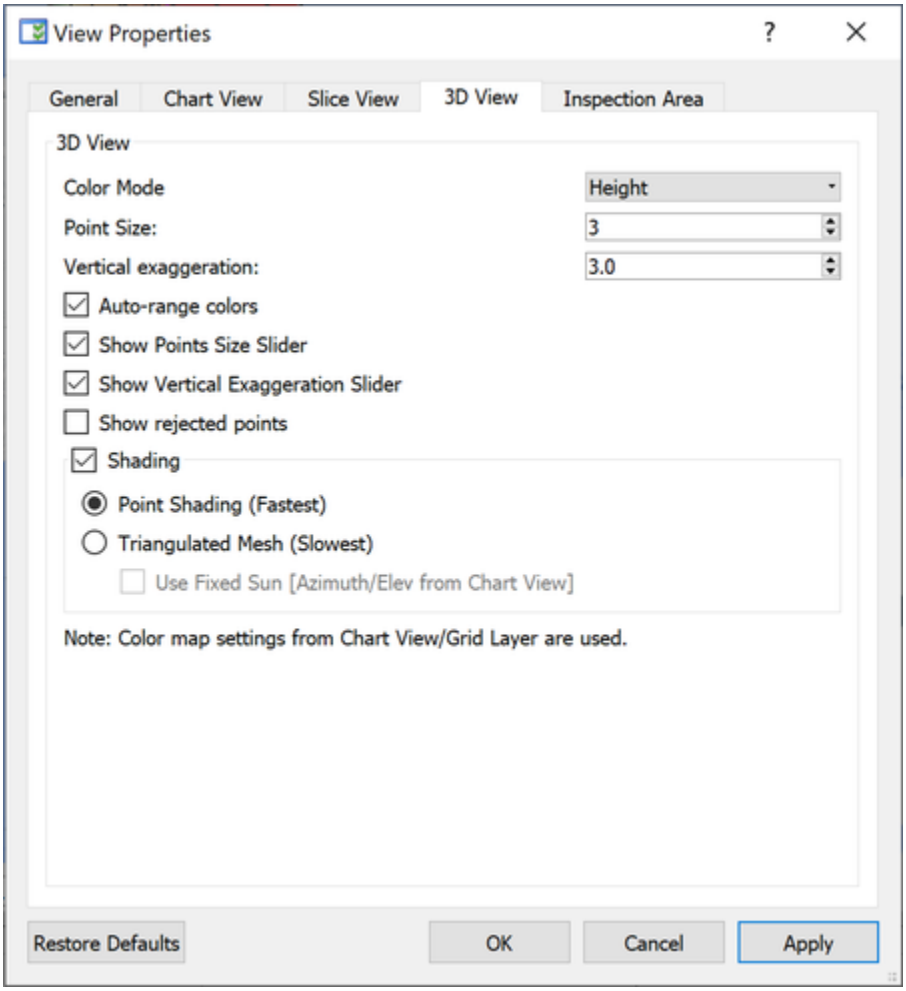
Slice View



Item	Description
Show Grid Mean Line	Show a line that represents the grid means of the cells that lie inside the slice box. Color and line thickness can be customized.
Show Grid Reference Line	Show a line that represents the grid Reference Layer of the cells that lie inside the slice box. Color and line thickness can be customized. Only visible when a Reference Layer is loaded into the grid.
Auto zoom On Valid Points	When enabled the slice view automatically zooms in on the valid points (rejected points are ignored).

Distinct Colors	When this option is enabled instead of the file colors the files in the Slice view will be give a unique, distinct color. A limited number of colors is used, the colors have a high contrast with respect to each other and the back ground.
Point Size	Each point is drawn with this number of pixels.

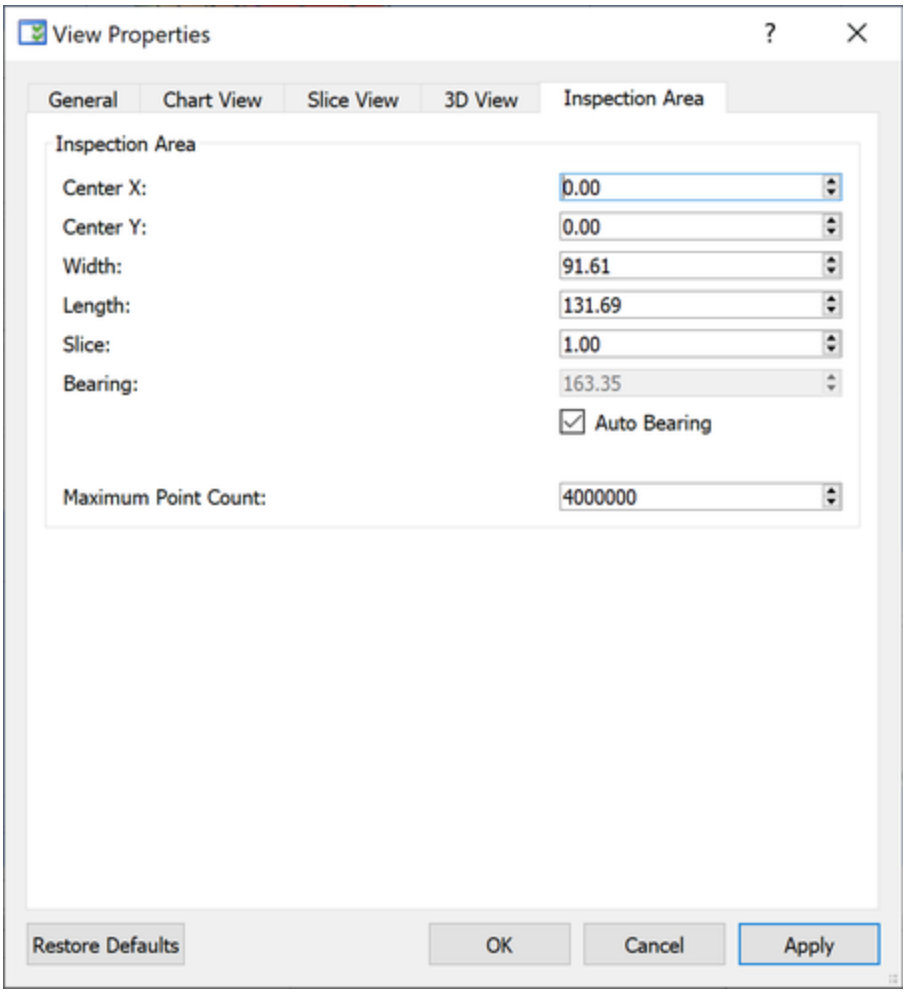
3D View



Item	Description
Color Mode	Coloring mode of the points. Options are: Height, File ID, Horizontal Distance, Intensity, Classification and Original Color (see 3D View for more info).
Point Size	Number of pixels of a drawn point. Typical value between 3-7. Note that very large points can slow down the display. When using point shading a larger point size can help to see the shadows better.
Vertical Exaggeration	Z Scale of the display. You can make this figure larger then 1 to emphasize spikes or seafloor features. It will exaggerate the Z value of points with respect to X-Y.
Auto-range Colors	Automatically ranges the chosen color scale on the point data. Is refreshed when a point is clipped. When disabled the user defined chart view scaling is used.

	When enabled this can help you to quickly identify spikes in the data, the lack of color gradients on the main body of points indicates the presence of a spike.
Shows Point Size Slider	Shows a slider that controls the point size inside the 3D View. Can be handy to make quick adjustments.
Show Vertical Exaggeration Slider	Shows a slider that controls the vertical exaggeration inside the 3D View. Can be handy to make quick adjustments.
Show Rejected Points	When enabled shows the rejected points, else they will be hidden.
Shading	When enabled a shading is drawn over the point data. Two different shading methods exist: 1) Point Shading. This is by far the fastest mode. Make sure point size is large enough to cover the surface for best shading. This helps you to visualize the seafloor topology, disabling it will only improve rendering speed marginally. 2) Triangulated Mesh. A Delaunay 2D triangulation is carried out on the points to create a mesh. The maximum link distance is automatically determined from the mean link distance. This is a relatively slow method of rendering and is advised only for smaller areas and for cleaning and visualization of special objects. There are two lighting modes: When option "Fixed Sun" is disabled global lighting is used. But when this option is enabled the sun comes from the azimuth/elevation as defined in the chart view. When for example showing a wreck the side away from the sun will be much darker.

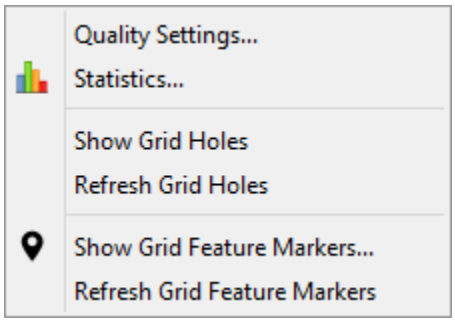
Inspection Area



The "Auto Bearing" will retrieve the average bearing from the nearest line. The nearest line will be calculated from the first selection click of the "Inspection Area".

The "Maximum Point Count" protects the user from selecting too large areas. Depending on the used PC hardware the number can be increased /decreased.

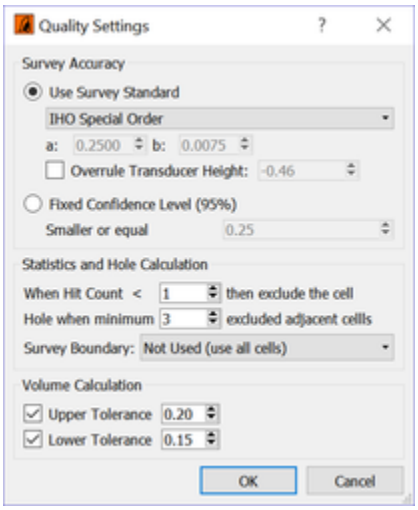
Quality



Menu	Description
Quality Settings	Set the survey standard and other Quality related settings.
Statistics	View the Grid Cell Statistics for the current project to evaluate Quality and progress of cleaning.
Show Grid Holes	Displays the grid holes. Holes consist of one or more empty cells cluttered together.
Refresh Grid Holes	Re-calculate the grid holes. Useful after the grid is updated.
Show Grid Feature Markers	Set feature markers to pinpoint areas of interest.
Refresh Grid Feature Markers	Grid Feature markers are re-detected from the grid. Useful after the grid is updated.

Quality Settings

This dialog is used to set the quality settings for the survey data. These settings are used in various calculations throughout AutoClean, e.g. Statistics, hole detection, Survey Accuracy Grid Attribute, Volume Calculation.



Survey Accuracy

Set the desired survey standard or use a custom standard. Optionally a non depth dependent "Fixed Confidence Level(95%)" can be used. The following standards are supported:

Norm	a	b
IHO Special Order	0.25	0.0075
IHO Norm 1A	0.5	0.013
IHO Norm 1B	0.5	0.013
IHO Norm 2	1.0	0.023
NL Norm A	0.1	0.0075
NL Norm B	0.15	0.0075
High Detail Survey	0.05	0.0002
Exclusive Order	0.15	0.004
Bfg201510	0.14	0.015
HPA201409	0.12	0.0045
WSA Bremen	0.2	0.00
WSA Cuxhaven	0.12	0.01
User Defined	various	various

When a survey standard is required that is not listed here, please use the User Defined option and fill in a en b coefficient.

The following formula is used: Max. Depth Error = SQRT(a^2+ (depth*b)^2)

For the calculation of depth a mean Transducer Height is required. By default this is determined from the survey data, a mean is taken from all the ping transducer heights from all the files, see Project Properties.

But sometimes this transducer height is unreliable or simply not available (for example in XYZ files), then the transducer height can be manually overruled in this his dialog.

Statistics and Hole Calculation

This contains the definition for a hole but it is also used in the statistics report to report the number of cells that have Hit Count smaller then the user defined minimum Hit Count.

Holes are detected from the grid cells, a hole consists of one or more adjacent cells that have less hits then the user defined hit count.

Setting	Description
When Hit Count < XX then exclude cell	A grid cell is considered a hole when it has less hits than this value. Value also used in statistics calculation to report number of cells with hit count >= this value.
Hole when minimum XX excluded adjacent cells	A hole should consist of at least this value adjacent cells

The hole detection searches in 8 directions for adjacent cells. The maximum hole size is 40000 cells.

Survey Boundary

The Survey Boundary is defined as the area for which quality calculations are carried out on. This is useful to exclude point data at the extents of the survey from statistics and hole calculation. Leaving it at option "Not Used" will use all the points. The combo box is filled with all the defined Selected Areas in the project. When the required polygon is not in this list yet, use the Area Selection functionality to select or import them into the project.

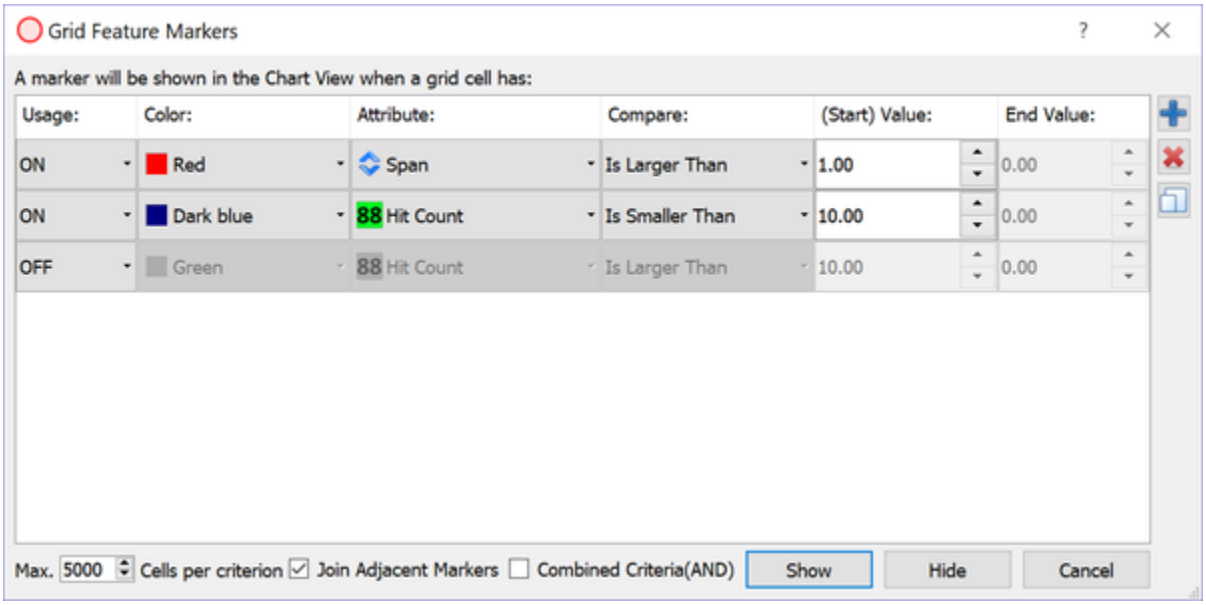
Volume Calculation

Upper and lower tolerances for dredge, both are positive values, lower tolerance level is below the design, upper tolerance level above the design. See Statistics Dialog for more information.

Grid Feature Markers

The grid feature markers enable the user to pinpoint areas of interest. Grid cells that meet a user defined criterion will be highlighted with a marker.

A feature marker is currently displayed in the chart view as a semi-transparent circle with the selected color.



When the dialog is closed then the detected markers are also placed on the clipboard in MS Excel formatting.

The Grid Feature Markers may not be up to date anymore after a filter action or any other edit action on the points was done. You can update the Feature Markers with Menu option Quality|Refresh Grid Markers manually.

A criterion has the following properties:

Property	Description
Usage	Show/Hide the markers for this criterion.
Color	Marker is drawn with this color in the chart view.
Attribute	Grid Attribute that will be evaluated. When this value meets the criterion a feature flag is drawn on the cell center.
Compare	Criterion for a feature. Choose from Larger, Smaller, Equal, Inside Range.
(Start) Value	Value or start value for criterion
End Value	End Value for criterion, currently only used for Inside Range.

The following buttons are available:

Button Function Description

	Add a new criterion	Will add a new criterion with some default parameters
	Remove all disabled criteria	Remove all disabled criteria. Set usage to OFF first when you wish to remove the criterion.
	Load Defaults	Load two default criteria. Note that this will remove all previous criteria.

The following options are available:

"**Max. Markers per Criterion**" is defined to limit the number of drawn markers. Drawing too many markers will slow down the updating of the Chart View.

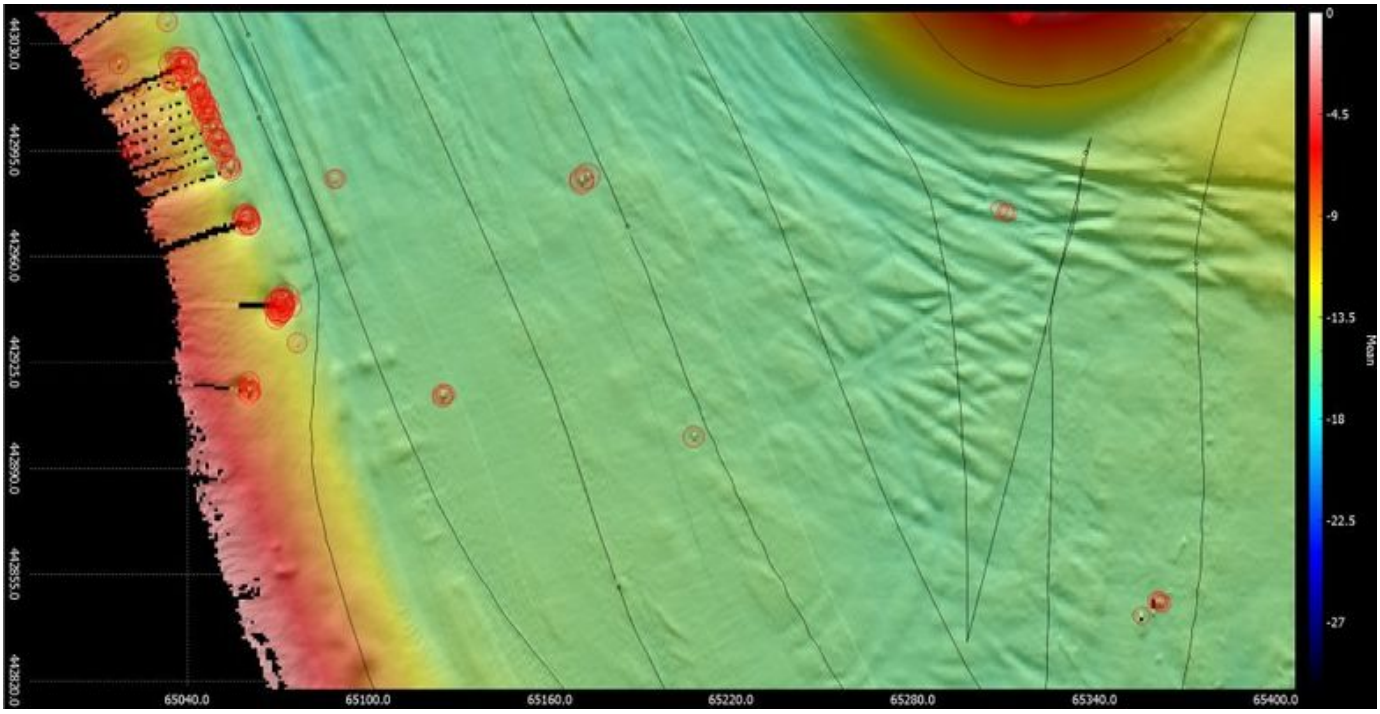
Note that currently the first xxx markers are shown.

The "**Join Adjacent Markers**" option can be used to combine markers from cells that are located next to each other. Instead of a cloud of markers now only one marker per area will be shown.

The "**Combined Criteria (AND)**" option can be used to mark cells that fulfill all the enabled criteria in the list. The coloring of the first enabled criterion is used.

Press the "Show" button to refresh the markers and show them. Press the hide button to disable the display of the markers.

An example screenshot of the Chart View with markers with settings as displayed in the dialog above. Notice that the spikes in the sounding grid are all marked.



Clipboard usage

When the markers are calculated the resulting markers are always placed on the clipboard. This allows for easy parsing to a spreadsheet or text editor application.

For an example of the clipboard contents see below.

```
description    Cell Count   Median Cell X   Median Cell Y   Median Cell
Z   All Cells XYZ
Criterion1-Marker4  1   64900.50    443361.50   -13.37
Criterion1-Marker3  1   65111.50    442477.50   -22.69
Criterion1-Marker2  2   65071.50    442944.50   -13.52  65071.50
442944.50   -13.52  65071.50    442943.50   -13.23
Criterion1-Marker1  1   65113.50    442477.50   -21.88
```


Statistics

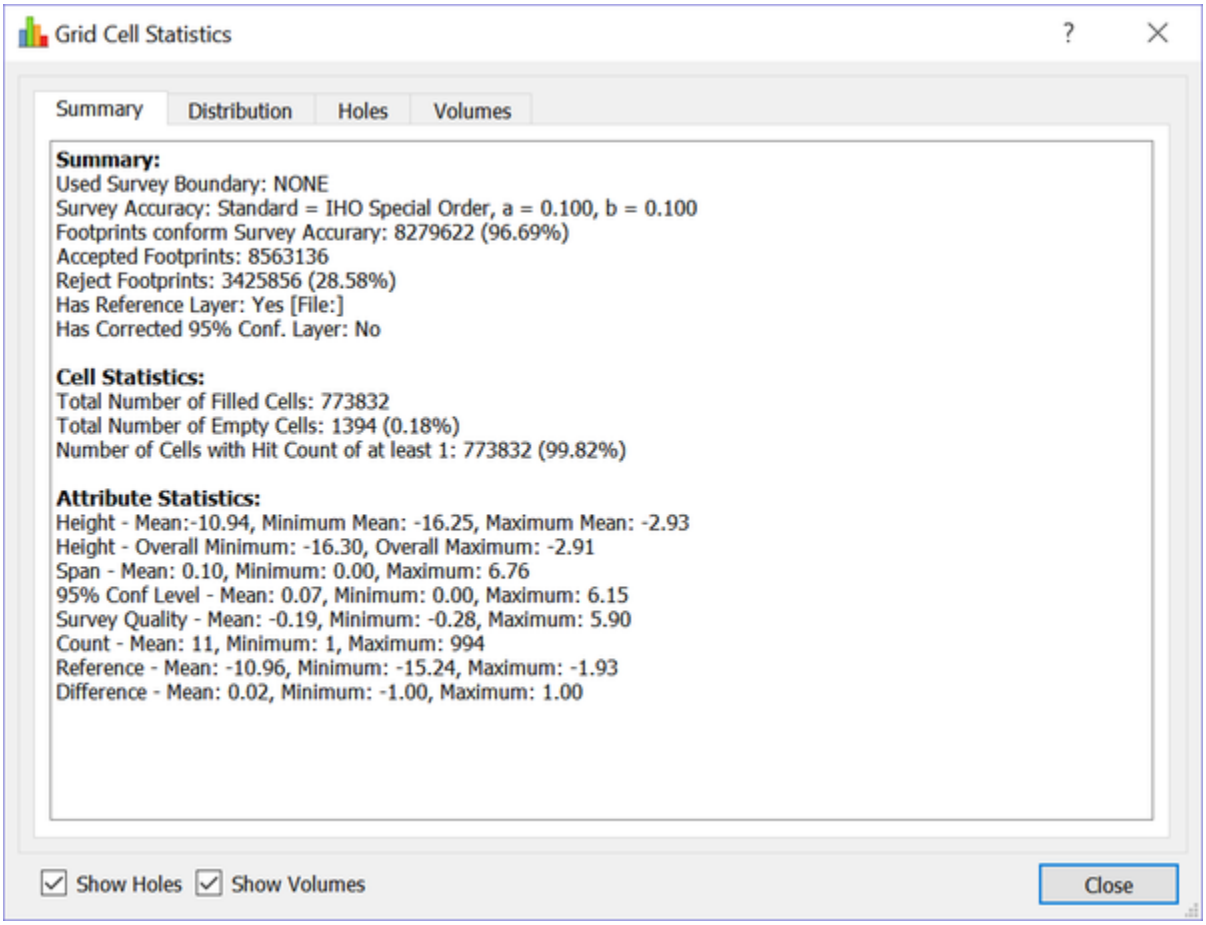
This dialog shows various Grid Cell Statistics and optional Hole and Volume Information.

On startup of the dialog the statistics are read from the grid, this can be interrupted at all times by just closing the dialog.
After the statistics are determined the hole detection is optionally carried out, this can at all times be cancelled.

The "Show Holes" and "Show Volumes" option is remembered in the application settings. The next time the dialog is shown the holes are not detected when this option is unchecked.

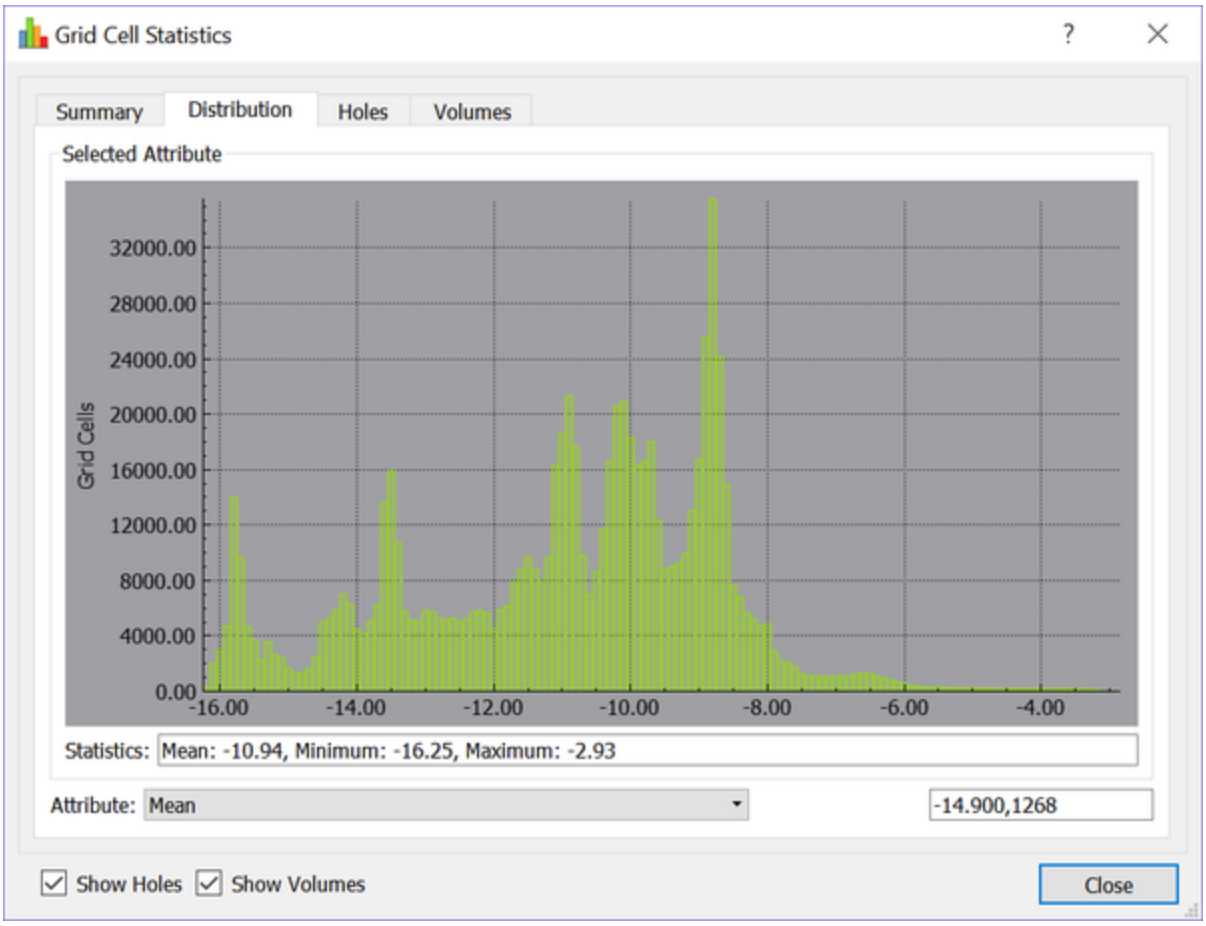
Four tabs are available, Summary, Distribution, Holes (optional) and Volumes.

Summary Tab



This Tab will show some overall statistics. Note that empty cell count is only available when the holes are shown or a Survey boundary is set.

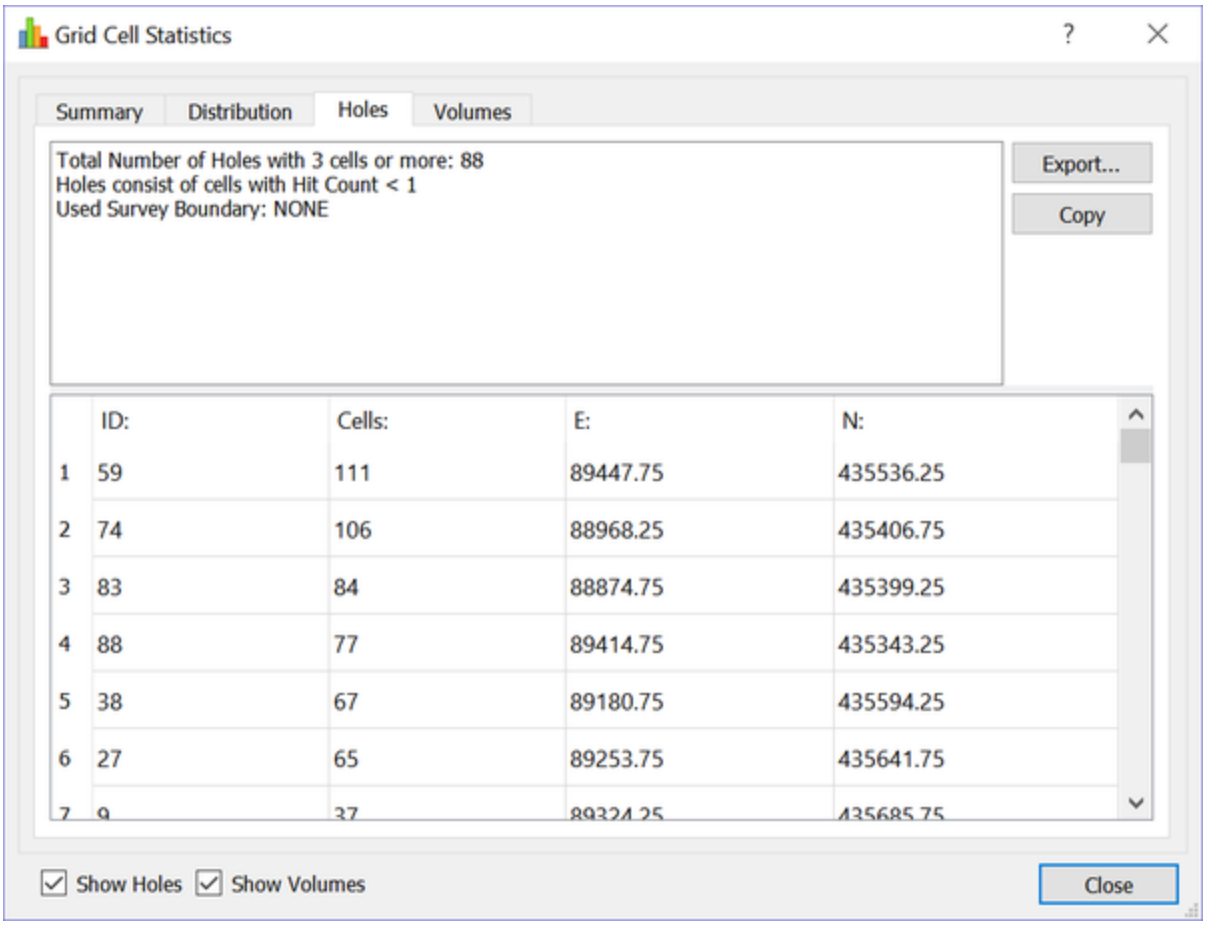
Distribution Tab



This Tab shows a histogram of the various cell attributes. ON the horizontal axis the attribute is plotted. On the vertical axis the number of cells.

Holes Tab

Optional Tab that shows the detected hole information.



The holes are determined with the Settings as set in the Quality Settings Dialog.

The Copy function will place all hole information on the Windows Clip board. It can easily be parsed in a text editor or spreadsheet of choice.

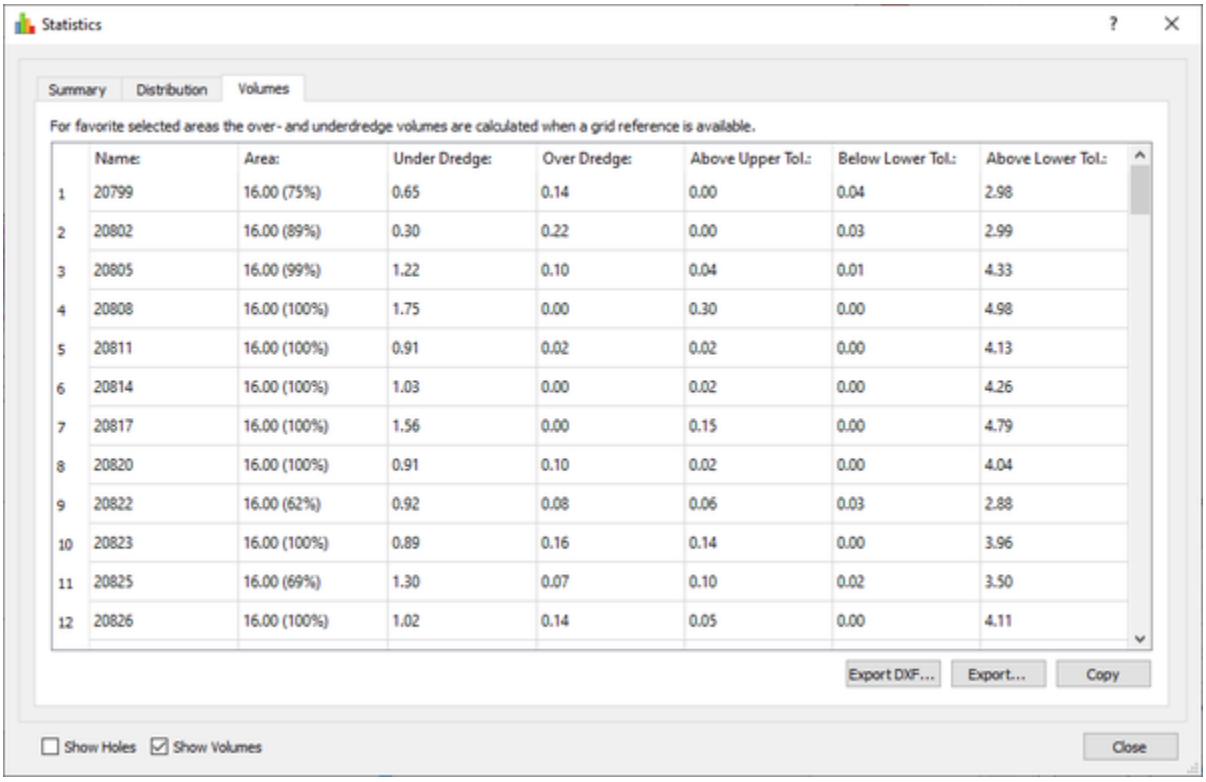
The Export function will save the holes to a basic text file.

Format of this file is: "Hole-<ID>-<CellCount>-cells,Easting of mean point,Northing of mean point<CR><LF>

Example:

```
Hole-326-253-cells,561498.50,5764481.50
Hole-207-167-cells,563469.50,5765072.50
Hole-541-106-cells,561283.50,5763912.50
Hole-510-80-cells,562263.50,5763942.50
Hole-481-72-cells,561086.50,5764022.50
Hole-146-59-cells,565458.50,5765498.50
Hole-551-50-cells,561183.50,5763973.50
Hole-543-47-cells,561248.50,5763928.50
```


Volumes Tab



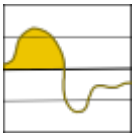
	Name:	Area:	Under Dredge:	Over Dredge:	Above Upper Tol.:	Below Lower Tol.:	Above Lower Tol.:
1	20799	16.00 (75%)	0.65	0.14	0.00	0.04	2.98
2	20802	16.00 (89%)	0.30	0.22	0.00	0.03	2.99
3	20805	16.00 (99%)	1.22	0.10	0.04	0.01	4.33
4	20808	16.00 (100%)	1.75	0.00	0.30	0.00	4.98
5	20811	16.00 (100%)	0.91	0.02	0.02	0.00	4.13
6	20814	16.00 (100%)	1.03	0.00	0.02	0.00	4.26
7	20817	16.00 (100%)	1.56	0.00	0.15	0.00	4.79
8	20820	16.00 (100%)	0.91	0.10	0.02	0.00	4.04
9	20822	16.00 (62%)	0.92	0.08	0.06	0.03	2.88
10	20823	16.00 (100%)	0.89	0.16	0.14	0.00	3.96
11	20825	16.00 (69%)	1.30	0.07	0.10	0.02	3.50
12	20826	16.00 (100%)	1.02	0.14	0.05	0.00	4.11

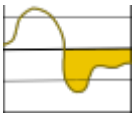
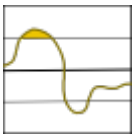
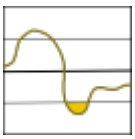
This tab shows the volume calculation.
The presented volumes are from the mean grid layer that is compared with the grid reference layer, with optional tolerances.

To activate the volume calculation you must:
1) Load a design or points into the reference layer.
2) Have one or more "Favorite" Selected Areas".
3) Optional In Quality Settings activate upper and lower tolerance.

For the favorite Selected Areas the area and various volume parameters are calculated.
Note that the Upper and lower tolerance values can be entered in the Quality Settings.

The following parameters are presented in the columns:

Parameter	Description	Notes
Name	This is the "Selected Area" Name	-
Area	This is the surface area in square survey units of the "Selected Area", (usually meters)	-
 Under Dredge	This is the number of cubes of the mean layer ABOVE the reference layer, this is also known as the Under Dredge value because it would require more dredging.	-

 Over Dredge	This is the number of cubes of the mean layer BELOW the reference layer, this is also known as the Over Dredge value because too much dredging was done.	-
 Above Upper Tolerance	This is the number of cubes of the mean layer ABOVE the (reference layer + Upper Tolerance).	Only shown when upper tolerance was entered in the Quality Settings.
 Below Lower Tolerance	This is the number of cubes of the mean layer BELOW the (reference layer - Lower Tolerance).	Only shown when lower tolerance was entered in Quality Settings.
 Above Lower Tolerance	This is the number of cubes of the mean layer ABOVE the (reference layer - Lower Tolerance). This is also known as "Over Design".	Only shown when lower tolerance was entered in Quality Settings.

You can import the dredging areas via Selected Area dialog. If you do this via a DXF that has proper labels then the names will be imported too.

Export to File

The content of the table can be exported to a text file, with the Export button. A header is written to the file with some project properties for convenience.

Header format:
Line 1: # Project Name, Mean Survey Time in Project, Grid Reference imported file
Line 2: # Upper Tolerance

Line 3: # Lower Tolerance

Line 4: # Header Line with the fields

```
# Project:NewProject1, Survey Time (UTC):27-05-2014 08:03, Grid
Reference:<Loaded From Mean>
# Upper Tolerance, 0.150
# Lower Tolerance, 0.200
# Name of Area, Total Area, Total Area Filled, Area Filled Percentage,
Area Mean Height, Area Mean Reference Height, Area Mean Difference,
Underdredge Area, Underdredge Volume, Overdredge Area, Overdredge
Volume, Above Upper Tolerance(0.150), Below Lower Tolerance(0.200),
Above Lower Tolerance, Tolerance
```



```
Area1,13892.71,13892.65,100,-14.885,
-15.881,0.996,13860.56,13830.84,32.10,0.00,11756.21,0.00,16609.37,
Outside Upper Tolerance
```

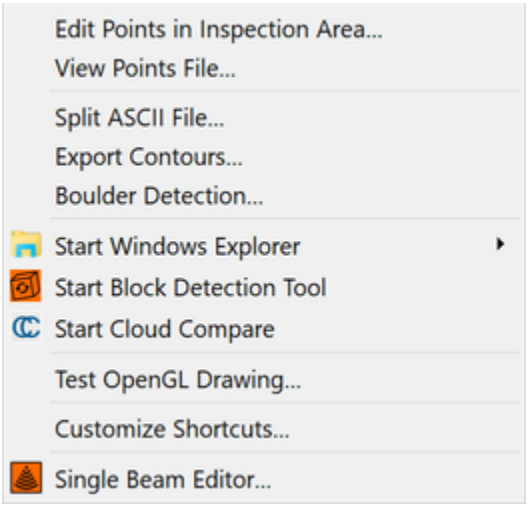
Export To Clipboard

The data can also be exported to the Windows Clipboard, the same format as file export is used, except that the seperator character is set to TAB instead of COMMA. This allows for easy import(Paste) in *Microsoft Excel*.

Export To DXF

The areas can be exported to DXF. Areas within tolerance Green. Areas outside tolerance Red.

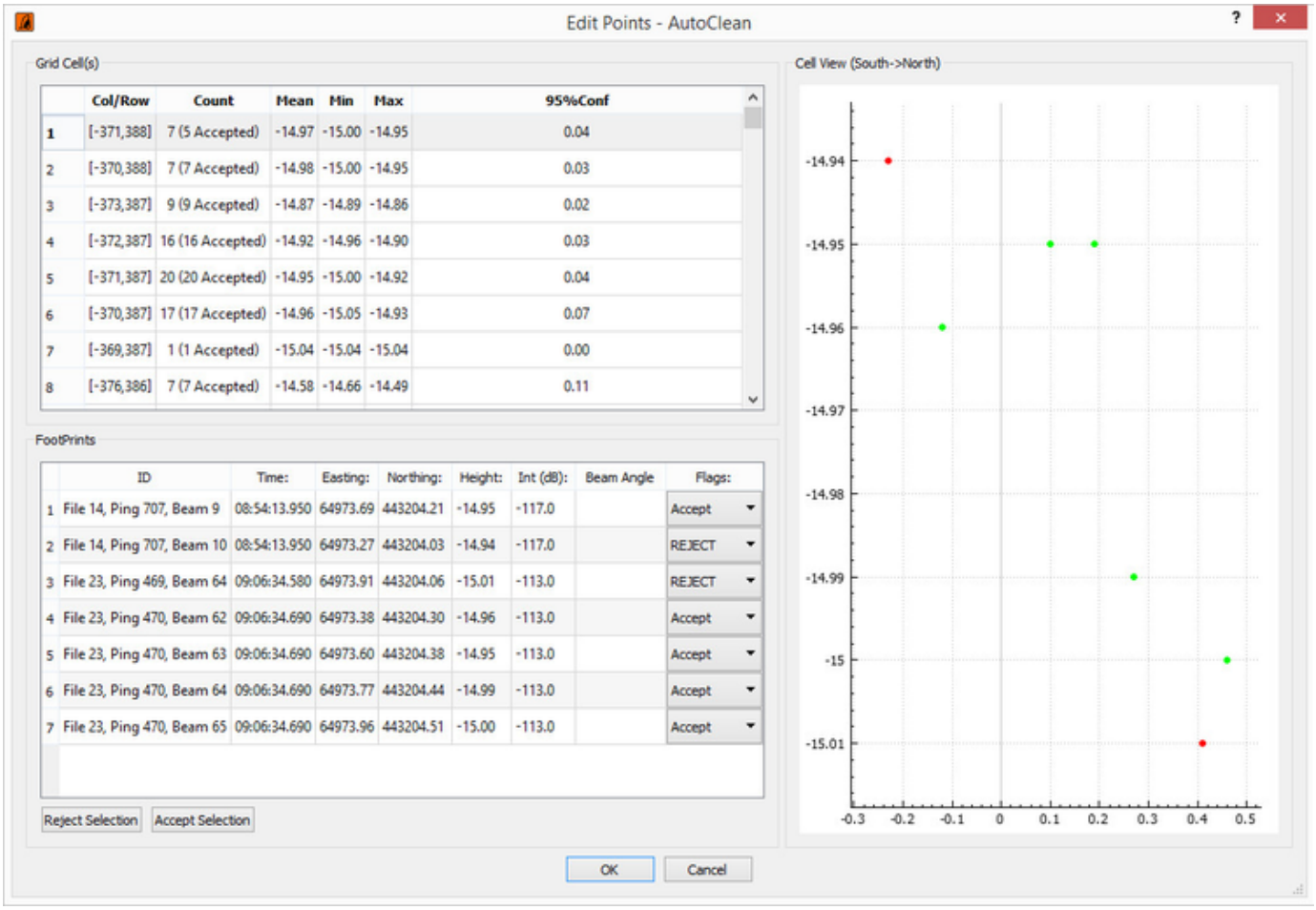
Tools



Menu	Description
Edit Points in Inspection Area	Edit the points is a table view environment.
View Points File	View and examine a point file details.
Split ASCII File...	Shows a dialog where you can select a CR/LF terminated text file. This can be split in a user definable number of parts. This is a useful tool when you need to view/edit an extremely large point file (Gigabytes) which is not handled smoothly by AutoClean. When you split it in parts of say a 100 megabytes it will work much better.
Export Contours...	Shows a dialog, create Contour lines of an area of the survey and export it to a CAD file.
Boulder Detection...	Shows a dialog, detect boulder shapes in survey and save their position into a "Selected Area".
Start Windows Explorer - Project Location	Start an external Windows Explorer, it will display the folder where the current project is stored.
Start Windows Explorer - Local Application Data	Start an external Windows Explorer, it will display the folder where the application data is stored. Here you can application dependent settings, e.g. the AutoClean.ini file with the current application settings.
Start Windows Explorer - Program Folder	Start an external Windows Explorer, it will display the folder where the AutoClean program is installed.
Start Windows Explorer - Last Imported Point File Folder	Start an external Windows Explorer, it will display the folder from where the points were imported from the last time.
Start Block Detection Tool	Start the Block Detection Program. this is an additional software option that can be used with a separate license. The points selected in the inspection area are transferred to the Block Detection when this option is selected. A temporary point file is created for this purpose in the project export folder.

Start Cloud Compare	Start the open source program Cloud Compare, the point data selected in the inspection area (accepted point only) are exported to a temporary LAS file and offered to Cloud Compare via a Command line option. The temporary LAS file is stored in the project export folder. Cloud Compare must be installed on the system in order to use this option. You can download CloudCompare here for free.
Test OpenGL Drawing	This shows a dialog that helps you detect if OPENGL is working properly on your Computer. The CAD Layer is drawn with OpenGL. When the Chart View fails to show any CAD data then can test with this option if there is a problem with the display driver. If the dialog does not show the objects properly then there is a problem with the graphics card driver. An update of the driver may help in this case.
Customize Shortcuts	Change user defined shortcuts.

Edit Points in Inspection Area



View Points File

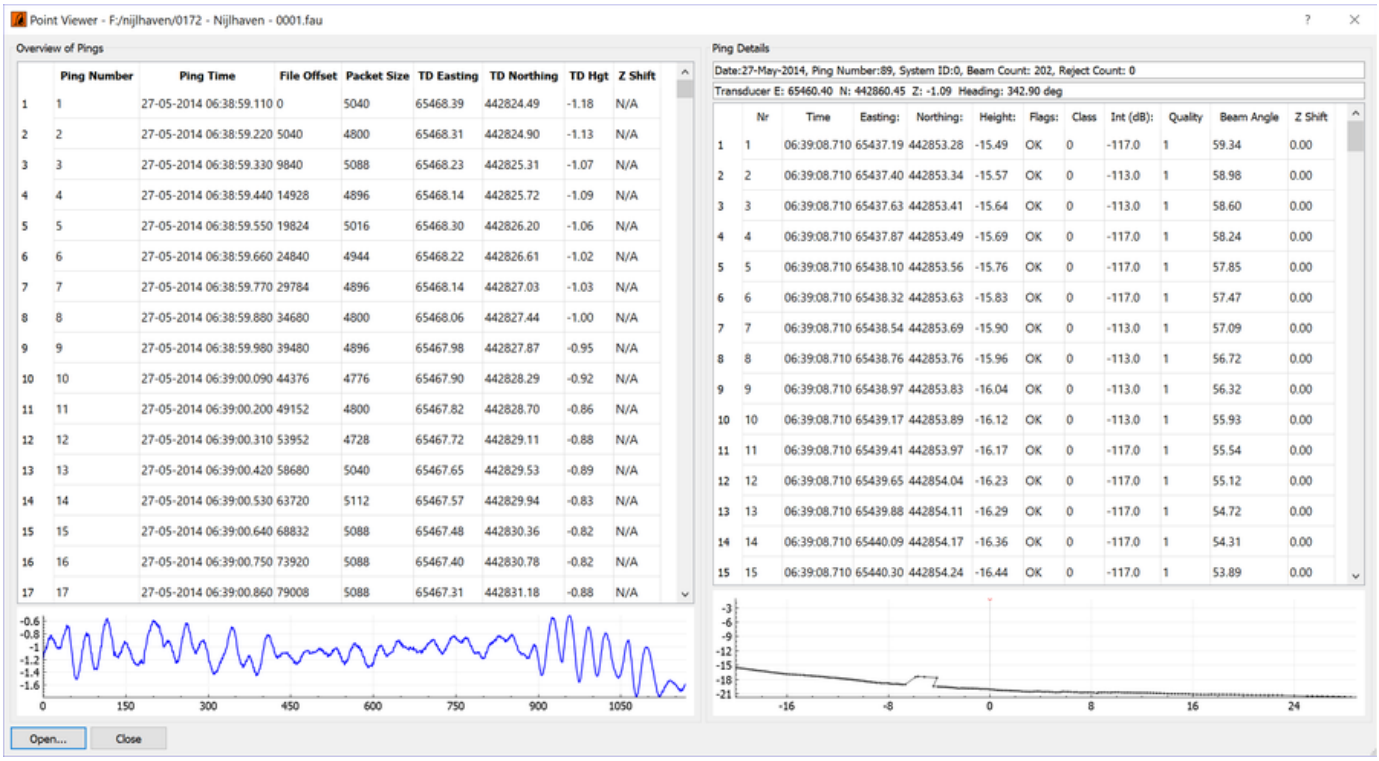
This function allows you to open any kind of point file format supported by AutoClean and view the contents in a ping/footprints table.

When the menu is click a file selection dialog is shown, select the point file you would like to inspect, note that the file does not need to be part of your current project.

> Files that are part of the project are easier accessed via the Project Properties, View File button.

When the file format is not recognized the message "Failed to load" is shown, in that case the formats file extension is not supported by AutoClean or the file could be corrupt. Note that QPDs can never be read with this function, if you wish to inspect a QPD it must be part of the project.

When the format is read without errors, a filled table is shown with on the left side the "pings", the multibeam swaths, and on the right side the points of the selected ping.



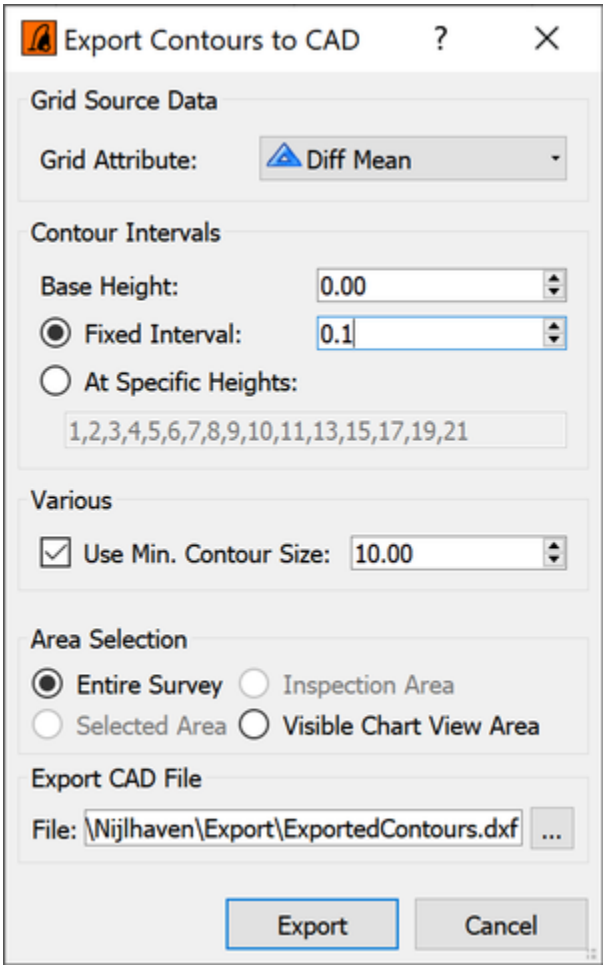
- The top left table shows the pings that were found in the file, on the right side the points in that selected ping.
- The bottom left graph shows the transducer height of the ping, note that for some point formats (xyz, fau) this is an estimated height.
- The bottom right graph shows all the points in the selected ping, black dots are accepted, valid points, red rejected

The "Open..." button at the bottom of the dialog allows you to view consecutive point files.

Export Contours

Creates contour lines of an area and exports them to a CAD file.
Contouring algorithm of GDAL is used. Poly lines that are created will all have the same height. No labels are added.
The contouring itself contains no smoothing options, it will work on the current grid data. If you require smoother contours then consider smoothing the data with the "Smooth Area" filter.

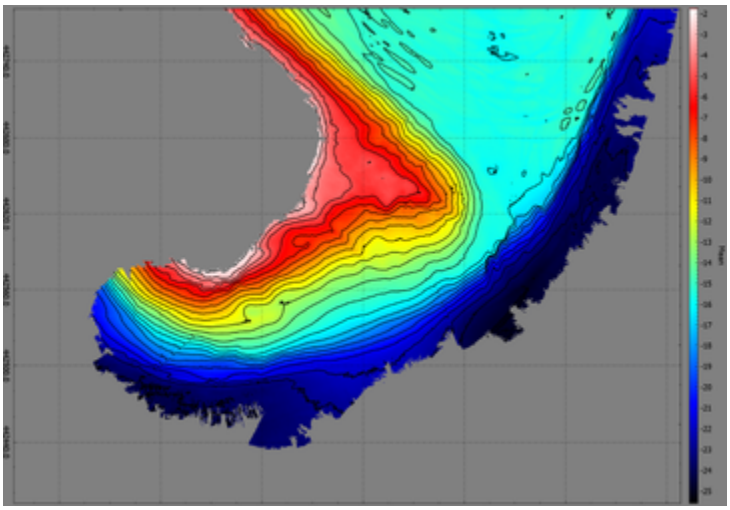
When you export the contours to DXF you can also show them in the background again of the Chart View, just add a CAD Layer with the exported DXF as input.
On Re-export the the view will automatically reload the CAD file.



Setting	Description
Grid Attribute	Select which grid attribute should be contoured
Base Height	The "base" relative to which contour intervals are applied. This is normally zero, but could be different. To generate 10m contours at 5, 15, 25, ... the Contour Base would be 5.
Fixed	The interval at which contours are generated, works in conjunction with base.

Interval	
At Specific Heights	Provide a comma based list of one or more contour heights, Base and Interval is not used.
Area Selection	Select the area that should be contoured.
Export CAD File	Select filename and format of the CAD file where contours are written.

The third and last step of the contouring export is used for writing the CAD file to disk, this can take a while and the user interface may temporarily become unresponsive when files get very large. Please be patient, it WILL finish.



Example of Contouring 1 meter.

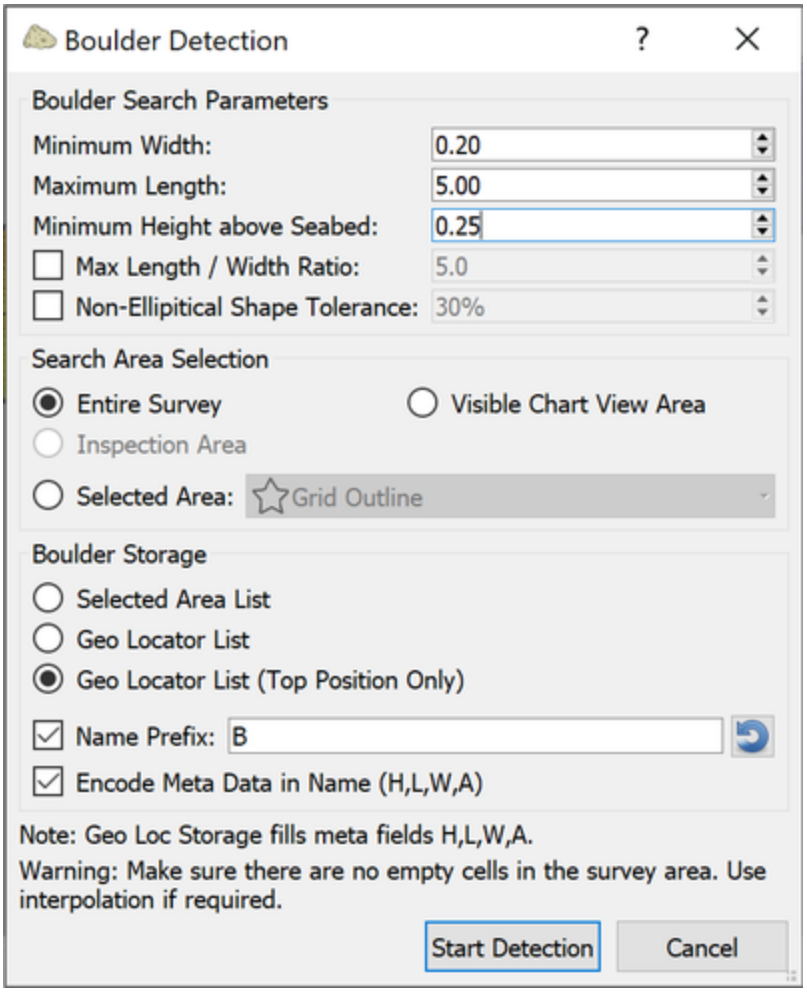
Boulder Detection

Finds boulder shapes in an area, grid data is used as input.

The shapes are stored as favorites in the "Selected Area"or directly to the Geo Locator list.
Various search parameters can be entered. The found boulders are characterized by a width and length (length is always the larger dimension) and height above the seabed around it. Furthermore a polygon with the outline is presented.

Some tips:

- Make sure that the grid is filled completely, use interpolation to fill empty cells.
- Grid cell size should be small enough, consider 0.1 to 0.25 m cell size.
- When you are expecting to encounter many boulders consider dividing the survey into chunks with selected areas.



The Search parameters

Setting	Description
Minimum Width, Length	Boulders with other dimensions are ignored.

Minimum Height above Seabed	Boulders smaller than this are ignored.
(Optional) Max Length /Width Ratio	Contours that have a very flat shape are ignored. Flatness is determined by the ratio of the length divided by Width. If the max ratio is set to three then any contour with a length that is more than three times the width are ignored. Default value is 5.
(Optional) Non-Elliptical Shape tolerance	Contours that do not look like an ellipse are ignored. A higher percentage will yield in more irregular found contours but also in potentially more found boulders. Default value is 30%.

Search Area Selection

The Search Area selection limits the search area. For Selected Area an alternative can be chosen via the combo box.

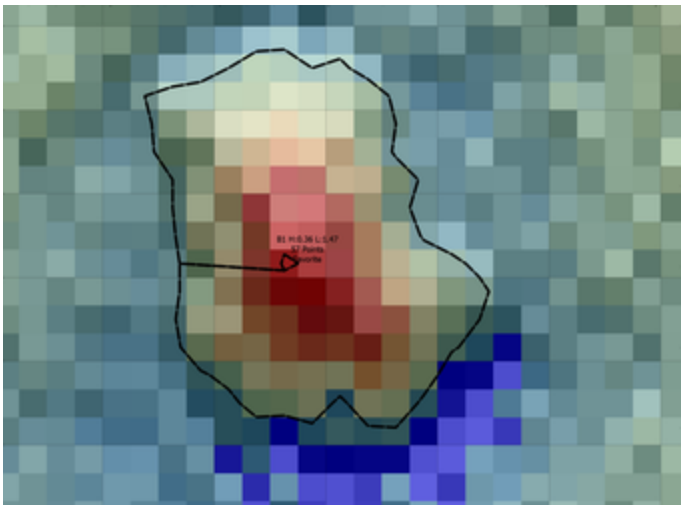
Boulder Storage

Setting	Description
Selected Area List	Resulting boulders are stored in the selected area as favorites.
Geo Locator List	Resulting boulders are stored in the Geo Locator List. First four meta data fields are filled with respectively: 1: Height above Seabed 2: Length 3: Width 4: Area
Geo Locator List (Top Position Only)	Same as Geo Locator List, but it only stores the average position of the top most contour.
Name Prefix	Prefix string added in front of the Boulder number.
Encode Meta Data in Name	When this option is enabled the name label will contain Height above Seabed (H), Length(L) , Width(L), Area(A). Label convention:<H:<height> L:<length> W:<Width> A:<Area>

When using the Geo Locator List you can disable the "Encode Meta Data in Name" option. All parameters can be shown in the Geo Locator table (See options).

Naming Convention is: <Prefix><Boulder Index><H:<height> L:<length> W:<Width> A:<Area>>. Only Boulder Number is mandatory, the others are optional.

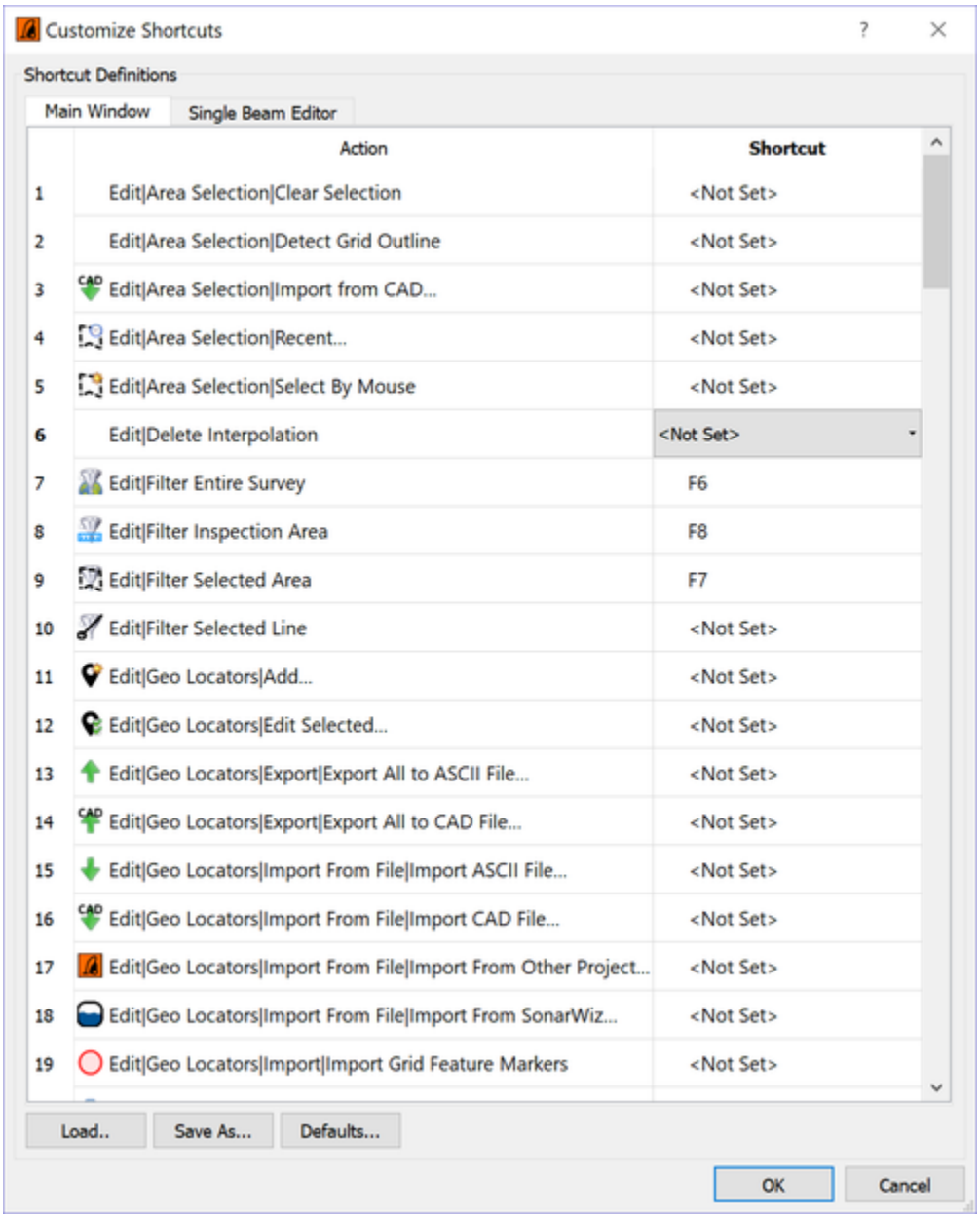
The resulting boulders are drawn with one polyline that consists of two merged polylines, the first presenting the top of the boulder, the second the boulder outline.



Customize Shortcuts

For nearly all functionality in AutoClean it is possible to define a keyboard shortcut.

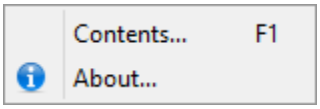
In the dialog below the available functionality is listed.The name convention is created from the Main Menu structure, for example for "File|Open Project...." the default shortcut is CTRL+O.
Some buttons that are not accessible by the main menu are listed under the name "Other Views".
For the Single Beam Editor (Dongle Option) the shortcuts can be separately defined.



It is possible to define the same shortcut key for the main window as for the single beam editor. The window that is active (has focus) will execute the shortcut in that case.

With the Save As.. And Load button you can save or reload the definition file anywhere on disk. With the Defaults... button it is possible to restore the original default shortcuts.
Note that AutoClean will remember the shortcuts when it closes and it re-loads these on start up. It uses the file "ShortcutKeys.ini" in the local application folder to store these.

Help

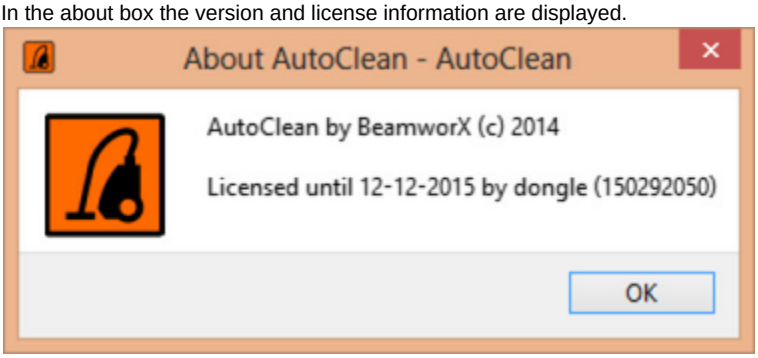


Contents

The program commands windows to execute and open the PDF manual in the program folder. The PDF extension should be registered in windows with a program to open it. When it does not open we advise to install Adobe Reader. Depending on the focus in AutoClean the designated topic is shown.

About

In the about box the version and license information are displayed.



Toolbar

The functionality of the buttons are described in the "Main Menu".

Main

 Project Properties

 New Project

 Add Files to Project

 Open Project

 Recent Project

 Measuring Cursor, details can be found in menu View

 Reject Area by mouse, details can be found in Reject Area by Mouse.

 Select Area, details can be found in Area Selection

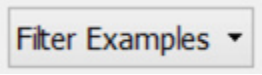
 Recent Areas, details can be found in Recent

 Statistics

 Undo

 Redo

Filtering



Select the current filter group

 Filter the Inspection Area (with the current filter group)

 Filter Entire Survey (with the current filter group)

 Filter Selected Area (with the current filter group)

 Filter Selected Line (with the current filter group)

 Filter Advanced

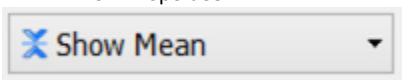
 Enable/Disable Filter Preview

 Reset Modifications

 Reject Points in Selected Area

Grid

 View Properties



Selected Grid Attribute for display

 Auto Scale Grid

 Refresh Grid

 Zoom All

 Zoom Inspection Area

Validation Rectangles

 Setup Validation Rectangles

 Show/Hide Validation Rectangles

Views

The main window of AutoClean consists of 5 different views.

The Views size and position can be customized by dragging and moving. It is also possible to "tabify" one or more views.

The following views are available:

View	Description
Chart View	Two Dimensional Top View of the data
Slice View	Profile View of the selected slice
3D View	3D presentation of the data selected in the Inspection Area
Filter Control	Filter Settings, can bue used to modify filter groups.
Geo Locators View	Geo Locator List, shows a list of Geo Locators.

Chart View

The Chart View shows a 2D top view of the project.

The following items are shown:

Item	Description
Sounding Grid Layer	The bathymetry in the Chart View is presented in a grid layer. This presents a top view of the gridded bathymetry. The user definable "Current Active Grid Attribute" determines the kind of grid data that is visualized.
CAD Layer(s)	A Cad file can be presented in a layer, various formats are supported. Select file in the File|Chart View Layers dialog. Layers can be toggled on-off via menu View|Chart View Layers. Multiple Cad files can be loaded (by creating multiple CAD layers).
Geo Tiff Layer(s)	A Geo Tiff file can be presented in the background (or a tiff with a tfw-world file). Select file in the File|Chart View Layers dialog. This layer can be toggled on-off via menu View|Chart View Layers. Multiple GeoTiffs can be loaded. It is also possible to load a OpenStreetMap background directly from the internet. You must have a proper internet connection and the project must have valid project CRS defined.
Map Service Layer(s)	A Map Service (currently only TMS service) can be selected in a layer, this can be used as background information. For example Google Maps or OpenStreetMap can be selected. Once selected the layer will be loaded dynamically from the internet. The tiles that are dwonloaded are placed in the cache, in the windows temp folder.
Geo Locator Layer	This layer shows the Geo Locators. It can be toggled on/off but not be removed.
Chart Features Layer	This layer currently only draws the coordinate grid lines. The order can be changed so it can be shown above or below the grid layer.
Transducer Tracks Layer	LEFT click a transducer track to select it.
Selected Area	By using Area Selection the user is able to operate with user select-able areas. Created manually, from Import CAD or Detected Grid Outline. It is also possible to edit the active Selected Area by moving the anchors around. All favorite Selected Areas will be drawn but only one can be active.
Survey Boundary	The boundary used for the survey statistics and can be selected in the Quality Settings.
Inspection Area	User select-able area. The points within the area are loaded from the disk and shown in the 3D View and the Slice View.
Validation Rectangles	Rectangles to assist the user in covering a large area.

Mouse Actions:

Mouse Action	Description
LEFT Double Click	Re-centers the view.
Mouse Wheel	Zoom in and out. The mouse position is the zoom point.
LEFT or MIDDLE* mouse button down + mouse move	Pan in Chart View.
Right Click Popup Menu 1	Place Inspection Area here.

Right Click Popup Menu 2	View Properties

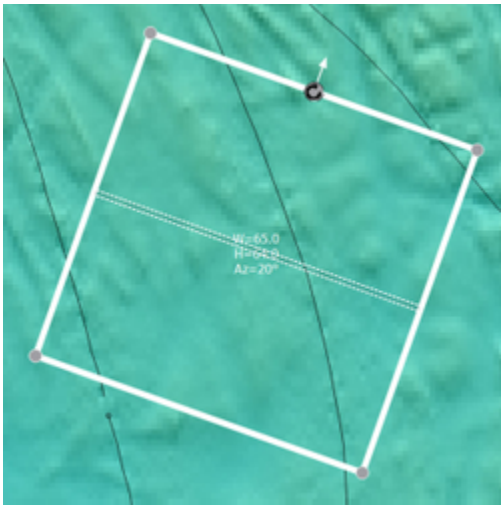
*) Middle button is usually the mouse wheel, that also support press button action.

Change the Inspection Area

The Inspection Area bounds are drawn in the Chart View. When the program is started the Inspection Area is not shown yet because its position needs to be selected first.

Selecting a new position or size can be done in multiple ways:

- Right mouse click on the Chart View, the pop up menu contains option "Place Inspection Area Here"
- Right mouse button dragging a new area, press right mouse button on center of area of interest, keep button down and move the mouse, this allows you to drag a new area, the direction of the box is determined in the View Properties.
  When you press the SHIFT or CTRL key at the same time that the button is released you can freely re-position the area, the points are loaded when you release the SHIFT/CTRL button.
- By using Validation Rectangles.
- The position, dimension and rotation angle of the box can be changed in the View Properties menu. This can be handy if an exact position is to be loaded.
- By mouse interaction. Hover cursor over Inspection Area, the area becomes highlighted and with the left mouse button the area can be moved, re-sized and rotated.
  When SHIFT key is held why doing this, you can re-position multiple times, points are loaded when SHIFT is released.

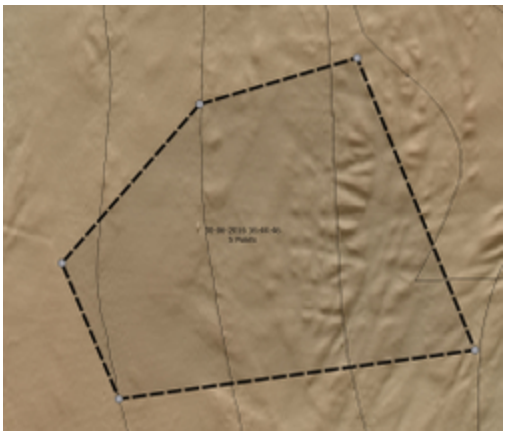


By dragging the corners the area is re-sized.
By dragging the "legs" the entire box can be moved around.
By dragging the "rotation marker", the gray circle with the arrow, the box can be rotated in every direction.

Edit the Active Selected Area

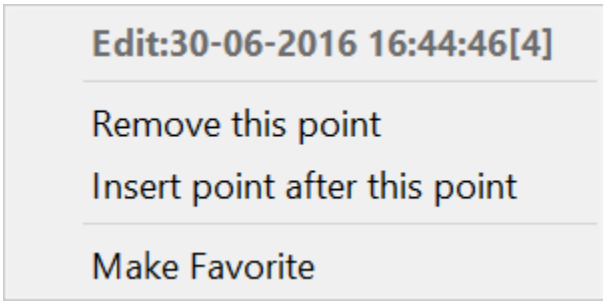
There can only be one Selected Area active. It can be edited by mouse interaction, points can be moved, inserted and removed.

The Selected Area is "normally" drawn with a solid line. When the line is clicked upon with the mouse cursor the Selected Area will become "active" , it will be drawn with a thick dashed line, and every point is drawn with a gray circle anchor. See screen capture below.
You can de-activate the Selected Area by clicking on the chart view on any other place away from the area.



When the cursor hovers above a point the icon changes to  shape:

- Point can now be dragged to a new position with the LEFT mouse button.
- Pressing the right mouse button is pressed will pop up a menu with the choices of inserting a point, removing the point or making the area Favorite or Non-Favorite.



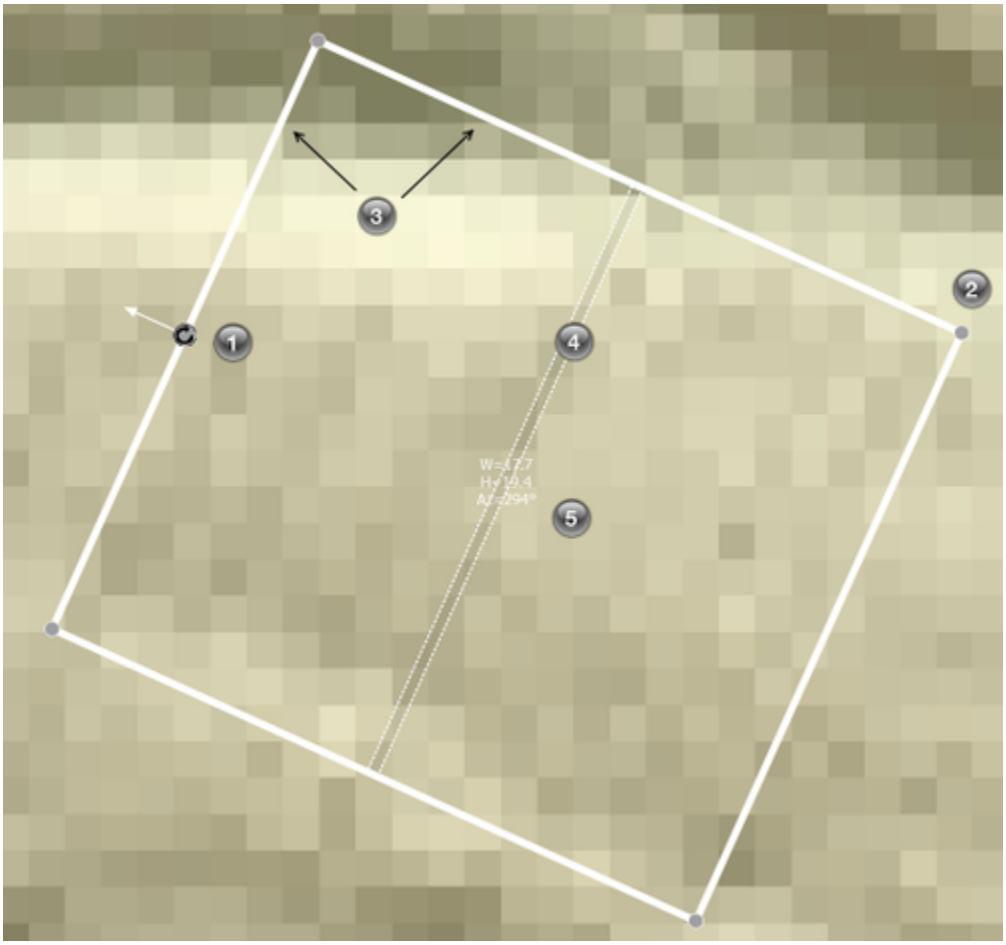
Layers

The Chart View consists of multiple layers. Layer Settings can be accessed directly via the View Properties|Chart View Tab.

Inspection Area

User select-able area(right mouse button to select), all points within the area are loaded from the disk and shown in the 3D View (all points))and the Slice View (points in slice).

Optionally aligns with closest track bearing by enabling "Auto Bearing" option in the View Properties.



When Cursor hoovers above the Inspection Area it is drawn in a "highlighted" state and "Anchors" (grey circles) area shown, the cursor shape also changes to the available function.
When the LEFT mouse button is pressed (and kept down) the anchors can be dragged to another location.

It is possible to:

- Rotate the area around its center with the top/center anchor (1). Note that once the left button is down on the anchor that the cursor can be moved away for an easier direction choice.
- Re-size the area with the corner anchors (2).
- Move the entire box clicking and dragging on the perimeter (3).

By default after every change the points from the area are re-loaded. But when the Shift or CTRL key is pressed then the area can freely be re-positioned.
As soon as the SHIFT/CTRL key is released then the points are loaded from the area.

Note that the slice box (4) is always shown. The footprints that are located inside the slice are shown in the Slice View.
The Center Text (5) is visible when a re-position action is in progress. Note that "Hold" is shown when the Shift Key was down when mouse button was released.

Use the shortcuts(default SHIFT + arrow keys) to move the Inspection Area North, East, South and West.

Mouse Action	Description
Right Click Popup Menu 1	Place slice. Positions the slice on the mouse location.
Right Click Popup Menu 2	Place Inspection Area Here. Positions the Inspection Area center on the mouse location.
When a line is selected in the Chart View popmenu 3 to 5 will appear. These are all part of Height Shift File functionality.	
Right Click Popup Menu 3	Shift Pings To Neighbors [ID : selected line id number]
Right Click Popup Menu 4	Reset Ping Shifts [ID : selected line id number]
Right Click Popup Menu 5	Reject Pings [ID : selected line id number]
Right Click Popup Menu last	View Properties

Sounding Grid

AutoClean shows a 2D sounding grid layer in the Chart View. The sounding grid contains sparsely filled grid cells (filled with points), the cell size is user definable when the project is created or when the grid is rebuild. Besides the bathymetry layer it can also contain a "reference layer", a layer for "Slope Corrected 95% Confidence" and an Intensity Layer. The first is a layer that can be use to display differences, for example by loading a design in it.

A cell is filled with accepted points (from enabled files) that are located inside the 2D boundary of the cell, for the reject count property the rejected points are obviously used.

The visualization is done with a user definable color map, optionally shading can be applied, see View Properties.

Attributes

The Sounding grid "Active" attribute is user-selectable and represents various types of views on the grid data.
The following attributes are available:


Shallowest

Shows the shallowest (largest height) of all of the accepted points.


Mean

Shows the mean height of the accepted points.


Deepest

Shows the deepest point (smallest height) of the accepted points


Span

Shows the Difference between shallowest and deepest point. (Span = Abs(Shallowest - Deepest).


95% Confidence Level

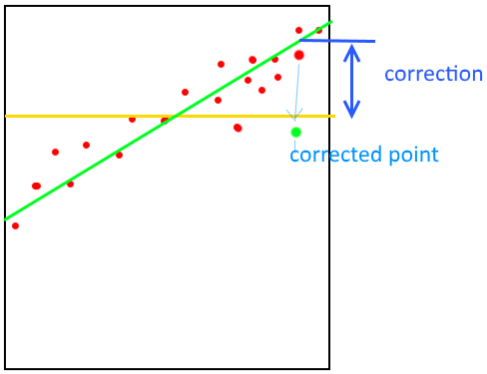
Show the 95% confidence level of the height of the accepted points inside the cell. This is approximately 2 times the Standard Deviation.


Corrected 95% Confidence Level

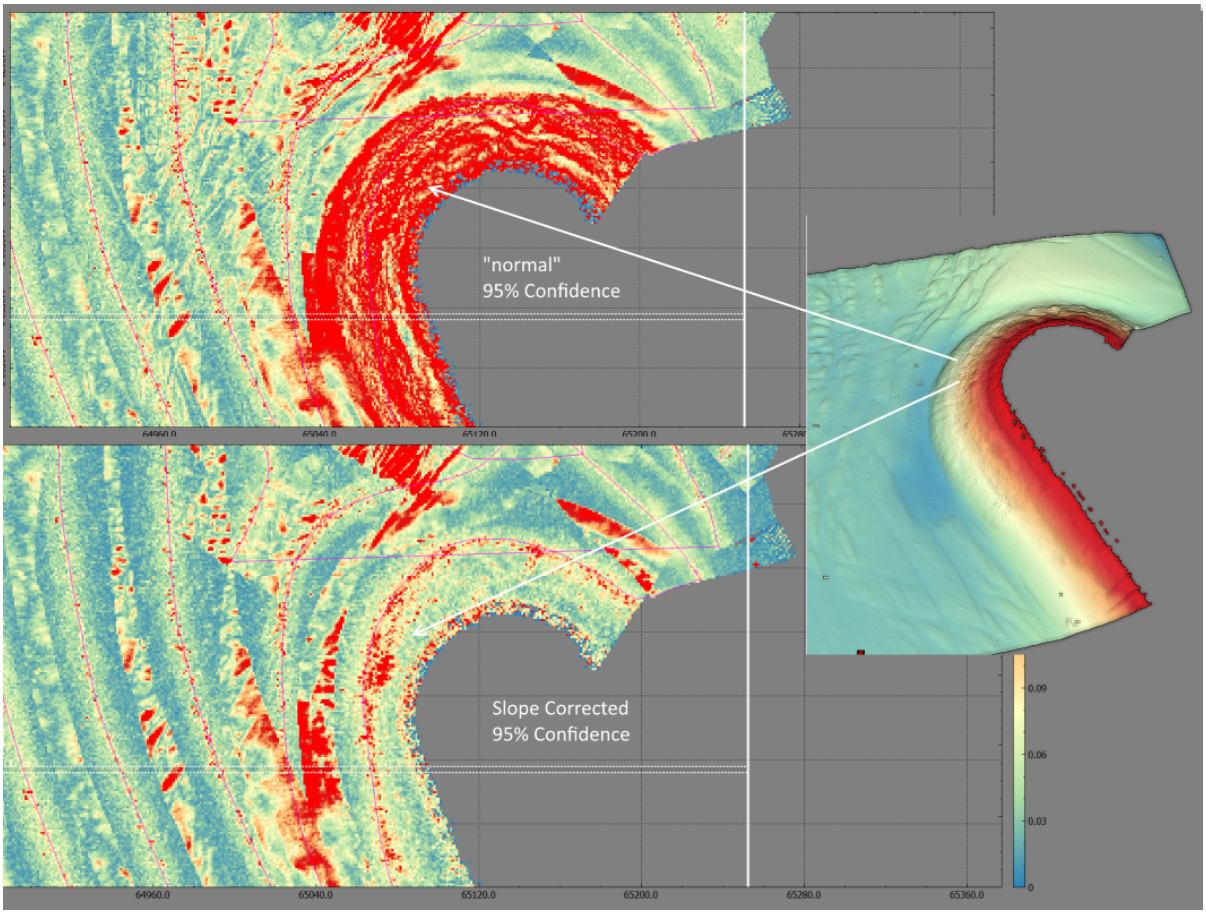
Shows the Slope corrected 95% confidence level of the heights of the accepted points inside the cell. This figure is in contrary to the "normal" confidence Level not sensitive to slopes in the bathymetry.

The grid most have been rebuild with the option "Slope Corrected 95% Confidence" enabled.

How is it calculated? The slope of a cell is determined by its 4 neighboring cells, North ,South, East West.
Every points that lies inside the cell will be corrected for the offset between the slope height at the points horizontal position and the mean of the cell. See also image below.



Mean Value
Estimated Slope



88 Hit Count

Number of accepted points in the cell.


Reject Count

Number of reject points in the cell. This is useful to visualize where a filter has rejected the most points.


Survey Accuracy

This represents whether the 95% confidence level lies inside the max error range as defined the the Survey Standard. If the cells meets the survey standard then the cell is colored green, else it is colored red.


Reference

Shows the mean bathymetry from the reference layer.

(Attribute is only visible when data was loaded in the reference layer).


Diff-Mean

Show the difference between the mean value and the mean reference layer. (Diff = Bathy Mean - Ref Mean).

(Attribute is only visible when data was loaded in the reference layer).


Diff-Shallowest

Show the difference between the shallowest (max height) grid cell value and the mean reference layer. (Diff = Bathy Shallowest - Ref Mean).

(Attribute is only visible when data was loaded in the reference layer).


Diff-Deepest

Show the difference between the deepest value (smallest height) and the mean reference layer. (Diff = Bathy Deepest - Ref Mean).

(Attribute is only visible when data was loaded in the reference layer).


Intensity

Show the Mean footprint Intensity (backscatter). This can give an indication on quality of the detection and seabed type. The magnitude of the values is format and system dependant and may vary.

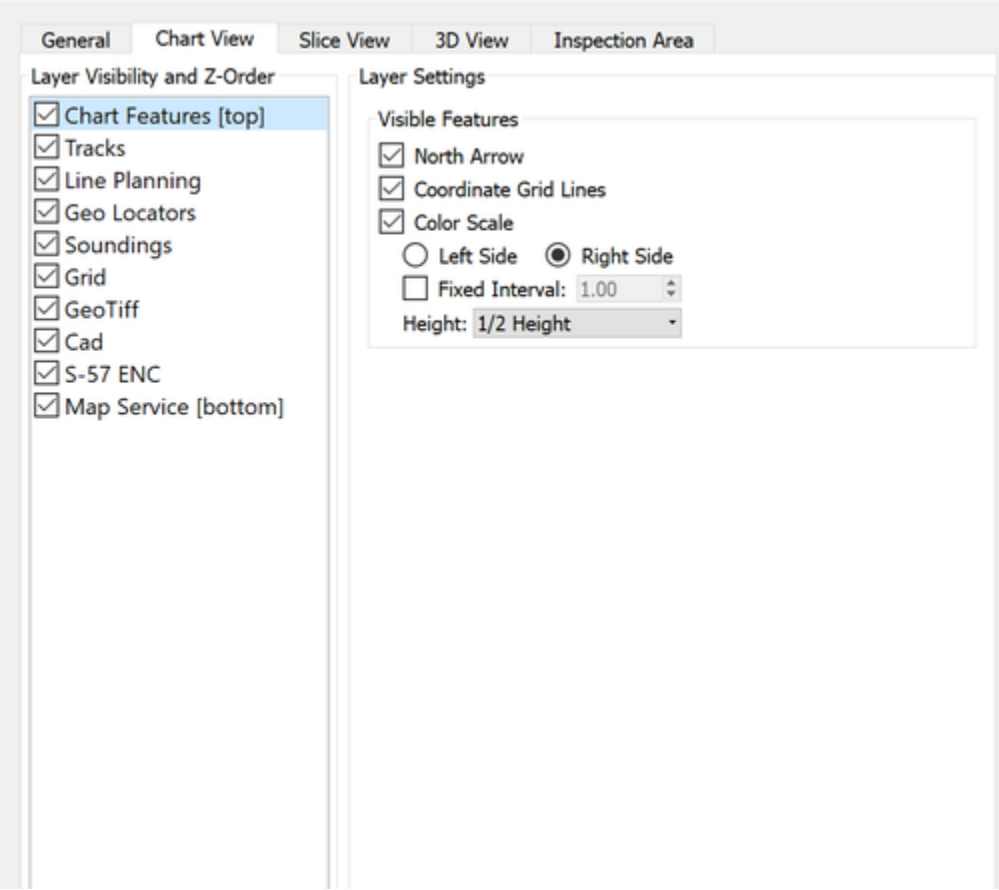
The project must have been created with option "Use Intensity" or grid most have been rebuild with the option "Intensity" enabled.

Chart View Layers

AutoClean can display various layers in its Chart View. Below these layers, and its properties, are presented.

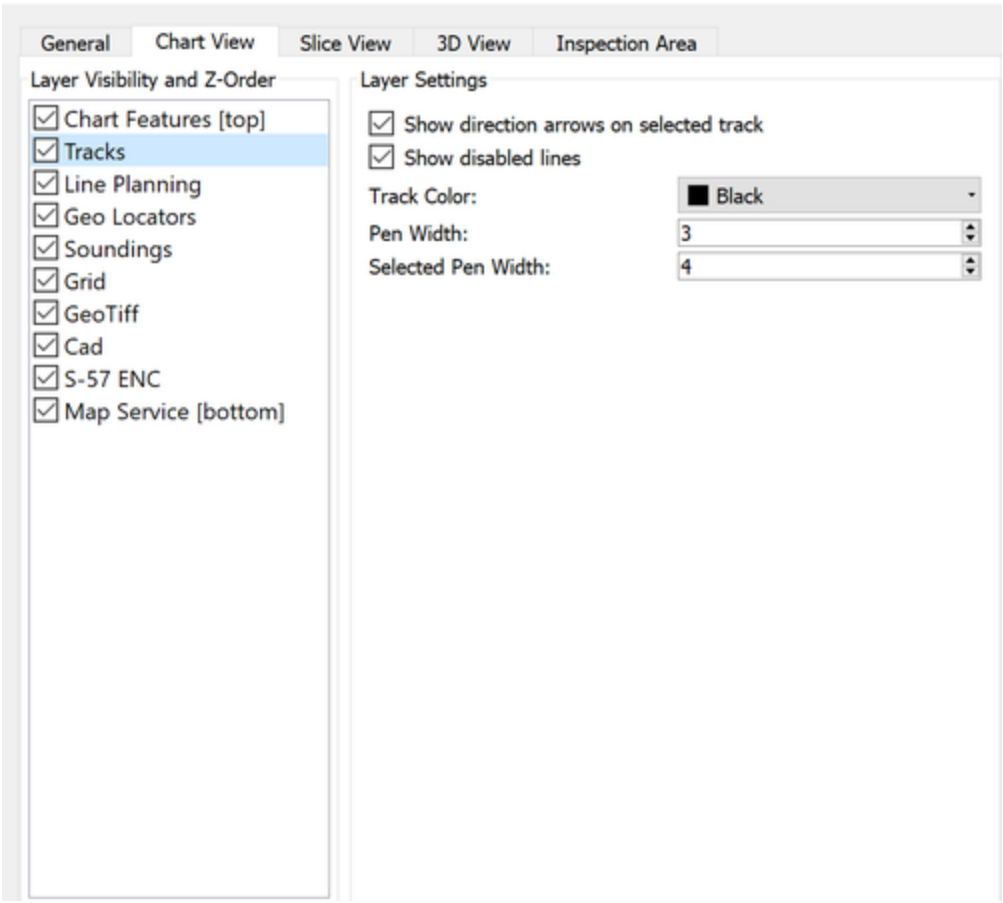
Chart Features

This layer presents some "helper" elements like a grid (coordinate) lines and color scale.



Tracks

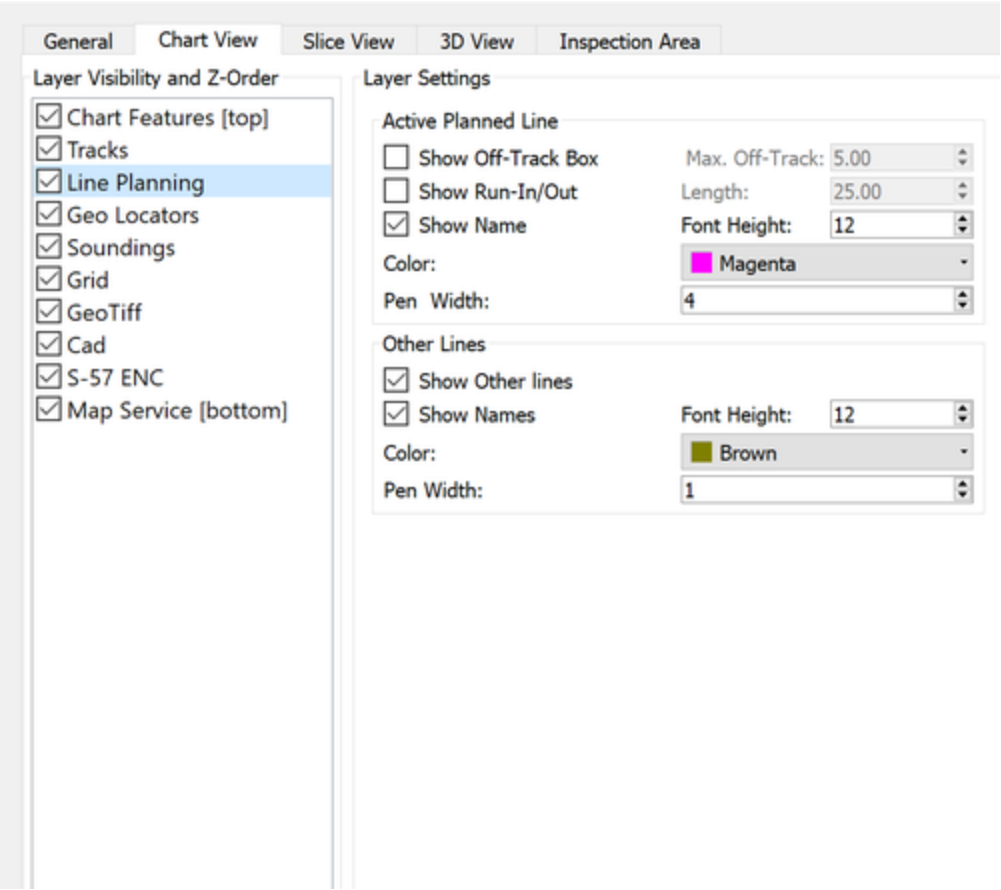
Layer that shows the transducer tracks of the echosounder data.



Setting	Description
Show direction Arrows on selecte track	When checked the highlighted/selected track will be annotated with arrows that shows the sailing direction.
Show disabled lines	When checked the tracks of disabled files (in Project Properties) are still shown, When unchecked they are entirely hidden.
Track Color	Color of drawn tracks.
Pen Width	Width of pen when track is not selected.
Selected Pen width	Width of pen when track is selected.

Line Planning

Shows how the planned lines (Survey Line/Theoretical Line/Route) are displayed.
See Project Properties to activate planned lines.



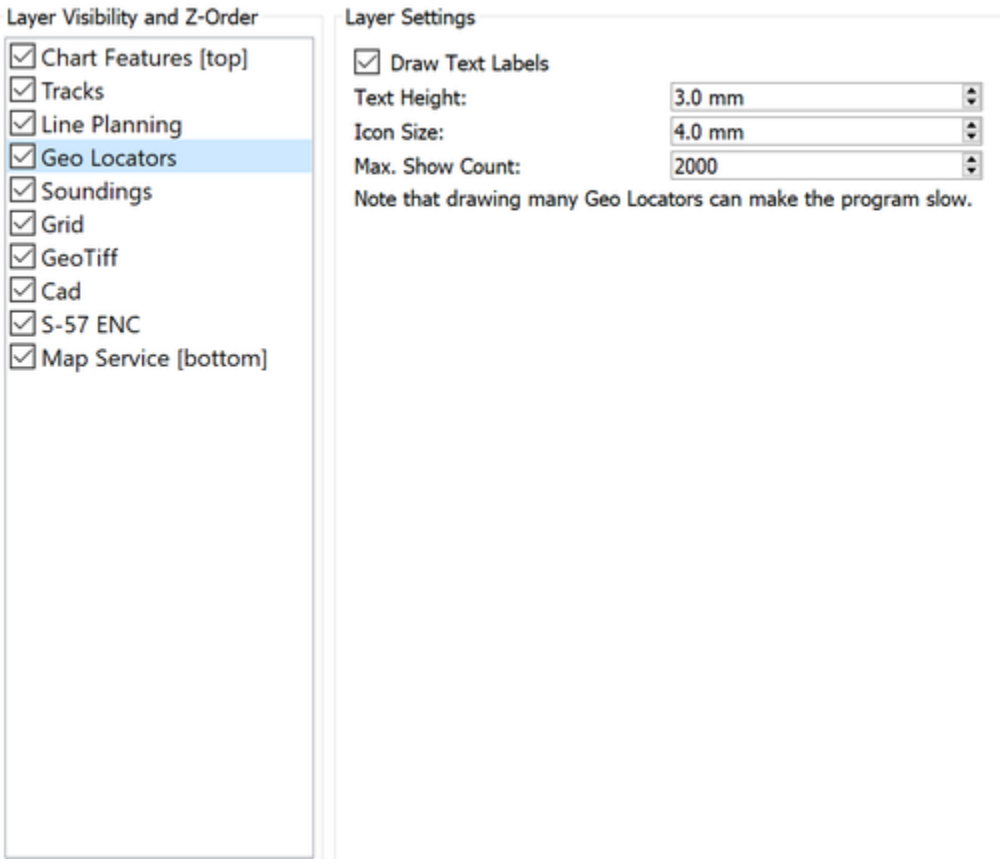
Active Planned Line, this is the line that is selected by the user:

Setting	Description
Show Off-Track Box	Draws a box around the planned line, with user definable width. Color is black.
Show Run-In/Out	Draw an extra line at start and end of planned line, with user definable length. Color is black.
Show Name	Draw text with the planned line name, font size is user definable.
Color	Color of drawn line.
Pen Width	Pen width of drawn line.

Other Lines, the planned lines that are NOT selected:

Setting	Description
Show Other Lines	Show/Hide the planned line of the lines that are not-selected.
Show Names	Draw text with the planned line names, font size is user definable.
Color	Color of drawn line.
Pen Width	Pen width of drawn line.

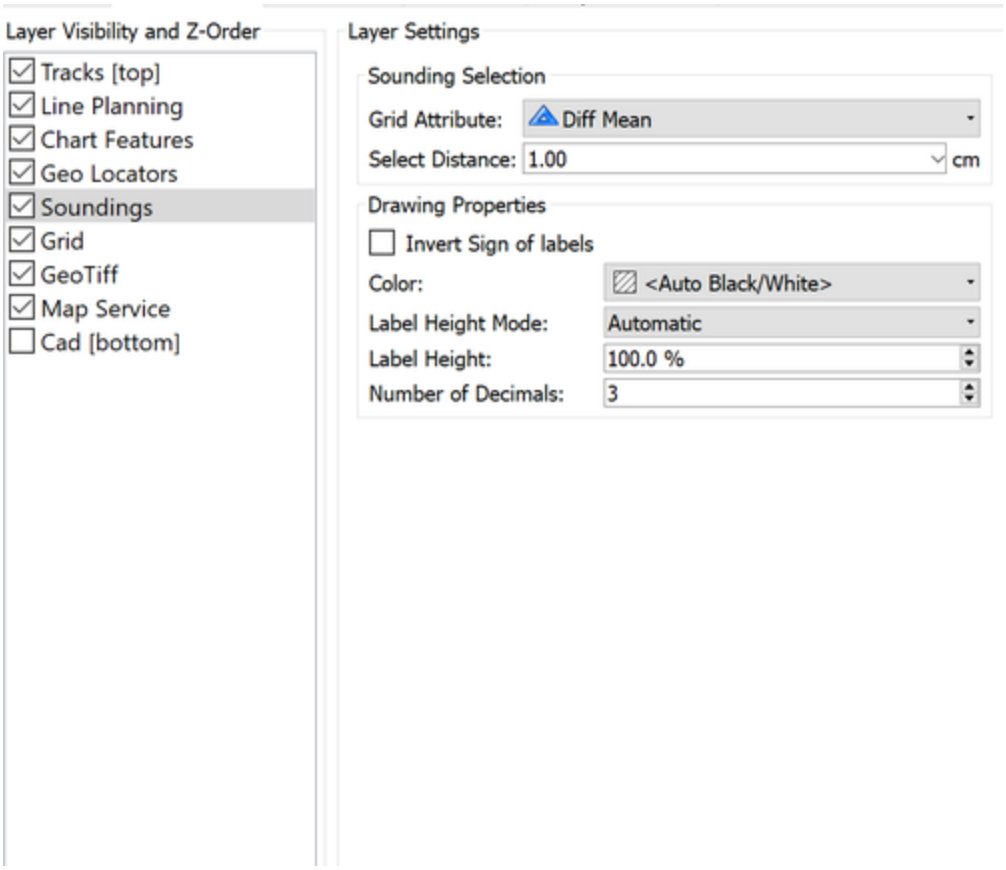
Geo Locators



Setting	Description
Draw Text Labels	Show/Hide the text next to a Geo Locator.
Text Height	Height in millimeters of the drawn text.
Icon Size	Height in millimeters of the drawn icon.
Max. Show Count	Maximum number of Geo Locators shown in the view.

Soundings

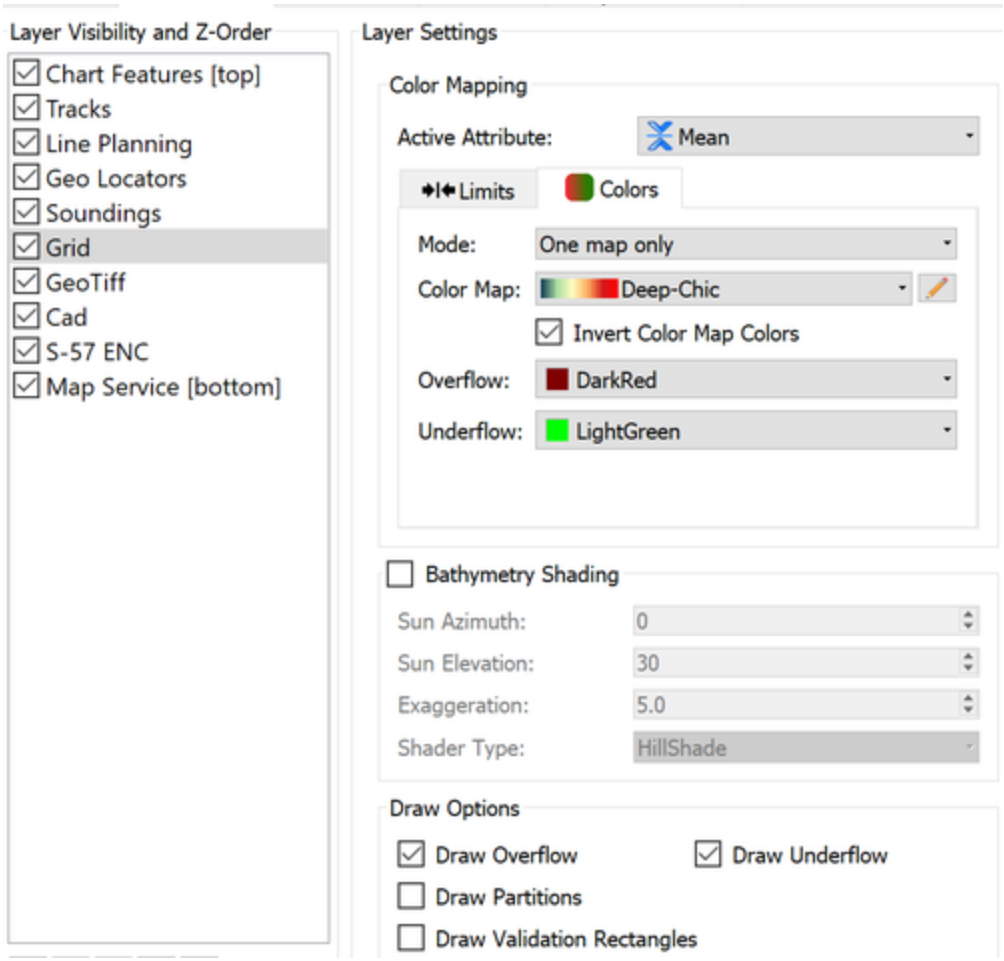
Sounding are text numbers that represent the selected grid attribute in the Chart View at a user definable interval.



Setting	Description
Grid Attribute	The selected grid attribute that is used as source. Can also be set to <Same as Grid Layer>.
Select Distance	Interval between soundings in centimeters. Note that distance is approximate.
Invert Sign of Labels	When actual sounding grid value is -15, the sounding wil show +15 when this option is checked.
Color	The Drawing color of the sounding label, can be auto black/white (for maximum contrast against background) or any other color.
Label Height Mode	How label height is entered (Auto/By Pixel/In Mm).
Label Height	Define Height of label.
Number of Decimals	How many digits behind decimal separator are drawn, e.g. 3 = 12.345, 1 = 12.4 etc.

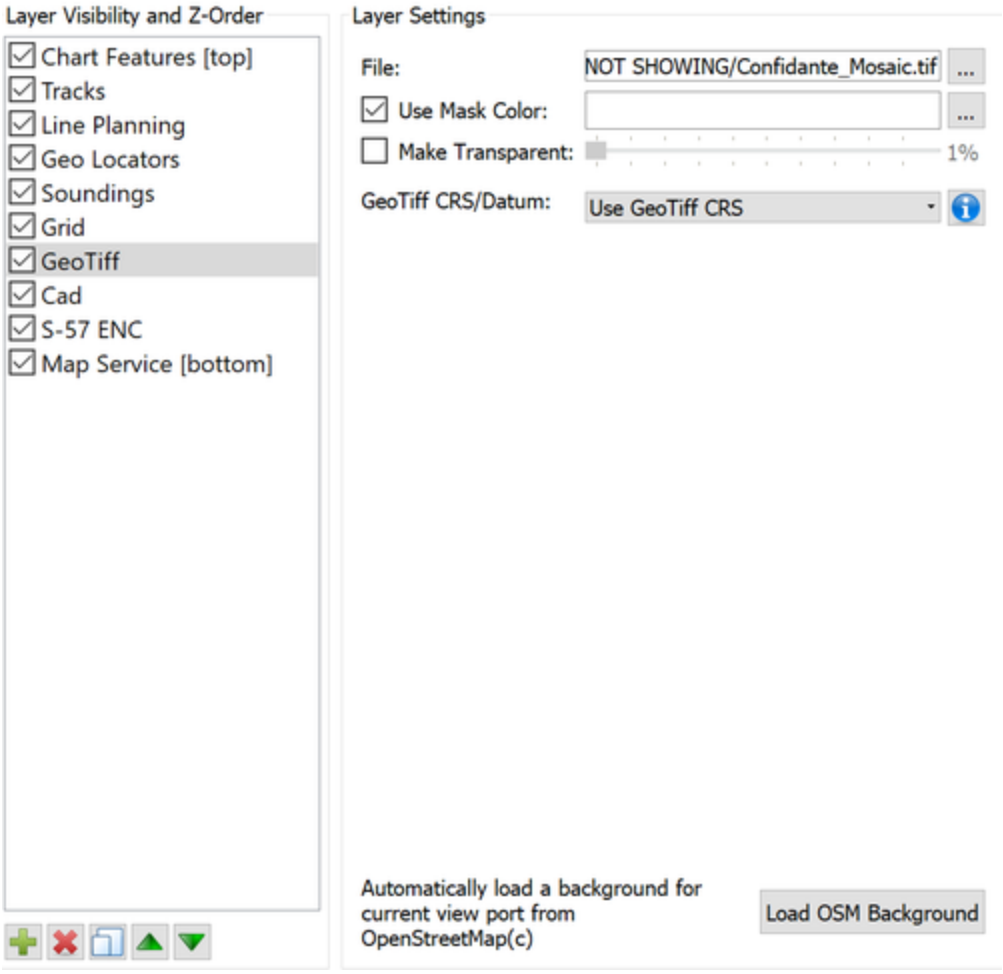
Grid

The grid layer shows a colorized height map including optional shading. In the settings the color translation is defined using minimum and maximum limits and color maps.



GeoTiff

AutoClean can draw one or more GeoTiffs in the background of the Chart View. When the tiff image contains internal Tag with Geo Information then it will use this to position the tiff in the chart. When absent it will check for a tfw "world" file with the same name as the tiff.
Note that the Mask Color Should be set to make sure that the back ground color of the tiff (the parts with no data) is drawn transparently. Optionally it can be drawn with some slight transparency, this allow you to draw it on top of a grid and still be able to see the underlying grid.



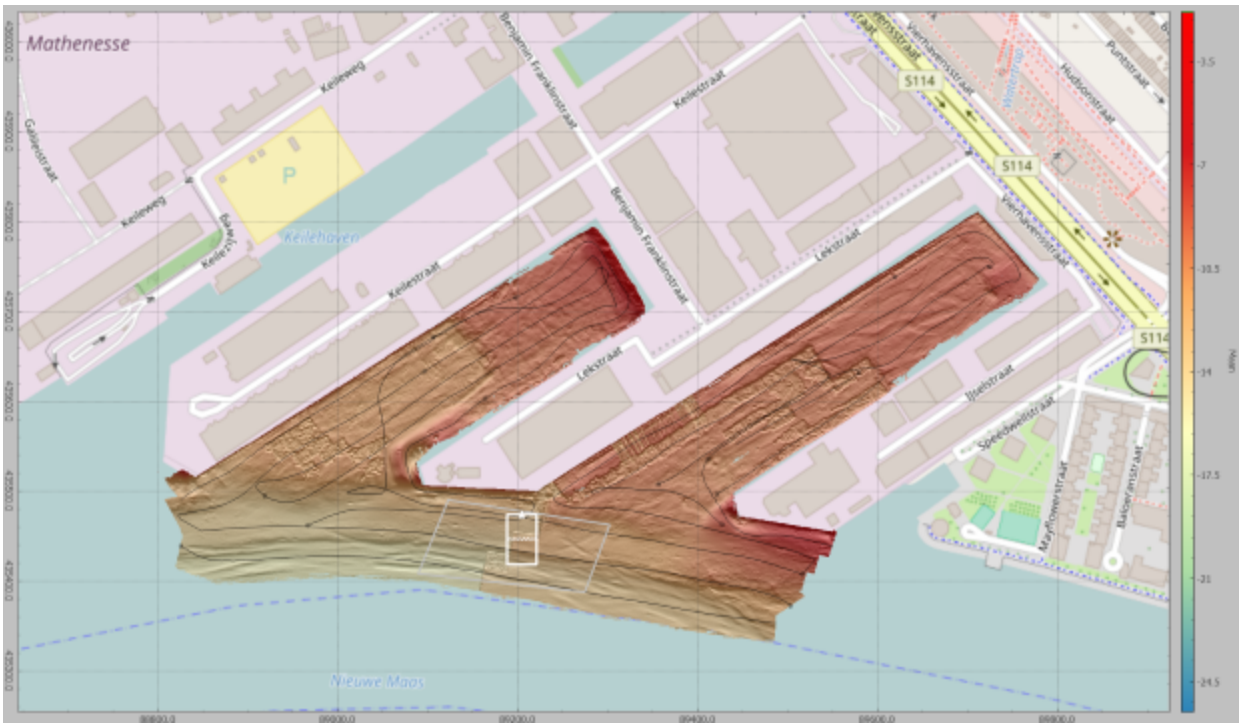
The Layer Settings are:

- File name
- Mask Color, this is optional, when disabled the image is shown "as is". When the mask color is activated then the mask color in the image is replaced with transparent color.
- You can make it transparent, optionally, the magnitude is user defined, 5% is not very transparent, opaque, but 90% transparent means very "shine-through".
- Select the CRS of the tiff, many tiffs contain full CRS/Datum info, this can be used in combination with the Project CRS to place the image on the right location in the chart view. If the GeoTiff doesn't contain any embedded CRS Info or it is wrong you can select the "Ignore" option.

With the button Load OSM Background you can fully automatically load an OpenStreetMap(OSM) background tiff image of the current view port. The OSM zoom level is determined automatically from the chart view scale. The image and corresponding TFW world file is saved to the windows temp folder.

For the automatic OSM Background you need to set a valid project CRS for the datum conversion. Furthermore an active internet connection is required.

Note that the OSM background functionality is superseded by the "Web Service" Layer. This layer can also be set to "Open Street Maps".



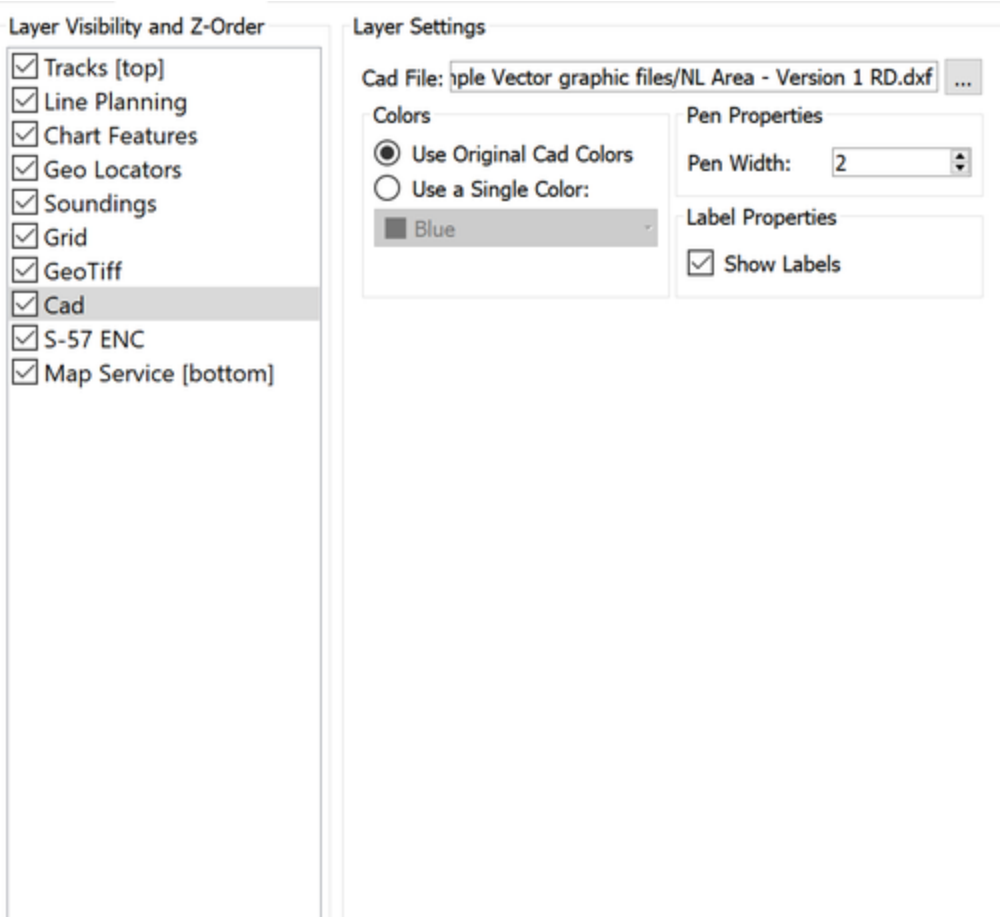
CAD

Various CAD formats are supported, e.g. ESRI Shape files, DXF, Atlas BNA and other formats supported by default by GDAL/OGR.

AutoClean will import the geometry in the background on startup or when a new file is added, very large files will result in a slight load delay so some patience may be required.

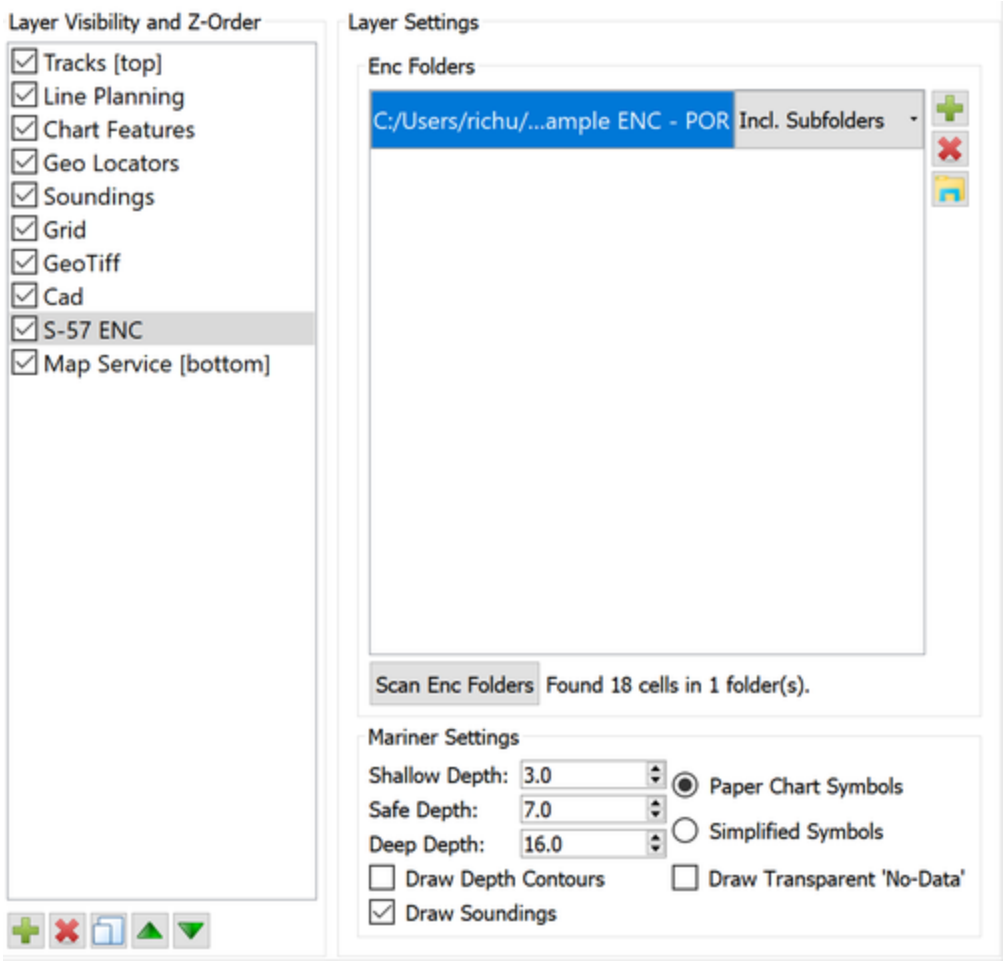
Currently only lines are drawn and text. The color of this can be selected in the properties of the layer. The Color Settings for "Cad Data" can either be set to a single color or to "Original CAD Color". The latter will use the original colors as imported from the CAD file. Note that not all CAD formats support color, but DXF colors will be read properly.

The CAD Layer uses OpenGL for its drawing. If AutoClean fails to show CAD data then there may be a problem with the display drivers. See also Tools|Test OpenGL Drawing.. for testing the OpenGL drawing.



S-57 ENC

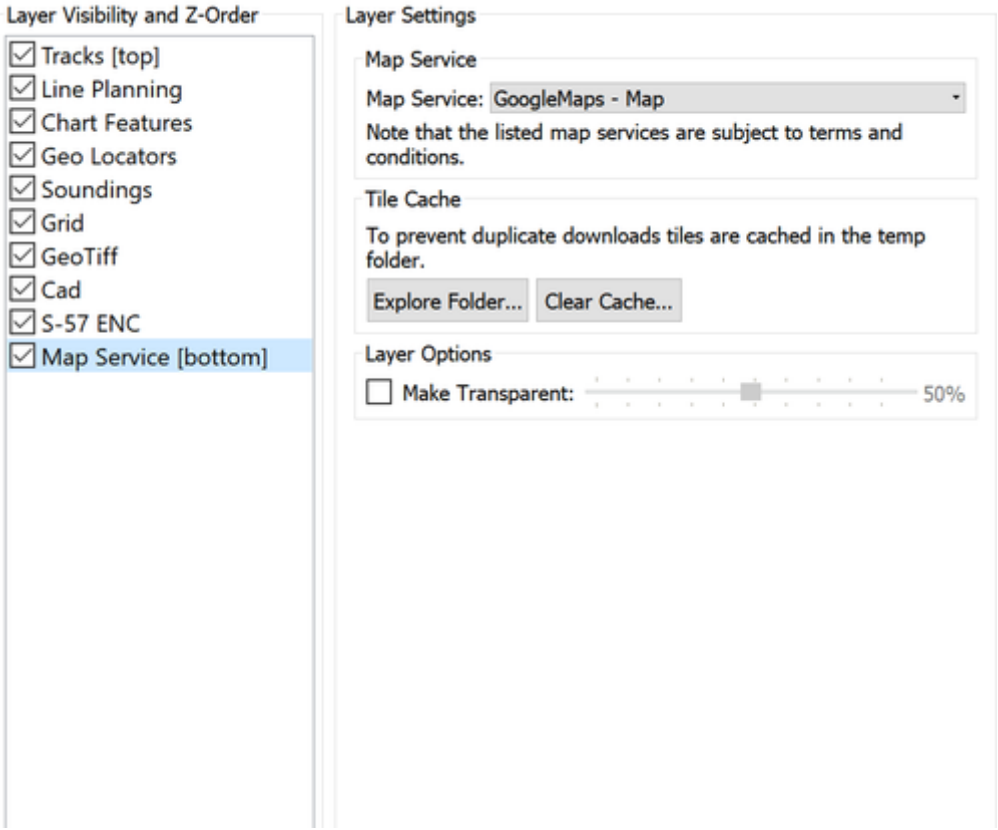
S-57 000 cells can be drawn in the background.



Map Service

AutoClean can read data from a TMS, WMS or WMTS Service. The tile data is loaded from a server via the internet. An active internet connection is required.
Once the tiles are downloaded they are placed in a specific cache folder. From then on the tiles are loaded from the cache to limit the internet traffic.

The service updates the tiles in the layer dynamically while zooming and panning. Depending on the responsiveness of the server and the speed of the internet it may take some time before the tiles are displayed.

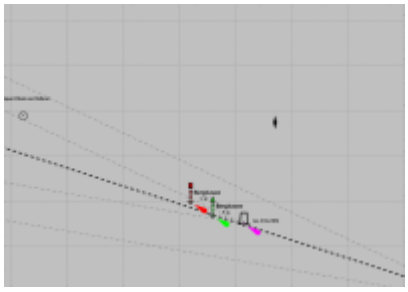


Default the following cache folder is used: C:\Users\<USERNAME>\AppData\Local\Temp\gdalwmscache.
The "Explore Folder" button allows you to start a Windows Explorer that directly points at the cache folder.
With the "Clear Cache" button you can remove all the images from the cache folder, this forces AutoClean to reload the tile data from the TMS Service.

Transparency is optional. You can give the layer a bit of transparency to make it's appearance a little less prominent.

The following services can be selected:

Service	Displays
OpenStreetMap	
Google Maps - Map	

	
Google Maps - Satellite	
Google Maps - Hybrid	
Google Maps - Terrain	
OpenSeaMap (Symbols Only)	

The OpenSeaMap service will show a transparent image with symbols drawn on it. This layer should be drawn on top of other layers.

It is possible to add your own Web Service, Locate the file "UserWebMapServices.ini" in the ProgramData/BeamworX folder, this file may be edited. Add a new entry user defined entry start at 100:

```
[Service100]
Description=Esri
Type=WMTS
URL="https://services.arcgisonline.com/arcgis/rest/services/Specialty
/World_Navigation_Charts/MapServer/WMTS/1.0.0/WMTSCapabilities.xml"
Layer=Specialty_World_Navigation_Charts
Transparent=0
```

Another example:

```
[Service101]
Description=NorgesKart sjokartraster
Type=WMTS
URL="http://opencache.statkart.no/gatekeeper/gk/gk.open_wmts?
request=GetCapabilities"
Layer=sjokartraster
style=default
TileMatrixSet=EPSG:3857
Transparent=0
```

Yet another example:

```
[Service12]
Description=NL - PDOK BRT Standaard
Type=WMTS
URL="https://service.pdok.nl/brt/achtergrondkaart/wmts/v2_0?
request=getcapabilities&service=wmts"
Layer=standaard
Transparent=1
```

More tips on WMTS:
1-If you get a URL from a server, always make sure it will request "GetCapabilities". you can enter the complete URL in a web browser to test it. If that either shows an XML with valid content or request to save a valid xml to disk then it works ok. If you get "HTTP Status 400 – Bad Request" the string is not correctly formatted. Then try to add "?request=GetCapabilities" to it.
2-For WMTS you really need to enter a layer ID name, this can be found in the xml in respective <Layer> group with tag e.g. **<ows:Identifier>sjokartraster</ows:Identifier>.**
3-For some WMTS Services also specify the the tile matrix set, this is found in the xml again in same layer def as: **<TileMatrixSetLink><TileMatrixSet>EPSG:3857</TileMatrixSet>** etc.

See above Service101.
4-Watch out with ampersand characters (&) in the URL name. These need to be replaced with ***&***.
5-When you have no idea why it is not working, use gdal_translate program (GDAL toolset OSGeo4W64) with the following command in a "windows command box".
gdal_translate "WMTS:http://service.pdok.nl/brt/achtergrondkaart/wmts/v2_0?request=getcapabilities&service=wmts,layer=water" wmts.xml -of WMTS

Slice View

Contains
Shows the content of all the points that lie inside the slice box.
Shows the grid mean values when enabled.
Allows for manual editing of points, manual reject, manual accept and undo of the last editing actions.

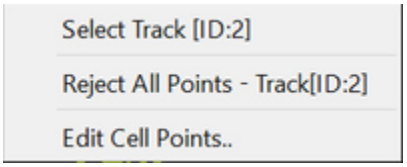
For the view settings refer to View Properties page.

Action	Description
Double Click Left	Re-centers the view.
MIDDLE* mouse button down + mouse move	Pans the Slice View
Mouse Wheel	Zoom in and out. The mouse position is the zoom point.
Mouse Wheel + (SHIFT or CTRL)	Zoom in and out. Vertical axis only.
Mouse hoover	When the mouse is close to a point then it is selected and the information shown.

*) Middle button is usually the mouse wheel, that also supports button action.

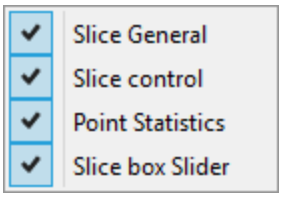
Slice View Pop-up Menu

The pop-up menu will only be shown when a point is selected. This is done by hoovering the cursor over it, the point will be marked with a cross symbol.
When a rejected point is highlighted then the option is presented to accept all point for a track, when an accepted point is highlighted the option is presented to reject all point for the line (see below).



Menu	Description
Select Track	This is a quick way to select a track in the Chart View. The track ID is shown.
Reject All Points - Track	Rejects all points that lie inside the slice box for the selected file.
Edit Cell Points	Edit a cell points in a detailed table.

Slice View Toolbars



Slice General

 Zoom All

 Toggle Rectangle, Polygon or Lasso

 Toggle Accept/Reject

 Show/Hide rejected points

 Revert modification

 Clip Selected track only

Slice Control

 Rotate slice 90 degrees

 Slice covers full Inspection Area

 Re-position Slice

Point Statistics

Displays the statistics of the selected points

Slice Box Slider

Contains the slider used to Re-position the slice

Manual Editing

All points can be manually rejected or accepted in the slice view. Changes are immediately written to disk. Last edits can be reverted or be undone with the undo option. Grid is immediately updated.
Selection can be done by rectangle, by lasso or by polygon.

In Polygon mode the points are added by clicking with the left mouse button. With a right mouse button click the final click is added and the reject or accept action is executed. The selection can be cancelled by pressing the ESCAPE key. The last clicked point can be removed by pressing BACKSPACE key. Note that the in Selection Mode Lasso/Rectangle the ESCAPE and BACKSPACE also work to cancel the selection.

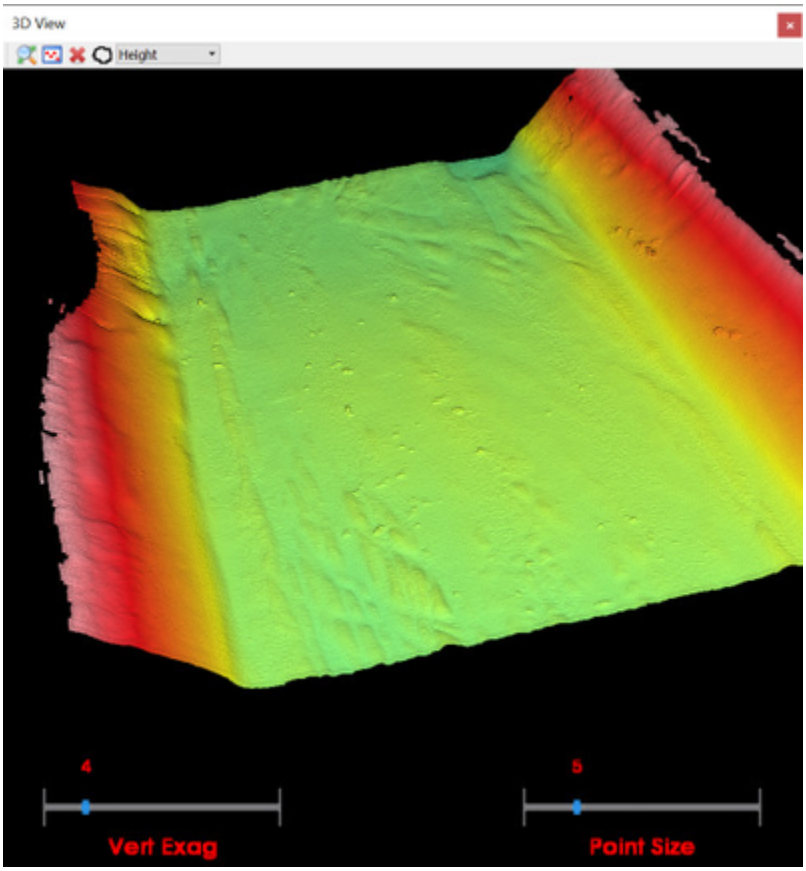
3D View

The 3D View can be used to visualize and edit the points that are loaded in the Inspection area. The point size, coloring and vertical exaggeration are controllable.
The view presents the points in a typical three dimensional presentation, a so-called trackball camera principle is utilized to control the scene (see mouse controls below).

Rejecting/accepting or filtering (active filter) points can be done with the right mouse button. The toggle function on the toolbar shows the currently set function, e.g. when a red cross is shown the reject mode is active.

OpenGL is used for the rendering, make sure you always have the latest windows driver for your video card installed.

If you do not like to see the 3D View at all then it is best to close it completely by clicking on the cross of the view. This way AutoClean will not load any points into it and the loading of a new Inspection Area will be a bit faster.



- In-View Sliders can be used to control the point size and Vertical exaggeration (Z Scale).
- A Special kind of point shading (optional) can be used that allows you to see very fine details in the bathymetry. The shading depends on the camera angle. Choose point size not too small to see the shading properly.
- When cursor is placed over a point it will become selected. its properties are visible in the Status Bar, left pane.

Editing points

With the right mouse button you can edit points. The active edit function can be toggled between Accept/Reject/Filter. Select the points by depressing the right mouse button, move the cursor to make a selection, then release.
Now the points inside the selection will be edited with the active function (reject, accept, filter). The filter option uses the filter that is active. Note that for filtering also the points from neighboring cells are used.

You can cancel the selection by pressing the ESCAPE key (before releasing the mouse button).

Point Coloring Mode

The points are colored depending on the color mode:

Mode	Description
Height	Colors are mapped to the global color map based on the height of the point. When automatic color scaling is used the scale is adjusted to the current point height difference. When disabled the same color scaling is used as in the Chart View.
File ID	Points are colored by the File ID they are contained in. See View Properties for the used color per file.
Horizontal Distance	Colors are mapped to the global color map based on the horizontal distance from point to the base of the inspection area (side opposite of arrow). This can be handy to visualize vertical structures. Always auto scaled.
Intensity	Intensities are auto-scaled to the global color map. Note that point intensities may not exist for certain import formats.
Classification	Colors by classification ID.
Original Color	Uses the point color from the original point files. This will only show colors when supported by the original file (for example supported for LAS and LAZ files). Will show black color when not supported.

Toolbar

Zoom out to all (accepted) data.

Show/Hide rejected points.

Enable/Disable Point Shading.

Toggle Right mouse button action, resp. Accept/Reject/Filter mode.

Toggle Right mouse button selection mode, either lasso or rectangle.

Point Color Mode

Mouse Controls

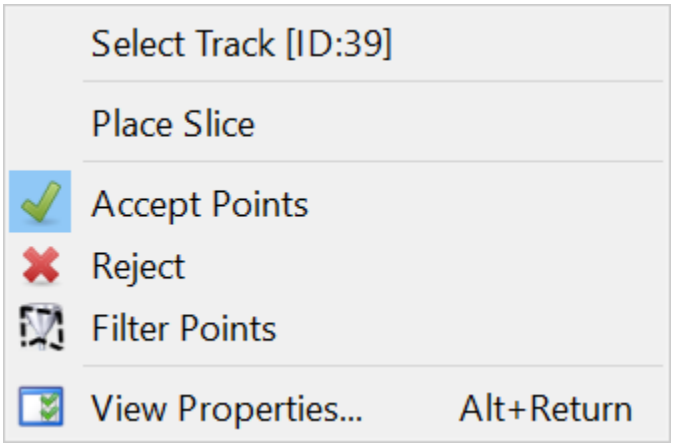
Action	Description

Left Button Double Click	Re-centers the view. The clicked point is the new rotation point of the camera.
Mouse Wheel	Zoom in and out.
CTRL+Left Button Down+Mouse move	Rotates view around the view center position.
SHIFT+Left Button Down+Mouse move or MIDDLE* Mouse Button down + Mouse move	Pans the view.
Left Button Down+Mouse move	Rotates the view around center point.
Right Button Down+Mouse move	Draws the Accept/Reject/Filter lasso or rectangle.

*) Middle button is usually the mouse wheel that also support press button action.

Pop up menu

When right mouse button is clicked above the 3D View a pop-up menu is shown.



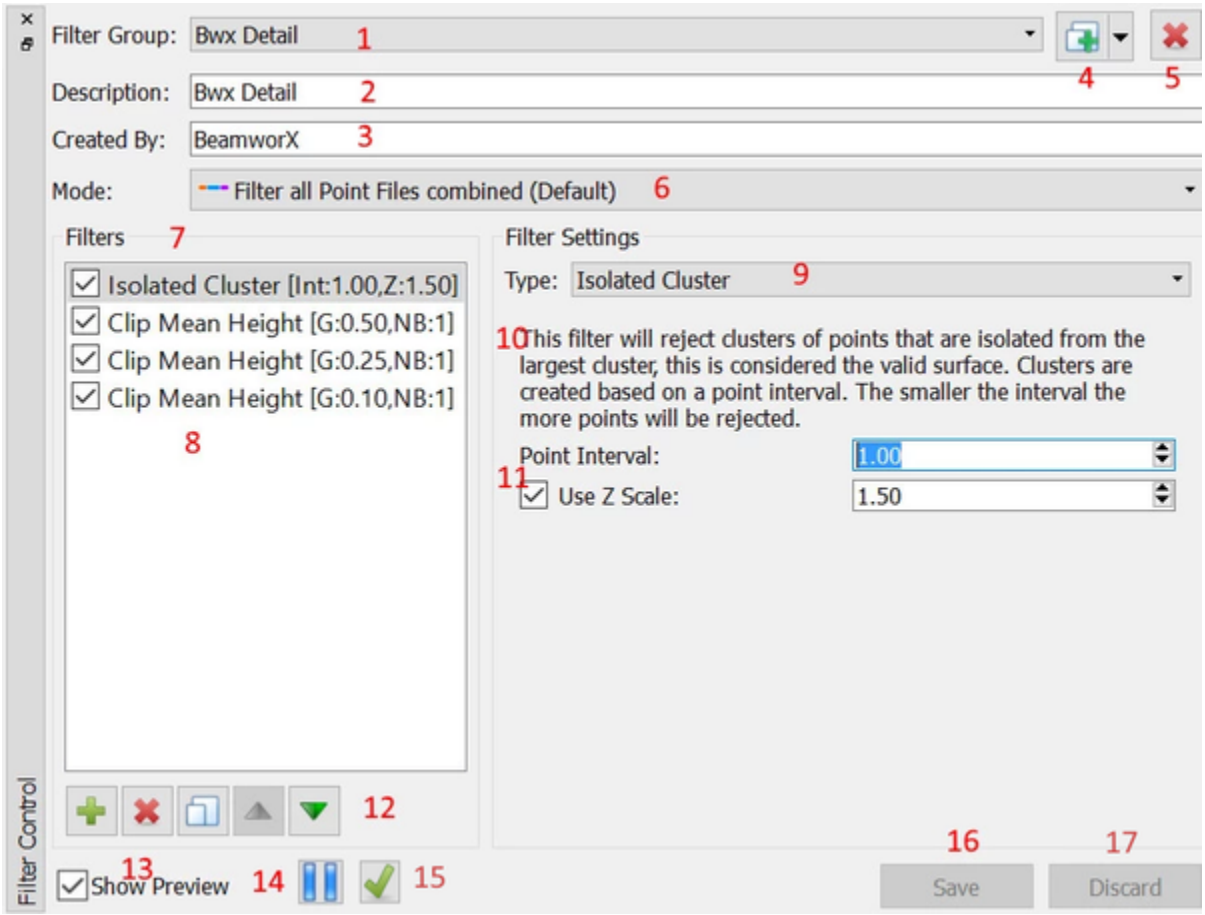
Item	Description
Select Track	Only when a point is highlighted. When selected the track that belongs to the highlighted point is selected in the Chart View.
Place Slice	Only when a point is highlighted. Places the slice over the selected when clicked.
Accept/Reject /Filter	Set the current Edit mode of the right mouse button action.
View Properties	Shows View Properties dialog.

Filter Control

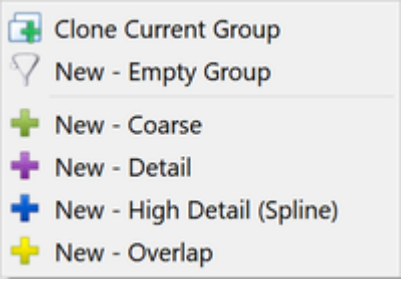
Filter Control is used for the creation and modification of filters and filter groups. Filter results are immediately visualized when the "Preview" option is enabled.

> The Filters are organized in groups, the so-called "Filter Groups. Each group will contain one or more filters. A filter action is carried out per group, the individual filters are called sequentially in the order in which they are displayed. A group is identified by its description. The filter group is stored in an XML file with the description as name in the local application data folder.

Below a screen capture is shown of a Filter Control filled with a typical filter group. The red numbers refer to the table below.



#	Explanation
1	Select current filter group, the combo box contains all defined filter groups. This is also the active filter that will be carried out by the "filter" functions. This selection will always be synchronized with the filter toolbar.
2	Name/description of current group. Can at all times be changed.
3	User name, just for reference, not used anywhere.
4	Add a new filter group. The button contains a drop down list with the following options:

	-Clone currently selected filter, a copy of the current filter is made and added -Add an new empty filter group -Add a new default filter group, various useful examples are available from the list. 
5	Removes the current filter group (after confirmation), note that filter group settings XML file (if exists) is also moved to the recycle bin.
6	Mode, filter all Points Files Combined (the default) or Individually. **Combined**, this is the default and should be used when files have a good height quality, e.g. because it was recorded with RTK GPS. It will offer the point data of all the files combined to the filters. **Individually**. The files are filtered one by one independently. This should be used when the files do not fit in height, e.g. because of astronomical tide application.
7	This lists all the filters in the group. The filters will be executed in the order they are display, topmost will be executed first. Note that the order of the filter can be modified with the green up/down arrows.
8	Enable/disable filters. A filter can be made inactive by deselecting the check box in front. Disabled filters are always skipped in the filter execution. The filter settings are now shown behind the name of the filter in [brackets].
9	The right pane will always show the settings of the filter that is selected in the filter list (6). The type can be changed by selecting another from the filter type combo box.
10	Filter specific info text.
11	Filter specific controls. The settings that are specific for the selected filter are shown here. Note that when preview is enabled a change in these controls will trigger an immediate update when not paused (13).
12	Add a new filter to the group Remove the currently selected filter from the group, if you accidentally removed a filter, you can use the discard option. Clones the currently selected filter into a new one, it will copy all the settings. Move the currently selected filter one position up in the list Move the currently selected filter one position down in the list
13	By enabling the "Live Preview" the "Slice View" and "Inspection Area" will both show the effect of the current filter group. Any changes to the filter settings will immediately be visible in these views. It is therefore advised to select an area that is representative for the filter. Also the accept button appears. When clicked the rejections from the preview are accepted and the "Preview" is disabled. This function is included the global Undo/Redo function.
14	Live Preview Only! Pause the live preview update. When this button is activated any changes in the filter controls will no longer trigger an immediate update of the points. When the button is clicked again the preview is updated with the latest (visible) settings.

15	Live Preview Only! Accept the changes made by the preview immediately and exit Preview mode. This function is included the global Undo /Redo function.
16	Save the filter group Settings
17	Discard the last changes to the filter group. The previous settings will be loaded.

It is advised to be cautious when filtering. It is better to add an additional step then to try to remove the spikes with a single filter. This way you can prevent removing valid bottom data.

Filter Types Settings

Detailed description is found here: Automatic Filters.

Geo Locators View

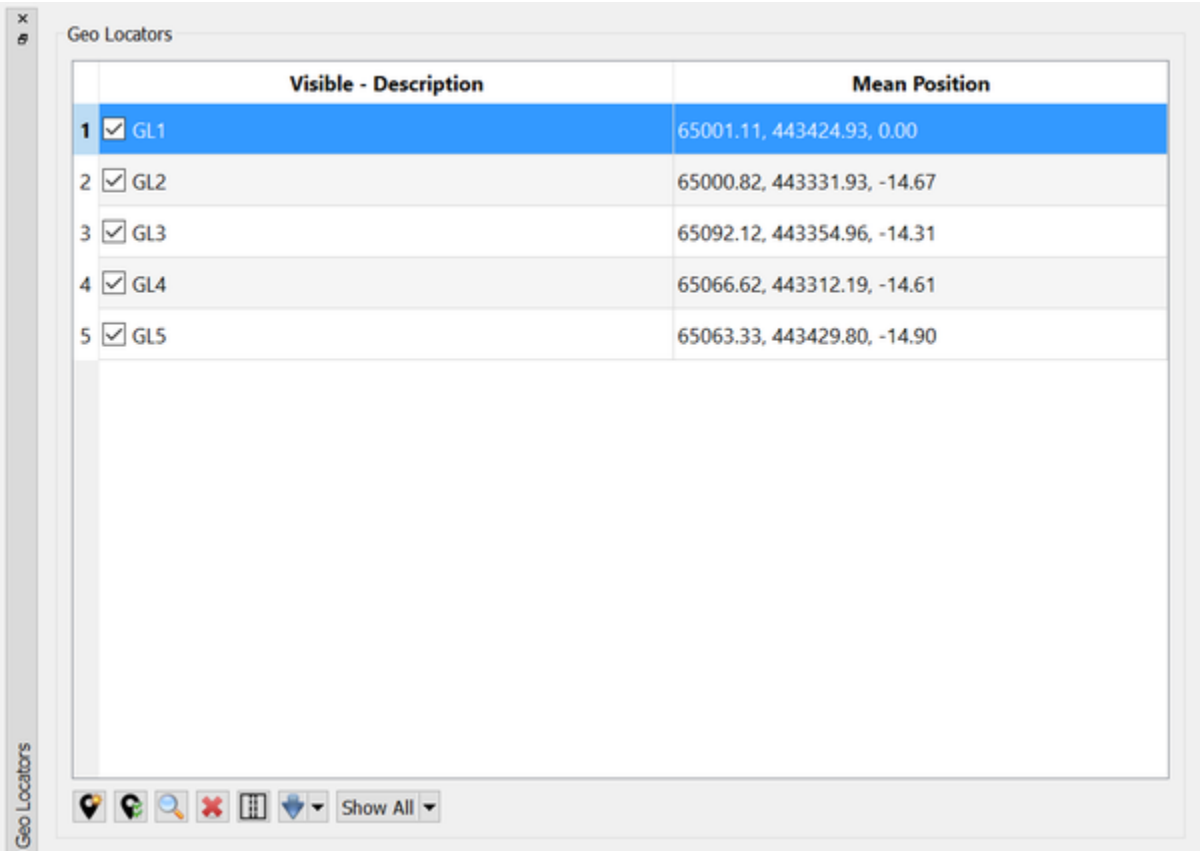
Geo Locators is the flexible "target" implementation in AutoClean. A Geo Locator consist of a label, one or more positions and some extra properties.

For detailed information refer to the Geo Locators.

The Geo Locators View is shown by default in a tab together with the 3D View and the Filter Control.
The View shows the list with existing Geo Locators (see below). The description is shown and the mean position.
The Check Box in front determines the Geo Locators visibility in the Chart View, 3D View and Slice View. When many Geo Locators are shown it can be handy to display only a subset.

One or more Geo Locators can be selected, note that when selection is changed the label of the selected Geo Locators are displayed in blue color in the various views.
Multiple Selection can be done by holding the SHIFT or CTRL key in combination with the mouse, a quick way to select them all is pressing in the top left of the list. The selection can also be changed with the "Select/Visible" drop down button.

When you double-click with left mouse button on a line then the Chart View will be be re-centered to the selected Geo Locator.



The buttons below the list give access to various functionality. Note that these features can be accessed from the Main Menu|Edit|Geo Locators menu as well.
Some functions like remove can be use with multiple selection while others like Edit only work on one selected Geo Locator.

Below the buttons are referenced for more details on the functionality refer to Geo Locators chapter.


Add Geo Locator

 Edit Geo Locator

 Zoom Chart View to the selected Geo Locator(s)

 Remove the selected Geo Locators

 Load Inspection Area around one Geo Locator

Import/Export Button

This is a drop down button that contains various import and export functionality.

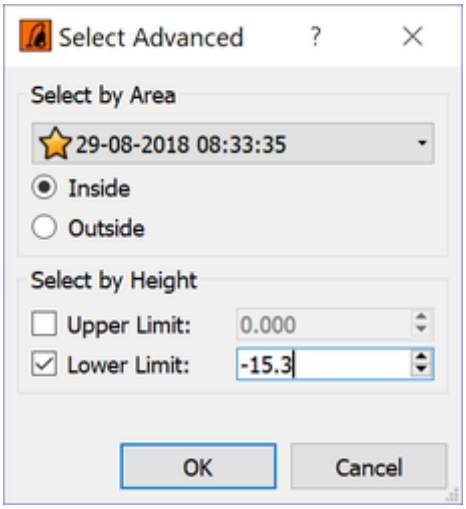
Select/Visible Button

This button is for convenience to select and change the visibility when a large number of Geo Locators are shown.

The functions are: Show/Hide All, Show/Hide Selected, Select All/None/Advanced.

Advanced Selection

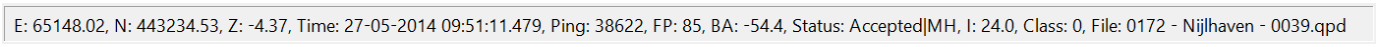
When the menu item "Select Advanced..." is clicked a dialog is shown which allows you to combine two selection criteria: by "Selected Area" and optionally by height.



Status Bar

The status bar at the bottom of the program shows various kinds of cursor and selection information. It is divided into three parts, the left, center and right panel. The horizontal position of the labels are user definable, when the mouse pointer hovers above the start of the label the cursor changes to "resize" and allows you to drag the label left or right. The positions are remembered when AutoClean is closed but also in the backup /restore layout functionality.

Left Panel



Slice View/3D View:
Cursor highlighted point properties are shown including position and point meta data.
The following fields are shown (see above for an example):
Easting, Northing, Height, Date/Time, Ping Number/ Point ID, Beam Angle (deg), Point Status*, Intensity, Classification, File Name.

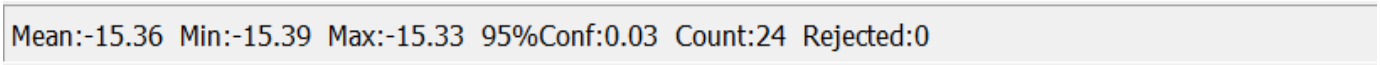
*) Point Status will show 'Accepted' when the point is considered valid and 'REJECTED' for invalid points.
Behind the pipe character ('|') a combination of character is shown that depict the so called point status flags. This shows the reason that the point was rejected and/or the height status. The flags are explained in the table below.

Point Status Flags	
A	Rejected by **A**utomated Filtering
M	Rejected by **M**anual editing
O	**O**riginal Rejection, as encountered during the file import, the creator of the point file, e.g. the acquisition software, already rejected this point.
Z	**Z** (Height) Shift applied, a height modification was carried out on the point, e.g. by the Overlap Fixer Filter.
H	Transducer (Ping) **H**eight Shift applied. This is a common Height Shift value per ping (group of footprints)

Note that accepted points may also have the point status flags set, these are points that were rejected in the past but were re-accepted by the user.

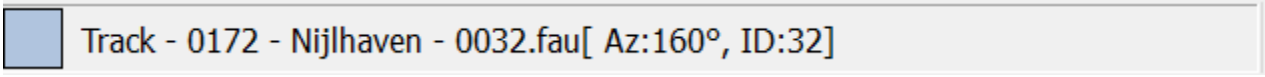
Chart View: When the cursor moves in the Chart View only the Easting and Northing are shown of the current cursor position.

Center Panel



Shows grid cell attributes of the cell below the cursor (Chart View) or the cell that holds the selected point (Slice View/3D View). The following grid cell attributes are shown: Mean/Minimum/Maximum Height, 95% Confidence level, Count, Rejected Count.

Right Panel



This will show the name and or ID of a selected object that is drawn in the Chart View, e.g. the selected transducer track or hole information. When a track is selected the name of the survey line, ID and mean azimuth is shown as well as the color used for showing the points in the Slice View.

The right panel also contains a fixed part that will display the currently used Grid Cell Size, if a grid reference was loaded (Ref), and if the Slope Corrected 95% confidence level was enabled (CC).

Geo Locators

Abstract

The Geo Locators is the flexible "target" implementation in AutoClean. A Geo Locator consist of a label, one or more positions and some extra properties (date/time only currently).

It can be used to mark locations and areas of interest in the project. Geo Locators can manually be assigned in the views or can be imported from an external file.
They can also be imported from existing Selected Areas, Holes or Grid Feature markers. Geo Locators can be exported to a text or CAD file.
All the views are capable of showing the Geo Locators.

A Geo Locator list is maintained per project. It is possible to import the Geo Locators from another project, see below. The Geo Locators are stored in the file "GeoLocators.csv" in the project folder.

Creation

There are various ways to create a Geo Locator:

-Create by entering a position manually.
-Import from other AutoClean items like Grid Holes, Grid Feature Markers, Selected Areas.
-Import From ASCII Text file or CAD file or from another AutoClean project.
-Create from Chart View, at the cursor position.
-Create from 3D View or Slice View. Place Cursor over a point and make sure it is highlighted, then press right mouse button, pop up menu is shown. Select here the "Add Geo Locator" functionality. Now the "Add Geo Locator" Dialog is shown with the exact point position.

See below for more information.

Access to Functionality

The Geo Locator functionality can be accessed primarily from the Geo Locator View, a number of buttons are available there. It is also possible to access from Main Menu Edit|Geo Locators. Furthermore some functionality (Add, Move) is available from the pop-up menu of the various views.

Selection & Visibility

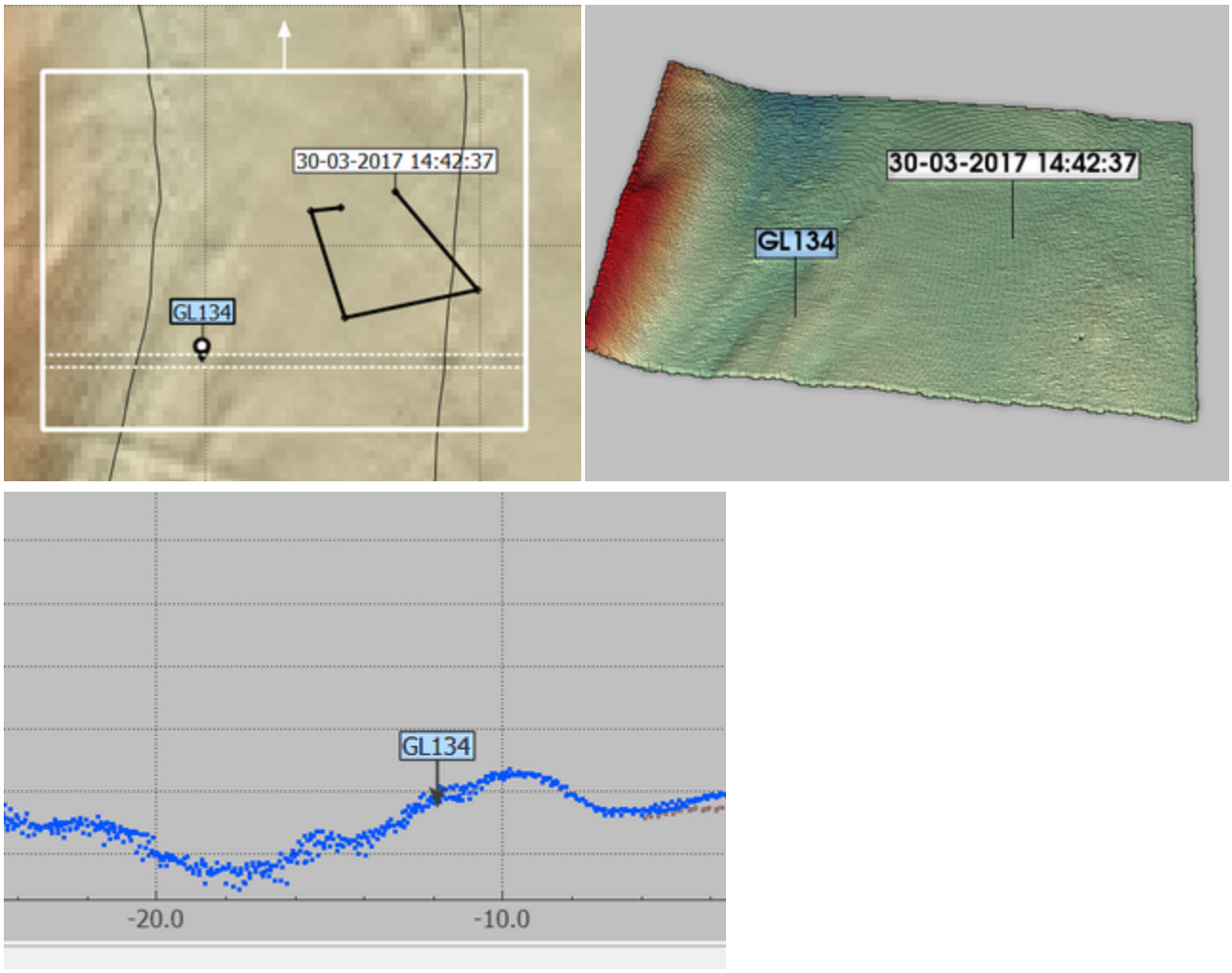
A Geo Locator can be in a selected or un-selected state. Multiple selection is possible from Geo Locator View by using mouse + SHIFT or CTRL. Selection is also possible by clicking the label or position of the Geo Locator in the Chart View, this enforces a single selection. Note that when a Geo Locator is clicked in the Chart View it is always scrolled into view in the Geo Locator View.

A Geo Locator can be in a visible or invisible state. The visibility can easily be changed from the Geo Locator View. Invisible Geo Locators are not drawn in the Graphical Views, but are always shown in the Geo Locator View. It can be practical to show only a subset when have lots of Geo Locators in the project.

Views

Geo Locators are displayed in the Chart View, 3D View, Slice View and Geo Locator View. The latter is a list with Geo Locators and gives easy access to the functionality.

Note that the label of a selected Geo Locator is drawn in light-blue color, in un-selected state the color of the label is white. The label colors are dynamically updated when the selection changes.
In the Chart View the Geo Locator is shown as an icon when it consist of only one position but it is drawn as a black poly-line in case of multiple positions. The label is always attached to the first position.
In the 3D View the Geo Locator is shown only as a label with a mean position. In the Slice view the the Geo Locators are only shown when the 2D positions is located inside the slice box. Note that when the Geo Locator contains a poly line then the Slice view shows a marker when a vertex point of the poly-line lies inside the slice.



Geo Locators

	Visible - Description	Mean Position
1	☑ GL134	64839.64, 443678.12, -14.88
2	☑ 30-03-2017 14:42:37	64864.56, 443695.27, -15.10

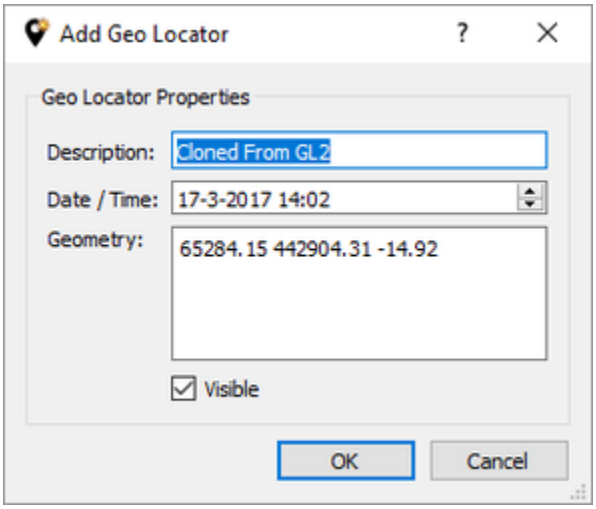
Show All

Geo Locators shown in the various views, top row from left to right: Chart View, 3DView, Slice View. Bottom row is the Geo Locators View.

Functionality

Add Geo Locator

"Add Geo Locator" Dialog is launched that allows you to add a new Geo Locator manually. This may be useful when you need to enter a specific position.

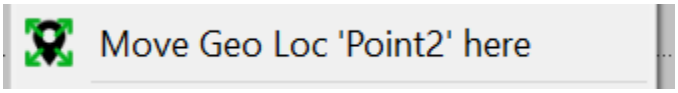


When a poly line needs to be enter just add multiple lines with values delimited by space. If you wish to add a closed poly line just enter the last coordinate that is the same as the first.

This functionality is also available from the Chart View, Slice View and 3D View pop-up menu. This is handy because this already fills in the correct position from the high-lighted point. Points added to the chartview will have the mean height from the grid. When you need to enter many manual positions consider to make a text file and then import it.

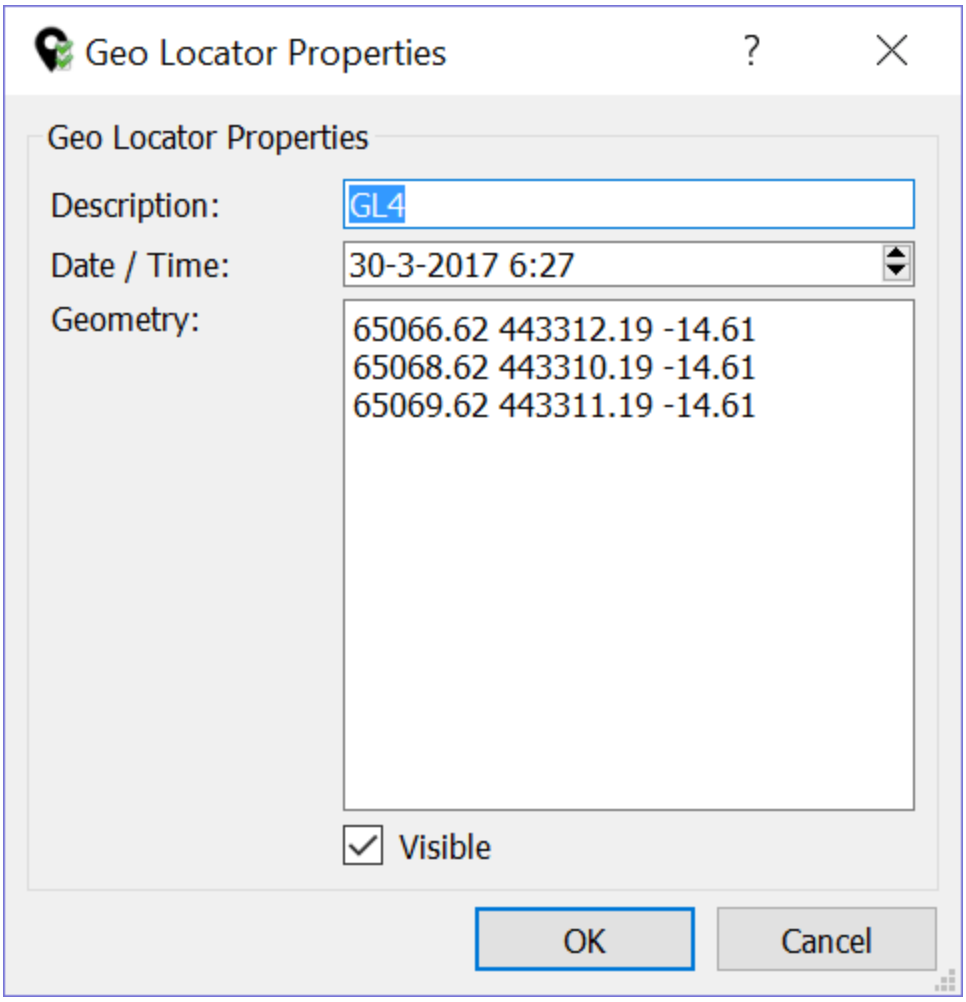
Move Geo Locator

This functionality is available from the Chart View, 3D View and Slice View only. Select a Geo Locator. Then hover the mouse to a new required position or point, then press right mouse button. The pop up menu will now show the option "Move Geo Locator 'xxx" Here". When option is selected the Geo Locator is moved to the selected position.



Edit Geo Locator

Launches the "Geo Locator Properties" dialog. Change the properties and press OK.



 Zoom Chart View to the selected Geo Locator(s)

 Remove the selected Geo Locators

 Load Inspection Area around one Geo Locator.

This function is available when just one Geo Locator is selected. When executed it will load the area around the center of the Geo Locator in the Inspection area.
Note that the current dimension of the Inspection Area is used. See View Properties, Inspection Area tab.

 Import Grid Holes

Convert the currently displayed grid holes to Geo Locators. A Hole consist of a collection of grid cell centers and these are converted to a convex hull. The convex hull is imported into the Geo Locators.
The name convention is "Hole-N-X-Cells", N is the hole ID and X the number of grid cells it contains. The Grid Holes are not changed.

 Import Grid Feature Markers

Convert the existing Grid Feature Markers into Geo Locators. When the "Join Adjacent Markers" option was applied then the Grid Cell centers are converted to a Convex Hull and imported.
The Name Convention is "CriterionX-MarkerN, X is the criterion index, N the Marker ID.

 Import Selected Areas (All)

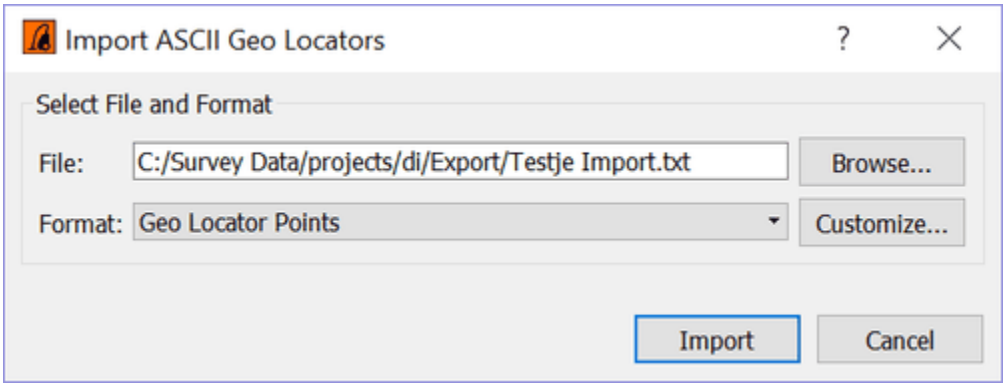
Import all selected areas, favorites and none favorites.

 Import Selected Areas (Favorites)

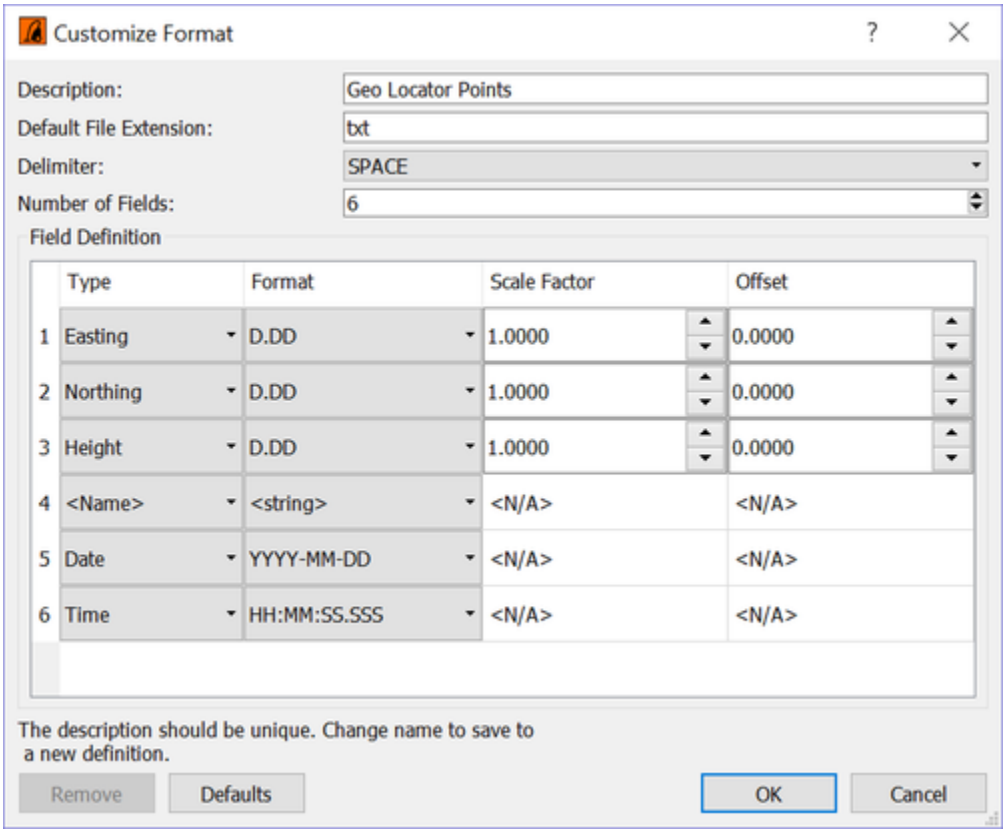
Import only the favorite selected areas.

 Import ASCII File

Import Geo Locators from an ASCII file. This launches the import dialog:

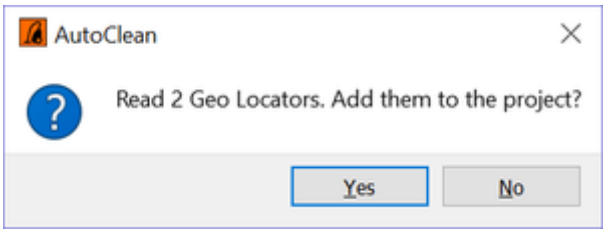


Select the file you wish to import. The Format combo box shows the available formats. With the Customize button new formats can be added or existing be modified.



Format are stored in the BeamworX application data folder in file ASCIIGeoLocFormats.xml.

Press Import to start Importing. When the importing is successful AutoClean will ask if new GeoLocators should be added.



Import CAD File

Import Geo Locators from a CAD File, various formats are supported, for example DXF, shape file etc. (through GDAL). Note that name import may not work properly depending on the format.

Import from Sonarwiz

Import targets from a Sonar Wiz target database. The file extension from this file is ".db3". Only a limited number of properties are imported:

```
Name, ClickX, clickY, DateTime UTC
```

When a Target has the "DeleteYN" flag set it is ignored.

Import from other project

Import Geo Locators from another project, browse to an existing project and select the file "Geo Locators.csv" in the project folder.

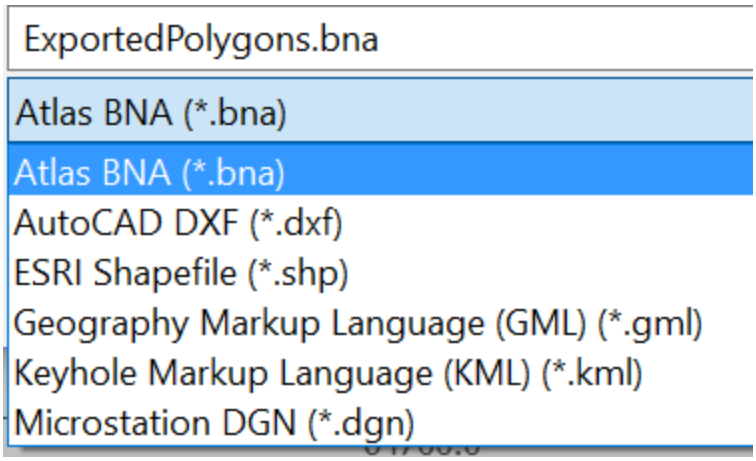
Export All to ASCII File

Export Geo Locators to a user definable ASCII format. The format can be specified and will be remembered for the next session.

Export All to CAD File

Export Geo Locators to various CAD formats. The format can be specified, only a limited number of formats are available.

Available formats are currently:



Load Heights from Grid Mean

Replace the Geo Locators (All or Selected) height with heights from the Grid mean layer. The Geo Locator X-Y position is used to lookup this height. When the Geo Locator is located in an empty grid cell it's height will not be replaced.
This is handy when 2D positions need to be properly displayed in Slice View or 3D View.

Automatic Filters

This chapter describes the automatic filters that are available in AutoClean. These filters can be applied on the point data set for cleaning outlier data or improving the overall quality (height shifting) of the data.
An overview of the filters is listed in the table below. More details on the inner filter workings are given in the following paragraphs.

Overview

The list below shows the filters that are available in AutoClean.

Filter	Description	Modification (R= Reject flags, Z=Z Shift, C = Classification)	Speed
Reset Modifications	Re-accepts rejected points, reset height modifications, reset Classification	R/Z	++
95% Confidence Level	Statistical outlier rejection based on cell mean	R	++
Low Hit Count	Rejects all points in a cell when cell does not contain enough points	R	++
Clip Abs. Height	Reject on absolute point height	R	++
Clip Mean Height	Rejects points in cell(s) based on mean height and gate	R	++
Clip Grid Reference	Reject points that are not located vertically near the grid Reference Layer	R	++
Clip Intensity	Reject on absolute or relative Intensity values (Reflection Strength)	R	++
Clip Quality	Reject on quality range or on specific values	R	++
Clip Bad Ping	Reject entire ping when xxx points are rejected.	R	++
Clip Time	Reject "older" points.	R	++
Clip Outerbeams	Reject invalid beams on the outside of the swath	R	++
Clip TPU	Reject beams based on their TPU (THU/TVU) values	R	++
Basic Ping blocking	Rejects based on relative position w.r.t. the transducer position.	R	++
Automatic Filters#Reducer (Voxel Based)	Voxel (3D box) based reducer	R	+
Automatic Filters#Reducer (Ping Based)	Ping based reducer	R	++
Slope Filter	Reject on mean slope to neighbors	R	--
Overlap Fixer	Fixes height errors on overlaps caused by refraction errors	Z	+
Area Outlier	Reject based on mean distance to its neighbors	R	-
Vertical Plane	Rejects vertical planes from data	R	-
Surface Spline Filter	Reject based on fitting a thin plated spline through patches of points	R	-- or +
Isolated Cluster	Reject points that are located in an isolated cluster (group)	R	++
Lonely Cells	Reject points that lie in isolated grid cells	R	++
Refraction Correction	Correct for refraction errors	Z	+
Edit Classification	Sets the desired classification and status to points	R/C	++
Edit Intensity	Changes the Intensity (Backscatter) value by simply offsetting it with a fixed value	Intensity Change	++
Shift Height	Shifts points up/down	Z	++

Smooth Area	Smooths the heights of a survey to the mean level, shifts heights	Z	+
Inverted Cloth	Reject buildings, trees etc from a point cloud	R	+

Detailed description

Reset Rejections

This filter is used to reset one or more rejection flags of the points. It can be called from the main menu directly, menu Edit|Reset Rejections... or you can place it at the top of a filter group to reset the filter flags before executing the filter group. This can be handy if you wish to have the same filter repetitive filter result. Note that it is possible to put this filter in the middle of the group but that would be rather useless as you would only be removing the filter results of the filters executed earlier.

Go to the detailed description by clicking this link.

95% Confidence Level

This filter will reject the worst outlier point in a cell in comparison to the cell median value. It will do this iteratively until the confidence level of the cell has fallen below the maximum user specified value or the minimum valid point count is reached. If "Relative to Mean Heights per file" is selected the filter will first create a temporary cell that contains all the points but shifted to the mean height compared per line. The temporary cell and points are not stored. They are only used to flag outlier points.

Low Hit Count

This filter will reject all the points in a cell when it has less accepted points than the user specified minimum.

Clip Abs. Heights

This filter will reject points based on their absolute height. Points outside the minimum or maximum range are rejected.

Clip Mean Height

This filter will reject points in a cell that have a bigger height offset from mean than set by the user. The user defined number of neighbors are used to calculate the mean value. Setting "No neighbors" will force the algorithm to create a virtual cell at each point position. This means that the point to be evaluated, always is the center of the cell. During evaluation the examined point does not contribute to the used mean value. Setting "1 Neighbor" will force the algorithm to adapt to the neighbor cell means. The "Reject when outside mean +/-" gate is applied to the minimum and maximum mean found in the cell and the 1 neighbor ring.

Clip Grid Reference

This filter will reject a point when its height is outside a user defined gate around the grid reference layer. This filter is useful when a previous cleaned survey or design is available for the survey area.
This filter is only effective when a reference layer was loaded into the grid. Cell that have no reference value are ignored during filtering. When a reference layer is not available this filter will not reject any points.
There are two settings: Max. Above Ref and Max. Below Ref., these define the data acceptance gate around the reference value. When the height of the point lies outside this gate then it will be rejected.

Clip Intensity

This filter will reject a point based on its intensity (Reflection Strength). Note that when the original format does not contain intensities the values will be zero. Note that the Intensity values are arbitrary and are read directly from the original input file.
Filter can be used in four modes: Absolute - Clip Outside, Relative - Clip High, Relative - Clip Low, Relative - Clip Outside.

Absolute - Clip Outside
In this mode the clipping is very straightforward.
When the Intensity value of a point is smaller than the min. filter value or larger than the maximum filter value then it is rejected.

Relative Modes
The relative modes are suitable for rejecting points that have a different intensity than its neighboring points.
Point data is visited in a grid cell-based fashion. For each cell and a user definable number of rings of neighboring cells a statistical mean and standard deviation of the intensity is determined.
From this data and the user-defined Standard Deviation Multiplier an absolute intensity gate is calculated. When the intensity of the point lies outside/above/below the gate the point is rejected.
Use "Clip High" mode to reject large intensity points, use "Clip Low" to reject low signal points, use Clip outside to clip both high and low intensity points.

Clip Quality

This allows rejection based on the point quality value. Note that the quality is format dependant, it may or may not be present.
There are two modes clip outside on a range and clip on specific value

Clip Outside

Clip footprint when quality lies outside the specified range.

Clip Specific Range

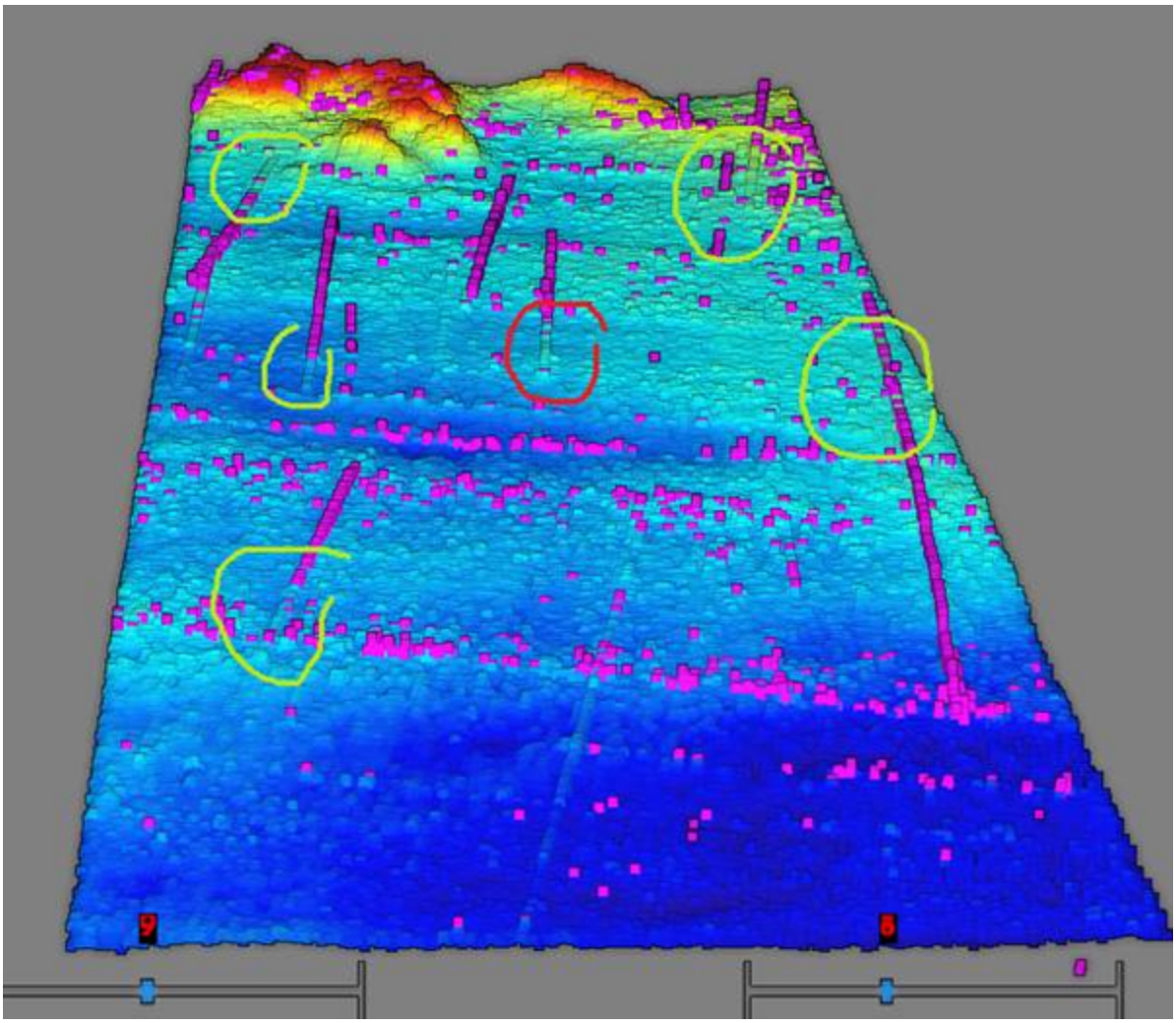
Clip footprint when quality is present in the specific range. The range can be entered as a comma and dash specified range.
For example: 1,2,4-6, footprint with qualies 1,2,4,5,6 are rejected, any other will not be affected.

Clip Bad Ping

Reject entire ping when xxx points are rejected.

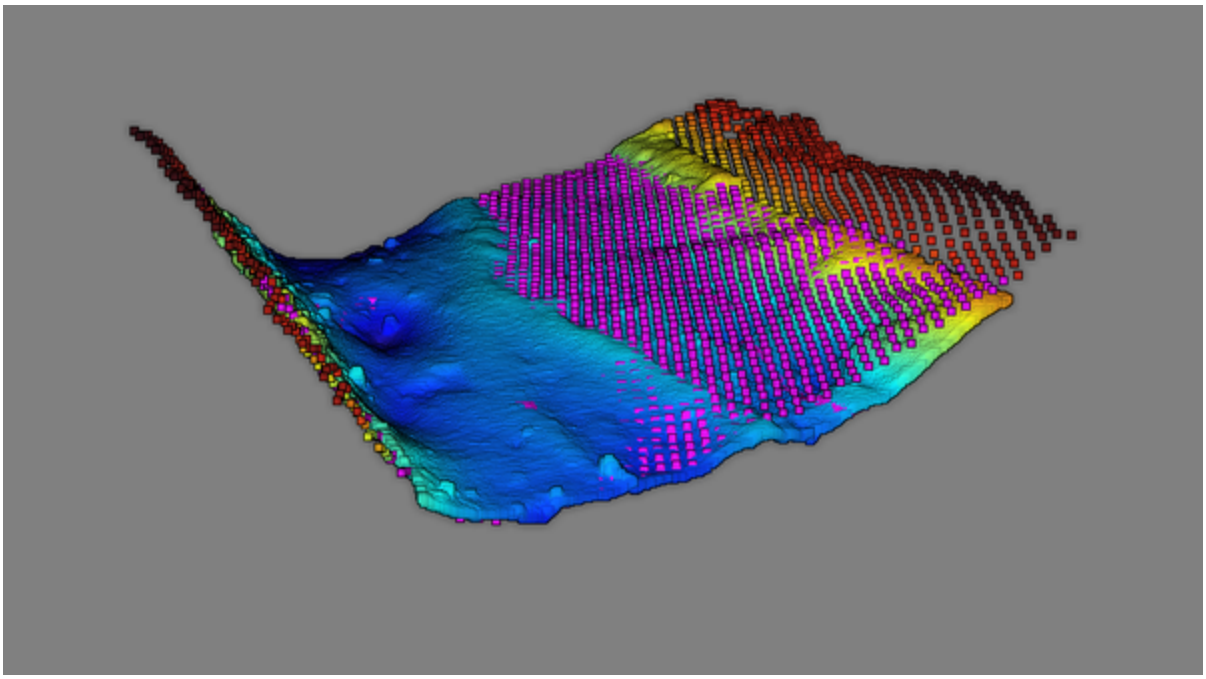
Sometimes there are bad pings that stick out from the others, for example when the weather is bad and applied attitude is for some reason not entirely correct.
The normal filters struggle to remove the last few points of these pings because the are quite close to the good data. The bad pings can be recognized by their abnormally large number of rejections.

This filter rejects all soundings from theses bad pings when the number of rejections exceed the user defined threshold. This is an absolute number of points, 50 would be a good number but this depends also on the number of beams per ping.



Clip Time

This cell based filter will reject a point based on its time. It will determine the newest point per cell and remove all points that are older then the set maximum age. It can be used to merge survey data what is specifically useful when dredging equipment is "dredging" in grids. This way you can avoid that older survey data is overwriting the dredging updates on the equipment.

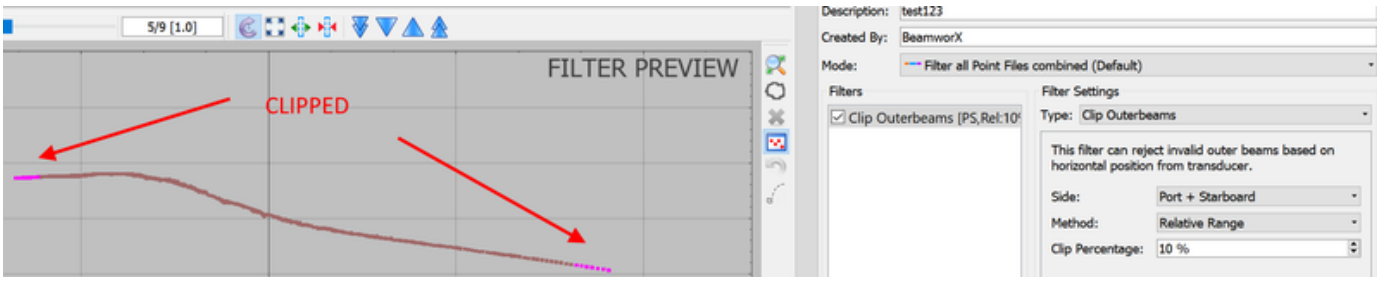


Example: Dredging model merged with newer survey data.

Clip Outerbeams

This filter will reject the outer beams of the swath. This filter can be used in case the multibeam system detect bad beam on the outer edge of the swath.

Select which sides, port starboard or both should be rejected.
You can select an absolute clip distance or a relative percentage of the swath width.



Clip TPU

This filter will reject the footprints based on its THU (Total Horizontal Uncertainty) and/or TVU (Total Vertical Uncertainty) value.

TPU values are optional, will only be filled when source files are bwxraw and TPU calculation is activated in the Survey Configuration. THU/TVU values that are invalid/not calculated are zero.

There are two operating modes:

- **By Fixed Values**
  Footprint will be rejected when its THU/TVU value exceeds the maximum entered value.

- **By Survey Standard**
  Footprint will be rejected when its THU/TVU value exceeds the calculated maximum value.
  The maximum tolerated value is calculated based on footprint Z distance to transducer and Survey Standard.

Basic Ping Blocking

This filter will reject points based on their relative position measured from the transducer. The user can select the preferred properties simultaneously.

Most point formats, e.g. FAU,XYZ do not contain a transducer position. AutoClean best estimates the transducer position and height from the available point properties during import. Although it does a great job at that the transducer height may contain some variation so the filter gates for this filter should not be set too tight.

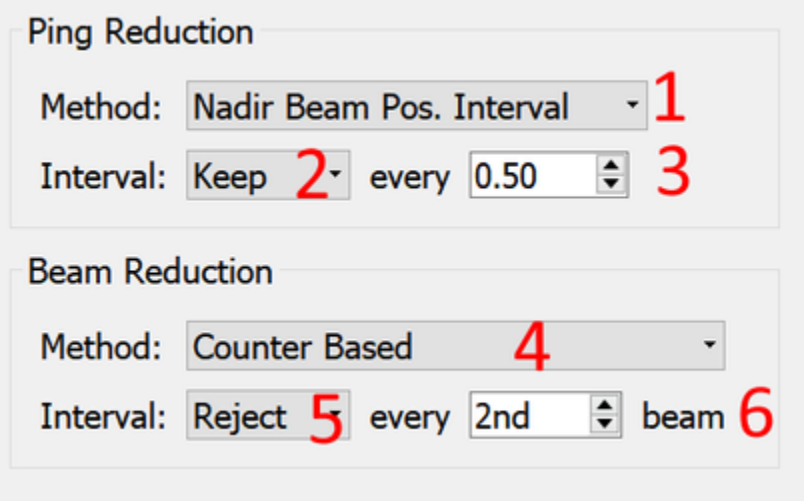
Reducer (Voxel Based)

Voxel (3D box) based reducer creates 3D cells with the user defined dimensions. The point closest to the cell center remains, the others points are rejected. The used voxels are aligned with the grid when the sizes make it possible.

This filter is also quite useful to remove duplicate points. For example when fau files are used as the source of data the resolution of all coordinates is limited to 1 centimeter. Duplicate points can in this case be removed with Horizontal and Vertical Voxel size set to 0.01.

Reducer (Ping Based)

Ping (Swath) Based reducer. This filter can be used to reduce the amount of points in the project by rejecting beams in an organized manner. It is possible for example to reject every second complete ping but it is also possible to reject every second beam. Note that reduction is done on file basis per system. Note that in Beam Reduction mode the outer beams are never removed.



#	Parameter	Options	Description
1	Ping Reduction Method	<Not Used> Counter Based Transducer Pos. Interval Nadir Beam Pos. Interval By Time	Ping Reduction not Used. Keep or remove every Nth ping, N = 2 or higher. Reduce on distance between transducer positions. Reduce on distance between nadir (below TD) positions. The better option when vessel pitches a lot. Reduce on Time between pings.
2	Mode	Keep Reject	Input is to specify what needs to be kept, e.g. "Keep every 5th ping" means that ping 1..4 are rejected and ping 5 is kept. Input is to specify what needs to be rejected.
3	Interval	N/A	Depending on mode this can be a count, distance in survey units or time in seconds.
4	Beam Reduction Method	<Not Used> Counter Based Position Interval	Beam reduction is not used. Keep or remove every Nth beam, N = 2 or higher. Note: outer beams are never rejected. Reduce on distance between footprint positions.
5	Mode	Keep Reject	See item 3), its the same principle.
	Interval	N/A	Depending on mode this can be a count or a distance in survey units.

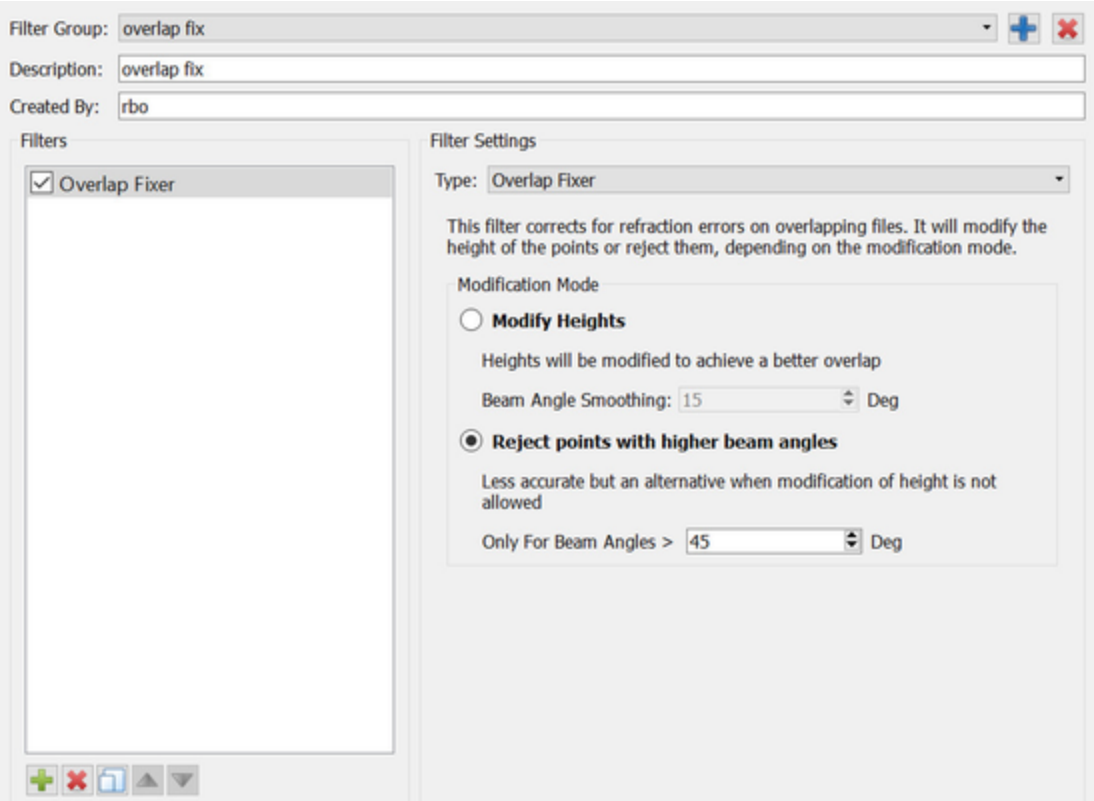
Slope Filter

This filter will reject points based on its mean slope to its neighbors. Setting the "Filter Strength" from weak to Aggressive will reject more points. Set the number of neighbors based on the measured point density and the "Live Preview" results.

Note that this filter may become very slow with very high cell counts (>1000).

Overlap Fixer

This filter corrects for refraction errors on file overlaps. It will either modify the point heights or reject the point with higher beam angle to remove the refraction error.
For each cell the filter calculates the "mean height value" and "average beam angle" per line in the specific cell.



- **Mode - Modify Heights:**
  The points from the lines with a higher average beam angle will be height shifted with the offset in the cells mean per line compared to the cell with the lower average beam angle.
  The Beam Angle Smoothing can optionally be used to make the overlaps smoother. Typical value for this is 5 to 10 degrees.

- **Mode - Reject points with higher beam angles:**
  No height modifications are carried out but instead the points with a mean higher beam angle will be rejected. Typically this should be used for Beam Angles higher than 45 degrees.

> Height modification will give the best results (more smoothness). Use "Reject points with higher beam angles" when height modification is undesired.

Area Outlier

This filter will reject points based on its 3d distance to its neighbors. Points are rejected when the SDEV of the distances is larger than the user defined threshold.

Vertical Plane

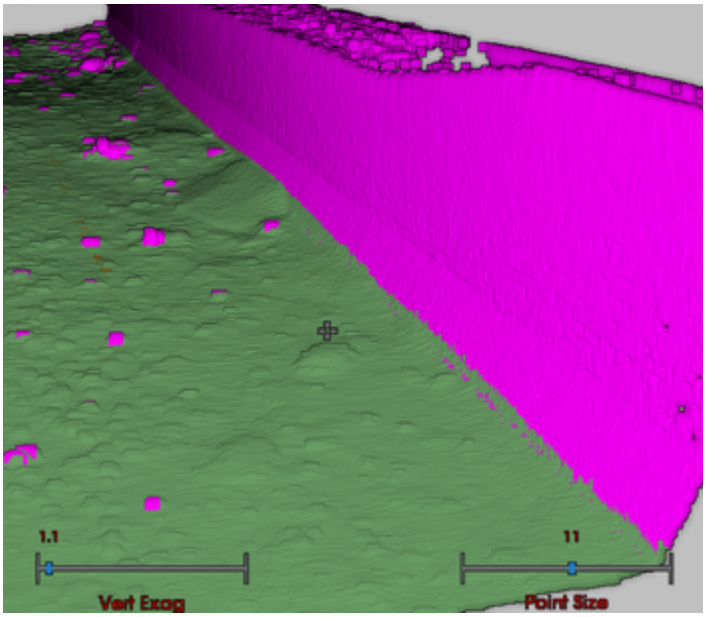
This filter is designed to edit quay walls, it will automatically detect a vertical best fit plane from the selected point data.
Points that lie inside or behind the plane can be edited. You can use this filter to remove the entire quay wall but the option to classify it will allow you to re-accept it later after seafloor filtering is completed. Use an "Edit Classification" filter for this.

It has two detection settings:

- The "Vertical Tolerance Angle" is the planes maximum allowed angle from vertical.
- The "Thickness" is is the used plane thickness.
- Minimum height of wall is at least 1 (this get not be changed)

It has a couple of Edit settings:

- Edit Inside
  Edit the points that fall inside the plane, you can either reject the points or change its classification or both.
- Edit Behind
  Edit the points that lie behind the plane (from the perspective of the transducer), again choose to reject the points or its classification or both.



This filter only works on the Inspection Area.

Surface Spline Filter

Rejects based on fitting of a thin plated spline through patches of points. When a point distance to the thin plate spline is larger the "Reject Gate" then the point is removed. The splining takes a lot of CPU time and makes this filter very slow (mode "All Points"). However when mode "Cell Centers" is used it is quite fast. Typically this filter will be preceded in the group by filters that remove large outliers like the **Isolated Cluster** filter.

The Settings:

- The Mode determines which points are used for the spline, advised is to use mode Cell Centers provided you have removed large spikes already with other filters in the group. Using All Points is much slower and not really recommended.
  Mode Cell Centers is very fast compared to the All Points method.
- The **Bottom Roughness** present an indication of the sea floor state: Very Flat, Flat, Normal, Rough, Very Rough. This affects the creation of the spline (how easy it "bends"). In most case, normal will do just fine.
- The Clipping Gate can set up in two ways, with a **Survey Standard** and with a **user defined value**. When a survey standard is used the depth is determined by taking the overall project transducer height and subtracting the point height from it. With a and b parameters of the Survey Standard the clipping gate is calculated.

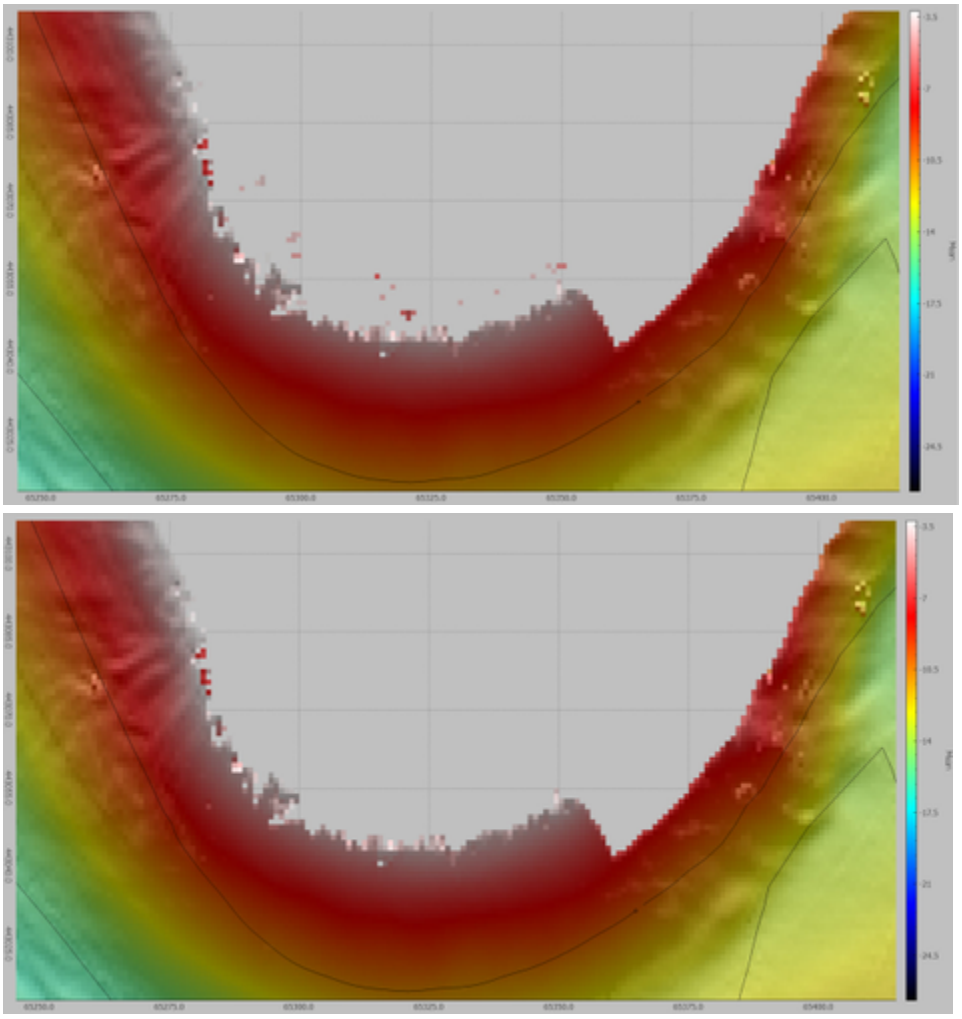
The Surface Spline Filter should **ALWAYS** be preceded by a filter that takes out the large spikes, e.g. an Isolated Cluster or a Clip Mean Height filter. Large spikes will badly deform the spline.
This filter would typically be used for removing small noise close to the seafloor.

Isolated Cluster

Reject points that are located in an isolated cluster(group). All points that lie within the 3D distance(Point Interval) of each other are added to a cluster. This way separate point clusters are formed. All clusters that have mutual positions on the main(largest) cluster are removed as well as clusters that are not on the partition boundaries. The second could be called lonely data. Optionally the user can set the "Use Z Scale" to modify the vertical distances and adjust the filter vertical sensitivity.

Lonely Cells

This filter will reject points that lie in sounding grid cells that are isolated from the "main survey cells". It is based on grid cells, it will only look in the horizontal direction. Cells that are not connected with at least one cell side to the main survey cells will be removed.
This filter has no further settings.

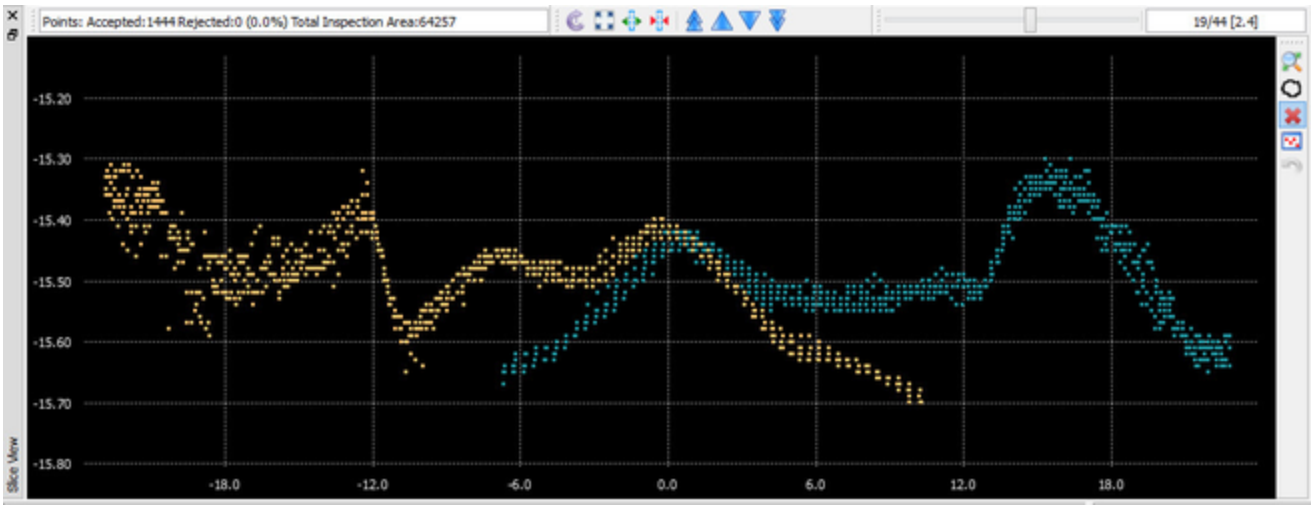


Left: Before Lonely Cell Filter, Right: After Lonely cell filter.

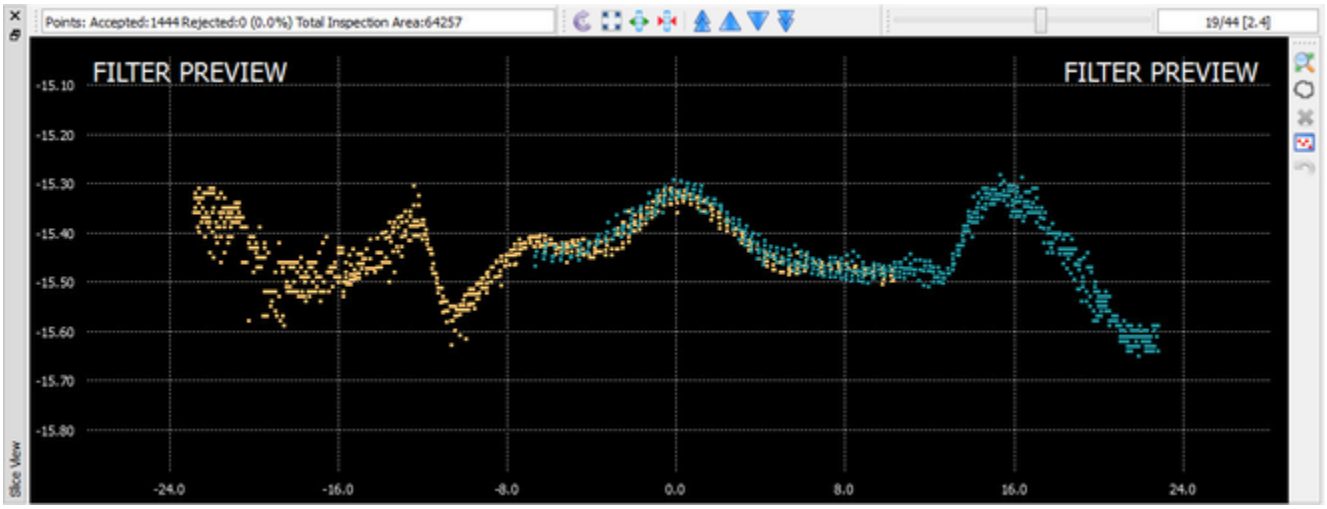
Refraction Correction

This filter corrects for refraction errors. The Refraction Filter allows you to correct for refraction errors due to svp changes during acquisition. A virtual refraction is applied to the data at entered depth with a change in sound velocity.

before:



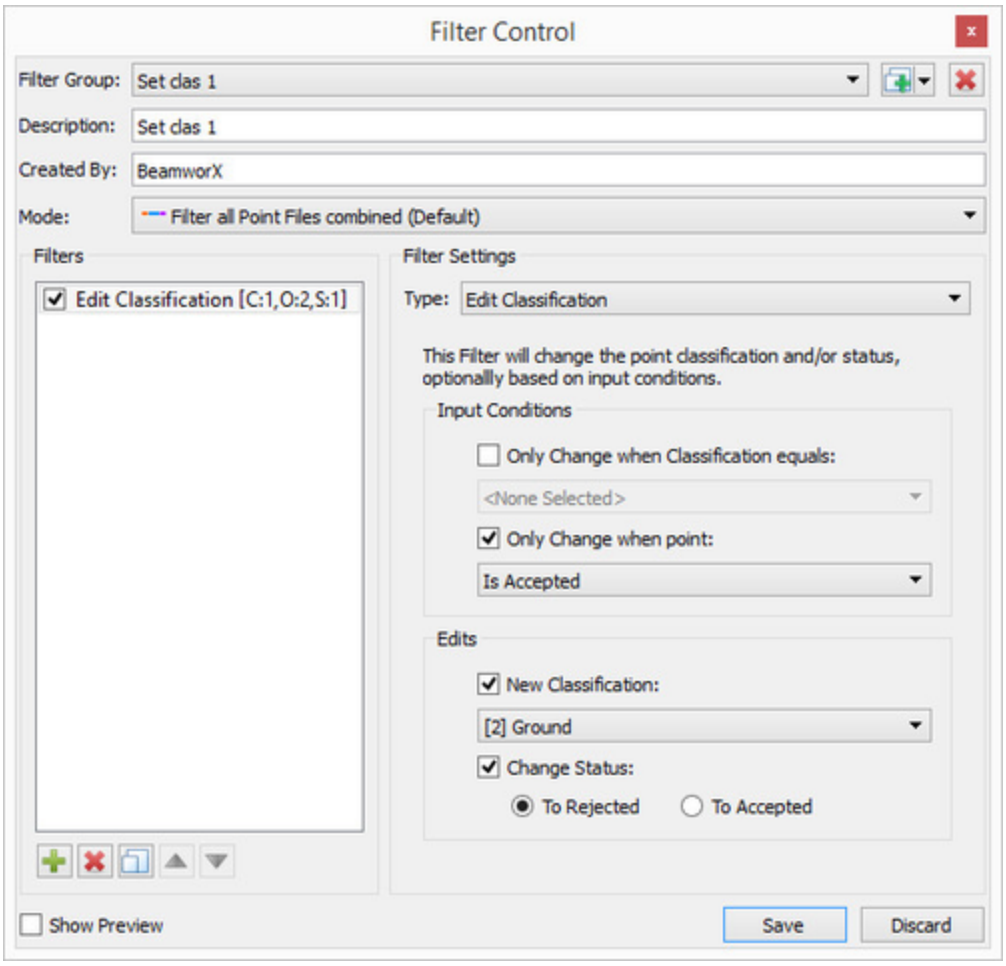
after:



In most cases it is best to keep the distance below transducer on 0. Use a negative SV correction to correct for frowns and a positive SV correction for smileys.

Edit Classification

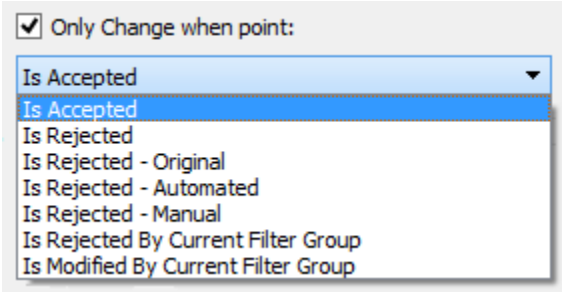
This filter can be used to change the classification and/or status of a user-selected subset of the points.



Input conditions
By using input conditions the edits will only be carried out on points that meet these requirements. When no input condition is selected the edits will be carried out on every point that is being filtered.

1 - Checkbox "Only Change when Classification equals", with the combo box with checks it is possible to select on or more classes.
Edits will only be carried out when point classification equals the selected classes.

2 - Checkbox "Only Change when point"
Extra condition, edits are only carried out when the point status meets the selected condition.



Condition	Edited when:	Remark

Is Accepted	Point is an accepted point	
Is Rejected	Point is a rejected point (any reason)	
Is Rejected - Original	Point is a rejected point, as imported from original point file	
Is Rejected - Automated	Point is a rejected point by automated filtering	
Is Rejected - Manual	Point is a rejected point, by manual rejection	
Is Rejected By Current Filter Group	Point Status was changed by the active filter group from accepted to rejected	Filter should be the last in the group!
Is Modified By Current Filter Group	Point Status was changed by the active filter group, this modification can be height shift, accept, reject etc.	Filter should be last in the group!

The "By Current Filter Group" options are very handy to "mark" a point when a filter is applied to it. This way you could for example always track which filter group rejected a point. For this purpose an Edit Classification filter is added to the end of the filter group, select input condition "Is Rejected By Current Filter Group" and select a new classification. Give every filter group a unique classification.

When both options are selected (checked) then edits are only carried out when both conditions are met.

Edits

Select the desired classification and status to apply to the points. When no edits are selected then the filter will not modify an points.
When one or more input conditions are set these conditions should be met before the filter edits the point.

Shift Height

This filter can be used to apply a height shift to the selected footprints. A shift value should be selected. Positive shift value will shift the points upwards, Negative downwards.

When a point is already is shifted in Height, then the new shift value is simply added to the existing shift value.

Smooth Area

This filter can be used to "height repair" an area or even the complete survey. This filter first calculates a mean, distance interpolated grid, then height shift all the footprints Z values to the grid height.
The result is rather drastic, all points will be Z shifted! The strength of the smoothing is determined by the number of Neighbors. The more neighboring cells are selected, the smoother the surface becomes.
For example: when 1 neighbor is selected, an interpolated grid cell will be created by distance weighted interpolation of the 8 cells that surround the cell and the cell itself, with 2 neighbors this is 24+1 cells etc.

A note on the speed of the filter, the larger the smooth strength, the more processing time is required. Normally 1,2,3 neighbors will already provide a very smooth, interpolated result.

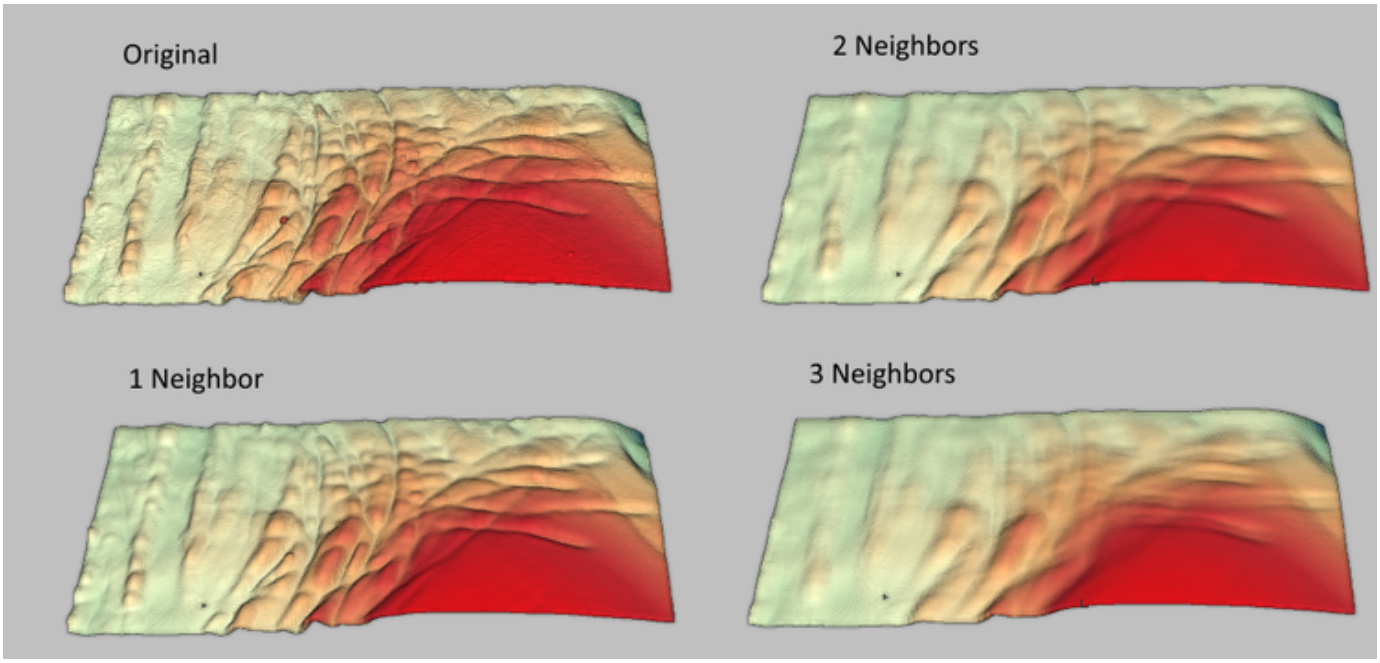


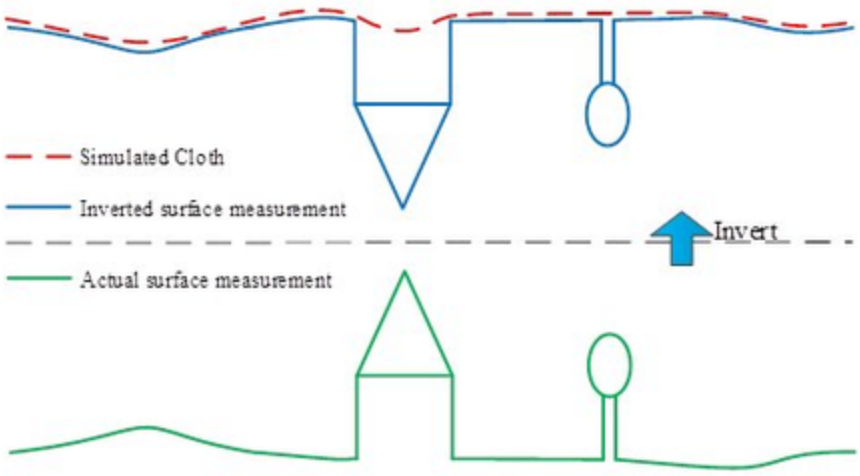
Figure: Examples of Smoothing Strength.

Inverted Cloth

Filter that can be used to reject or classify* the non-ground plane data in a lidar point cloud. It can also be used on multibeam data of course.

This uses the so called CSF "cloth simulation filtering" method as invented by **W. Zhang, J. Qi, P. Wan, H. Wang, D. Xie, X. Wang, and G. Yan, "An Easy-to-Use Airborne LiDAR Data Filtering Method Based on Cloth Simulation," Remote Sens., vol. 8, no. 6, p. 501, 2016.**

CSF details:
CSF is a airborne LiDAR filtering method which is based on cloth simulation. It is simply trying to simulate the interactions between the cloth nodes and the corresponding LiDAR points, the locations of the cloth nodes can be determined to generate an approximation of the ground surface. Then, the ground points can be extracted from the LiDAR point cloud by comparing the original LiDAR points and the generated surface. Thus, the filtering algorithm could be called cloth simulation filtering,



Settings are:

Setting	Description
Scene Type	Type of data. This determines how "flexible" the simulated cloth will be. Choose between Flat, Relief, Steep Slope.
Clip Distance	Distance in survey units that determines if a point should be rejected. When the vertical separation between the cloth and a point is larger than this threshold then it will be rejected.

*) Use the "edit classification" filter as last in the group to re-accept the rejected points and assign a new class to it.

Supported Point File Formats

AutoClean supports a number of point file formats, see list below for an overview.
AutoClean can import points, export it to new files or update the edits to existing files, this way the original data is kept, for instance Raw GSF packets or Kongsberg ALL files.
It can also import raw survey data when the extra raw ad-on is installed on the dongle. With this option you can fully reprocess raw echosounder data including raytracing.

Some file formats (e.g. GSF,ALL) only contain (WGS-84) lat-lon coordinates. In order to read this you should set up a proper Coordinate Reference System(CRS) or use Auto UTM.

Below the table are more details on the file format.

Format	Description	Data Type	Contains Lat-Lon	Import Result	Import Raw	Export	Export Edits to Source Files
BwxRaw	BeamworX Binary Raw Data format from NavAQ	Binary/Raw	✓	✗	✓	✗	✗
Teledyne Reson S7K	Teledyne Reson Raw Multibeam data, S7K format	Binary/Raw	✓	✗	✓	✗	✗
Edgetech JSF	Edgetech Interferometric system bathymetry	Binary/Raw	✓	✗	✓	✗	✗
XTF	Extended Triton Format (XTF), e.g. for importing raw QINSy data	Binary/Raw	✓	✗	✓	✗	✗
Hypack HSX	Hypack raw HSX data (in combination with hypack .raw)	Binary/Raw	✓	✗	✓	✗	✗
GeoSwath RDF	GeoSwath raw data	Binary/Raw	✓	✗	✓	✗	✗
FAU	Binary Point File (created by RDANH Royal Danish Hydrographic service)	Binary/Results	✗	✓	✗	✓	✓
BwxRes	BeamworX Binary point file format	Binary/Results	✗	✓	✗	✓	✓
ASCII XYZ/PTS	ASCII Point files	ASCII/Results	✗	✓	✗	✓	✗
Generic Sensor Format (GSF)	Generic Binary File for survey data (created by Saic/Leidos)	Binary/Raw & Results	✓	✓	✗	✓	✓
Kongsberg All (ALL)	Kongsberg EM Multibeam data files	Binary/Raw & Results	✓	✓	✓	✗	✓
LAS	ASPRS LIDAR Data Exchange Format Standard	Binary/Results	✗	✓	✗	✓	✓ (To a copy)
LAZ	Compressed LIDAR Data	Binary/Results	✗	✓	✗	✓	✓ (To a Copy)
Hypack HS2/HS2X	Hypack result files	Binary/Results	✗	✓	✗	✗	✗✓ Only Flags/No Heights
Teledyne PDS	Teledyne PDS files	Binary/Raw & Results	✗	✓	✓	✗	✓
QPS QINSy QPD	QINSy QPD Binary Point File format (option on Dongle)	Binary/Results	✗	✓	✗	✗	✗
User Defined ASCII (TXT)	User definable ASCII files, various fields are supported	ASCII/Results	✓✗	✓	✗	✓	✗
WSV Binary MBES	Wasserstraßen- und SchifffahrtsVerwaltung (WSV) Binary files	Binary/Results	✗	✓	✗	✓	✓
Kongsberg Geoswath GS4	Result file from GeoSwath Plus version 4	Binary/Results	✗	✓	✗	✗	✓
WASSP G3 Data	ENL WASSP G3 Data File (wmbf)	Binary/Raw & Results	✓	✓	✓	✗	✓
Kongsberg KMALL	Kongsberg KMALL (successor of ALL)	Binary/Raw &					

		Results	✓	✓	✓	✗	✓
RWS Raai ASCII	Rijkswaterstaat ASCII For Single Beam Echosounder	ASCII/Results	✗	✗	✗	✓	✗
GDAL Supported Grids	Various grid formats (via GDAL library)	Binary/ASCII /Results	✗	✓	✗	✗	✗

Table: Overview of supported Point File Formats

Format Details

QPD Usage
QPS QPD Format is read through an SDK (dll) that was provided by QPS and is protected by an option on the BeamworX Dongle. If this option is not set on the dongle the QPD file can not be imported.

FAU

The FAU format was originally developed by RDANH Royal Danish Hydrographic service for use with the Elac BC system.
The data shall normally be in UNIX-style (Big Endian). However little endian data is automatically recognized too based on height and time.

Format Description

```
struct FAU_FORMAT
{
        long FAU_ly, /* position north in cm */
        long FAU_lx, /* position east in cm */
        long FAU_lz; /* depth in cm */
        long FAU_time; /* sounding time UNIX-Format */
        short FAU_angle; /* beam angle 1/100° */
        char FAU_heave; /* heave in 2 cm */
        char FAU_roll; /* roll angle in 2/10q */
        u_char FAU_bqual; /* quality and flag (0…15) (16-256) */
        char FAU_amplitude; /* amplitude in dB */
        char FAU_pitch; /* pitch angle in 1/10q */
        u_char FAU_thsec; /* sounding time in 1/100 sec */
};
```

Note: All char values are in "2-complement", 0 to 127 are positive values starting from 0 and up, 128-255 responds to minus 128 down to minus 1, Zero = 0.

FAU_ly& lx = Footprint position (xy) in map projection.

The minimum is –2147483647 cm = –21 474 836.47 m

The maximum is 2147483647 cm = 21 474 836.47 m

FAU_lz = Depth with positive values with draft and tide selectable (see down).

FAU_time = Seconds since 01 Jan. 1970 00:00 UTC. It should be in UTC regardless of computer BIOS.

FAU_angle = Beam angle from nadir, 1/100 degrees, + is port.

FAU_heave = Heave in 2 cm, ± 2.5 m (+254 cm ... -256 cm) + is up.

FAU_roll = Roll in 2/10q, ± 25q, + is port.

FAU_bqual = Sonar qualities of beam. Reson 0-15, Elac 1-9. The upper “Nibble” is used for flagging data as rejected whilst the original quality value is maintained.

FAU_amplitude = Intensity value from sonar. –128 to +127 dB.

FAU_pitch = Pitch in 1/10q, ± 12.5q, + is bow down.

FAU_thsec = Extra byte with the 1/100 seconds since 01 Jan. 1970 00:00 UTC.

Decoding Notes:

- Since AutoClean works in heights the Z value sign is inverted on import.
- AutoClean can detect automatically if the FAU file was exported from PDS2000, then the byte order is not big endian but little endian and a 768 bytes header starting with '"f', 'a', 'u', '_', '_', 'u', 'a', 'f"' or '"f', '\0', 'a' , '\0', 'u', '\0', '_', '\0"' (newer 64 bits PDS).
- AutoClean detects the byte order by the time and Z of the first 5 points in the file. When a negative time is encountered or a Z value outside range -45.000 - +45.000 the byte order is swapped.
- The most significant quality bit is interpreted as "accepted/rejected" status flag. This flag is "1" when point is rejected and "0" when accepted.
- Grouping of footprints into a ping is based on the footprint time, adjacent footprints with same time-tag will be placed into the same ping.
- Transducer track is reconstructed from the points positions and beam angle.

Encoding Notes:

- For updating only the Z value and the rejection flag are updated. The other fields are unaffected.
- In Export mode not all fields are filled: pitch/roll/heave are left to zero.
- Export Mode, the newly created files will have BIG-ENDIAN byte order.

BeamworX result file

This is the internal binary file used by AutoClean. It contains full footprint information.

Format Description

Please contact us on support@beamworx.com for a description.

ASCII XYZ/PTS

This format is hard-coded interpreted.

Separation character is automatically recognized, either space or comma. Each line should contain only one point consisting of fields X/Y/Z, in this fixed order. Each line should end with a <CR><LF>.

If more advanced XYZ files are required see the "User Defined ASCII" format below.

Format Description

X<sep>Y<sep>Z<CR><LF>

Decoding Notes

- The last line should also end with <CR><LF> or else the last point is discarded.
- When XYZ files were written in file ping by ping the import algorithm will regenerate the pings automatically by looking at the changes in position between the points.

GSF

Note that you should enter a valid EPSG code (or 0 to use Automatic UTM) in the project settings to convert from the GSF Position Datum (usually WGS-84) to local projection (as specified by the EPSG Code). A list of EPSG codes can be obtained from http://spatialreference.org/ref/epsg/.

- The transducer position is calculated from the ping position (usually from COG-REF) with the offset of the transducer as can be found in the processing parameters (APPLIED_TRANSDUCER_OFFSET).
- The Horizontal Datum name is read from the processing parameter "GEOID" if this is not EQUAL to "WGS-84", "UNKNWN" or "UNKNOWN" its is assumed that the datum of the GSF is the same as specified for the project. Else it will use EPSG code 4326 (WGS-84).
- When the EPSG code is set to "0" the imported will automatically select the proper WGS-84/UTM EPSG code based on the first encountered position. For northern hemisphere the EPSG code will be: 32600 + UTM Zone number. For southern hemisphere: 32700 + UTM zone number.
- The horizontal datum of an exported GSF is hardcoded to "WGS-84"
- Intensity is decoded from gsf ping subrecord "Calibrate Beam Amplitude"(prefered) or "Relative Beam Amplitude" record when it is available, else intensity values will be zero.
- The GSF library automatically creates index files, with extension "nsf", next to the gsf files when exporting edits to source. These can be safely removed later on.

For more information of the format please visit https://www.leidos.com/maritime/gsf.

Please note that the used GSF library does not support Unicode filenames, files and folders with special characters that are common in the German (e.g. umlaut) and French language are not allowed and hence can not be imported!

Kongsberg ALL file

Kongsberg ALL file is used by all Kongsberg (Simrad) EM series multibeams, e.g. EM120/122/300/302/710/3000/3002/2040/2040C. It is a hybrid format containing setup information, raw data records and result records. The result records "Depth" (old) and "XYZ88" (new) are both supported for reading and updating for AutoClean. The point data inside the ALL file are relative vertically to the transducer and horizontally to the active position records.

When import wizard option "Use GPS Heights" is used then Heights will refer to the Survey Datum, when the option is not used then Heights will refer to the water line.

Older Kongsberg Systems (EM300, EM3000, EM3002 etc.) write Depth (D) datagrams in the all file while newer systems (EM122,EM302, EM710, EM2040) write XYZ88 datagrams.

AutoClean handles updating of these records depending on the datagram type differently, see below in decoding notes.

Format Description

Refer to Kongsberg Documentation.
The result coordinates inside the all files are in WGS-84/local ship frame. These are converted to survey datum automatically on import. For this purpose the P (position records) and h (height records) are used.

Decoding notes

- Always enter a valid EPSG code in the project settings to convert from WGS-84 to local projection. When the EPSG code is set to "0" the imported will automatically select the proper WGS-84/UTM EPSG code based on the first encountered position. For northern hemisphere the EPSG code will be: 32600 + UTM Zone number. For southern hemisphere: 32700 + UTM zone number.
- The import routine first searches for Position(P) records (with active status) and optional height(h)records, the latter for ROV/AUV depth or RTK height info. It will calculate an interpolated position for TX ping time.
- Soundings are in Depth relative to transducer and in ships frame Across/Along, these soundings are rotated with the grid heading. E/N Scaling to grid is applied as well.
- Flag: point from Depth records are all accepted, there is no rejection info. Points from XYZ88 can be either marked as an invalid detection or rejected by real time cleaning, in either case they will be imported as "rejected".
- Updating:
  Depth (D) record points (older systems, e.g. EM3002), when rejected the across/along/depth triplet is filled with zero values (the record has no status flags, this is the only way to "flag" the data).
  XYZ 88 record points, when rejected the real-time cleaning info char is made negative, if this was zero then it becomes -1. When a rejected point is accepted then the cleaning info becomes positive. and the invalid detection bit is reset.
- When all file contains height (h) records then these are used to calculate the correct footprint Z values.

Las + Laz

Las files are binary data files for LIDAR Laser Data, Laz is the compressed version. There are numerous versions, 1.0 - 1.4. for more details refer to http://www.asprs.org/Committee-General/LASer-LAS-File-Format-Exchange-Activities.html.

We use the Laszip library by http://www.laszip.org/. This supports all the version 1.0 to 1.4, all point records.

Decoding Notes

- Withheld bit is used as the rejection flag.
- classification is always decoded.
- Intensity is always decoded.
- When point rgb data is available (point formats 2,3,7,8,10) the colors are decoded, The decoded RGB values are divided by 256.
- Points will be grouped in pings by looking at the time of the footprints. When there is no time available the points are grouped in pings of 1024 footprints.
- Times are converted from internal LAS GPS Time to UTC time, We assume a hard-coded 18 seconds as the time offset between UTC and GPS.

Encoding Notes

- Export is hard coded to LAS version 1.2. Point Format 3.
- Withheld bit is used as the rejection flag
- classification is encoded in the classification bits
- Intensity is always encoded
- Points are always encoded although these may be zero RGB values are converte from 8 bit to 16 bit range by multiplying with 256.
- Times are converted, internal ping times are assumed to be UTC time, converted to GPS LAS time by assuming a hard-coded 18 seconds UTC- GPS offset.
- Resolution is always 1 millimeter
- System identifier field is set to: "BeamworX AutoClean"
- All points are stored in point record type 3.
- No meta data regarding the current datum is stored.
- Edits can be written to a copy(!) of the source file.

Hypack HS2/HS2X

HS2(X) Files are combined Raw/Results files as generated by Hypack. With the "HS2READR_64.dll" DLL that was kindly provided by Hypack, AutoClean can read and update the HS2(X) files.

Decoding Notes

- Ping Times are available in seconds since midnight, Date is added by looking at the file creation/modification time.
  Note that you can now overrule the Date during import in autoclean!
- Intensity is always decoded
- Transducer positions are estimated from footprints
- An accepted/rejected flag is decoded per footprint, the "per ping" accept reject flag is applied to all the footprints.

Encoding Notes

- Only supports updating of rejection flags, Height Modifications can NOT be saved.
- For writing flags back to hs2(x) files the AutoClean application should be run as an Administrator because Hypack makes use of local temp files that requires write access!
- We noticed that the updating can become problematic when the data folder is part of a Dropbox shared folder. The Dropbox client interferes with the Hypack DLL, to fix the problem just pause the Dropbox client temporarily.

> Height modifications can NOT be saved back to Hypack HS2(X) files!

> For exporting it is essential that your run AutoClean.exe as an administrator!!

Teledyne PDS

The .pds files that are created by the Teledyne PDS software are hybrid files containing settings raw, raw data and computed results. With the "RDataPds.dll" kindly provided by Teledyne Reson we can read and update the pds files.

Decoding Notes

- Intensity is decoded when available in the pds file
- Transducer positions are accurate
- Footprint is rejected when PSTAT_REJECTED of the entire ping is set or when the beam status is equal or greater than BSTAT_FLTR_BEAM_REJECT AND the BSTAT_FLTR_FORCE_VALID flag is not set.
- For Multibeam Data, class 0 is set for each footprint, for LASER data class 1 is set. This allows you to distinguish laser from multibeam data.

Encoding Notes

- An export to pds file is not possible but it is possible to update the original pds file with the changed point flags and the height shifts.
- When a point is accepted that was originally rejected the BSTAT_FLTR_FORCE_VALID is set.
- When a point is rejected that was originally accepted the BSTAT_FLTR_FORCE_VALID is cleared and the BSTAT_USER_MAN_REJECT flag is set for manual rejected and the BSTAT_FLTR_STATS_REJECT is set for automated filtering.
- The ping height shifts is applied to the PDS_GRID_Z value, the footprint height shifts are applied to the PDS_MBS_BEAM_Z values.

QPS QINSy QPD

The QPD files are created by QPS software, e.g. QINSy. The QPD Format is read through an SDK (dll) provided by QPS and is protected by an option on the BeamworX Dongle. If this option is not set on the dongle the QPD file can not be imported.
The SDK contains no option to write the edits back so the import is read-only.

Decoding Notes

- Per Ping the ping time and ping id is imported.
- Per footprint the footprint position, intensity, beam flags are imported. Beam flags are translated to a single raw accept/reject flag.
- Transducer positions are also decoded now including height.

User Defined ASCII (TXT)

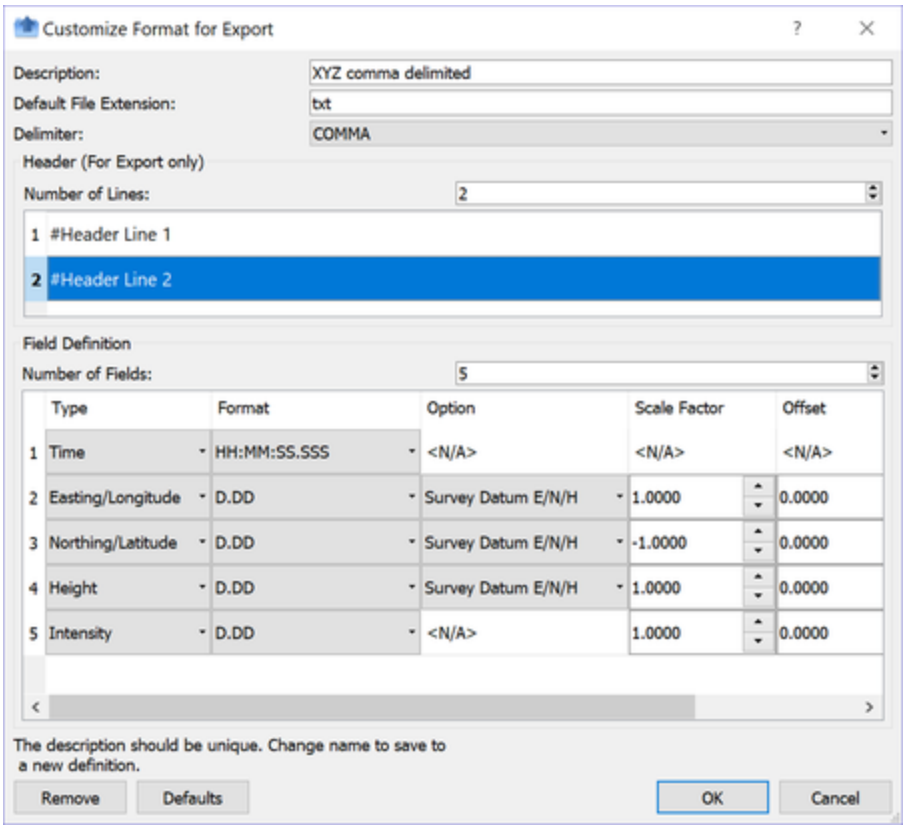
Support for XYZ ASCII files with additional meta data like time, beam angle, classification etc. The definitions are stored in a template XML and store in the application data folder so they can easily be copied to another computer.

The definitions can be edited in the New Project/Add Files wizard and the Export Points dialog.

A format consists of a delimiter character, a default file extension, a optional header and a number of fields. Various fields are available, all with different format capabilities. For each numerical field you can apply a scale and offset value.
The offset value should be entered in "target units".

The scale factor and offset are applied according to this mathematical formula:

New Value = (Decoded Value * Scale Factor) + Offset



The Description is used as the name of the format in the XML file. By changing the name and pressing OK the format will automatically be saved to a new format.
With the remove button you can erase the format.

The following Fields are available:

Field	Description
System Name	Name of the system. This is useful for Single Beam Data import to distinguish between systems.
Date	Date of the measured point
Time	Time of the measured point
Easting/Longitude	X-coordinate, set option to select either Easting on survey datum or Longitude on WGS-84*
Northing/Longitude	Y-coordinate, set option to select either Northing on survey datum or Latitude on WGS-84*
Height	Z-coordinate, +up, set option to select either Height on survey datum or Height on WGS-84 Ellipsoid.
Beam Angle	This is not the real beam angle with respect to the transducer but the vertical angle between transducer and point.
Intensity	Intensity value as imported from original format
Quality	Quality value as imported from original format
Classification	Class of the point, integer value
Accept Flag	1 = Point is Accepted, 0 = Rejected
Reject Flag	1 = Point = Rejected, 0 = Accepted.

<skip field>	Ignore this field in decoding

*) You must setup a proper Project CRS in order to use Lat/Lon/Height.

WSV Binary File MBES

Binary file as used by the WSV (*Wasserstraßen- und Schifffahrtsverwaltung des Bundes*) and various WSA (*Wasserstraßen- und Schifffahrtsamt*) agencies in Germany.

The used extension is *.mbes. The file contains Meta Data Header of 476 bytes, this contains information on how and where the survey was conducted, and Point Records.
The Point Record in the MBES file consists of an absolute footprint positions and a status value that can be:

Point Status Value	Status Meaning
0	ACTIVATED
1	MANUALDEACTIVATED
2	SENSORDEACTIVATED
3	NOTPLAUSIBLE
4	NOTUSEFUL

Table: MBES files Point Status

Byte order is litle endian, the alignment used is 4 bytes.

The Header also contains the number of points in the file and the bounding box (min/max Easting/Northing).

Behind the header the points ares stored, for each point the following is stored: Easting, Northing, Depth (-Height!) and Status.

AutoClean supports the import, export and update(edits back to source point files).

Decoding Notes (import)

- Header is ignored entirely, the number of points in there is ignored too.
- When mbes files were written in file ping by ping the import algorithm will try to regenerate the pings automatically by looking at the changes in position between the points.
- Point status of zero (ACTIVATED) is interpreted as accepted, non-zero (1,2,3,4) as rejected, the rejection reason will always by "Original Rejections".
- Transducer Track is reconstructed based on the mean position of the pings.
- Since the Data is stored in the mbes files as E/N/Depth and AutoClean uses E/N/Height the depth value is hard coded multiplied by -1. So there is no need to use invert height option during import.

Encoding Notes (export)

For exporting it is possible to populate the header meta data from an XML file that is generated by QINSy. This XML needs to have the same name as the point file (except extension). In that case the export will automatically connect and load the correct xml and read the meta data from it and export it to the header of the file.

- When an XML file is found (folder with xml's should be selected in point export dialog) with the same name as the points file then the meta data is loaded from there and written into the header.
  The following fields are imported:

  Date/Time, ProjektName, SchiffName, Operator, MinKP, MaxKP, StartTime, Wasserstraßennummer, Dienststellenkennung, Auftragsname, TeilRivier, Lagestatus, Hoehenstatus, Schwingerfrequenz, Ortungsverfahren, Beschickungsverfahren.
  These fields are then stored in the mbes file header.

There are XML's in the field that contain a Lage or Hoehen status that do not conform the standard "LSXXX" or HSXXX" respectively. In that case the export will write zero's for the statuses. In that case it is advised to overrule the statuses with user defined values.

- During export the number of points and the bounding rectangle info are automatically calculated and filled into the mbes header when the file is closed.
- When the XML failed to load or does not exists then a default header is loaded with set date/time (when available in source point files), bounding box and number of points.
  For the meta data fields some defaults are used (see table below).
- The Lage and Hoehen Status can be overruled optionally in the user interface. The user-defined statuses will be written in the MBES file. Obviously these will overrule the values from the XML.

Field	Default Value
Lage Status	150
Hoehen Status	160
OrtungsVerfahren	High Precision GPS (3)
BeschickungsVerfahren	High Precision GPS (4)
Frequenz	4130
Status	Erfolgt (1)

Table: Defaults for mbes file header when xml not found.

- The AutoClean Point Status is translated to the MBES point Status as follows:

AutoClean Status	MBES Point Status
Accepted	ACTIVATED(0)
Rejected by Manual Cleaning	MANUALDEACTIVATED(1)
Rejected by Automated Filter	NOTPLAUSIBLE(3)
Original Rejection	SENSORDEACTIVATED(2

Table: AutoClean Status MBES Status

When writing edits back to source file the header is untouched, only the individual points are updated.

Example WSV QINSy XML (only relevant part is shown)


```
<?xml version="1.0" encoding="ISO-8859-1"?>
<root>
<Project Name="20160215_omgxxx" Identifier="" Vessel="Schiff"
Operator="" QINSyVersion="8.10.2014.10.20"/>
<MBES_METADATA>
<COMMENT>
<Header Wasserstraßennummer="100" Dienststellenkennung="200"
Auftragsname="Auftragsname" Teilrevier="TeilRevier" Lagestatus="LS150"
Hoehenstatus="HS160"
Schwingerfrequenz="4130.0 (200-310 KHz)" Ortungsverfahren="High
Precision DGPS" Beschickungsverfahren="High Precision DGPS"/>
</COMMENT>
<LINE>
<UTC StartTime="2016-02-15T09:46:44.239+00:00" EndTime="2016-02-15T09:
49:52.795+00:00" StartFix="445" EndFix="459" Duration="00:03:08"
SurveyLine="as"
TemplateDb="" StorageDb="0002 - as - 0001.db" DtmFile="0002 - as - 0001.
mbes" SoundingGrid="new grid.grd" Min_KP="-0.029" Max_KP="0.556"
Min_Easting="57060.19" Min_Northing="394348.11" Max_Easting="57199.16"
Max_Northing="394916.26"/>
</LINE>
```

Kongsberg GeoSwath GS4 Result File

Binary files with point results as created by the new Kongsberg GeoSwath Plus GS4. These files contain meta data and point results including flags.

Due to its complex header AutoClean can not export in this format, but import and writing the edits back to the source files is supported.

File extension is SFF.

Decoding Notes (import)

- For each point the position, quality, intensity (RAW Intensity) and flags are read.
- The Ping times are in UTC seconds since 1-1-1970.
- Transducer X/Y is read ok, Transducer Height is determined from the Tide value, heave and transducer_Z offset (from Header)
- Since the Data is stored in the files as E/N/Depth and AutoClean uses E/N/Height the depth value is hard coded multiplied by -1. So there is no need to use invert height option during import.

Encoding Notes (edit export)

Only writing edits back to source is supported.
The Status of a point is only changed when the overall state(rejected/accepted) changed. For Rejected Points the Status "SWATH_ERROR" (5) is set, for valid point the status "SWATH_GOOD" (0).
Height corrections are applied simply by writing the new overall point Z value back to the file. The Tide/heave values in the ping are not changed.

WASSP G3 Data File

Binary files with setup/ raw data / point results as created by the last (Generation 3) WASSP Multibeam from ENL New Zealand. These files contain setup data, raw data and full results (Bathymetry and Water column targets).
AutoClean can, when reading results, read both bathymetry results and water column targets. The latter points will receive a classification of "1" the former "0".

Due to its complexity header AutoClean can not export in this format, but import and writing the edits back to the source files is supported.

File extension is WMBF.

Format Description

Refer to WASSP Documentation for more details.

The Bathymetry points are decoded from the "BATHYCOR" packet.
The Water Column Targets are decoded from "WCT_DATA" packet.
The result coordinates are decoded from inside the files are relative with respect to the GPS antenna which is in WGS-84 geographical coordinates. These are converted to survey datum automatically on import.

Decoding notes (import)

- The ping times are in UTC, they are created from the last modification date of the file and the time of the packets that are in nanoseconds since midnight.
- Decoded are: lat/lon,height, Quality, backscatter, flags.
- Flags are decoded from "Detection Quality" value, 0 = invalid, >0 = valid
- Always enter a valid EPSG code in the project settings to convert from WGS-84 to local projection. When the EPSG code is set to "0" the imported will automatically select the proper WGS-84/UTM EPSG code based on the first encountered position. For northern hemisphere the EPSG code will be: 32600 + UTM Zone number. For southern hemisphere: 32700 + UTM zone number.
- Soundings are in Heights relative to the chart datum optionally corrected for tide, horizontally with respect to the GPS antenna, these sounding are rotated with the true heading.
- Transducer position is actually the GPS position, for most WASSP configurations that use a pole this is identical.
- Water Column Targets are also decoded. These footprints will receive a classification of "1". The regular bathymetry will get a classification of "0".

Encoding Notes (edit export)

Only writing edits back to source is supported.
The Status of a point is only changed when the overall state(rejected/accepted) changed. For Rejected Points the "Detection Quality is set to 0, for accepted points to 1.
Height corrections are applied simply by writing the new overall point Z value back to the file. The Tide/heave values in the ping are not changed.
Note that Water Column Targets can not be written back to the source.

Kongsberg KMALL file

Kongsberg KMALL file is the successor of the "ALL" file. This file is currently only used by the new SIS version SIS5 in combination with the Echosounder systems EM2040M and EM2040P. But it will gradually support all types of sounder or at least the EM2040 family. It is a hybrid format containing setup information, raw data records and result records. The "MRZ" record contains raw and result information of a ping.
AutoClean supports reading and updating of the results that are contained in the MRZ record. Note that the point data inside the KMALL file are relative to the Central Reference Point (CRP) of the vessel (and to the waterline).

Format Description

Refer to Kongsberg Documentation.
The result coordinates inside the all files are in WGS-84/local ship frame. These are rotated to world frame with the ship's heading and converted to survey datum automatically on import.

Decoding notes

- Always enter a valid CRS definition in the project settings to convert from WGS-84 to local projection. When the CRS is set to "Not Used" it will automatically select the proper WGS-84/UTM EPSG code based on the first encountered position. For northern hemisphere the EPSG code will be: 32600 + UTM Zone number. For southern hemisphere: 32700 + UTM zone number.
- Sounding heights are referred to WGS-84 ellipsoid when option "Use GPS Heights" is selected. They are referred to the waterline when this option is not selected.
- Flags: a beam is rejected when the "Detection Type" field is set to "Rejected" or the "Detection Method" field equals "No Detection".
- Intensity values are decoded from the "reflectivity1_dB" field.
- Ping Numbers are not decoded because they are only 16 bit numbers that roll-over quite often, instead a unique ping counter is used per file.

Updating

AutoClean can write ping height changes, footprint height changes and flags back to the KMALL file.

- When a footprint is flagged as rejected the "Detection Type" field is set to "Rejected" and the "Detection Method" is set to "No Detection". When it is accepted these fields are set to "Normal" and "Phase Detection" respectively.
- Ping Height changes will be applied to the fields: "pingInfo.txTransducerDepth_m", "pingInfo.ellipsoidHeightReRefPoint_m", "pingInfo.z_waterLevelReRefPoint_m";
- Footprint changes will be applied to the field: "pSoundDefz_reRefPoint_m"

RWS Raai ASCII

This ASCII file type can be used to deliver Rijkswaterstaat (RWS) Basis Bestand Hoogte (BBH) files for Single Beam Echosounder measurements.
This file type is not supported for Import, only for export!

Note that the format actually consists of three sub formats, Raai ASCII, Raai ASCII (BBH) and Raai ASCII (Format 2).
The time reference is always UTC.

This format depends highly on the planned line name. Currently only BwxRes files that are recorded with NavAQ contain a planned line. When a FAU file is imported the planned line info is not available.

When the individual export is used, the overwrite check is not performed because the line name is not known in advance. Hence you will not get the message "file already exists, do you want to overwrite?" , so be prudent not the overwrite any previous files.

Single File vs. Individual files

"Export to single file" versus "Export to individual files" will have a different meaning:

Mode	File Name Convention	Line Name	Overwrite Warning:
Single File	User provides the export name.	The theoretical line name will be stored in the file prior to the lines with soundings.	Yes
Individual Files	The exported files will get the name of the planned line, each file can contain data from one or more input files.	Will not be stored inside the file, instead use as name of the file.	No

	The number of created files depends on the number of planned line names found in the exported files. Data of multiple files will be merged into one file when recorded on the same line. The planned line name is NOT written inside the exported file instead it is used to name it.		

Format Description

BBH

Header: Line name and line azimuth, bearing from start to end vertex (only single file export)

```
zjj0006.900,331.02<CR><LF>
```

Footprints will follow according to the following format:

```
EEEEEE.EE,NNNNNN.NN,HH.HH,YYYYMMDD,HHMMSS<CR><LF> (UTC Date/Time)

example:
57662.34,403487.66,-8.60,20160512,114223
```

Raai ASCII

Header: Line name only (only single file export)

```
zjj0006.900<CR><LF>
```

Footprints will follow according to the following format:

```
EEEEEE.EE NNNNNN.NN HH.HH DDMMYY HH:MM:SS<CR><LF> (UTC Date/Time)

example:
64675.03 404243.37 -1.70 19/05/16 11:11:19
```

Raai ASCII Format 2

Header: Line name only (only single file export)

```
zjj0006.900<CR><LF>
```

Footprints will follow according to the following format:

```
############DD/MM/YY#HH:mm:ss##EEEEEE.EE##NNNNNN.NN#ddd.dd
 Where # = space. And ddd.dd is the height in NAP, unused chars will be
replaced by space. (e.g. 1.45 becomes ##1.45)


example:
           05/11/18 07:17:19  206850.08  604555.76  -9.72
```

GDAL Supported Grids

Reads various grid types via the GDAL library, many formats are supported, the most important being GeoTiffs, Arc Info Grid, Erdas Images. A raster grid is read row by row, one or more virtual pings are created per row, each ping will have at most 256 "footprints", one footprint per raster cell is created.
Cells that contain the"NoData" value are ignored.

Notes:

- No datum transform is performed, lat-lon grids are not converted currently but read as is.
- Only the first Raster layer is imported.
- Cell centers are imported as footprints.

Export of this formats can be done through Export Grid menu option, so not the Export Points menu option.

Supported Grid Export File Formats

AutoClean can export the gridded data to various file formats, with various properties. A great numbers of export formats are supported thanks to the used GDAL library.

This page will describe only the custom BeamworX exported formats, for more details on the formats that are supported by GDAL Refer to this page.

Format	Description
ASCII XYZ Cell Centers	Export the cell center position and the selected attribute (e.g. shallowest, mean, deepest) to an XYZ file, space separated.
ASCII XYZ Shoalest point	Export the XYZ position of the shallowest point inside the cell to an XYZ file, space separated.
User Defined ASCII	Create and export a user definable format consisting of user selectable grid attributes and separator character.
Hypack Matrix	Exports the selected attribute to a Hypack MTX file (type Hypack Survey)
Rijkswaterstaat BBH Type1	Rijkwaterstaat Basis Bestand Hoogte (BBH) versie 2.1 Type 1.
GeoTiff	Exports the grid to a GeoTiff, either colorized or with height values. A TFW World file is always exported too. The GeoTiff is created with GDAL.
KML SuperOverlay	Exports to a KML Super Overlay structure for google Earth, this is a GDAL Export.
Various Other Formats	Supported by GDAL, see web page for a profound description. This includes png and JPG images too.

Table: Overview of supported Formats for Grid Export

Format Details

User Defined ASCII

You can setup the attributes, their format and the separation character. The format is stored into an XML File "ASCIIGridFormats.xml" in the local application data BeamworX folder.
The format can easily be re-used next project. The format is ASCII, every record will end with Carriage Return/Line Feed characters. The separation character is user definable.

It is possible to optionally add a header with user defined lines.

A cell is only exported when it contains at least 1 accepted point!

The following fields are available for export:

Field	Description
Cell Center Easting	Center of the cell position
Cell Center Northing	Center of the cell position
Shallowest Easting	Position of shallowest ("shoalest") point in cell

Shallowest Northing	Position of shallowest ("shoalest") point in cell
Mean	Mean Height of accepted points
Shallowest	Maximum Height
Deepest	Minimum Height
Span	Maximum Height - Minimum Height
Hit Count	Number of accepted points in cell
Reject Count	Number of rejected point in cell
Standard Deviation	Standard Deviation
95% Confidence Level	Confidence level
Reference*	Mean Height of reference layer, 0 when not available
Intensity**	Mean Cell Intensity
Difference (Mean-Ref)*	Mean Height minus Mean reference layer Height, 0 when no ref layer available
Difference (Ref-Mean)*	Mean reference layer Height minus Mean Height, 0 when no ref layer available
Date (oldest)	Oldest Date of all accepted points in the cell
Time (oldest)	Oldest time of all accepted points in the cell
Date (newest)	Newest Date of all accepted points in the cell
Time (newest)	Newest Time of all accepted points in the cell
Time (span)	Span is time difference = newest - oldest

*) The grid Reference Layer should be filled or else a warning is generated and the reference related field will be filled with zero's. Note that the reference is only available when the option "User alternative Cell Size or alignment" is DISABLED.
**) The grid Intensity Layer should be filled.

You can create a user defined "Shoalest Soundings" export by combining the *Shallowest Easting*, *Shallowest Northing* and *Shallowest* fields.

Hypack Matrix (MTX)

Abstract

The Hypack Matrix ASCII file comes in different flavors, Hypack Survey, Hypack Dredge Hysweep.
This export supports only the Hypack Survey format, this supports a single value per cell, so every attribute can be exported.
The file consists of an 8 lines header and a variable number of lines with the cell data. Each data line contains an index and the value.

Header

#	Description
1	X coordinate of bottom left corner of matrix
2	Y coordinate of bottom left corner of matrix
3	Matrix width from bottom left corner (in meters or feet, user defined)

4	Matrix height from bottom left corner (in meters or feet, user defined)
5	Cell width (in meters or feet, user defined)
6	Cell height (in meters or feet, user defined)
7	Matrix rotation in decimal degrees with zero being due north and increasing clockwise, along the height edge
8	Matrix Type, subtypes 0,1,2 (0=Survey, 1=Dredge, 2=HYSWEEP)

Notes: rotation is always 0, type is always 0.

Indexing

Starting at Line 9 are the cell values. Each line is a cell number. The cell numbering starts at the anchor point (Line 1, Line 2) at the bottom left corner of the matrix and increases from left to right starting at the left with the lower number each row.

Example

```
64965.00
443843.00
2.00
2.00
1.00
1.00
0.00000
0
0 -15.02
1 -15.07
2 -15.05
3 -15.08
```

Rijkswaterstaat Basis Bestand Hoogte Type 1

Abstract

Export of grid to a BBH type 1 grid. This ASCII XYZ+Properties file contains the cell centers of the filled cells, the mean height, Hit count and Standard deviation but also cell based slope information.
Slope information is calculated per cell. All the points that lie inside the cells are used to determine the mean slope via Least Square adjustment. The fields are separated by comma.

There are some extra rules:

- When the Cell Hit Count is less than 6, the slope related fields are set to zero (field 6-10).
- When the corrected standard deviation (SD) becomes higher that the standard deviation, the corrected SD is made equal to the SD and the slope fields (7-10) are set to zero.

Every file will start with the following header line:

```
X,Y,Zgem,Hits,Standaard Deviatie,Gecorrigeerde SD,Hellingshoek,
Hellingsrichting,RCx,RCy,MGD
```

Columns

Position	1	2	3	4	5	6	7	8	9	10	112
Field	X Center position	Y Center Position	Z mean	Hit Count	Standard Deviation	Corrected Standard Deviation	Slope Angle(0-90)	Slope Azimuth (0-360)	Slope X (RichtingsCoeficient)	Slope Y (RichtingsCoeficient)	Shallowest Depth (MGD)
Description	Always on half number So on 1 m grid coordinate should be EE.50, NN.50		Average of points	Number of valid sounding in cell	Normal sample Standard deviation (STDEVS)	Standard deviation corrected for slope.	Magnitude of slope in degrees. Between 0 (horizontal and 90 (vertical).	Direction of slope.	Solved from mathematical formula (A)	Solved from mathematical formula (B)	Minst gepeilde diepte
Resolution	Base		Base	0	Base	Base	Base +2	Base+2	Base+1	Base+1	Base

Settings

The resolution (digits behind decimal separator) can be set in the grid settings. See Resolution row above. The selected resolution is used as a base resolution, for the slope fields 1 or two digits are added to conform with the format description.
The scale factor is supported for the Z values, normally this is left to 1.

In order to comply with the RWS definition you should always export with option "Origin on Cell corner"!

Example Data

```
X,Y,Zgem,Hits,Standaard Deviatie,Gecorrigeerde SD,Hellingshoek,
Hellingsrichting,RCx,RCy,MGD
64909.50,443584.50,-14.84,16,0.005,0.002,0.8016,299.1296,-0.012,0.007,
-14.83
64910.50,443584.50,-14.85,15,0.005,0.002,0.8492,324.6486,-0.009,0.012,
-14.84
64911.50,443584.50,-14.86,15,0.005,0.002,0.7308,328.3195,-0.007,0.011,
```



```
-14.85
64912.50,443584.50,-14.86,16,0.003,0.001,0.6480,342.5447,-0.003,0.011,
-14.86
64913.50,443584.50,-14.86,16,0.004,0.002,0.6481,15.2260,0.003,0.011,
-14.86
64914.50,443584.50,-14.86,15,0.005,0.001,0.9091,38.1202,0.010,0.012,
-14.85
64915.50,443584.50,-14.84,9,0.006,0.002,0.9617,37.6243,0.010,0.013,
-14.84
64916.50,443584.50,-14.83,10,0.007,0.003,1.1492,47.2351,0.015,0.014,
-14.82
64917.50,443584.50,-14.80,9,0.010,0.004,1.6893,35.0851,0.017,0.024,
-14.79
64918.50,443584.50,-14.79,12,0.010,0.005,1.6462,40.4848,0.019,0.022,
-14.77
```

Note that we do not create meta data (xml) files.

For more details contact RWS CIV Service Desk Data +31015-2757575

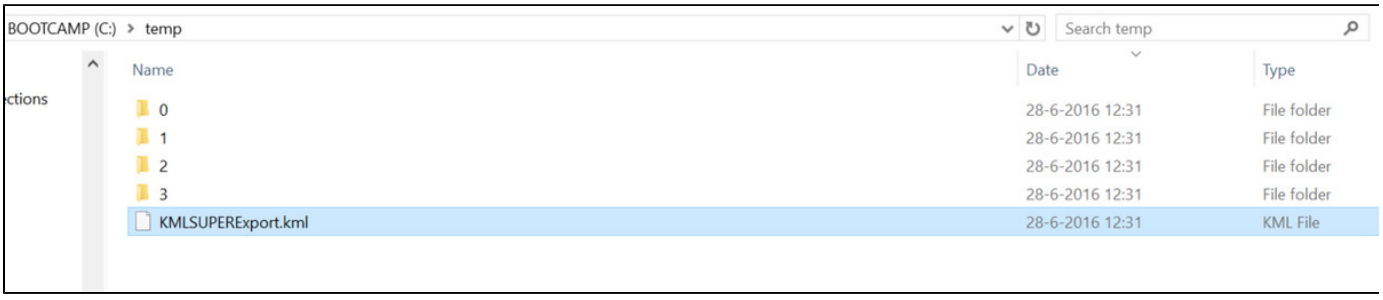
KML Super Overlay

This is an export that is executed by the GDAL library. This will create a folder structure on disk with various tiles (jpg) and various KML files. This so-called super overlay can be loaded into Google Earth. The overlay consist of a multi-resolution tile hierarchy.

This export will only work properly when the project CRS is properly defined. The export will automatically convert the project coordinates to the datmu used by KML (EPSG 4326, WGS-84).

The Option "Export RGB, with background" MUST be enabled or you will get images with true height values that will show as black and white.

Example of a KML Super Overlay folder structure:



Supported Raw Import formats

AutoClean can import various types of raw data formats. A full re-processing is carried out of the data during import.

In order to import raw data files in a **Raw Processing** license option is required.

Please note that the page links below point to parts of the AutoPatch manual but the text is also applicable to raw import.
Various raw data file formats are supported, see list below.
Click on the Format entry to go to the page with more details.

Format	Description	For export from
XTF	Extended Triton Format	QPS QINSy
HSX	Hypack Raw ASCII Files	Hypack Hysweep
Kongsberg ALL	Raw/Result data file from Kongsberg	Kongsberg SIS
Teledyne PDS	Teledyne PDS Software proprietary File containing raw and results	Teledyne PDS
WASSP G3	ENL WASSP latest generation (G3) systems file format (wmbf)	WASSP G3
Kongsberg KMALL	Raw/Result data file from Kongsberg, newest version	Kongsberg SIS Version 5
GeoSwath RDF	GeoSwath Raw Data file	Geoswath GS4 Software
Teledyne Reson S7K	Teledyne Reson Seabat S7K file (s7k).	PDS/Reson Seabat Software/ Norbit Gui Program
EdgeTech JSF	EdgeTech JSF Raw files. Only bathymetry packets are supported.	EdgeTech Discover Sofware

Update Dongle License

The BeamworX software is protected by a hardware dongle, the Unikey.
The licensing information is contained inside the key and has a limited validity, it requires updating when it is expired.
This chapter describes how to upgrade the dongle.

The license information is visible in the Program's about box.

Prerequisites

Before you can start you will need to be supplied with:

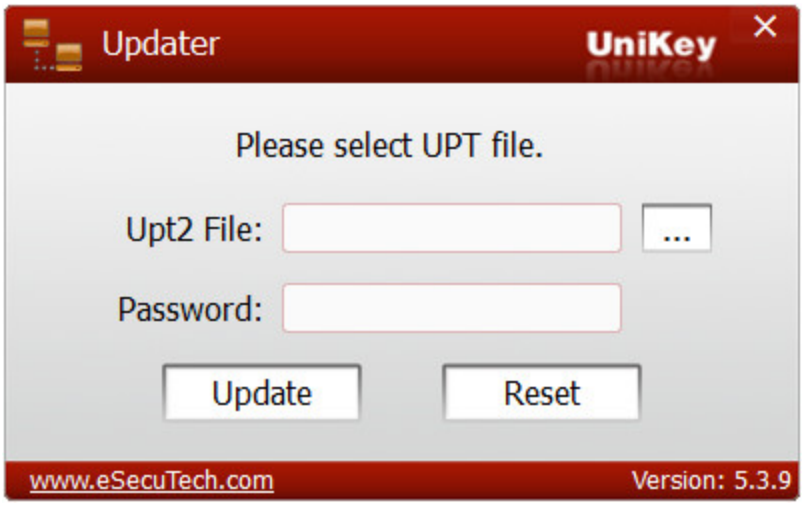
- The updater program
- the UPT upgrade file, this is a unique license file with the dongle upgrade info.
- An update password
- Your dongle

If any of those are missing please contact BeamworX, provide also the Dongle ID, as visible in the about box.

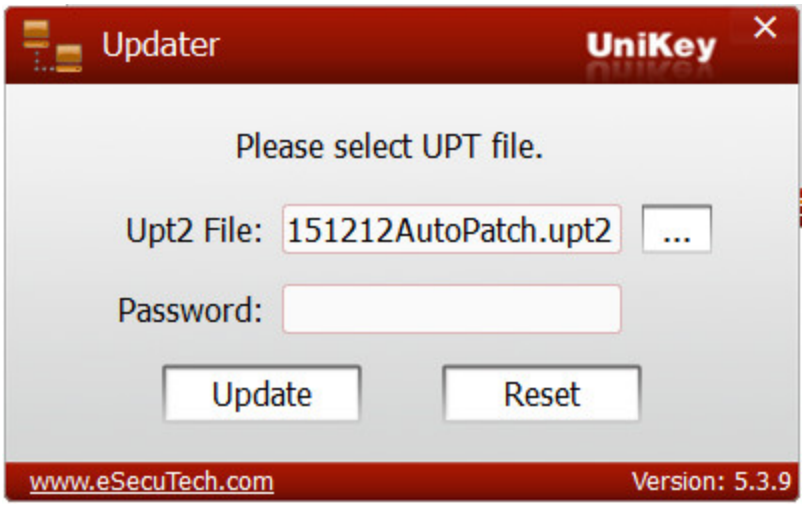
Procedure

Step 1: Place the dongle in a USB port.

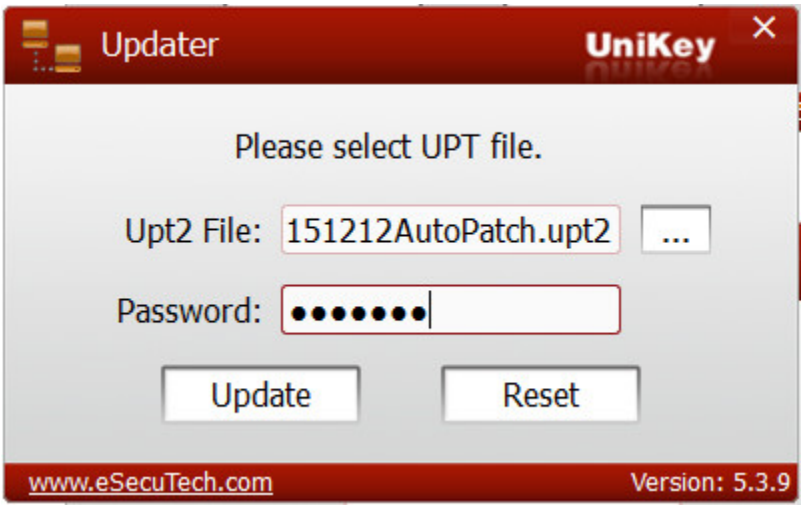
Step 2: Start Updater.exe



Step 3: Select the supplied Upt2 File.



Step 4: Enter the supplied password and press “Update”



The updater program should respond that the update was successful.
When the license UPT file is incompatible with the hardware ID the procedure will fail.

Start AutoPatch or AutoClean and verify the license duration in the about box.

FAQ

Q - I can see data in the slice and 3D View, But I can't see data in the Chart View?

A1 - Use the "Auto Scale Grid" in the toolbar. This doesn't work when the visible points are rejected!

A2 - Check the "Chart View layers". The "Grid Layer" can be turned off or underneath an other layer.

A3 - Check the "Project Properties General" and see if the required system is enabled in the "System Selection".

A4 - In the "View Properties Chart View" check the "Active Attribute settings" and enable the "Under/Overflow".

Q - I can see the grid in the Chart View, But I can't see data in the slice and 3D View?

A - In the View Properties General check the "Point visibility settings".

Q - Problems with Chart View, GeoLocators are moving during zoom. The grid features are not complete?

A - The problem rises with multiple displays that have a different scaling. Use the same scaling on all displays. Do not start AutoClean on one display and then move it to another display.

Q - Problems writing edits to source file with hypack HS2(x) files?

A - For this function the Hypack SDK(HS2READR_64.dll) is used. The dll creates a temporarily copy of the file a the dll location causing access issues. The solution is to install outside the "Program Files" folder where there is normal access.

Q - How to apply post-processed tide in QINSy?

A - Record in QPD files, apply offline tide to the QPD's. Export the data to FAU format using the processing manager. Import the data in AutoClean.

Q - My 3D data looks ugly and shows weird striping?

A - It can happen that the grid origin is set to zero. Then rebuild the grid in the "project properties".

Q - I'm not able to create a new inspection area with the right mouse down inside the chart view?

A - Probably the "Measuring Cursor" or the "Select area by mouse" is enabled. Turn it off and try again.

Q - I have problems with the 3D view?

A - From version 1.1 we progressed to OpenGL version 2. First update the graphics drivers. Second use an OpenGL utility to check if the PC graphics is supporting/operational with OpenGL. As suggestion we would advise OpenGL Extension Viewer. Please use the next link to get the utility:

http://www.realtech-vr.com/glview/

Q - I would like to take a filter and install it on another PC?

A - Go to the Menu Tools Start Windows Explorer Local Application Data. Copy the Filter name.xml from the **Filter** folder and place it it the same folder on the other PC. It is loaded when the program starts.

Q - Why does AutoClean completely crashes when I try to browse?

A - This only happens on certain Dell computers. Dell provides "Dell Backup and Recovery". Version(s) of this program are not properly built. To resolve the problem please uninstall "Dell Backup and Recovery" and reboot the computer.

Q - I'm sure I selected the correct folder for the AutoImport but the monitor doesn't see the new files?

A - Sometimes after a fresh installation the AutoImport fails. Reboot the computer to resolve the problem.

Q - Why can't I select a track in the Slice View?

A - It is not possible to select tracks when they are not drawn. Enable "Draw Tracks" in the View Properties Chart View.

Q - Why can't I re-accept the points I have just rejected?

A - It is not possible to select points when they are not drawn. Enable "Show Rejected Points" in the View Properties or use the Toolbar button.

Q - Why can't I see a view after it is undocked?

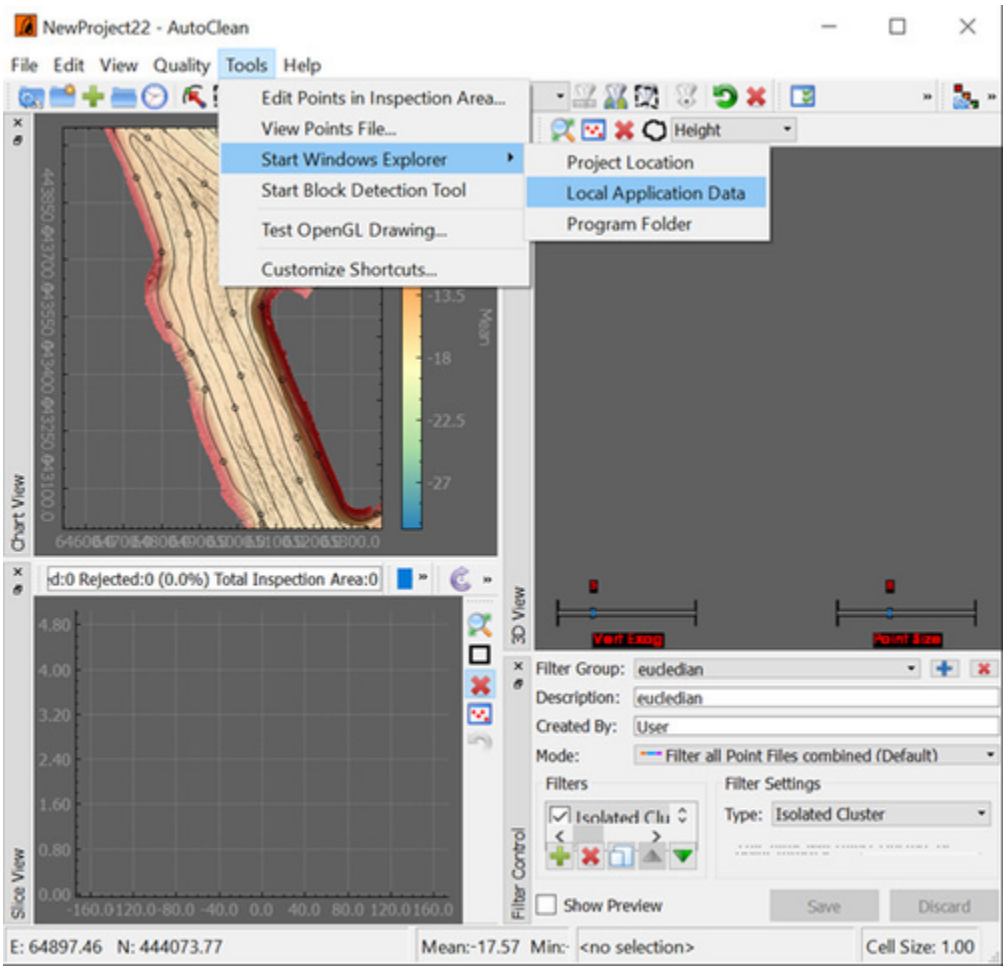
A - It's position is probably outside the available screens due to a change in your screen setup. Restart AutoClean. When a display is not visible then it's position is forced into the "Main Window".

Q - I have trouble entering numbers, for example the NODATA value in the grid export dialog.
A - This is due to bad regional settings, when the Digit Grouping symbol and Decimal Symbol are set to the same character.
In order to fix this go to go to control panel - clock, language and region - region settings. After that click on "Additional settings". In this dialog make sure you do not use the same symbol for digit grouping and decimal separator.
After the change, please restart the software.

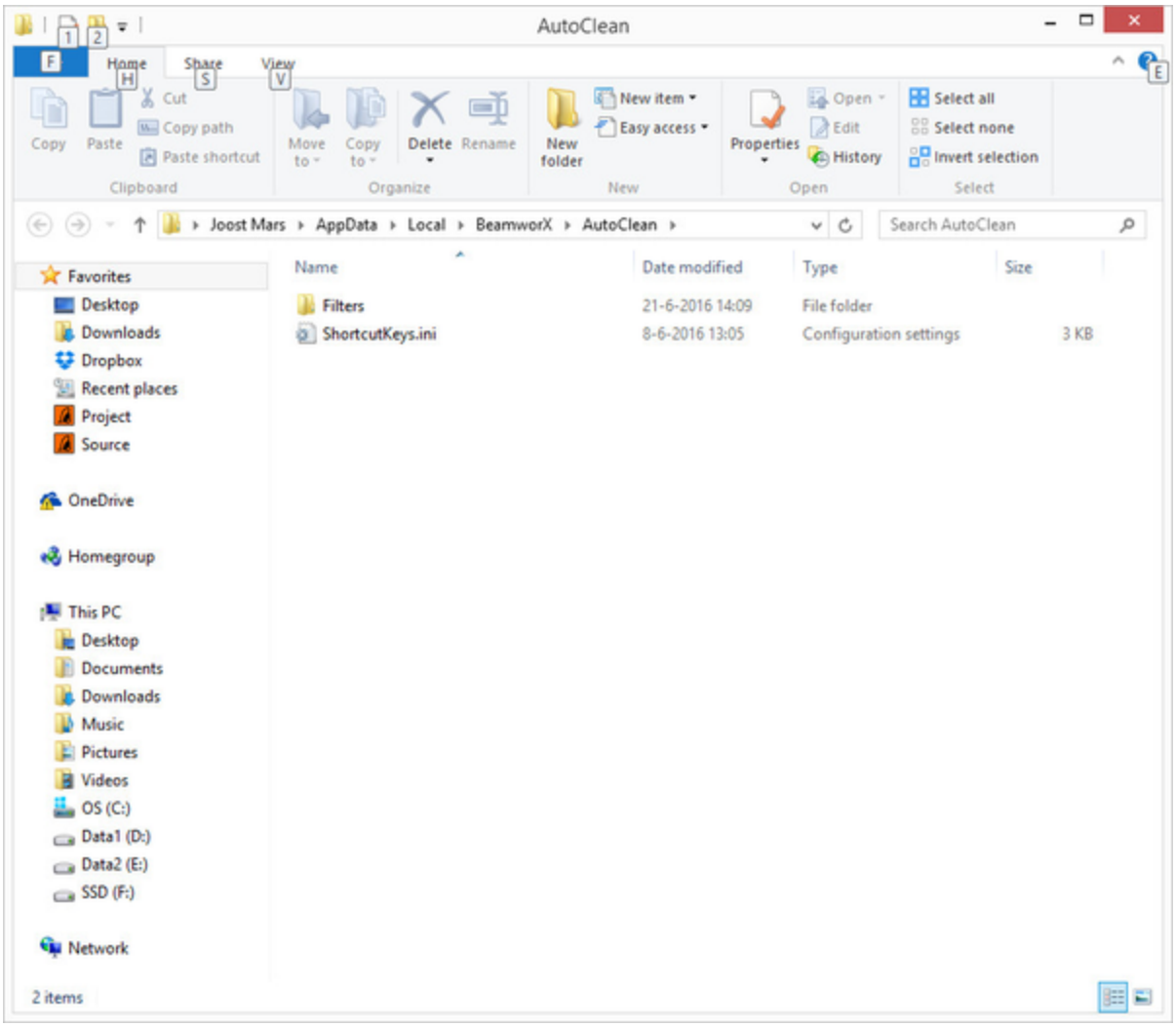
How To: Share Filters

How To Copy AutoClean Filters from PC to the next PC

Step 1) Start AutoClean on the PC1 with the existing filters. Then start the windows explorer in the Local application data.



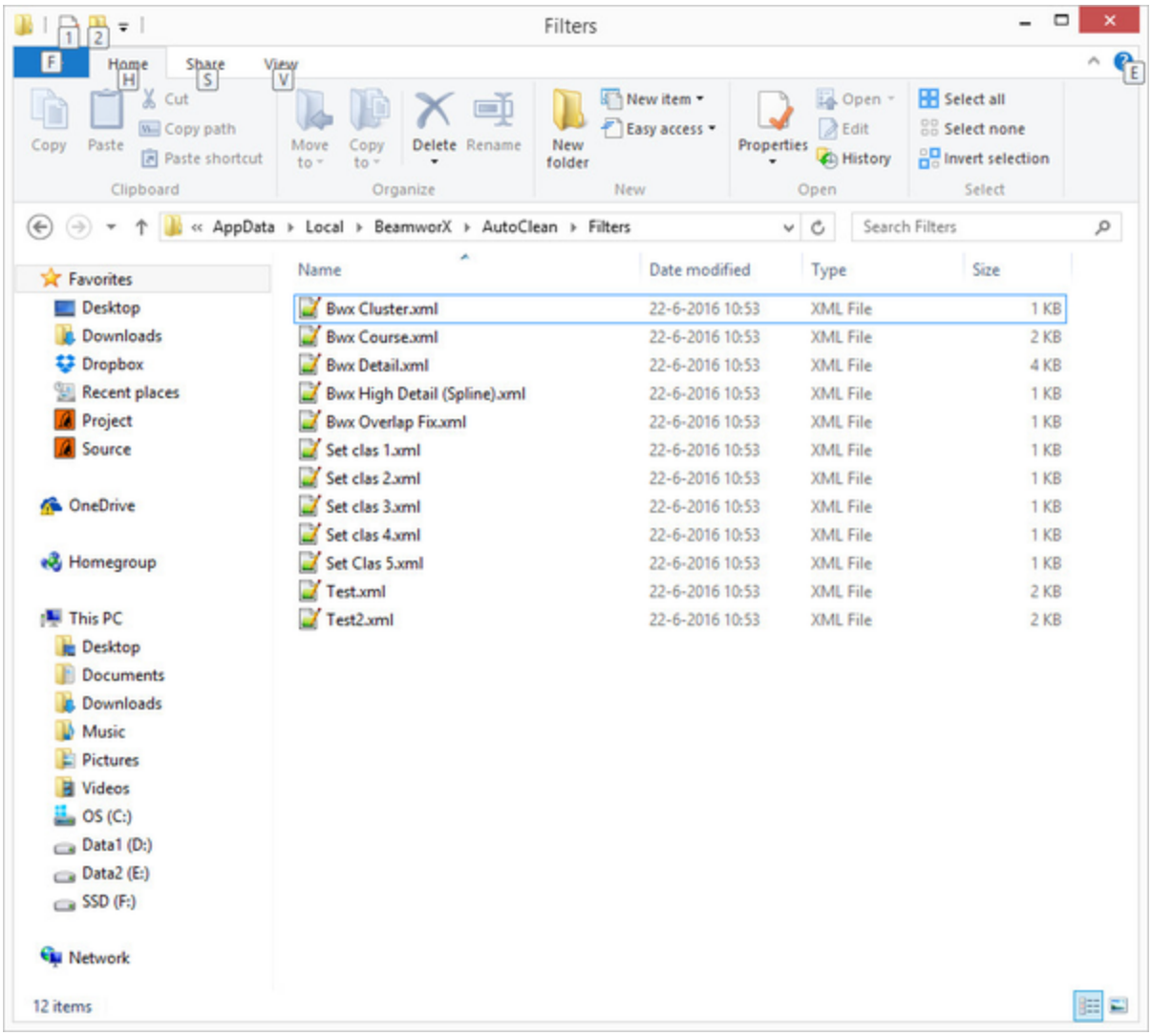
The Window Explorer starts in the application data folder



Step 2) Copy XML filter definition files

Enter the subfolder Filters:

Each XML file represents a Filter Group. These files now need to be copied to a memory stick or temporary location.



Step 3) Next we will copy the files to the other PC, PC2. Repeat Steps 1 + 2 to find the application data folder. Then CLOSE AutoClean. This is important because it may refresh the xml files.

Now copy the XML files to the filters folder.

Step 4) Restart AutoClean on PC2. The copied filters should now be available.

How To: Colorscales

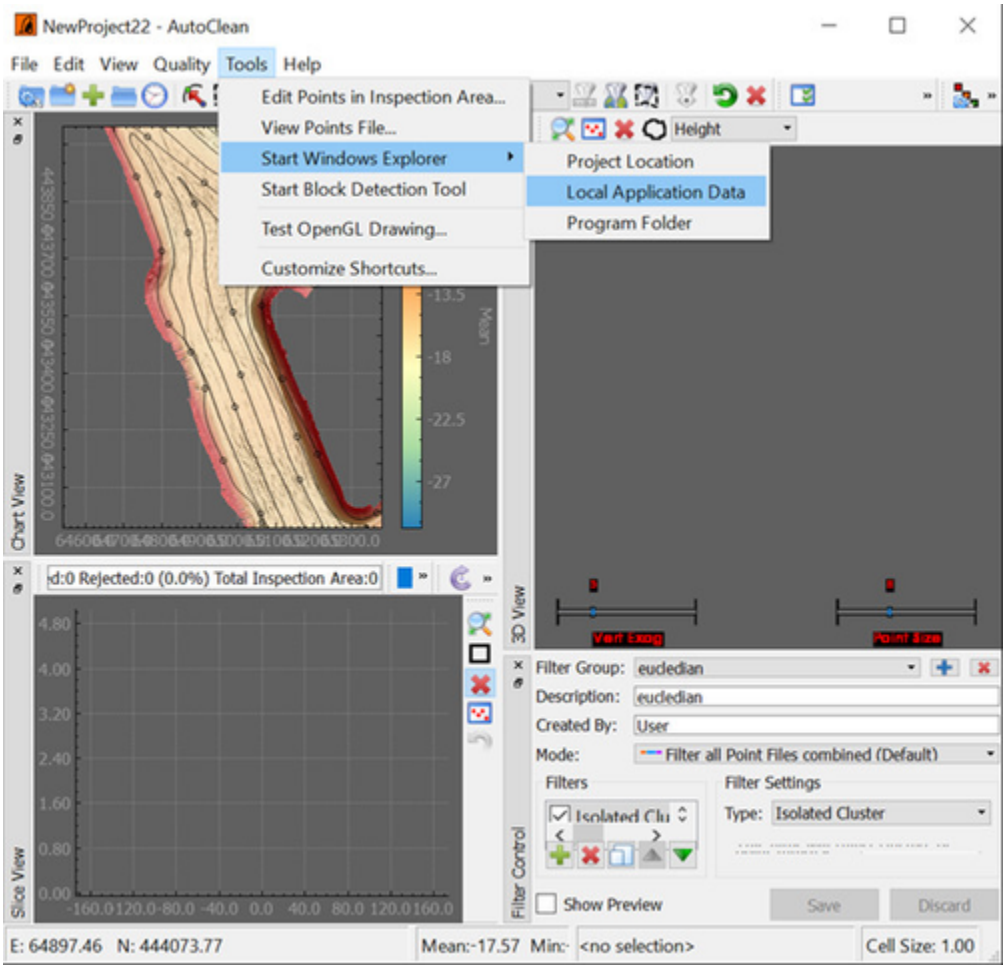
How To add User Defined Colorscales

AutoClean is compatible with QINSy colorscale XML format. You can use the ColorScale Editor in the QINSy console to generate or modify colorscales.

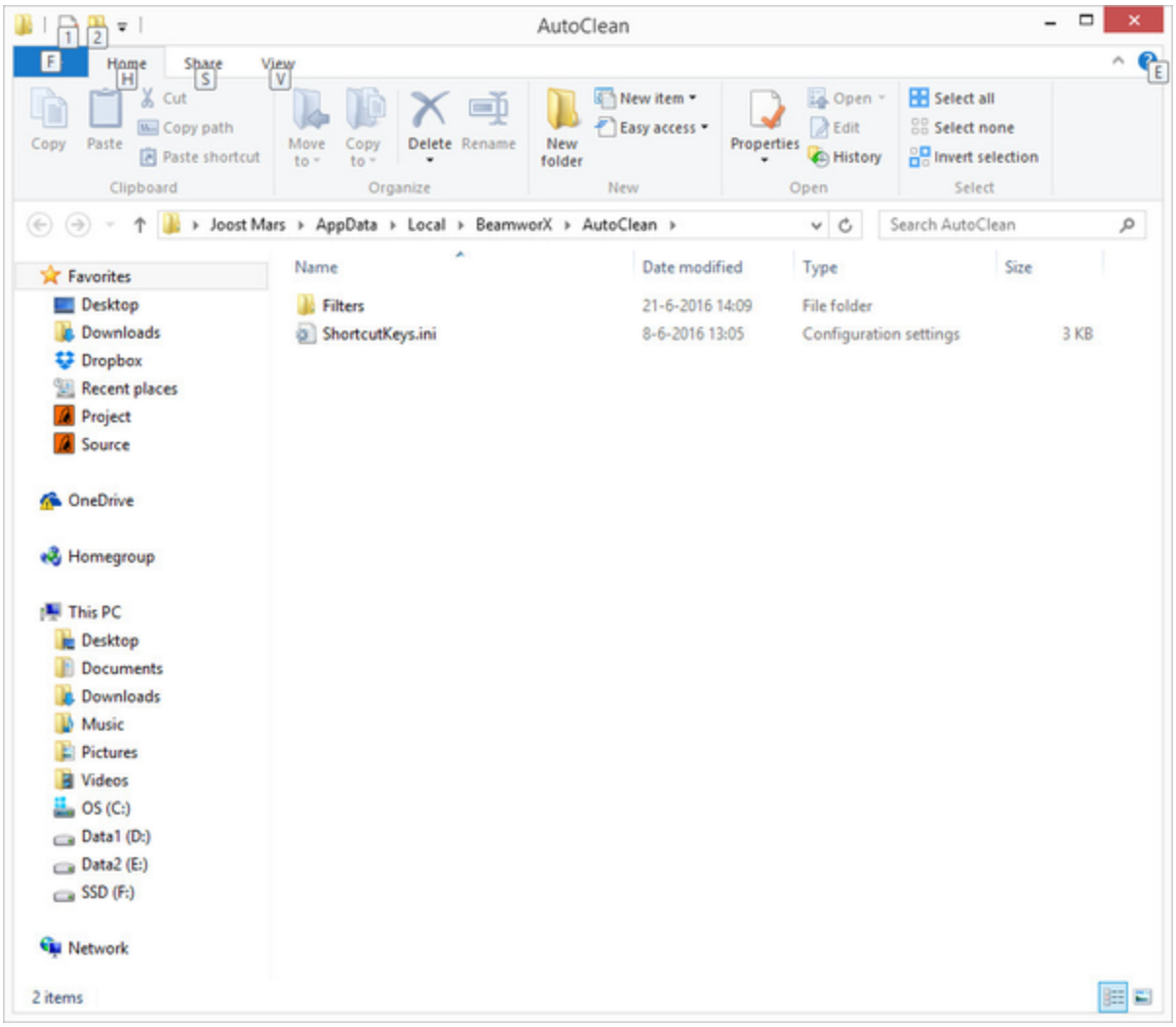
We plan to support additional formats in the future.

To add a colorscale to AutoClean follow the next steps:

Step 1) Start AutoClean and explore the "Local Application Data".



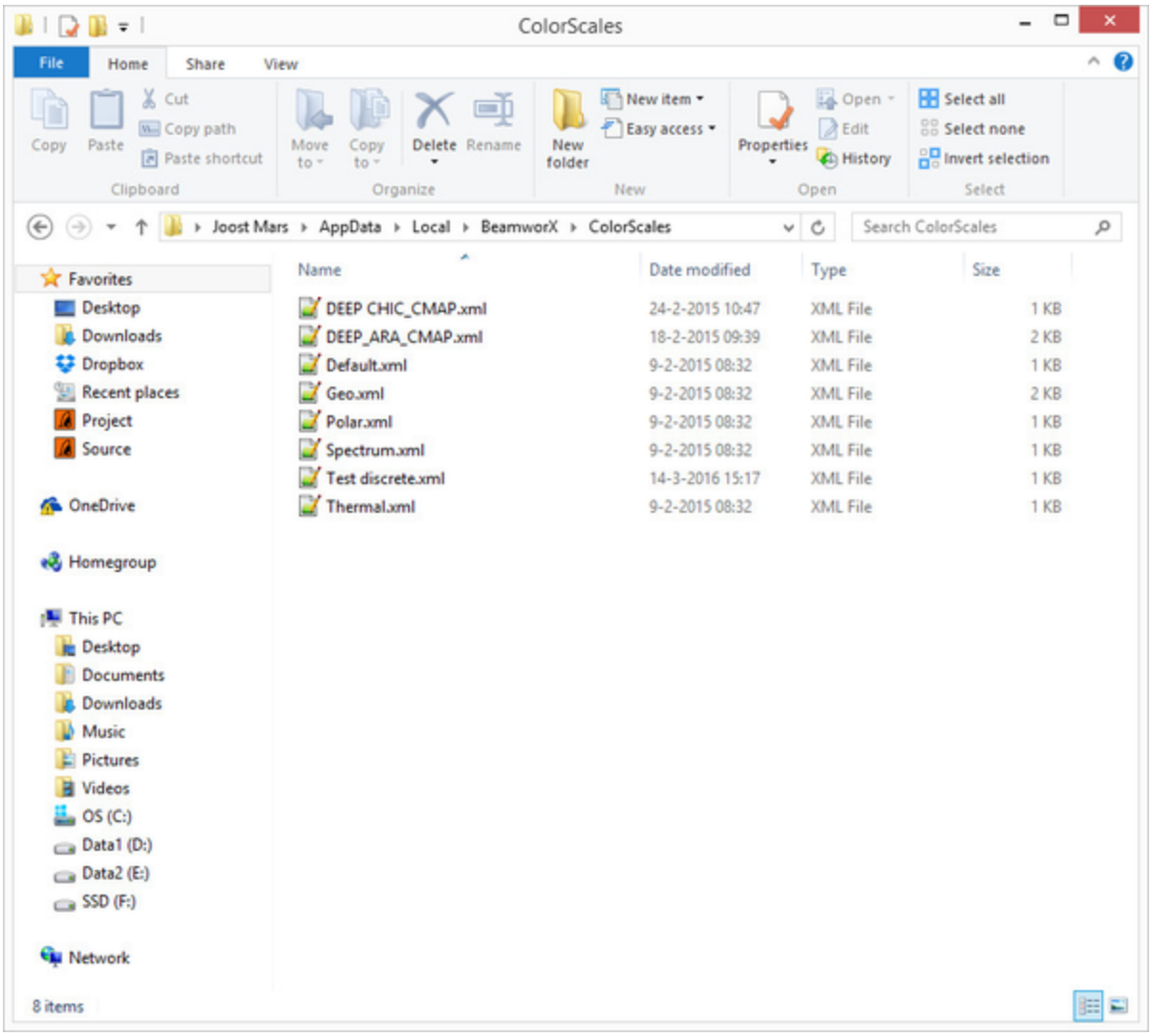
The Window Explorer starts in the application data folder



Step 2) Browse one folder up to the BeamworX folder

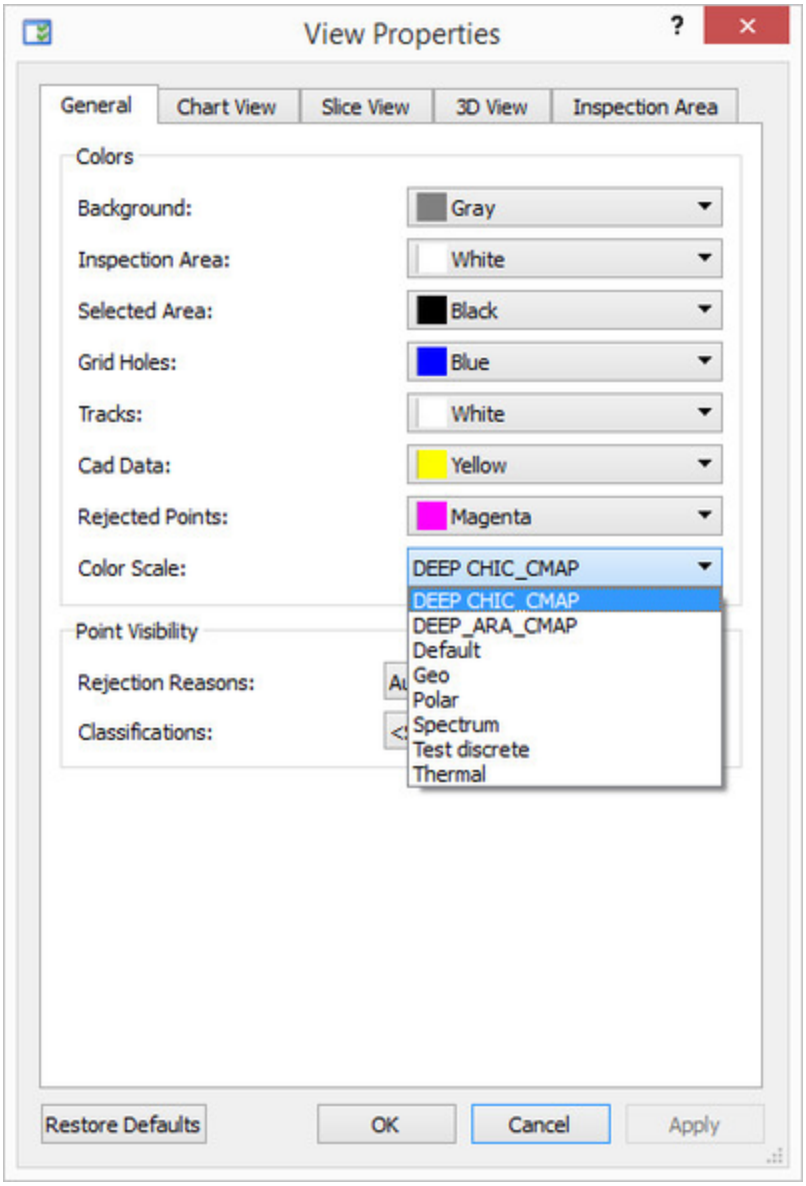
Enter the subfolder ColorScales:

Each XML file represents a ColorScale. Add your own ColorScale XML file to this folder.



When you remove all xml files and restart AutoClean then it will automatically create some default color scales in the folder

Step 4) Restart AutoClean. Your ColorScale should now be available in the "View Properties" tab colors.



How to: Setup a proxy server for Web layers

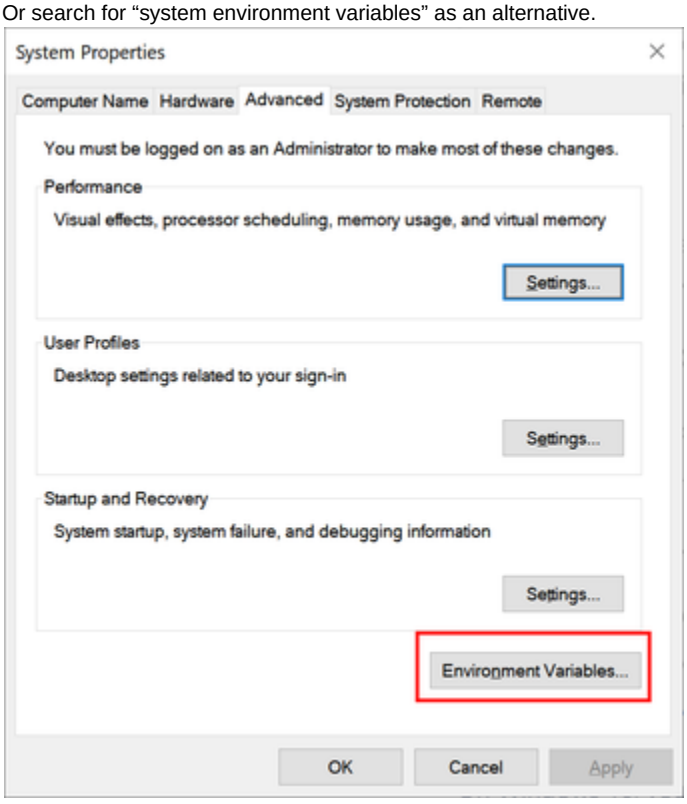
AutoClean but also NavAQ and TrajectEdit can use a Web Layer (Google maps, OpenStreetMap etc.) in the background. Sometimes a direct Http connection is blocked by the company network and needs to be re-routed via a proxy server. Below is explained how to set this up.

BeamworX software uses the GDAL Library for this, GDAL uses the curl library for the HTTP/HTTPS layer, and that respects `http_proxy` environment variable. However you can also specify a `GDAL_HTTP_PROXY` environment variable, along with `GDAL_HTTP_PROXYUSERPWD` and `GDAL_PROXY_AUTH` if you need to authenticate to the proxy.

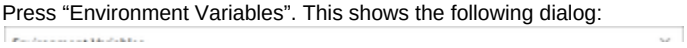
From https://trac.osgeo.org/gdal/wiki/ConfigOptions:

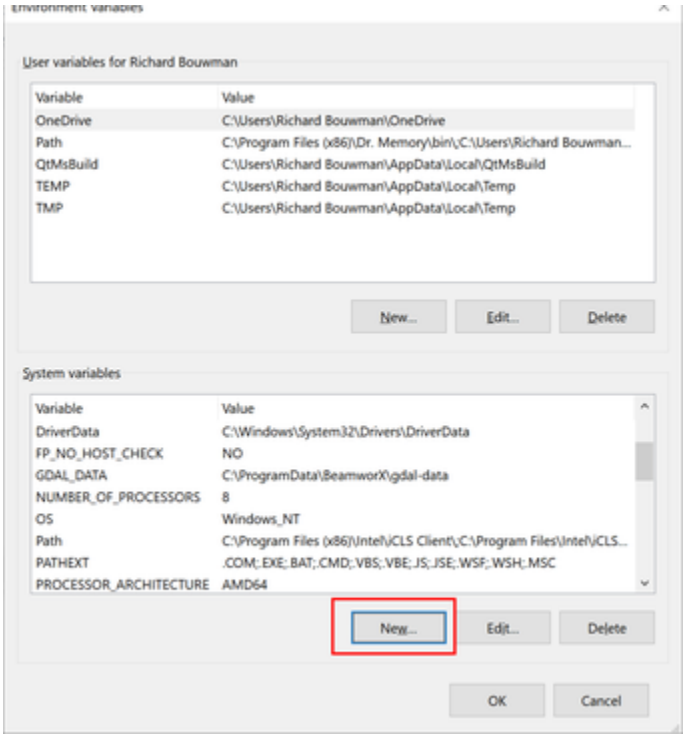
> ***GDAL_HTTP_PROXY***
>
> *Set HTTP proxy to use. The parameter should be the host name or dotted IP address. To specify port number in this string, append :[port] to the end of the host name. The proxy string may be prefixed with [protocol]: since any such prefix will be ignored. The proxy's port number may optionally be specified with the separate option. If not specified, libcurl will default to using port 1080 for proxies.*
>
> *GDAL respects the environment variables http_proxy, ftp_proxy, all_proxy etc, if any of those are set. GDAL_HTTP_PROXY option does however override any possibly set environment variables.*
>
> ***GDAL_HTTP_PROXYUSERPWD***
>
> *The HTTP user and password to use for the connection to the HTTP proxy. Must be in the form of [user name]:[password].*
>
> ***GDAL_PROXY_AUTH***
>
> *Set value to [BASIC/NTLM/DIGEST/ANY] to tell libcurl which authentication method(s) you want it to use for your proxy authentication. See http://curl.haxx.se/libcurl/c/curl_easy_setopt.html#CURLOPTPROXYAUTH for more information*

On Windows 10, you can set these variables under Control Panel -> System and Security -> System. Use Advanced System settings and look at the bottom of the "Advanced" tab for "Environment Variables...".
Or search for “system environment variables” as an alternative.

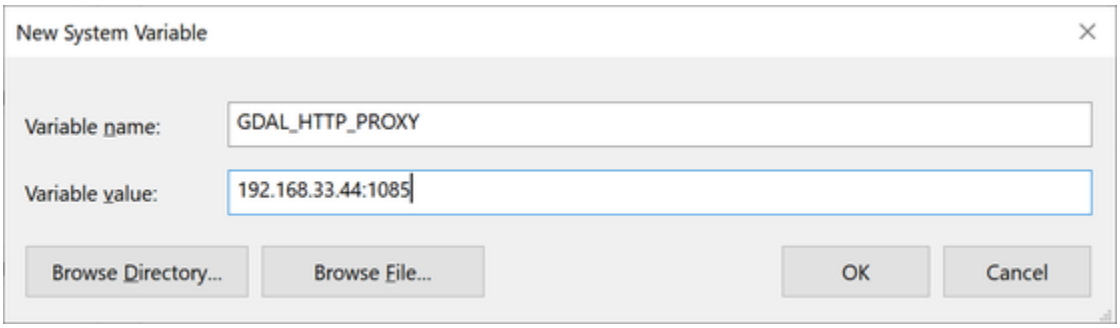


Press “Environment Variables”. This shows the following dialog:





Press New Button:

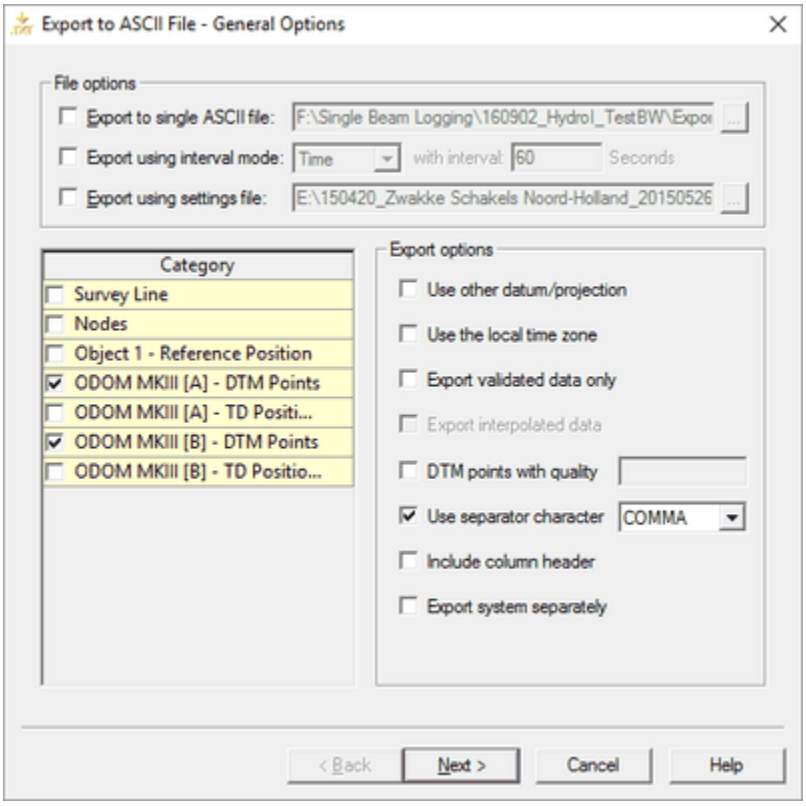


For the example the proxy server address 192.168.33.44 was added and the port number was 1085. If the port number is the default 1080, you can omit that, and the colon char too, so just enter the address in that case.

Press OK. Now it will appear in the list. Press OK to close the dialog and OK again to close the parent dialog.
You do not need to restart your computer, only restart AutoClean/NavAQ.

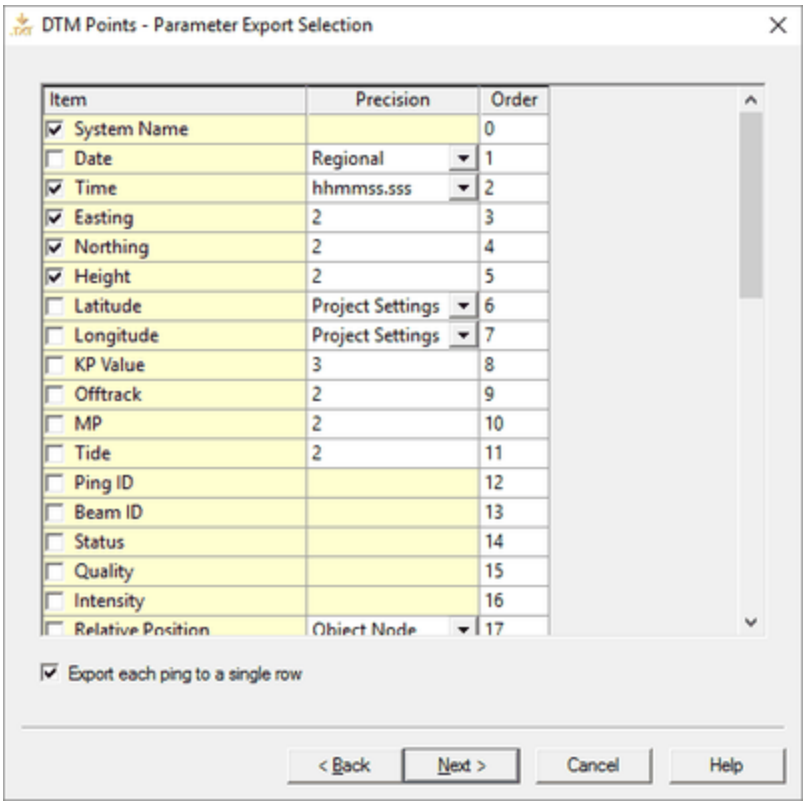
How To: SBE ASCII export from QINSy Processing Manager

In order to retrieve ASCII dual frequency data from QPD files export from Processing Manager (PM) as:

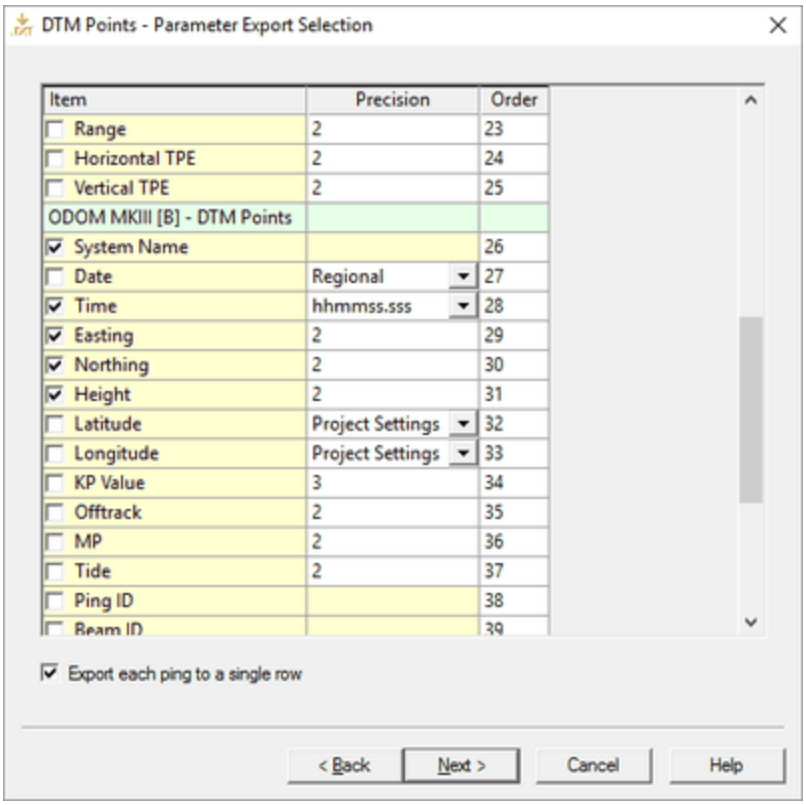


Recently(end 2018) we have seen exports with missing points. Enabling the "**Export system separately**" seems to prevent missing data.

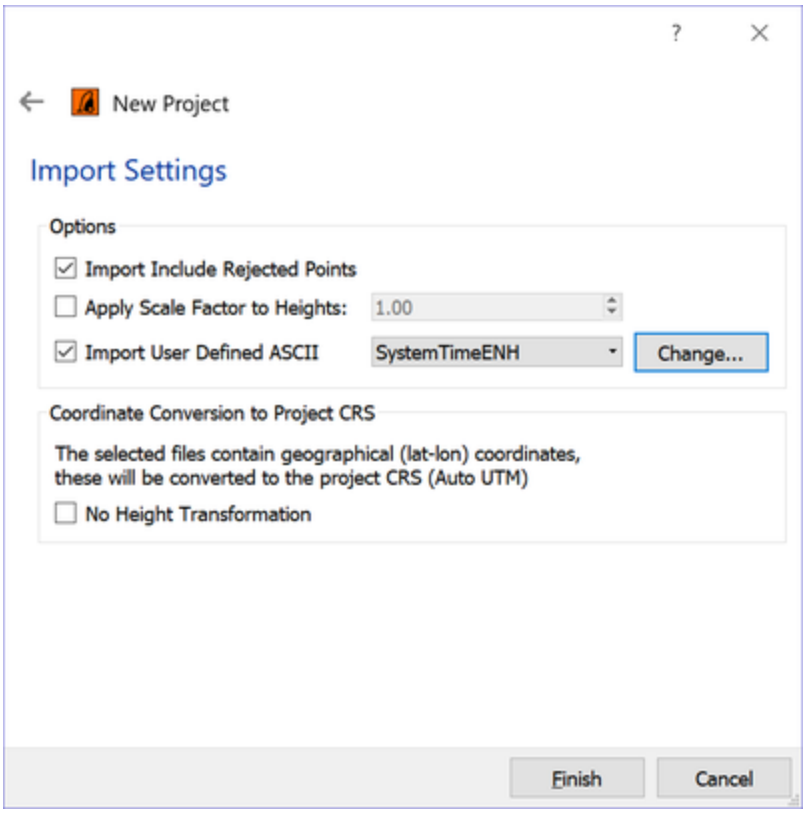
Channel A:

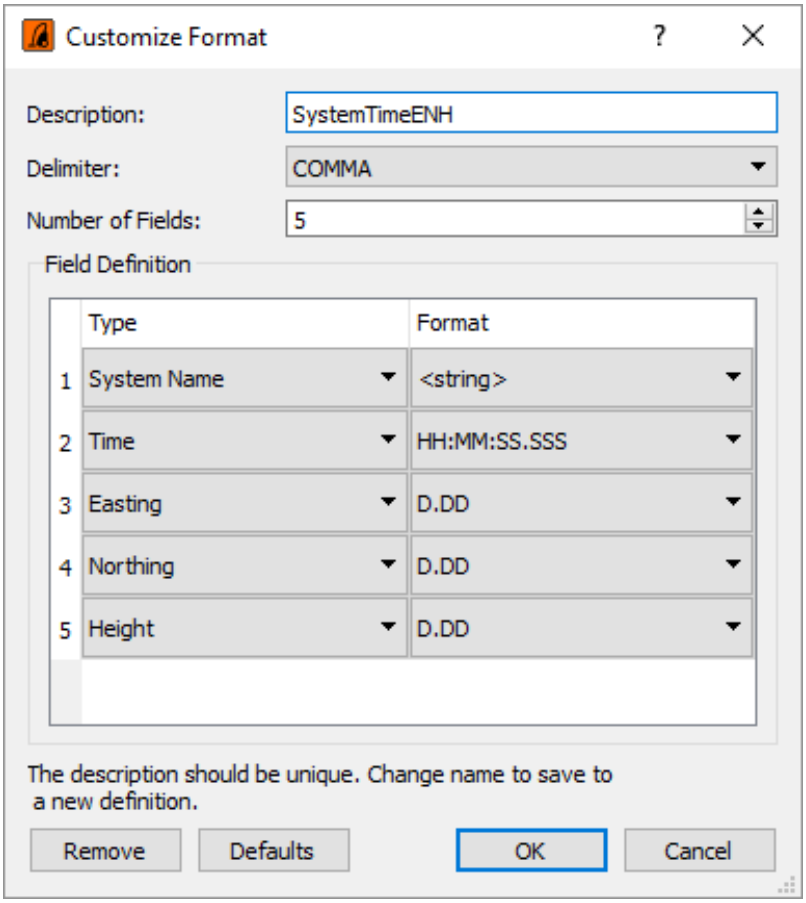


Channel B:



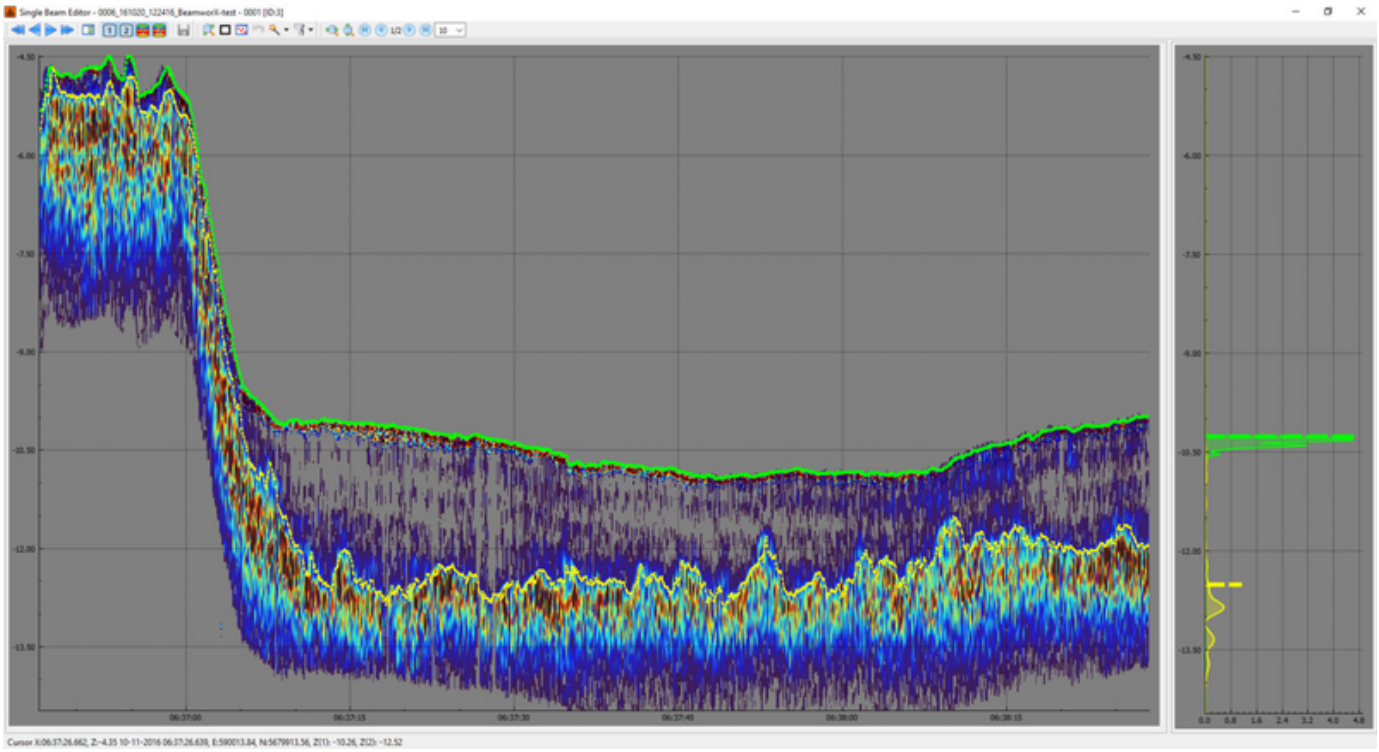
Then Import in AutoClean:





SBEdit (Single Beam Add-on)

SBEdit is designed to edit Single Beam Echosounder Data (SBE) in chart datum with the raw acoustics as background. The background makes it easier to decide how to edit the digitized High and Low Frequencies (HF and LF). SBEdit is an AutoClean Add-on and is fully integrated into AutoClean. It uses the BwxRes (result data) files combined with BwxRaw (raw data) files that are both generated by the BeamworX NavAQ Acquisition software. The raw acoustics are retrieved from the BwxRaw files. Note that it is also possible to use without the raw data, single beam results can also be imported with the User Defined ASCII format.



The main program functionality of SBEdit is described hierarchically in the following chapters:

Toolbars

Views

Status Bar

SBEdit Toolbars

The application contains the Main, Edit and Zoom tool bars, see described below.

Main Toolbar

This is the primary toolbar of the Editor.

Select First, Previous, Next or Last file in the project.
When pressing one of these buttons another file is selected in AutoClean and loaded in the Editor.

 Settings /View Properties

 Show/Hide Channel 1 Digitization (result data)

 Show/Hide Channel 2 Digitization (result data)

 Show/Hide Channel 1 Trace (raw data)

 Show/Hide Channel 2 Trace (raw data)

Edit Toolbar

Toolbar with edit functions.

 Zoom All. Zoom to extents (horizontally and vertically) of the Active digitized Channels.

 Selection tool Rectangle, Lasso or Polygon

 Show/Hide original raw points(without edits). Note that points can be rejected or interpolated in height.

 Revert last edit action.

The next buttons are used in combination with the selection buttons.

 Accept the rejected points inside the selection

 Reject the points inside the selection

 Interpolate Height of points inside the selection. When the First or Last selected point(s) is marked for Interpolation then it will automatically be extrapolated.
When multiple points are selected they are all neatly interpolated between the adjacent neighbors.

 Digitize Channel 1, or 2.
Change the points z value with the cursor manually. This can be done in 2 modes:
-When the selection tool is set to Lasso, then it is a real free draw.
-When the selection tool is set to Polygon or Rectangle, then it is as a polygon free draw.

 Filter Channel 1

 Filter Channel 2

 Filter Both Channels

Unique filter settings per channel can be defined in the Settings Dialog. Filters include despiking and smoothing.

Zoom Toolbar

Toolbar with zoom and page navigation functions. Toolbar always display which page is visible and how many pages there are currently.
The number of pages depends on the line length and the current horizontal scale.

 Zoom to extends horizontally, this adjusts the horizontal scale only.

 Zoom to extends vertically, this adjusts the vertical scale only.

 Jump to first page

 Jump to previous page

 Jum to next page

 Jump to last page

 Select/view the vertical scale. This will always show the actual vertical scale. It can also be used to change the scale to a predefined scale value.

SBEdit Views

SBEdit contains 2 views. The Slice View that shows a longitudinal profile of the single beam data and the Trace View that shows the intensity trace of the trace that is located under the current cursor position.
Views are separated by a slider. In the bottom of the view is the status bar.

Slice View

The slice view shows the following items:

Item	Description
Traces	Intensity, signal strength, data shown as colorized background (raw data)
Channels	The digitized channel data (result data)
Fix Marks	Fix marks generated by the survey software

The Vertical axis is always in Chart Datum. Controlled by the Survey Software through the COG value.

The Horizontal axis unit can either be to time or distance in the Settings Dialog.

All items can be shown/hidden with the Toolbars and the Settings Dialog.

The following cursor/mouse actions are supported for boh views:

Mouse Action	Description
Double Click LEft or right button)	Re-centers the View.
MIDDLE mouse button down + mouse move	Pans the Slice View. The scroll wheel usually can be pressed and serves as the middle button.
Mouse Wheel	Zoom in and out. The mouse position is the zoom point.
Mouse Wheel + (SHIFT or CTRL)	Zoom in and out. Vertical axis only.
Mouse hoover	Updates Statusbar and Trace View

Trace View

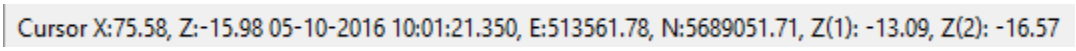
The trace view shows the raw enabled signals. Vertical axis in Chart Datum and Horizontal axis in dB (Kongsberg) or volts (Odom).

When the user hoovers over the Slice View then the Trace View is updated with the trace data located under the cursor. It will always use the same vertical scale as the Slice View, this way the trace can easily be compared with the digitized values.

If you want to hide the Trace View completely just resize it so it becomes invisible. Hover over the left edge of the window. The icon will change into a horizontal arrow, Now drag it to resize.

SBEdit Status Bar

When the the cursor is moved over the Slice View then the status bar is updated with the actual cursor position and the closest data points.



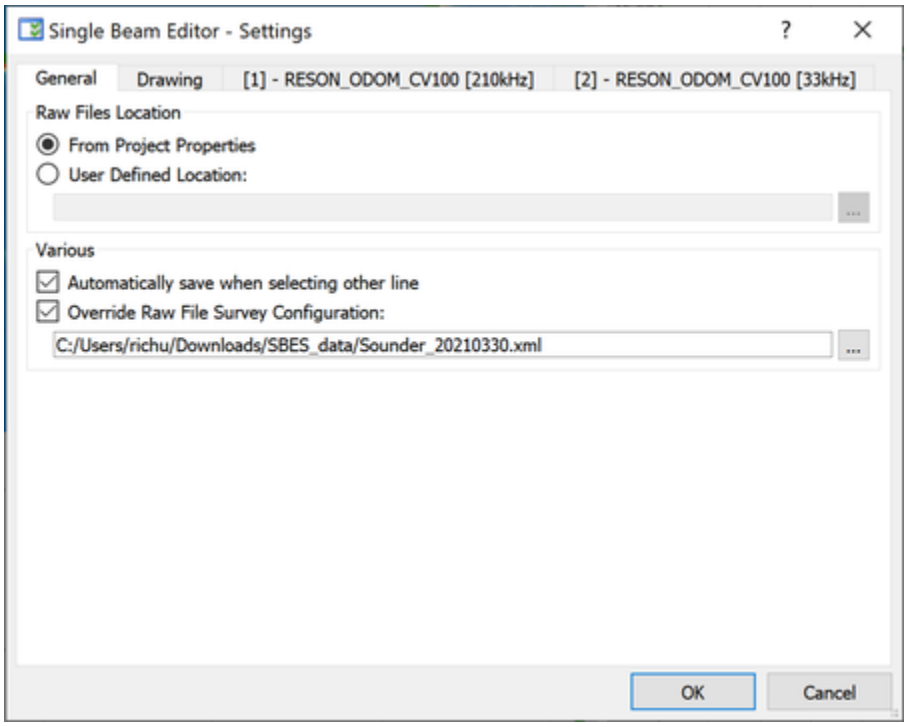
The status bar shows the following items:

Item	Description
Cursor X	Cursor location on horizontal axis. Can be Distance or Time.
Cursor Z	Cursor location on Vertical axis, Height in Chart Datum.
Nearest Ping Date	DD-MM-YYYY
Nearest Ping Time	hh:mm:ss.sss
Nearest Ping Easting	xxxxxxxxx.xx (Survey Units)
Nearest Ping Northing	xxxxxxxxx.xx (Survey Units)
Z(1)	digitized depth channel 1 xx.xx (Survey Units)
Z(2)	digitized depth channel 2 xx.xx (Survey Units)

SBEdit Settings

The View Properties consist of 3 or more tabs, the "General" tab, the "drawing" tab and one or more "Channel" tabs for each found echosounder system.

General



Raw Files Location

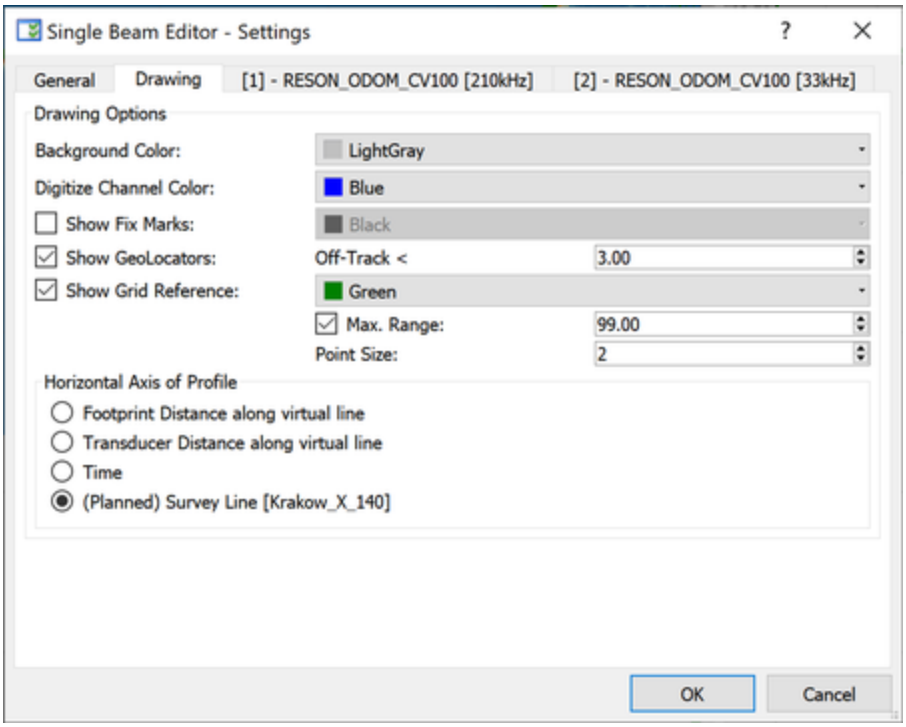
SBEdit will automatically load the raw data when the raw file is found in the selected location.

- From Project Properties. SBEdit expects the Bwxraw files in the AutoClean project properties specified folder.
- User Defined Location, select a preferred Raw data folder.

Various

-Automatically save when selecting other line. When disabled the user is prompted if changes are present.
-Override Raw File Survey Configuration. When this option is not used the survey config is extracted from the first bwxraw in the project. But if there are wrong settings in there for example a latency that must be adjusted you can overrule it with a survey configuration xml. This xml can be extracted in AutoClean Raw import option or In NavAQ with option File|Import Survey Configuration".

Drawing



Background color, sets the background color for the Slice View and Trace View.

Digitize Channel Color, sets the displayed color when using the Channel Digitize functionality.

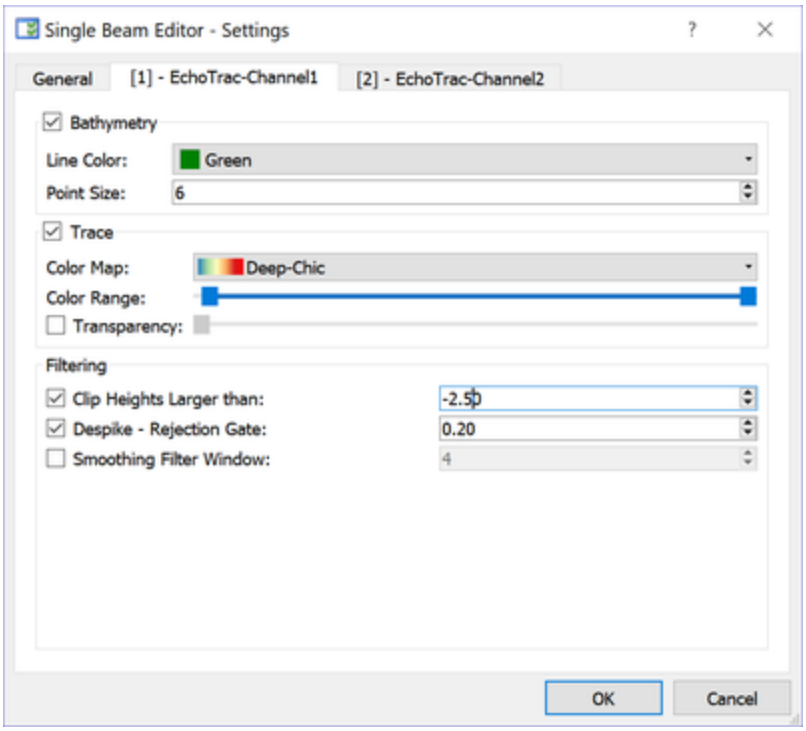
Show Fix Marks, Show/Hide fix marks in the Slice View.
Show Geolocators, Show hide geolocators. enter the max off-track distance for searching.

Show Grid Reference, Show/Hide the Grid Reference in the Slice View.
The Max. Range value can be used when the reference layer is only sparsely filled. Then it will search the closest grid cell with this search criterium.
The higher the range the slower the searching can be.
Point size of shown grid graph can be selected here too.

Horizontal Axis of Slice View, can display either time or distance:

-Footprint Distance along virtual line
-Transducer Distance along virtual line
-Time
-Planned Line (only when available in the bwx Raw/Res file)

Channel 1-2 Tabs



Bathymetry, set the per channel line color and point size.

Trace, set the per channel Color Map, Color Range and transparency.

Clip Heights Larger than, Enables filtering when the points have an absolute height larger than the selected level.

Despike - Rejection gate, Enables despiking with a fixed filter length 10, applying the selected gate. 1m gate is applied as +/-0.5 survey unit.

Smoothing Filter Window, Enables smoothing(moving average) with the selected window length.

Backscatter Processor

Abstract

When both bwxres and bwxraw data files are available then with this Backscatter Processor the intensity values of the footprints can be "recalculated" from the raw data. For most multibeam systems the "Per-Beam Intensity" is available. But it is also possible to use the Snippets /Seabed Imagery records when they are recorded in bwxraw files.

Process the backscatter data

Follow below steps to process the backscatter data. Please note that the backscatter data is always part of the bwxres footprint bathymetry.

This implicates the following:
-There is only one backscatter value available per beam, not more.
-Rejected Footprints do not show the backscatter.
-Backscatter can be visualized in the intensity layer.

Step 1 - Add Data

After the survey we will load all bwxres files in an AutoClean project as we always do. It is also possible to re-import the bwxraw data.

Step 2 - Assign Bwxraw Folder

for the processing of the backscatter AutoClean needs to match bwxres and bwxraw files. The project always contains bwxres files so AutoClean needs to be told only where the raw files are.

After adding go to the "Project Properties" dialog, here you can select the original location of the bwxraw files.

If you copied the bwxraw to the AutoClean project folder then select "In Project Folder". Else select a "Custom Folder" and assign it to the folder with the bwxraw files.
It will report in the title of the group box when some are missing.

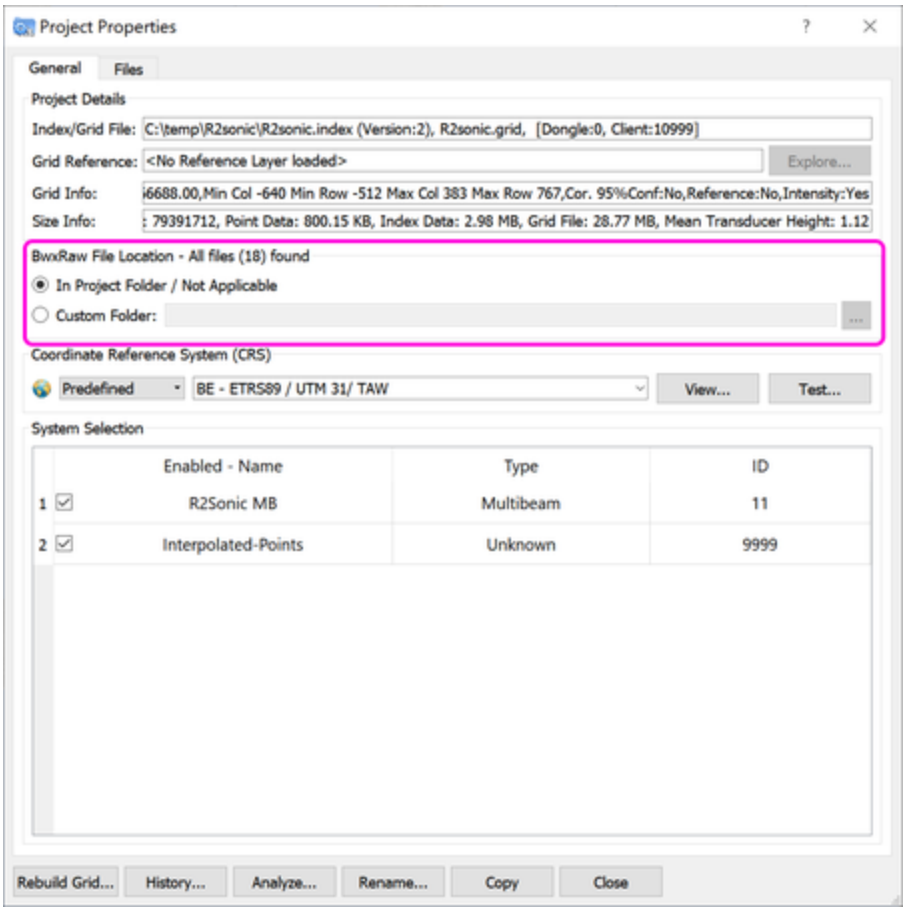


Figure: AutoClean Project Properties.

When importing Raw Files this setting will automatically be set after files are imported.

Step 3 - Run Backscatter Processor

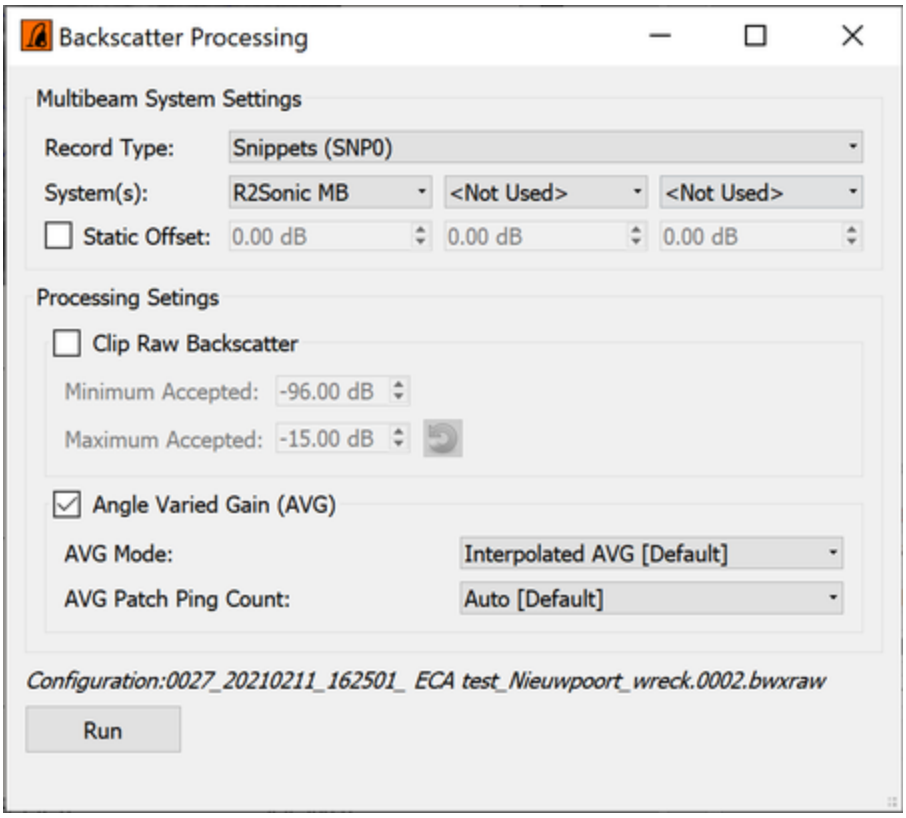
It is strongly advised to first clean/filter the bathymetry. When that is done the backscatter can be processed.

Go to menu Tools|Backscatter Processor... to launch the dialog.

Select system and record type and press "Run" button.

The "AVG" option will get rid of along line artifacts.

When the static offset, Clip raw backscatter and "AVG" options are disabled the result will be the same as the online generated values.



Options are explained here:

Option	Description	Default Value
Record Type	Choose which record type to use, choose between the per beam intensity value from the bathymetry or a snippet type.	N/A
System(s)	Select the multibeam system that should be processed, for single head system the other two right-most systems selection stay at "<Not Used>"	N/A
Static Offset	Select a backscatter offset in dB's' that is applied after the processing. You can mitigate differences in backscatter between two transducer heads here.	Not Used
Clip Raw Backscatter	Enable when the system has output very wrong unrealistic Snippet values, e.g. zero or very high. This usually indicates a bug in the sonar firmware. This is rarely used. Only used sofar for Teledyne Reson 7125. The encountered system outputs zero samples sometimes in the outer beams. In that case a limit of -100 to -5 db will clip it.	Not Used
AVG - Mode	How AVG is used. Choose between: **Interpolated AVG**: for each beam the AVG is determined by doing a range interpolation to its neigboring swath. This is the slowest method but gives the best overall result. This is the default. **File based AVG**: Per file one single average AVG curve is used. This can be used when Interpolated gives undesired results. Watch out with split databases. This may not look good then. **Project AVG**: Per project one overal AVG curve is used. This can be used for testing.	Interpolated AVG

AVG - Ping Patch Count	Per number of pings a mean AVG curve is determined. Leave to auto for best results.	Auto

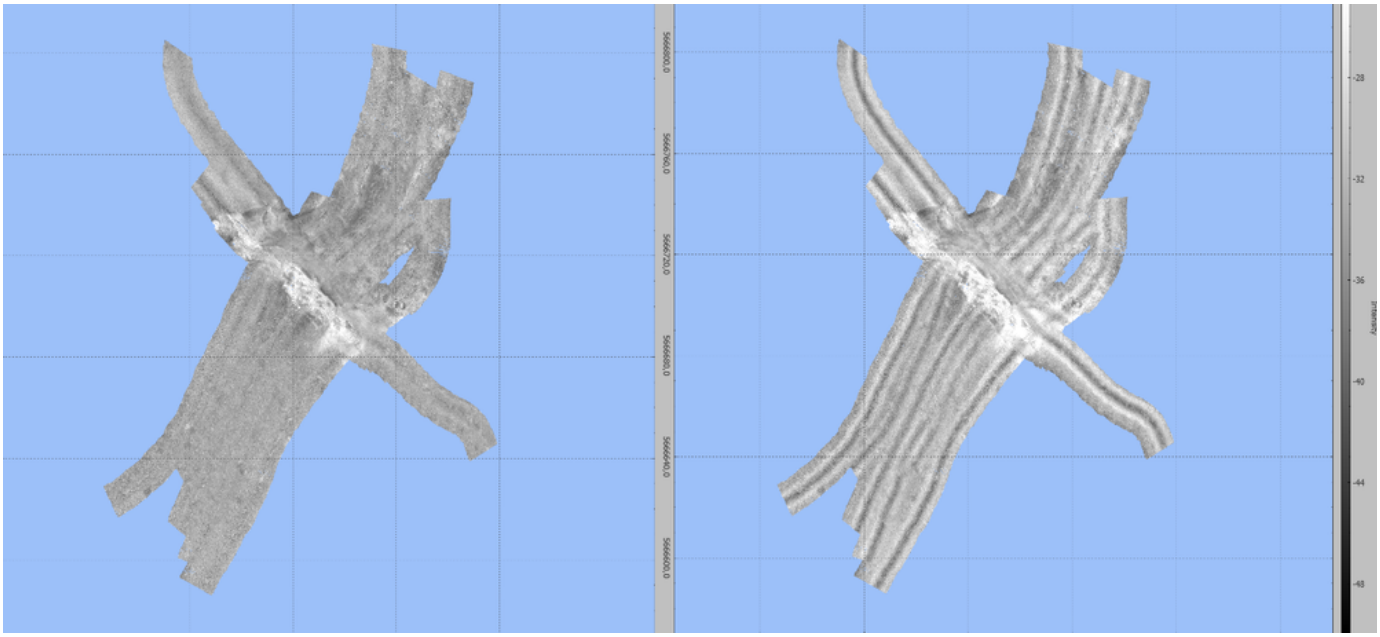
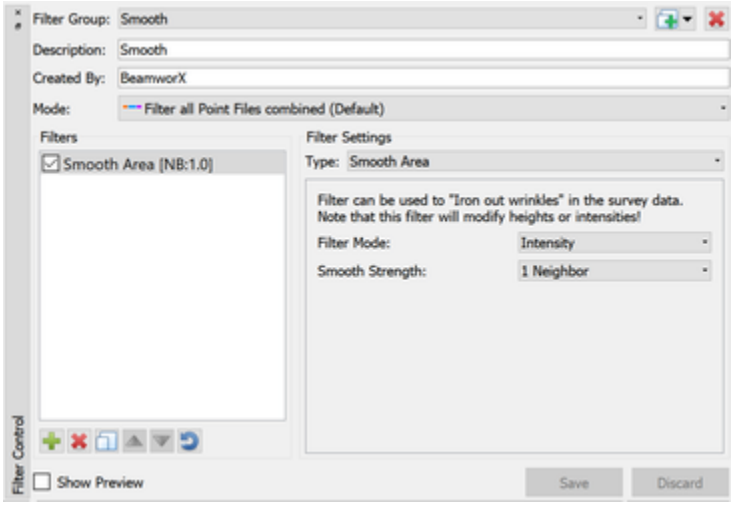


Image: R2Sonic Data, Left AVG applied, Right Original Raw Data

Step 4 - Smooth Intensity filter

When you are happy with the results of the backscatter processing you can optionally run a filter over it to make it look smoother. Note that this removes some of the noise but it also adds a bit of a blur over the data.



Step 5 - Export Backscatter

Backscatter values can be exported from AutoClean as a GeoTiff with the backscatter image (Grid Export). But it is also possible to export the raw packets from the BwxRaw and dump them in binary files. This can be done in NavAQ, see menu option BwxRaw/Res files. for example for Reson or Norbit all packets can be dumped to a 7k file.

Auto Script

Abstract

AutoClean functionality can also be called from a so-called auto script. This way you can define a number of common tasks that are automatically executed by AutoClean after startup.
These tasks are described in a text file, extension must be "txt". The name of the text file must be provided to AutoClean by a command argument.
You can also start it from Windows by right clicking on a text file in the windows Explorer, and select menu "Open with..." and browse to the AutoClean executable in the ProgramFiles folder.

Script Format

The script is a simple text file with comma separated fields. The extension must be "txt".
Each line contains one command, all arguments must be placed on this single line.
The first column is the command name. The command name must always be preceded by a hashtag "#". Other columns are filled with arguments and are optional. These commands must have the form Argument=value.
Note that the command names are not case sensitive. Note that arguments may not contain the comma character.
You can comment a line out by writing a double slash in front. So the first two character must be "//" so no space in front.
Arguments with strings may be inside double quotes but it is not strictly necessary.

The following table shows the available commands:

#	Command	Description	Arguments
1	Create Project	Creates a project and import files from a specified folder.	Yes
2	Auto Script#Filter	Filter the entire project with a filter group.	Yes
3	Export Points	Export all points to individual files.	Yes
4	Auto Script#Exit	Quits the AutoClean Application.	No

1 Create New Project

Create a project with xx cell size and by adding files from a specified folder.
The files can be result point files or raw files. For the latter a survey configuration file must be provided as an argument.
Optionally also a trajectory file name can be provided.

Available Arguments are:

Argument	Description	Type
Name	Name of the project	Mandatory
UniqueName	When argument present the project name is made unique (adds number) to prevent overwriting.	Optional, default is all data will be overwritten.
ParentFolder	Name of the parent folder where the project folder is created in.	Mandatory
GridCellSize	Size of grid cell in survey units	Optional, default is 1.0
ImportFolder	Name of import folders, input files are located here	Mandatory
WildCard	File selection wild card. Limit selection of files in the input folder. Example: *.bwxres or *.pds or *.s7k	Optional, default is *.*
ConfigFile	BeamworX Survey Config file, for raw processing only. SVP Profile must be contained in the Survey Config.	Optional, but for raw input files it is mandatory

	Note: Must be either a full path including directory or it can be file name only, then it is expected to be located in the ImportFolder.	
TrajectoryFile	Trajectory file name, when provided the position AND Attitude are extracted from trajectory. Note: Must be either a full path including directory or it can be file name only, then it is expected to be located in the ImportFolder.	Optional
TrajectoryBaseDate	Trajectory base data. Only for SBET. From this date the beginning of the GPS week is automatically extracted. So you can just use the data of the survey. Format of date = DD-MM-YYYY. When omitted the date from the first position in the raw import file will be obtained, this will work fine.	Optional, Only use when the auto date extraction from raw file is not working.

Note that all files will be overwritten when project or point files already exist.

2 Filter

Filter entire survey. One argument only, the name of the filter group.
When omitting the group name the actual selected filter group is used. This will become the last filter selected when AutoClean closed.

Available Arguments:

Argument	Description	Type
Group	Name of the filter group	Optional, default is last selected group

3 Export Point Files

Export all files in the project, various formats are supported: fau, xyz, las, laz, mbes, gsf.
An existing target folder must be supplied. For each point file in the project an output file is exported.

Available Arguments:

Argument	Description	Type
Format	Format specifier. e.g. fau, xyz, pts, las, laz, gsf, mbes	Optional, default is las.
OutputFolder	Name of existing folder where files are written to	Optional, when omitted the files are exported to the project folder, subfolder "Export".
OutputFile	Name of a single file where all data is exported to. The extension can be left out. In that case the export filename will get the extension as dictated by the file format. File will be saved in the output folder or if that argument is omitted the export folder of the project.	Optional, when omitted an export to individual files is done.
OnlyAccepted	Only export accepted points	Optional, when omitted also the rejected points are exported.

4 Exit

Quit AutoClean application after the execution of the script is done.
Note that this command does not have to be last in the script file.

Command has no arguments. When this command is omitted or commented out then AutoClean will not exit.

Example file

```
#CreateProject, Name = Test, ParentFolder = C:\temp, GridCellSize =
1.0, ImportFolder = "C:\SurveyData\laser\calibration", Filter = "*.
bwxraw", ConfigFile = "Optech Polaris.xml", TrajectoryFile =
"sbet_200609T.out", trajectorybasedate = 07-06-2020
//A Comment should be preceded by a double forward slash
#Filter, group = "Bwx Detail"
#ExportPoints, format = fau, outputfolder = c:\\temp, onlyaccepted
#Exit
```

