GUIDELINEGEO | MALÅ

MALÅ Vision

User Manual

Our Thanks...

Thank you for choosing Guideline Geo and MALÅ as your Ground Penetrating Radar solution provider. The very core of our corporate philosophy is to provide our users with the very best products, support and services. Our development team is committed to providing you with the most technologically advanced and easy-to-use GPR products with the capability to meet your needs for efficiency and productivity now, and into the future.

Whether this is your first MALÅ product, or addition to the MALÅ collection, we believe that small investment of your time to familiarize yourself with the product by reading this manual will be rewarded with a significant increase in productivity and satisfaction.

At Guideline Geo, we welcome comments concerning the use and experience with our products, as well as the contents and usefulness of this manual.

Guideline Geo team

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Sign up

Visit malavision.guidelinegeo.com for both Sign Up and Log In.

To Sign up, you need to enter a valid e-mail address and choose a password.

When you have signed up, you will receive a verification e-mail. Click on "Confirm my account" and your account will immediately be active.

You are re-directed to a page for personal settings and confirmation of Terms and Policy. When this is done, MALÅ Vision is up and running.

Note: You can upgrade your MALÅ Vision license in the main menu option Subscription

Getting started

When you have logged in you can create a new project or open an existing project.

User settings, account settings and subscription details are located in the main menu, which is accessed by clicking the hamburger menu at the top left corner.

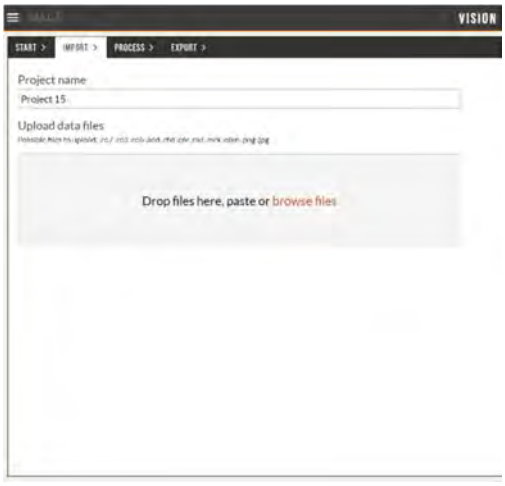
The main menu also includes direct access to Guideline Geo Support if needed.

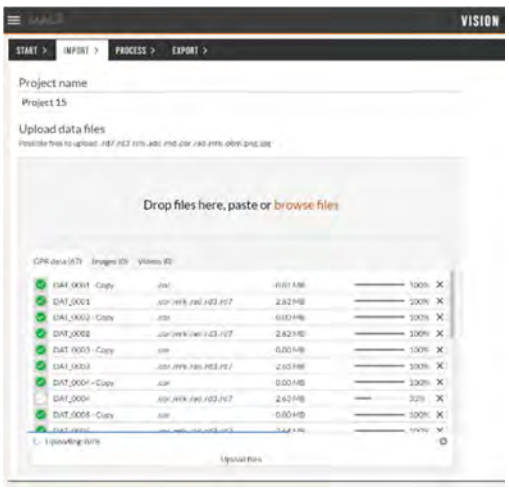
To create a new project, press **New project**. Start by naming your project. Drag and drop your files, complete data folders, even zip-archives, onto the drop zone or use the browse function to upload files.

Note: If you drag and drop a complete project folder, MALÅ Vision will import all recognizable data and meta data formats.

Press the **Upload Files** button to start the process. The upload progress of each file can be viewed in the Import tab. During upload, the progress is clearly seen and when upload is ready the files get a green tick mark.

Note: You can also upload images and videos connected to your GPR project.

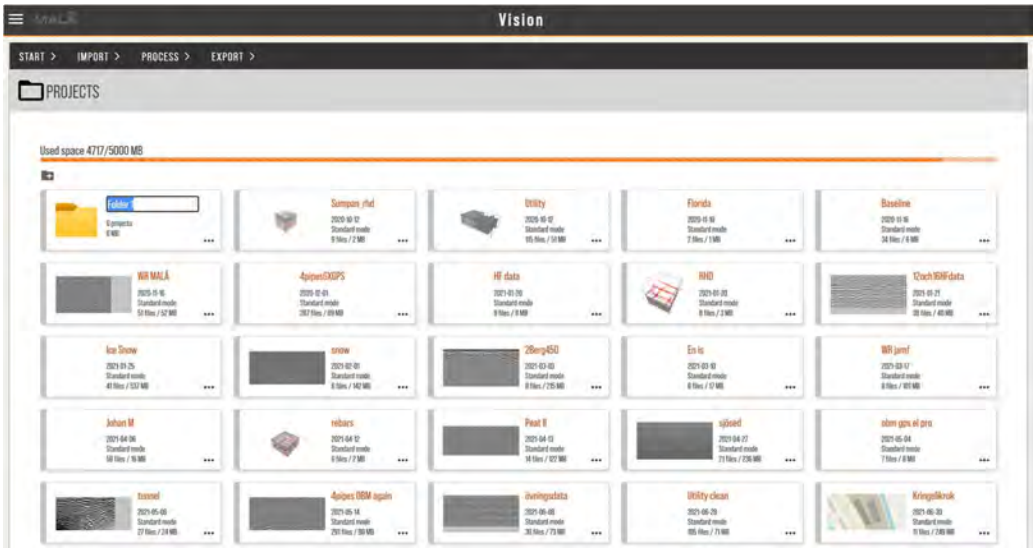




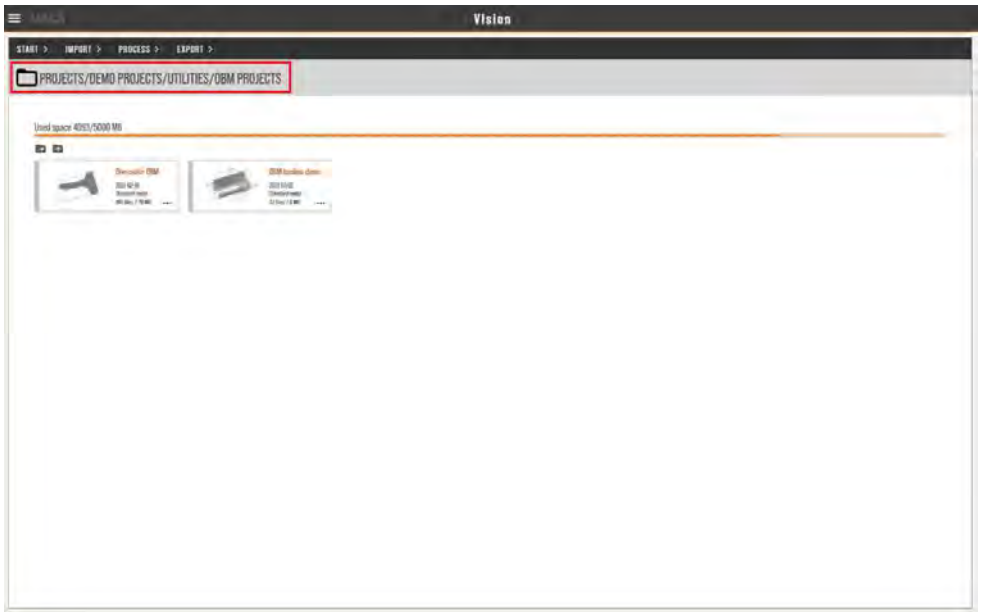
MALÅ Vision will of course also import Object Mapper and 3D Grid projects (acquired with some of MALÅ´s Monitors/Controllers). When uploading an Object Mapper Project, you will get the option to decide if X or Y should increase to the north.

To open an existing project, choose **Open Projects** in the start menu. All available projects are listed with name and size. The amount of available disk space on your account is also displayed at the top of the window.

To organize your projects, you can create folders by clicking and add projects to these folders by drag-and-drop. To delete and rename projects and folders click the ••• button.



In order to move projects further up in the map structure, drag-and-drop the project to the desired level (see red square in the image below). You can also click these folder names to move to the desired folder level.

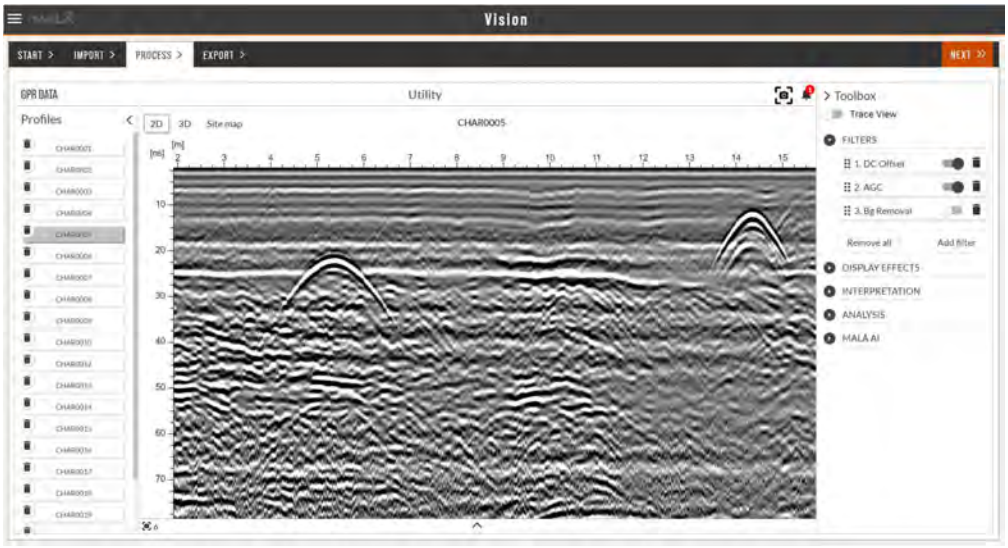


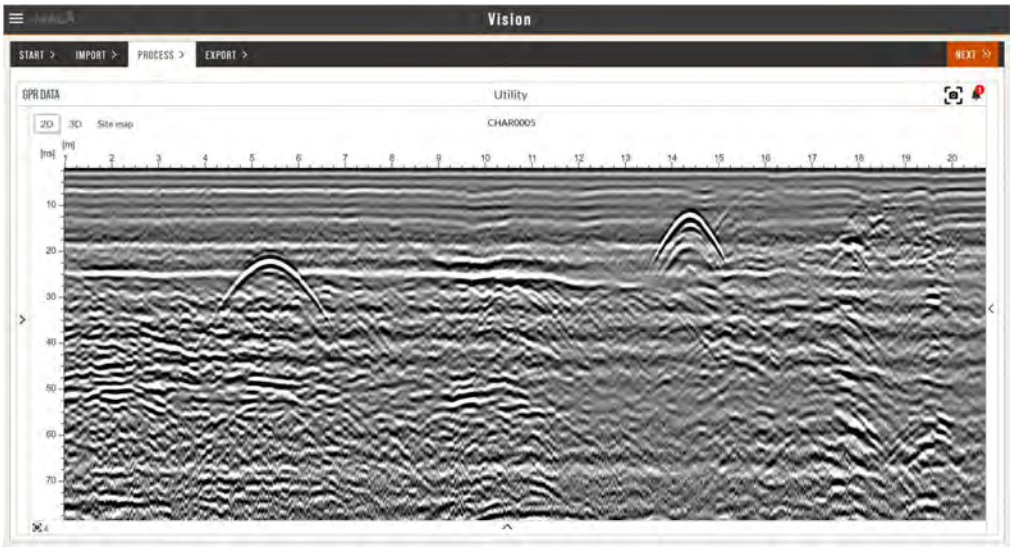
2D view

When the project is uploaded, the first GPR data file will be displayed in 2D. The list of all imported GPR profiles is found under the pane to the left of the window. Press the arrow > on the left-hand side to view and navigate between imported profiles.

In the 2D viewer you can easily switch between profiles using PgUp and PgDn on your keyboard. While viewing a profile, you can filter, add display effects or interpret your data by using the different Toolboxes on the right-hand side.

Note: The Toolbox and Profile lists are dynamic and can be minimized or maximized by using the arrow >





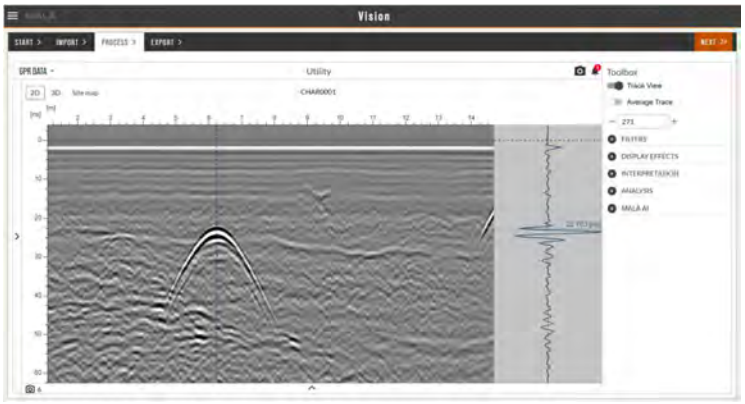
Note: Notifications from the software give information on upload status, interpolations, error messages etc.

If you have Easy Locator Pro WideRange HDR data, the low and high frequency profiles are displayed separately at the left-hand side.

Trace view

When trace view is on, you display a single trace or an average for the whole profile.

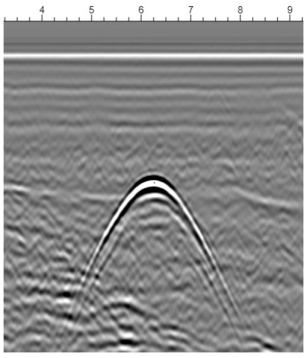
By clicking or entering a number, the trace to be viewed is set.



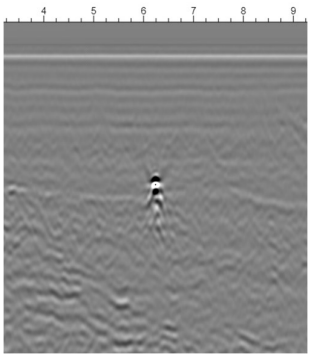
Filters

In order to add a filter to your data, simply press the Add filter button and select a desired filter. If you wish to remove a filter, simply press the trash can icon next to the filter.

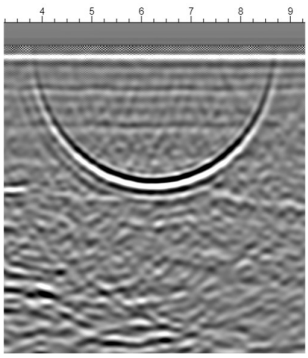
Some filters have additional controls; for example, the velocity for the Fk-migration is adjusted by using a slide-bar. The correct velocity is determined by adjusting the slide-bar until the legs of the hyperbola are minimized and only a point response remains in the data. See examples below.



Too slow velocity



Correct velocity



Too fast velocity

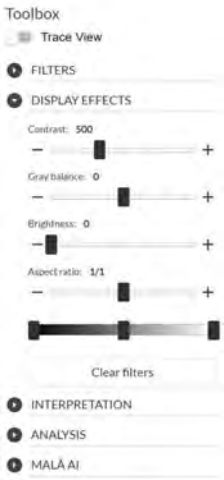
Display effects

In the Display Effects menu, changes to contrast, gray balance and brightness can be made.

When right-click on a node on the color bar, the color of the radargram can be changed.

Use the aspect ratio and zoom (mouse wheel/stretch with two fingers on mouse pad/screen) to zoom in and out in the data.

Keep left mouse-button down and move, moves the radargram with the present zoom and aspect ratio level.



Interpretation

To add interpretations simply click the Interpretation tab and select the size, type and color of your marker.

Left click in the displayed profile to add a marker. To move or delete a marker, right-click the marker in the profile and select the appropriate action. See below. You can also delete all markers in one profile or in all profiles.

When right-clicking on a marker you can also set the depth of the same. The velocity of the radargram will change accordingly. See below.

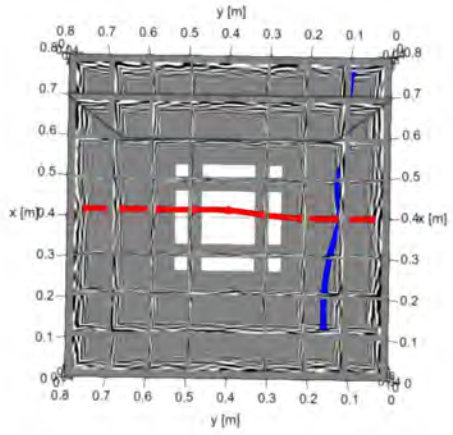
There is also an option to hide all markers (both interpreted or added during import as .mrk files) in the Interpretation tab, by un-ticking ☐ Markers . The last set marker can be deleted by Ctrl+Z.

Use the Auto switch option to automatically jump to the next 2D radargram in your list (left-hand pane) when setting markers.

Note: The colors of the markers are defined in the marker template, found in Applications settings, in the main menu.

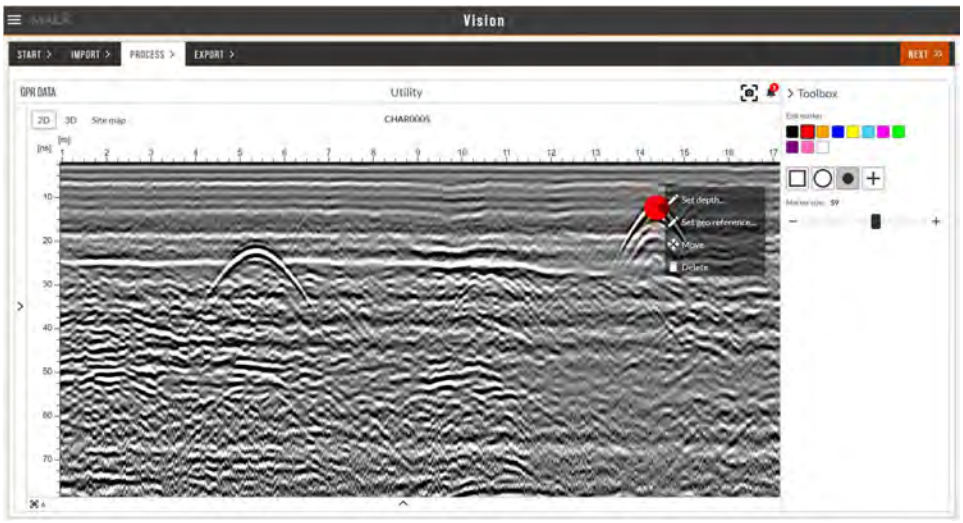
Markers of the same combination of shape and color get linked together in 3D and Sitemap view. These appear automatically once you have more than two of the same combination and are possible to turn off if wished, under polylines in the Toolbox.

The filled circle shape along with undefined color combination (which is the default MALÅ AI combination, see below) is a slight exception to this. This combination will have an algorithm applied to it which only makes polylines from markers forming straight lines.



Example of polylines

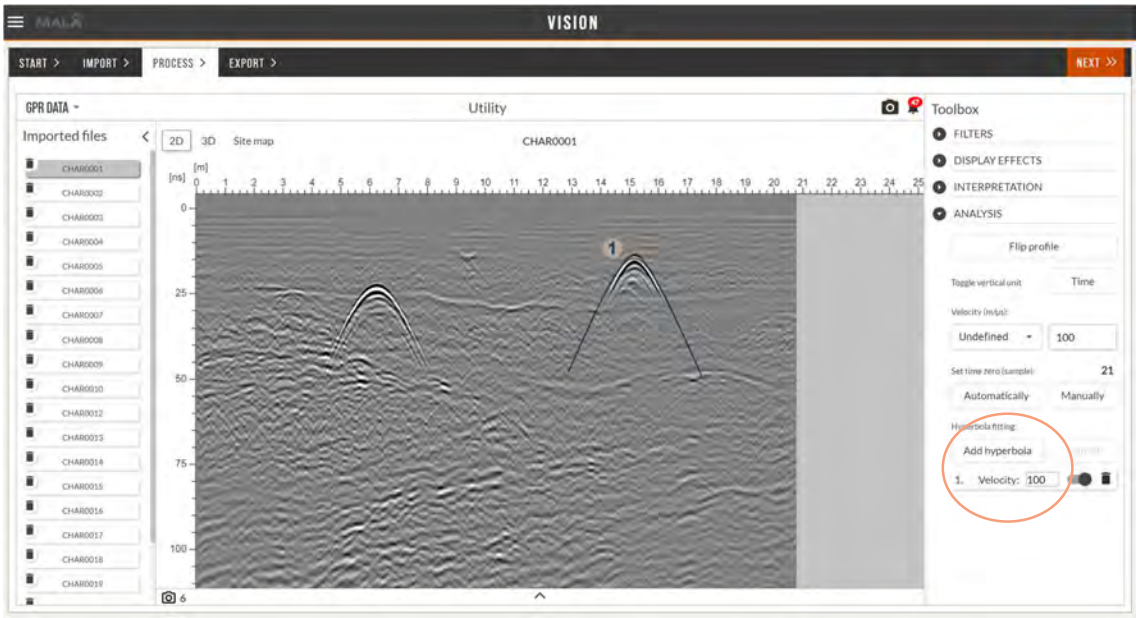
When right-clicking on a marker you get a menu with different actions (set depth, set georeferenced, move or delete). Left- (or right-clicking) a marker also provides you with an option to edit the marker in form of color, shape and size through the Toolbox menu.



Analysis

In the Analysis tab you can flip profiles, toggle between time and depth for the vertical unit, set the velocity (manually or using pre-defined values), adjust the time zero and use hyperbola fitting to check the velocity of your radar data.

Hyperbolas can be used and added to displayed data for an easy verification of the velocity. Press Add hyperbola and place the hyperbola in the radargram with a left click. Change the velocity in the Analysis toolbox to change the shape of the hyperbola. Right-clicking on the top of the hyperbola gives you the option to delete or move the same.

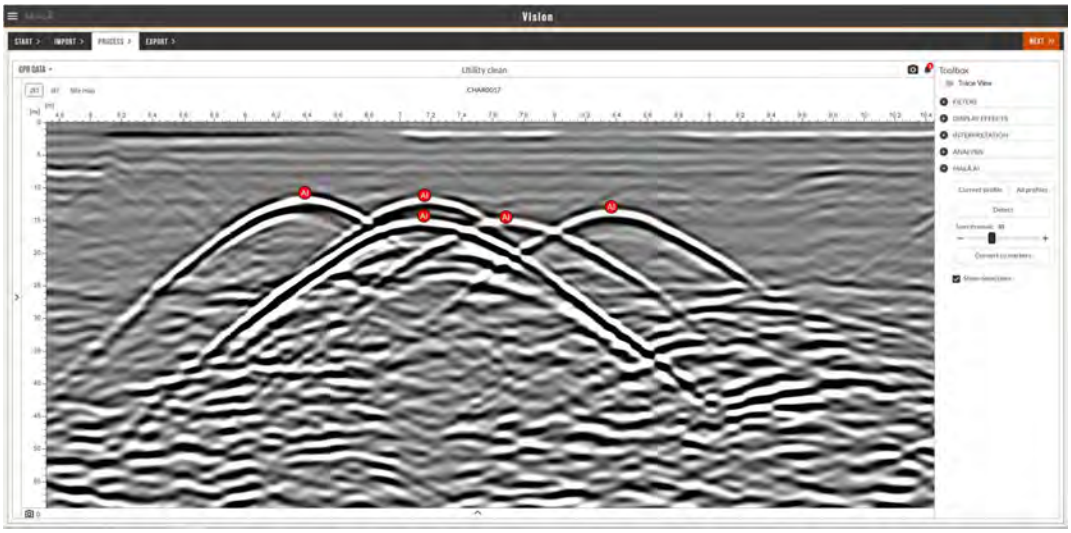


MALÅ AI

The MALÅ AI can be used as an efficient aid in identifying hyperbolas. This can be done for one single profile in the data set or all profiles in the data set. Press Detect and the identified hyperbolas will be marked with red. These are displayed in the 2D and 3D views.

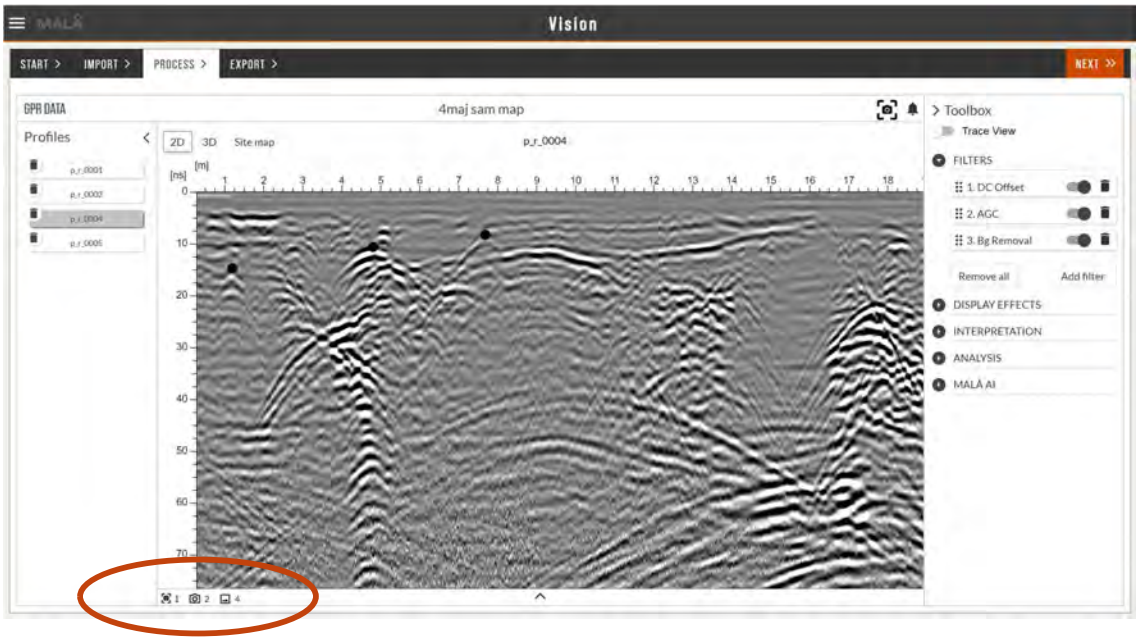
If changing the score threshold, the sensitivity of the MALÅ AI is set.

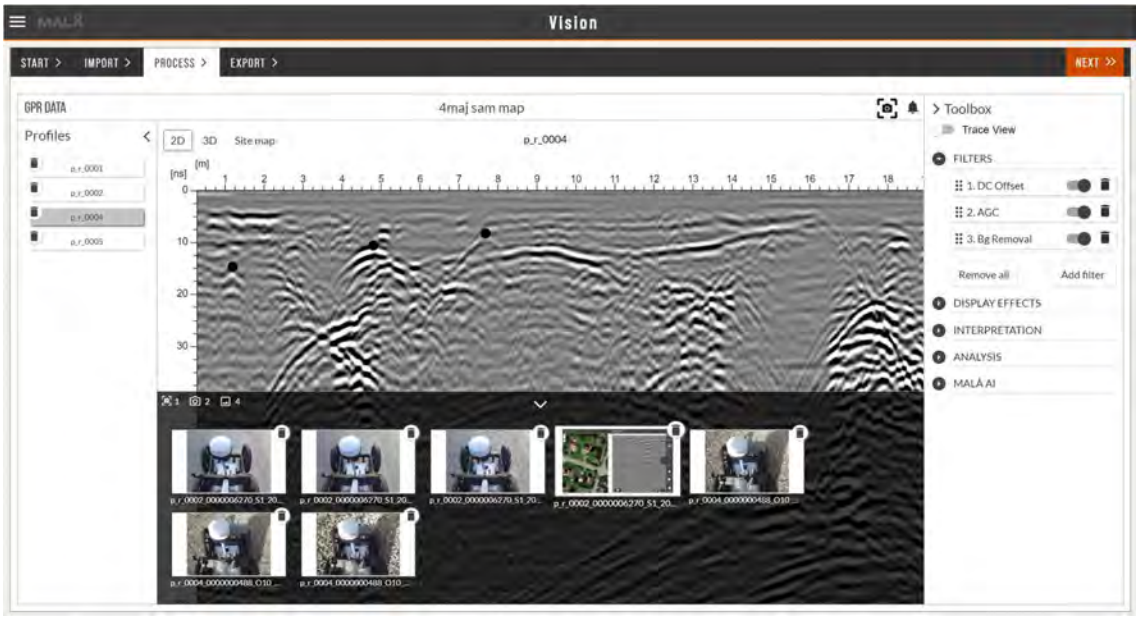
The identified objects can be converted into markers and are then also displayed in the 3D and Site Map view, both as markers and as polylines. For markers set with AI, the polylines created are only created for markers forming straight lines.



Annotations

All annotations added during a survey using the MALÅ Controller App (audio, photo, snapshot, text etc.) will be imported together with your project and will be available by clicking the annotations bar below the radargram view (see images below). You can open and view/edit your annotation by clicking it, or you can click the arrow on top to the annotation thumbnail to move to the location of that specific annotation (in the 2D view).


Vision
START >
IMPORT >
PROCESS >
EXPORT >
NEXT >>
GPR DATA
4maj sam map
Profiles
2D
3D
Site map
p_r_0004
[ns]
[m]
Toolbox
Trace View
FILTERS
1. DC Offset
2. AGC
3. Bg Removal
Remove all
Add filter
DISPLAY EFFECTS
INTERPRETATION
ANALYSIS
MALÅ AI


Vision
START >
IMPORT >
PROCESS >
EXPORT >
NEXT >>
GPR DATA
4maj sam map
Profiles
2D
3D
Site map
p_r_0004
[ns]
[m]
Toolbox
Trace View
FILTERS
1. DC Offset
2. AGC
3. Bg Removal
Remove all
Add filter
DISPLAY EFFECTS
INTERPRETATION
ANALYSIS
MALÅ AI

3D View

In the 3D tab you can view your data as single 2D files in a 3D volume, interpolate your data, change the threshold of 2D profile and use MALÅ AI to identify hyperbolas.

By right-click on a profile in the 3D view, you can hide it. By left click on a profile in the 3D view, you will open it in the 2D View. Keep right mouse button down and move will move the 3D volume at the present zoom level.

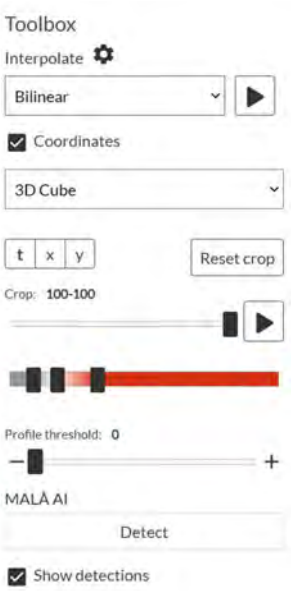
To create a 3D volume, select your preferred interpolation method and press the play button to start the process. You can continue working as the interpolation is carried out.

The interpolation settings allow the user to customize the process. See more on interpolation below.

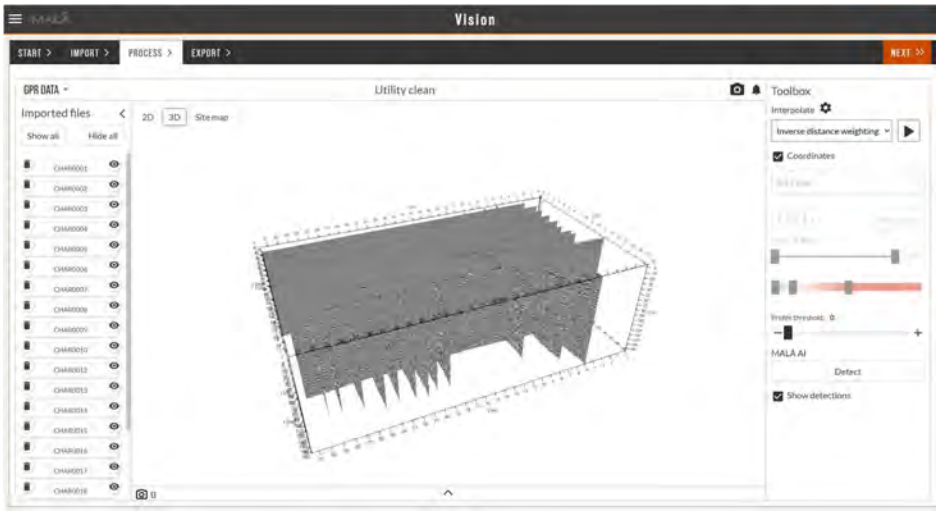
When the interpolation is finished, use the drop-down menu to view the interpolated data as either a 3D Cube, Time slice or as an Iso surface. Alternatively, the interpolated volume can be switched off. Both the 3D cube and the Iso surface can be cropped in three orientations: (t) time, x and y.

The colors of the 3D Cube can be changed by right-click on a node in the color bar.

Profile threshold makes weak reflections in the profiles below the given threshold transparent.



Note: The left-hand pane can be used to view all 2D profiles included in the 3D volume. Individual profiles can be hidden from the 3D view by clicking on the eye icon next to the specific profile.



Interpolation

In MALÅ Vision interpolation of the data volume can be done with the following techniques.

Inverse distance weighting

Inverse distance weighting is primarily suitable for irregularly spaced profiles. The method functions as a heat map and will keep the values of the original data points. It calculates the distance to each point in the vicinity and takes this distance between the points into account. This means that points in closer proximity to each other will affect one another more than points that are separated by a longer distance.

Linear

Linear interpolation is mostly suitable for parallel profiles with an equal spacing. In other words, the linear interpolation works best when utilities or other linear structures are in line with the chosen direction of interpolation. Specify the direction of interpolation and the resolution in the settings ⚙ As you most likely have a denser inline data point distance than profile spacing it is recommended to increase the resolution (number of datapoints) between the profiles and decrease the inline resolution. The interpolation method takes the average value of two points in adjacent profiles.

Bilinear

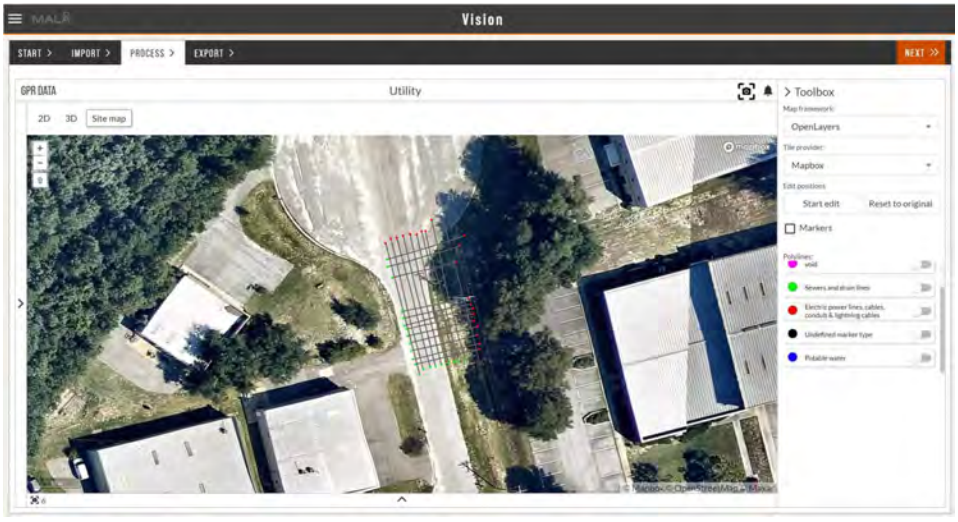
Bilinear interpolation is best for data collected in two directions (such as a 3D grid project collected by one of the MALÅ GPR equipment's). Bilinear interpolation should be avoided if having profiles in an irregular pattern. It performs a linear interpolation in both directions and averages the two results to yield the final result. When using bilinear interpolation for a grid project it is recommended to try to use the trace number of the profiles as the resolution value in both x and y direction, thus matching the profile data points 1:1 with the interpolation data points. You could possibly also lower the z value for a better result.

FK Pocs 3D

FK Pocs 3D is the only method to take all three dimensions into account and it creates new points with new values in a more coherent pattern. The FK Pocs 3D method is useful when features are dipping between profiles as it takes the z value into account but can potentially create artifacts in your data if the data is collected in a too irregular fashion. The larger the distance between profiles the longer the interpolation needs to run in order to create a good result.

Site map view

If your imported data contains positioning information (as *.cor files or *.obm-files) the Site map will display all GPR profiles onto a map or satellite image for .cor-files and a layout for .obm-files. The Site map will also display all interpretations, including polylines.

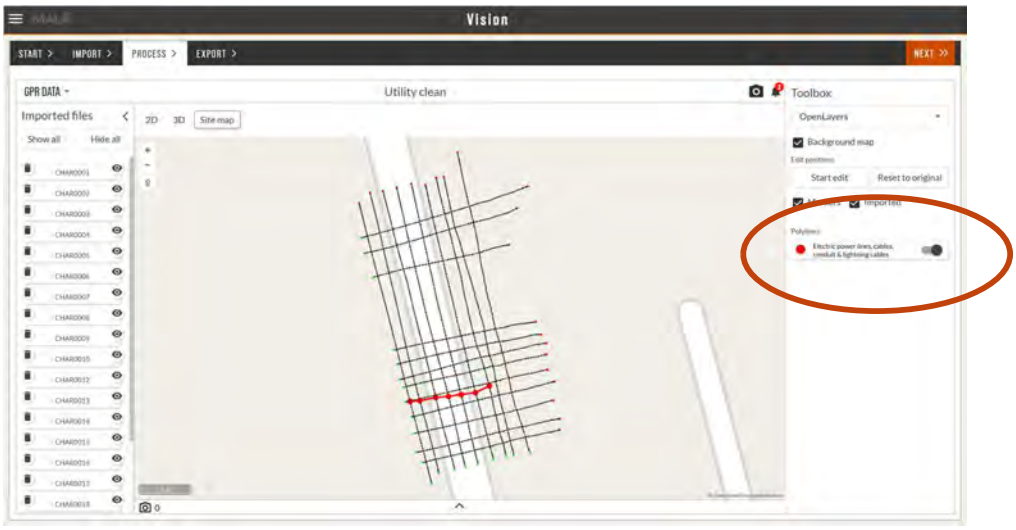


If you have 2D profiles without any positioning (*.cor or *.obm) these will be displayed as evenly distributed parallel profiles, where the location can be edited. See below.

The color of the GPR profile indicates the direction the data was collected. Green dot indicates the start and red the end of the profile.

When you hover above the profiles in the site map the correct profile is high-lighted in the left-hand profile list. When right-clicking on one of the end nodes on a profile in the site map, this will provide you with an option to show the profile in the 2D view.

If markers are created in the 2D or 3D View, the created polylines can be turned on and off



Note: When making changes to markers in the 2D view, these are automatically updated in the Site Map.

Edit geometry

The geometry can be edited for all types of collected files. Depending on GPS or non-GPS data the edit differs. See below.

Note: To enable Edit, choose OpenLayers as map resource.

Data in Site Map can also be georeferenced. Right-click on the node that will be used for georeferencing and enter the corrected Lat and Long positions. Press Set.

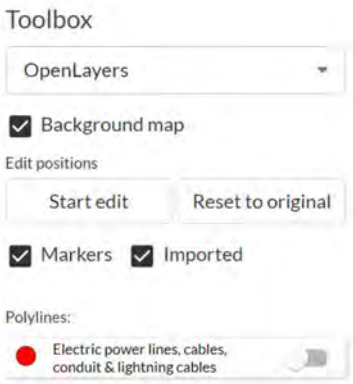
When georeferencing is done for two points, the data set will move and rotate to the new location. The first point set gives the rotation of the project and the second point the exact location. If setting a georeference point again, it will be point 2 for rotation and point 3 for the exact location.

Note: Reset is only applied for edited relative positions of nodes, not for georeferenced points.

Edit geometry – data with GPS or OBM and 3D Grid Projects

If you have collected data with positioning (cor-files available) the following adjustments can be made, when pressing Start Edit:

- Change position of single nodes.
- Change position of several nodes.
- Change position of several lines.

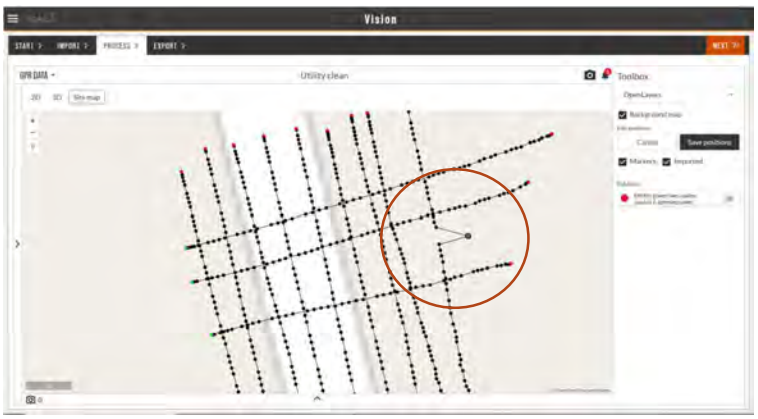


Use the following commands to mark and move:

- Mouse-click to mark a single node.
- Control+mouse-click to mark several nodes.
- Shift+mouse-click+hold to draw a square around nodes or profiles be marked.
- When the nodes are marked: Hold and move.

When you are satisfied with your changes, press Save positions for saving or Cancel to return.

Example of a marked and moved node:

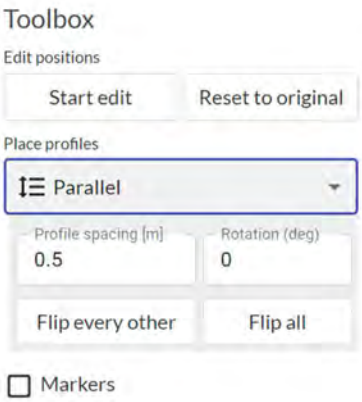


Edit geometry – Non-GPS data

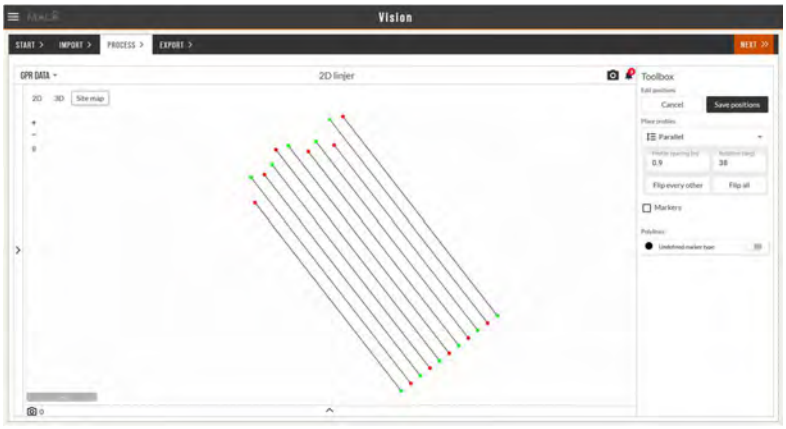
If you have collected data without positioning as single 2D files, MALÅ Vision will automatically place them in parallel, and you can easily adjust the following:

- Place profiles in parallel or in a grid
- Change profile spacing and rotations.
- Flip profiles

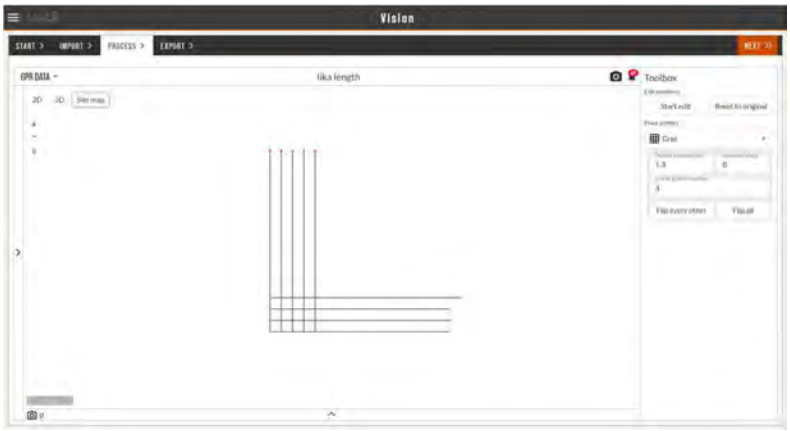
When right-clicking on a profile point you can flip that single profile or georeference the project.



Note: When press Start Edit the nodes can be marked and moved as for GPS and OBM data. See section *Edit Geometry – Data with GPS or OMB projects*.



Data rotated and flipped.



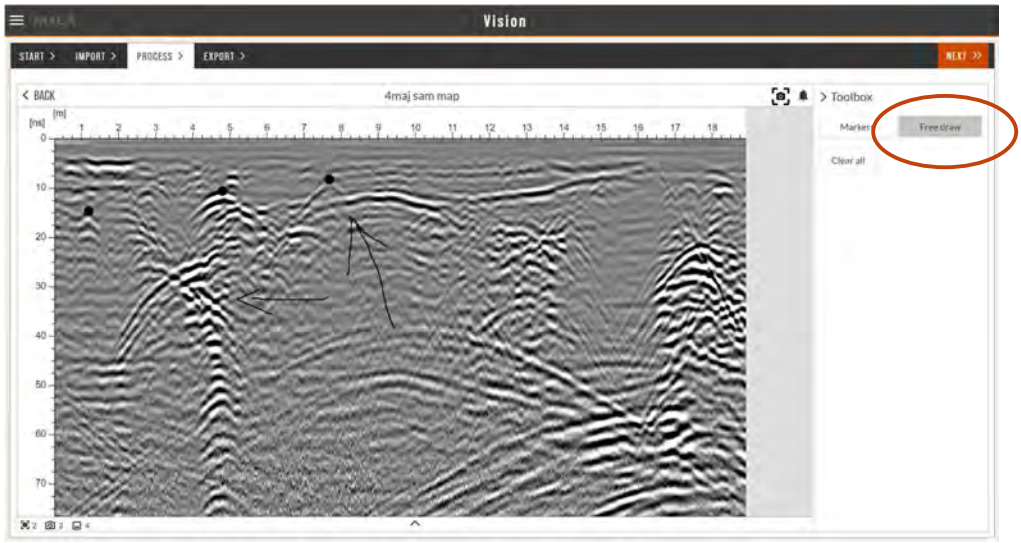
Data files sorted as a grid.

Screenshots and additional features

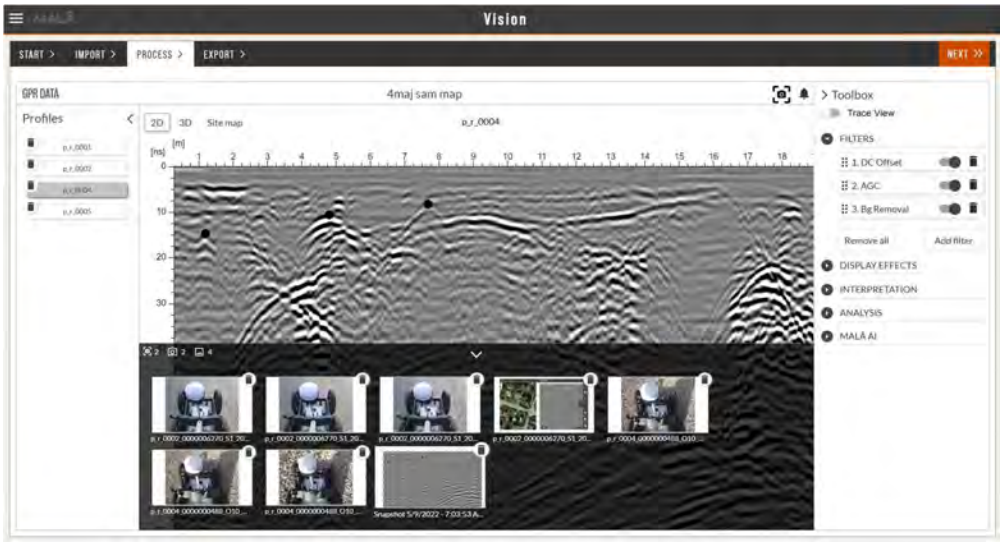
For both 2D, 3D and Site map a snapshot tool is available . When using this tool, the current workspace screen is saved as an image for easy use in a report or for export. All snapshots are viewed and retrieved in the lower part of the screen or in the Export/Report tab.

When changing to Snapshots or Images (in the drop-down menu in the upper-left corner) more markers can be set, and a “Free draw” option is available, which can be used to enhance and mark features in the data.

Use Back to go back to your radardata.



The snapshots are seen together with your annotations in the lower foldable menu.



Report and Export

When you are ready with your interpolation and snapshots of the data, proceed to the Export tab. From this tab you can chose to either create a report, or to export data, interpretations and images

With the Create report tool you can add both snapshots and text to a standardized report template, which are compiled to a document for easy sharing with a contractor or customer. The report can be exported to PDF or Microsoft Word format.

Note: When choosing snapshots for the report, these are included at the bottom of the text.

The Export data option includes export of GPR files, Profile location, Markers, Polylines, Snapshots and Images. The markers can be exported as .txt, .cvs, .dxf or as .kmz-files (Google Maps).

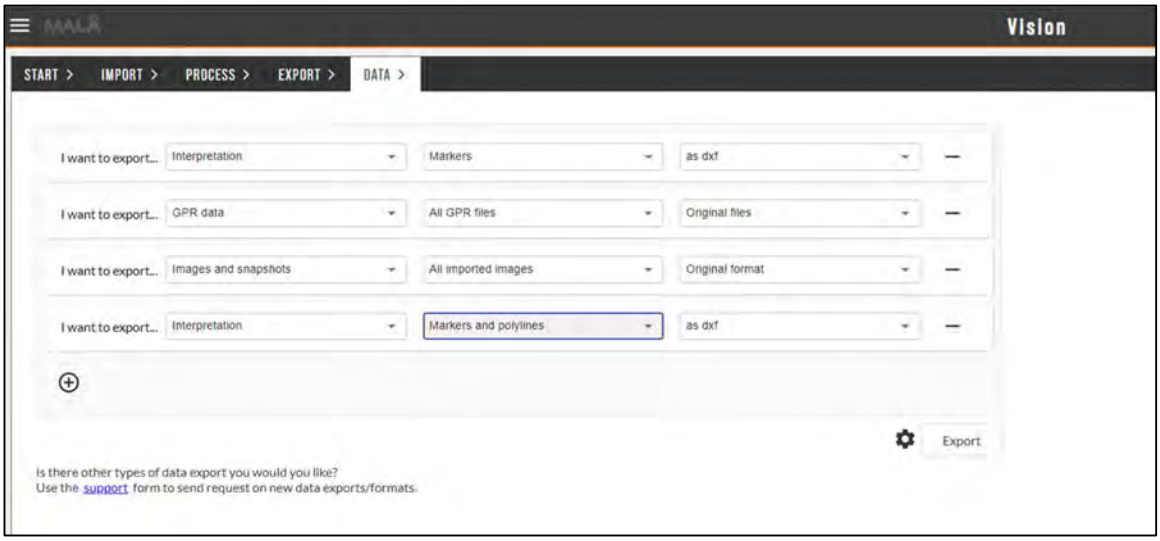
Use the + button to add additional exports items to the same zipped export folder.

When exporting to dxf (choose Interpretation -> Marker or Polyline or Marker & Polyline) the different marker types and polylines will be exported into a single dxf file with several different layers. The geographical location of the profiles is also included in this .dxf export.

If you do not have any markers or polylines available, the .dxf export will only include the profile line location (without GPS altitude).

If you choose the option -> Profiles with GPS altitude, only the location of the profile is exported to .dxf, with the altitude (z-level).

The txt and csv export contains information about markers. The marker position is listed with profile, type, symbol, trace number, sample number, longitude and latitude, depth, GPS-altitude, distance from start and comment.

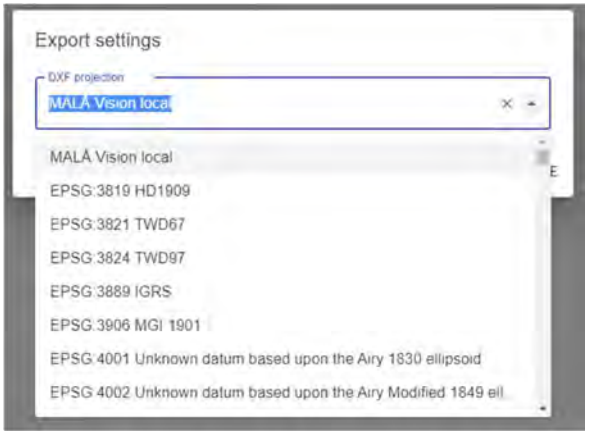


If you wish to output your interpretations to a specific map projection (.dxf) press ⚙.

A window will open in which you will be able to enter the name of your desired output map projection.

Select the projection you wish to convert to and press Save & Close. Finish the process by clicking the Export button.

If you choose MALÅ Vision local (the default option) the interpretations will be exported into a local coordinate system (as displayed in the 3D view of MALÅ Vision).



The exported data will be exported to a zip-file with the same name as your project. If you export several different categories, these are stored in different folder in the zip-file.