OKM Visualizer 3D Studio Manual

https://www.thunting.ir

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Installation and Activation of Visualizer 3D Studio

Before you can use the Visualizer 3D Studio software you have to install it on your computer and activate its license.

After purchasing your software you will receive a Software Key (by e-mail or attached to your physical product) that can be used to download the software digitally as well as activate your installed software product. This Software Key is an alpha-numerical number that is unique for each software product.

1. Download Visualizer 3D Studio

No matter if you purchased your personal copy of Visualizer 3D Studio as a single product or in combination with an OKM Detector, you may download the installation file directly from our website at www.okmdetectors.com/v3ds-download by entering an appropriate Software Key.

2. Install Visualizer 3D Studio

After downloading the installation file, run your Visualizer 3D Studio software installation process by clicking *Setup.exe* and follow the instructions of the Installation Wizard.

3. Activate Visualizer 3D Studio

When running your software for the first time, you have to activate it by entering your Software Key as shown in figure 1.
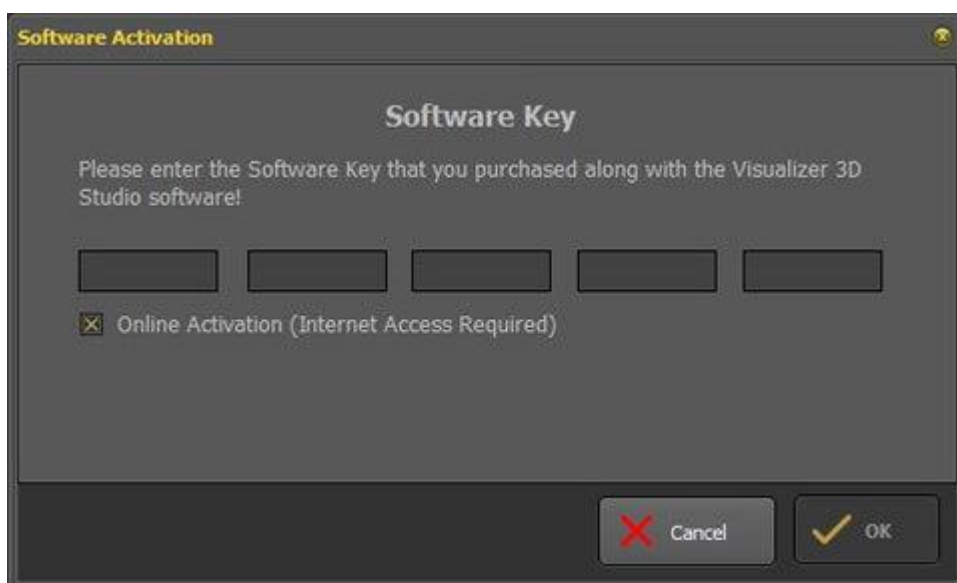

Figure 1: Enter Software Key

There are two separat ways to activate your software:

1. **Automatic (Internet access required):** If your computer is connected with the Internet and you entered a valid Software Key, the Activation Code is determined automatically by clicking the OK button.

2. **Manual:** You may call your local dealer or OKM directly to obtain your Activation Code. Please make sure to provide your Software Key and Software Code as indicated in figure 2, when asked. Alternatively you can also get your Activation Code from our website at www.okmdetectors.com/software-activation.

Figure 2: Manual Activation of Visualizer 3D Studio

Graphical User Interface

The Graphical User Interface (GUI) of OKM Visualizer 3D Studio has many different toolbars, buttons and controls to utilize the feature rich software.

Figure 1: Main window of software application

Figure 1 shows the main window of the software application that will appear as soon as the program has been launched. The main components are:

- **A = Main Menu**
  The main menu is a collection of nearly all functions that are available in Visualizer 3D Studio.

- **B = Main Toolbar**
  The most import functions of the main menu are placed in the main toolbar on the top edge of the software program.

- **C = Left Sidebar**
  This is the place where the mouse mode functions and view function are located.

- **D = Right Sidebar**
  In this sidebar there are functions located that can be used to visualize and analyse your scan images.

Main Menu

The main menu contains nearly all functions and operations that are available in Visualizer 3D Studio. Some of those functions are additionally accessible via following toolbars:

- Main Toolbar

- Left Sidebar

- Right Sidebar

The main menu is located at the top of the Visualizer 3D Studio window as shown in figure 1.
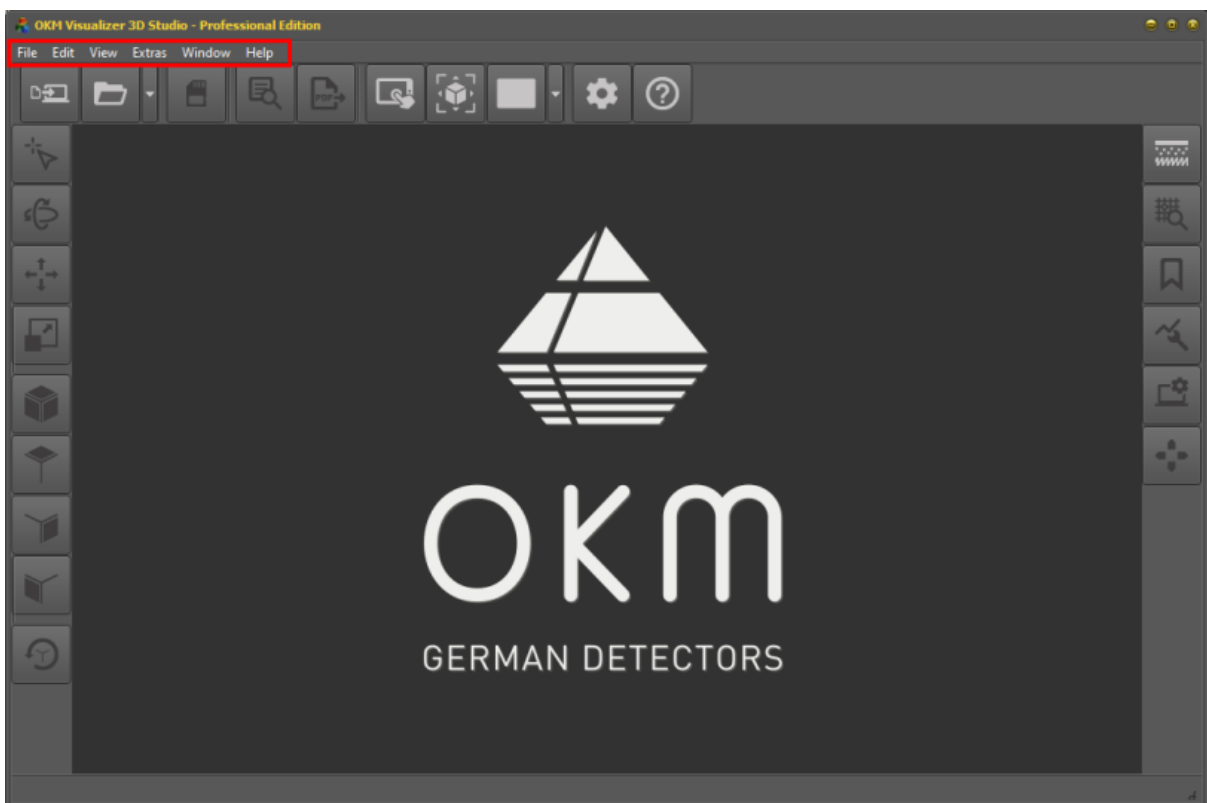

Figure 1: Main Menu of the Visualizer 3D Studio software

The following sections will give you a short overview of all available menu items and its meanings.

File

- **Import**
  When you need to import scan data from one of your OKM Detectors this is the place to start with. Please read section Data Import to understand all details about importing data into Visualizer 3D Studio.

- **Open**
  Click on Open to read files from your harddisk for further analysis in Visualizer 3D Studio.

- **Recent Files**
  Here you can select a scan file from a list of your recent used files.

- **Examples**
  Here you can select an exemplary scan file to learn about the features and functions of Visualizer 3D Studio.

- **Save**
  Click on Save to store any changes in your scan files permanently on harddisk. Please read section Save Scan Files to learn more about all available save options.

- **Export**

  - **Image**

Use this function to export your current screen view as digital image in BMP, PNG or JPG format.

  - **PDF Report** Added in 3.0.0

Use this function to export your current screen view and all applied scan information as well-arranged PDF report. This is a helpful tool to provide customers and clients clean documentation of scan projects. Please read section Export as PDF Report to learn more about all available PDF export options.

  - **CSV** Added in 3.1.1

This function exports your scan data to a CSV file for use in external software or spreadsheet applications such as Excel, OpenOffice or LibreOffice. Please read section Export as CSV to learn more about all available CSV export options.

- **Exit**
  Click on Exit to close the software program completely.

Edit

- **Characteristics**
  Use this function to add additional scan information (GPS coordinates, description, field length and width, soil type …) to your scan file. Please read

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section Adding Charactersitics to Scan Files to learn more details about it.

- **Modifiers**
Here you can select a specific Modifier function to optimize and improve your scan data. Please read section Modifiers to learn more details about all that functionallity.

- **Bookmark**
When clicking Bookmark, you can add additional information to the specific data that is marked with the 3D cursor. Please read section Bookmarks to learn more details about all that functionallity.

- **Next Bookmark**
Click on Next Bookmark to place the 3D cursor over the next Bookmark that is available in your Bookmark list.

View

- **Design**
Select one out of four pre-designed Themes to give your software a nice look.

- **Tablet Mode**
The Tablet Mode is useful for outdoor use, when importing new scan data in the field. Then all import dialogs will be scaled to fullscreen.

- **Sidebars**
You can either use these menu items to hide or unhide the right sidebars or simply use the toolbuttons of the right sidebar itself. More information is available in section Right Sidebar.

- **Render Views**
Depending on your scan image, you can switch between different views.

  - **Radargram 2D**
  This render view shows recorded data of ground penetrating radar in 2D view (radargram).

- o **Planar 3D**
  This render view shows default 3D Ground Scans.

- o **Volumetric 3D**
  This rendering view displays volumetric data from GPR and geoelectric instruments, as well as 3D Ground Scans.

- **Viewport**
  Use this function to switch between three pre-defined viewport designs (Full, Default and Quad).

- **Auto-Scale**
  If Auto-Scale is enabled, any changes in Z-Scaling (e.g. caused by soil type changes) will keep the scan image within the viewport window.

- **Perspective View**
  This menu item applies Perspective View to the current scan image.

- **Top View**
  This menu item applies Top View to the current scan image.

- **Side View**
  This menu item applies Side View to the current scan image.

- **Front View**
  This menu item applies Front View to the current scan image.

- **Reset**
  This menu item applies the Default View to the current scan image. Furthermore all transformation changes will be undone.

- **Scale**
  Here you can select a specific zoom level from a pre-defined list.

Extras

- **Language**
  Here you can select your preferred operating language that should be used for

the user interface of the Visualizer 3D Studio software.

- **Preferences**
  Click on Preferences to open up a settings dialog with many adjustable options as described in section Preferences and Settings.

- **Fullscreen**
  Use this function to toggle between standard and fullscreen.

Window

- Cascade

- Arrange Side by Side

- Arrange Stacked

- Close

Help

- **Documentation**

Click this item to open the integrated help.

- **Websites**

Here you find a list of additional internet pages that might be of your interest.

- **License Manager**

This function allows to add or remove different Software Keys. Please read section License Manager to get more information!

- **Check for Updates**

Use this function to manually check if a new software update is available. Usually the Visualizer 3D Studio software checks for updates automatically during startup (if not disabled).

- **System Information** Added in 3.0.13

This option shows a dialog with additional information about Windows and the graphics card. This could be helpful while contacting OKM support.

- **About Visualizer 3D Studio**

Click on this item to bring up the splashscreen with some information regarding the current software version.

Main Toolbar

The Main Toolbar is situated directly underneath the Main Menu and contains the most important functions of the Visualizer 3D Studio software.

Figure 1: Location of the Main Toolbar within the Graphical User Interface

The following table gives a short introduction of all available tool buttons.

	Import Click this button to import scan data from one of your OKM Detectors. Please read section Data Import to understand all details about importing data into Visualizer 3D Studio!
	Open Click this button to read files from your harddisk for further analysis in Visualizer 3D Studio.
	Save Click this button to store any changes, that you've made in your scan files, permanently on harddisk. Please read section Save Scan Files to learn more about all available save options!

Characteristics	
	Use this function to add additional scan information (GPS coordinates, description, field length and width, soil type, etc.) to your scan file. Please read section Scan Information / Charactersitics to learn more details about this topic!
Export as PDF Report	
	Use this function to export your current screen view and all applied scan information as well-arranged PDF report. This is a helpful tool to provide customers and clients clean documentation of scan projects. Please read section Export as PDF Report to learn more about all available export options!
Tablet Mode	
	The Tablet Mode is useful for outdoor use, when importing new scan data in the field. Then all import dialogs will be scaled to fullscreen.
Auto-Scale	
	If Auto-Scale is enabled, any changes in Z-Scaling (e.g. caused by soil type changes) will keep the scan image within the viewport window.
Viewport	
	Use this function to switch between 3 pre-defined viewport designs (Full, Default and Quad).
Preferences	
	Click on Preferences to open up a settings dialog with many adjustable options as described in section Preferences and Settings.
Documentation	
	Click this item to open the integrated context sensitive help (this documentation).

Left Sidebar

The Left Sidebar is situated directly on the left side of the Visualizer 3D Studio software as indicated in figure 1.

Figure 1: Location of the Left Sidebar within the Graphical User Interface

The following table gives a short introduction of all available tool buttons.

	Mouse Mode - Pick When this tool button is pushed down, the picking or selection mode is activated. From now on, any click - with the *Left Mouse Button (LMB)* - into the scan image will pick or select the specific scan data under the mouse cursor. It will set the 3D cursor or cross-hairs respectively.
	Mouse Mode - Rotate When this tool button is pushed down, the rotation mode is activated. Now you may hold down the LMB - while moving the mouse - to rotate the scan image around its axis.
	Mouse Mode - Move When this tool button is pushed down, the translation or move mode is activated. Now you may hold down the LMB - while moving the mouse - to move the scan image.

	Mouse Mode - Scale When this tool button is pushed down, the scale mode is activated. Now you may hold down the LMB - while moving the mouse - to scale up or down the scan image along its axis.
	Perspective View Click this tool button to change the rotation of the current scan image to a perspective view.
	Top View Click this tool button to change the rotation of the current scan image to top view (bird's-eye view).
	Side View Click this tool button to change the rotation of the current scan image to side view (right side of your scan field is in view).
	Front View Click this tool button to change the rotation of the current scan image to front view (starting line of your scan field is in view).
	Reset View / Default View Click this tool button to reset all transformations and bring back the default view.

Right Sidebar

The Right Sidebar is situated directly on the right side of the Visualizer 3D Studio software as indicated in figure 1.

Figure 1: Location of the Right Sidebar within the Graphical User Interface

The following table gives a short introduction of all available tool buttons.

	Soil Types This tool button toggles the visibility of the *Soil Type Panel*, which can be used to select a proper soil type for the scan image. Read more in section Soil Types!
	Scan Information This tool button toggles the visibility of the *Scan Information Panel*, which provides additional information regarding scan field dimensions, GPS coordinates and scan values of your current scan image. Read more in section Scan Information / Characteristics!
	Bookmarks This tool button toggles the visibility of the *Bookmark Panel*, which can be used to create and view individual bookmarks and notes. Read more in section Bookmarks!

Modifiers This tool button toggles the visibility of the *Modifier Panel*, which provides additional functions to optimize and improve 3D scans. Read more in section Modifiers!	
Visualization This tool button toggles the visibility of the *Visualization Panel*, which can be used to adjust several settings regarding graphical display, colors and textures of scan images. Read more in section Visualization!	
Transformations This tool button toggles the visibility of the *Transformation Panel*, which provides easy access to 3D transformations like rotate, move and scale. Read more in section Transformations / Views!	

Shortcut Overview

Visualizer 3D Studio has many shortcuts that simplifies the operation of the professional analysis software. Here is a complete list of all available key combinations.

Shortcut	Description
Ctrl + I	Start a new Data Import
Ctrl + O	Open new files
Ctrl + P	Export active scan file as PDF
F9	Open Characteristics dialog to add specific scan information
Ctrl + B	Create a new bookmark at the 3D cursor
Ctrl + Alt + B	Set 3D cursor to next available bookmark
F1	Open the Documentation / Help
F5	Set Perspective View
F6	Set Top View
F7	Set Side View
F8	Set Front View
F11	Toggle fullscreen mode
Ctrl + R	Set all transformations back to default
LMB (Left Mouse Button)	Rotate scan image
LMB + Ctrl	Move scan image
LMB + Alt	Set 3D cursor
← (Left Arrow)	Move crosshairs left (next scan line)
↑ (Up Arrow)	Move crosshairs forward (next impulse)
→ (Right Arrow)	Move crosshairs right (previous scan line)
↓ (Down Arrow)	Move crosshairs backward (previous impulse)

Shortcut	Description
Page Up (Pg Up)	Move crosshairs up (decrease depth)
Page Down (Pg Dn)	Move crosshairs down (increase depth)

Preferences and Settings

There are several settings in Visualizer 3D Studio that can be adjusted individually. Click on ⚙ in the Main Toolbar or alternatively on Extras › Preferences in the Main Menu to bring up the Preferences Dialog as shown in figure 1.
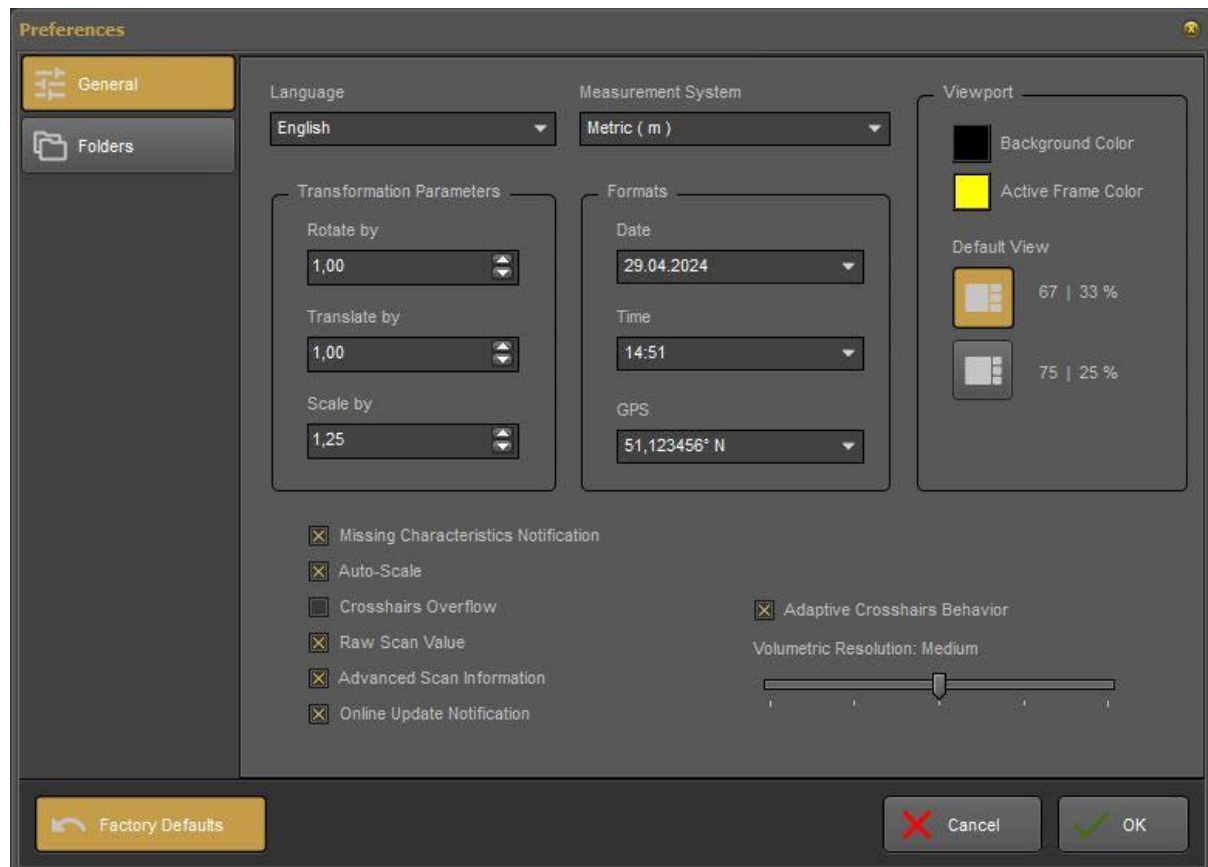

Figure 1: Preferences Dialog to adjust settings

The Preferences Dialog is made up of 2 basic categories:

- **General**

In this category you will find general settings like language, formats, viewport and scan value settings. Read more in section General Settings!

- **Folders**

In this category you can set all default folders for opening, saving, exporting and importing files. Read more in section Folders Settings!

Click *OK* to confirm your changes or *Cancel* to discard any of your changes.

If you click the button ***Factory Defaults***, you can reset all your changes back to factory settings.

Preferences: General Settings

In figure 1 the Preferences Dialog is showing all settings of the category **General**, that can be adjusted in Visualizer 3D Studio.
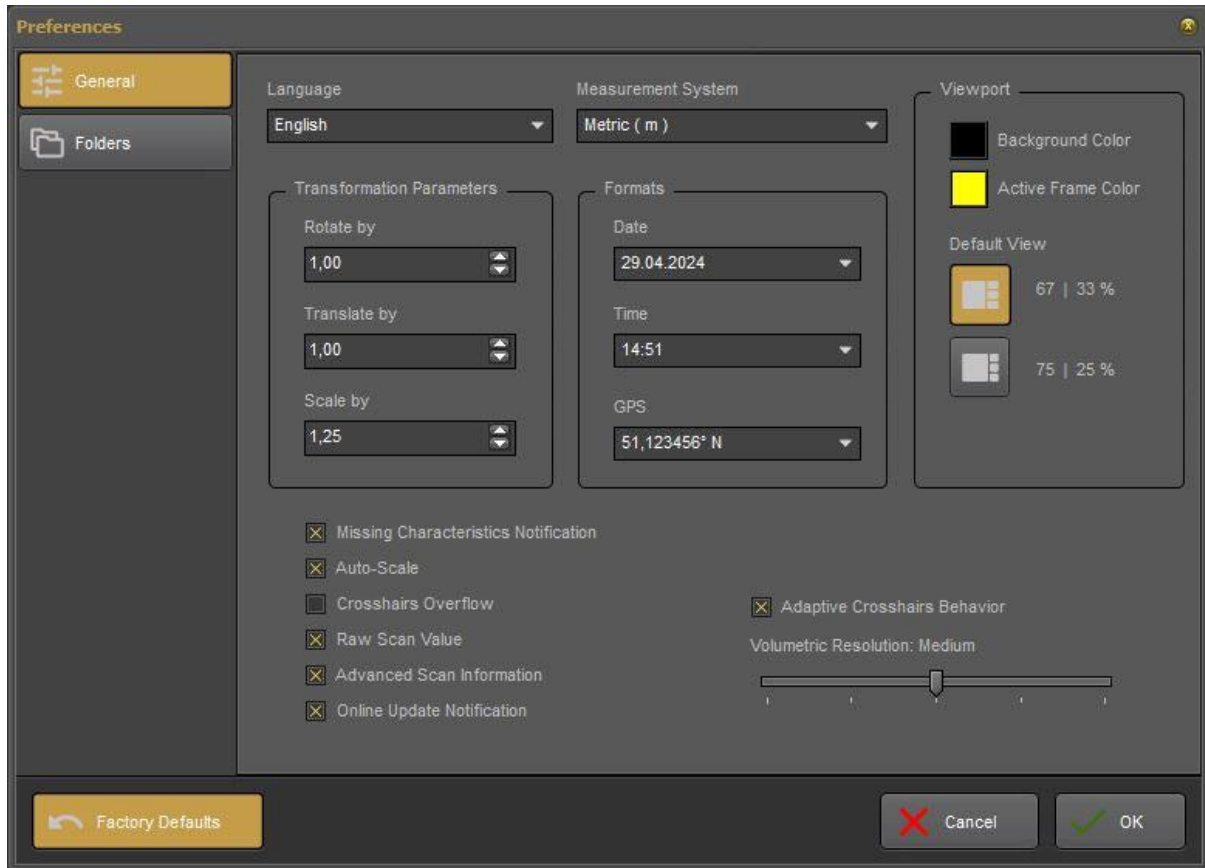

Figure 1: General Settings of the Preferences dialog

Following settings can be adjusted:

- **Language**
  Select your preferred language, that is used to label all elements of the user interface. Simply pick one from the list of supported languages.

- **Measurement System**
  Select your correct measurement system (metric or imperial). Depending on your selection all units will be converted into meters or feet.

- **Transformation Parameters**
  These parameters are factors for the mouse operations and influence the speed and step width of the corresponding operation.

- **Formats**
  Adjust the formats of date, time and GPS according to your personal preferences.

- **Viewport**
  Here you configure some options according to the viewport where the scan images are displayed.

    - *Background Color*
      Click on the colored area to select another background color. Specially outdoors it could be useful to set a brighter color for better visibility.

    - *Active Frame Color*
      Click on the colored area to select another frame color that highlights the selected viewport. Depending on the brightness or darkness of the environment you might change this color for better visibility.

    - *Default View*
      When the Default View is used to view the scan images you may adjust the width of the 3 smaller views on the right side. Therefor you have 2 options: *67 | 33 %* or *75 | 25 %*. The first number indicates the width of the main viewport in percent and the second number is the width of the 3 small viewports.

- **Missing Characteristics Notification**
  If this option is checked, you will get notified about missing characteristics such as field length, field width or soil type when closing a scan image. Thus you can add missing information and store it along your actual scan data.

- **Auto-Scale**
  If this option is checked, any changes in Z-Scaling (e.g. caused by soil type changes) will keep the scan image within the viewport window.

- **Crosshairs Overflow**
  If this option is checked, the crosshairs will pass the borders when moved by the cursor keys. Let's assume the crosshairs are located at the first measure point. If

the *Crosshairs Overflow* option is NOT checked, you can NOT move the crosshairs back or right, otherwise it would be possible and the crosshairs would immediately jump to the opposite side of the scan image.

- **Raw Scan Value**
  If this option is checked, you will see the raw scan data value as measured by the OKM Detector in the Scan Information Panel. This is a useful option for OKM's Support Team.

- **Advanced Scan Information**
  If this option is checked, you will see impulse data as well as measurement system data in the Scan Information Panel.

- **Online Update Notification**
  If this option is checked, Visualizer 3D Studio will automatically check for new updates every time the program starts (internet access required).

- **Adaptive Crosshairs Behaviour**
  If this option is checked, Visualizer 3D Studio will adapt the arrow keys according to the selected Render View. This makes it much more easy to navigate the crosshairs.

- **Volumetric Resolution**
  The Volumetric render view requires additional GPU computational power, which may lead to a slowdown of the user's PC. To optimize performance on slower PCs, it is advisable to decrease the Volumetric resolution. Conversely, for enhanced quality, increasing the resolution is recommended.

Click the *OK* button to confirm your changes, otherwise click *Cancel* to discard all changes!

Preferences: Folder Settings

In figure 1 the Preferences Dialog is showing all settings of the category **Folders**, that can be adjusted in Visualizer 3D Studio.
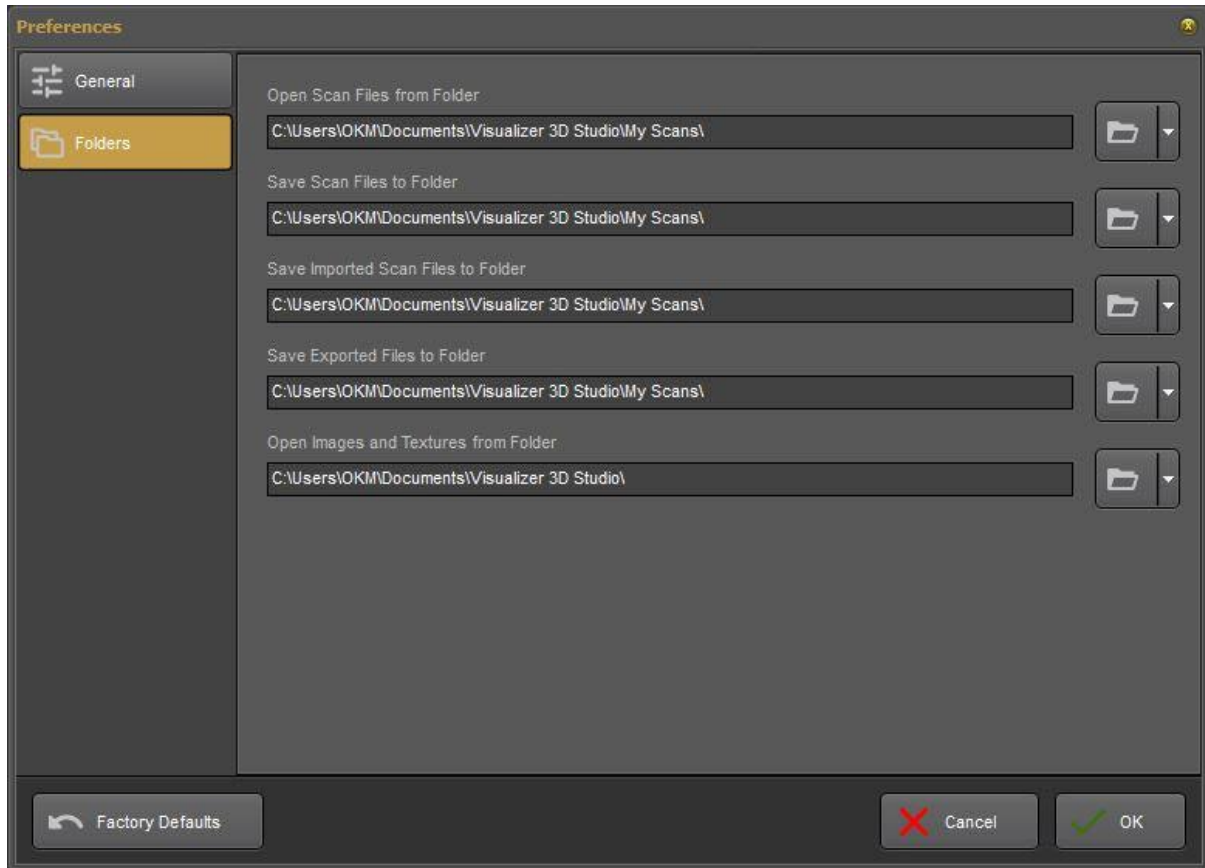

Figure 1: Folder Settings of the Preferences Dialog

Following default folder locations can be adjusted:

- **Open Scan Files**

This folder defines the default location that is used when you open scan files from your hard disk (e.g. by clicking the ⬚ button in the Main Toolbar or File › Open via Main Menu).

- **Save Scan Files**

This folder defines the default location that is used when you save scan files to your hard disk (e.g. by clicking the ⬚ button in the Main Toolbar or File › Save via Main Menu).

- **Save Imported Scan Files**

This folder defines the default location that is used to save imported scan files from OKM Detectors, when importing from any USB device (e.g. eXp 4500, eXp 4000, etc.).

- **Save Exported Files**

This folder defines the default location that is used to store exports like Images and PDF

Reports (e.g. by clicking the button in the Main Toolbar or File › Export via Main Menu).

- **Open Images and Textures**

This folder defines the default location that is used when you select textures and images (e.g. for Soil Type definitions or Scan Field Overlays).

Importing Scan Data from Detector

Before any analysis can be processed, you have to import your scan data from your OKM Metal Detector or 3D Ground Scanner into Visualizer 3D Studio.

The import process starts by clicking in the Main Toolbar or alternatively via Main Menu (File › Import). Then the Import Wizard appears which guides you through the rest of the import process.

This import process is dependent from your specific OKM Detector. Please refer to your device manual concerning any specific details.

Select Detector

First you have to select the proper OKM Detector from the list of all detectors. It might be possible that only your specific detector is available (depends on Visualizer 3D Studio license).

Figure 1: Import Dialog to select OKM Detector

When the detector has been selected, click on "Next" to proceed with the next step of the import process.

Depending on the type of detector the import process may vary according to its transfer method:

- Wireless via Bluetooth

- Wired via USB Cable

Wireless Data Import via Bluetooth

After selecting the proper OKM Detector as described in section Importing Scan Data from Detector, several additional options may be selected according to your detection device.

Select Interface

At the very beginning of the whole import process you have to select the computer interface at which your OKM Detector is connected.

Figure 1: Import dialog to select connected interface

As shown in figure 1, all available interfaces are listed. Please select the correct one and click "Next" to proceed.

Select Operating Mode

Selecting the right operating mode depends on your OKM Detector on one hand as well as the preferred task to fullfil on the other.
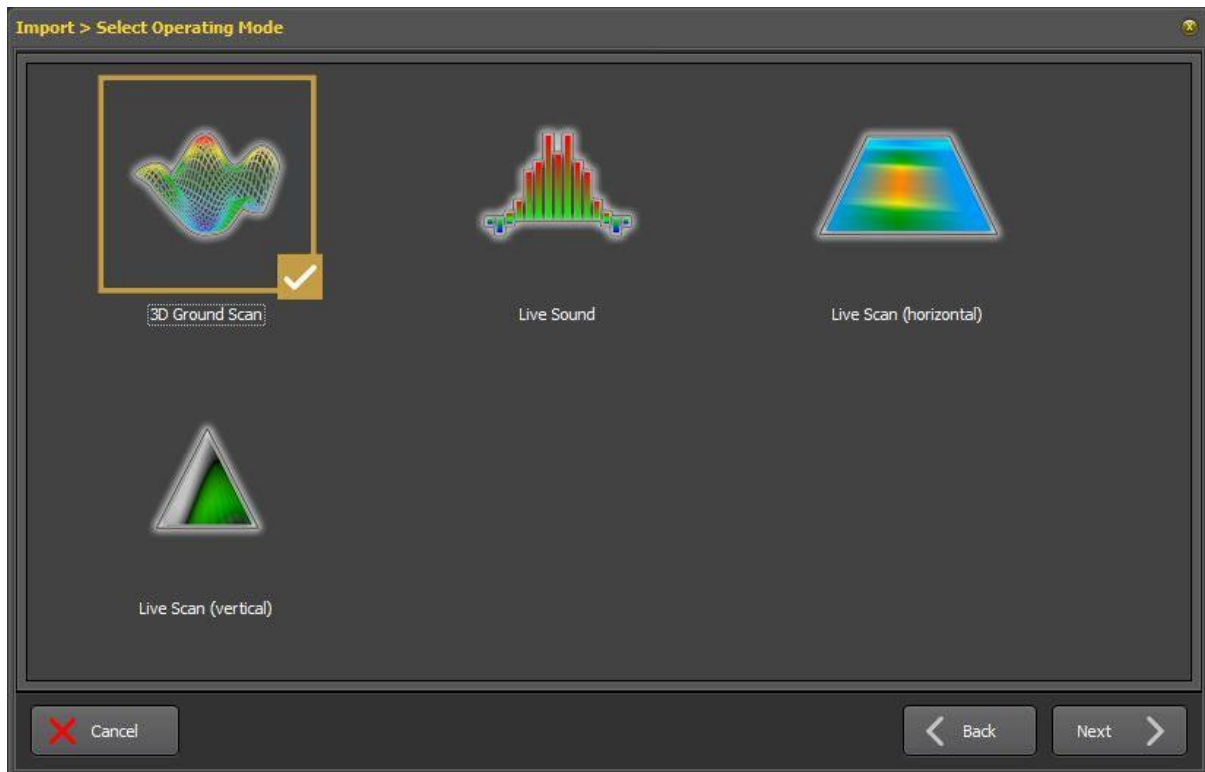
Figure 2: Import dialog to select operating mode

After selecting one of the operating modes you have to click "Next" or "OK", depending on your selection and OKM Detector.
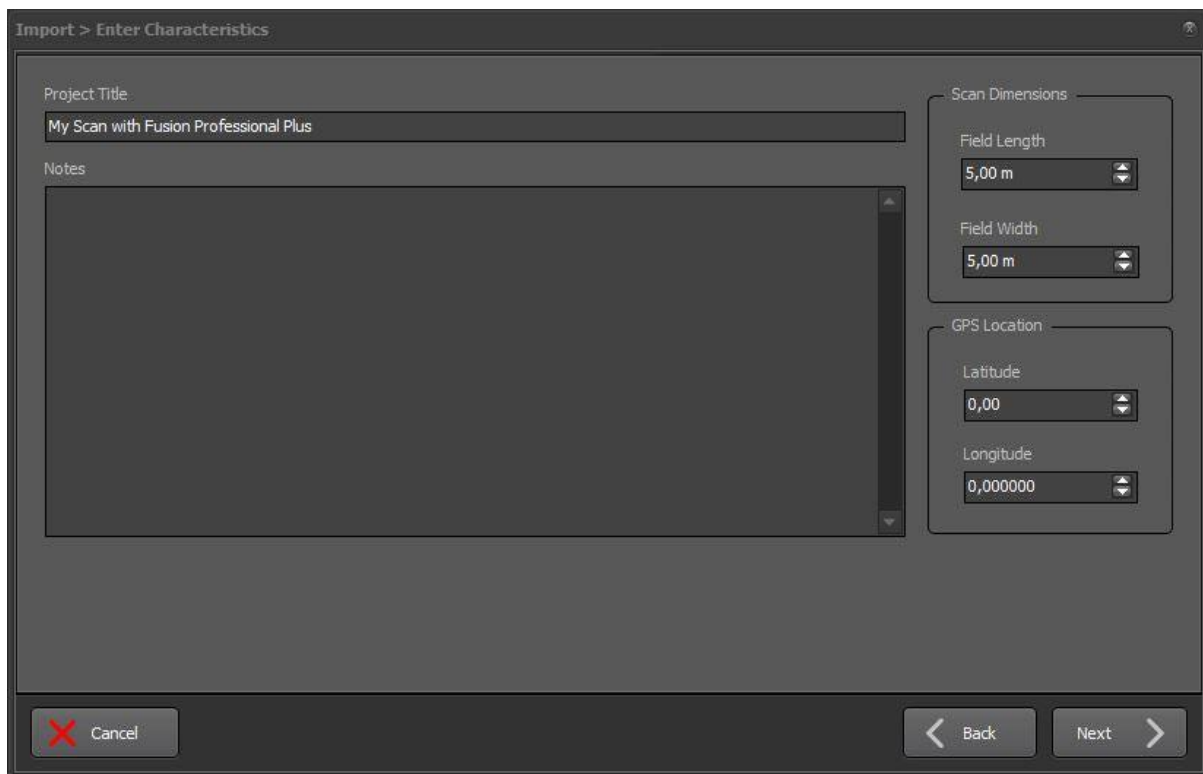
Please refer to your user manual of the OKM Detector to learn about the specific details of the available operating modes!

Enter Project Information

In this step you have to enter important as well as additional scan information, that might be necessary for later analysis.

This could be anything like

- GPS data
- Description of environment
- Length and width of the scan field
- Device dependent information (e.g. probe)

Figure 3: Import dialog to enter specific scan information

As seen in figure 3, you have to enter at least a proper project title as well as the length and width of your scan area before clicking "Next".

Select Soil Type

One important aspect in any scan analysis is depth measurement. Due to the fact that the correct depth depends on many soil factors, you have to select the most matching soil type to get depth indications as close as possible.
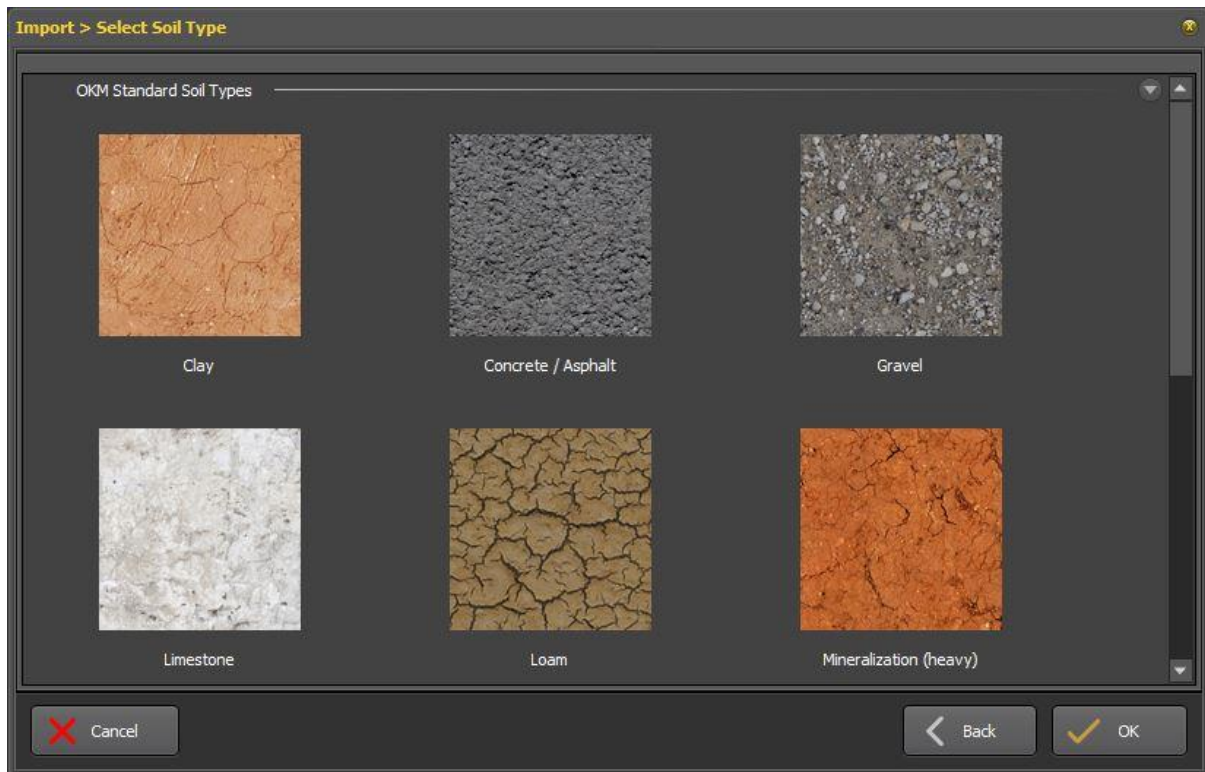
Figure 4: Import dialog to select a soil type

Figure 4 shows the dialog that offers you many pre-defined or individual soil types to choose from. Pick the soil type that is closest to your soil conditions before clicking "OK" to activate the data import.

Please read the corresponding user manual of your OKM Detector to initiate the data transfer of your detection device!

Wired Data Import via USB Cable

After selecting the proper OKM Detector as described in section Importing Scan Data from Detector, several additional options may be selected according to your detection device.

Prepare Data Transfer

At this moment your detector needs to be plugged in to your computer. Please make sure it has been connected via USB cable and that all USB drivers has been installed correctly.

In case there is no Serial Number displayed, check if your OKM Detector has been plugged in properly. Also make sure it is powered on and click to scan for connected devices.

Furthermore you have to select the Destination Folder, where all stored scan files will be transferred to.
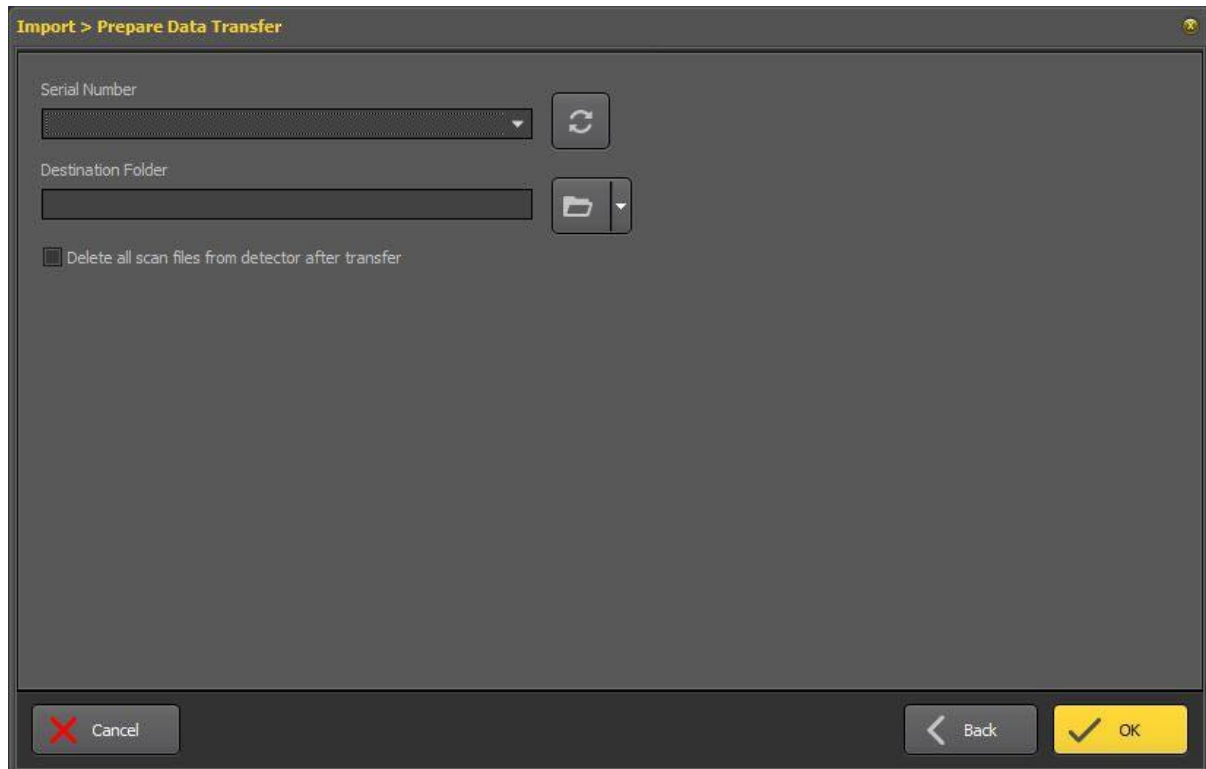

Figure 1: Import Dialog to adjust Serial Number and Destination Folder

Additionally you may check **Delete all scan files from detector after transfer** to remove all the files from the internal memory of your connected device after the files has been transferred.

After all information has been set up, click on "OK" to start importing all stored files from your OKM Detector.

Analyzing and Editing 3D Scan Images

Before conducting any geophysical measurement you have to know what kind of objects or cavities you are looking for and if the area you choose is suitable for this procedure. Measuring without a plan will not give you the results you are expecting.

Prior to performing a scan, ensure that you have chosen a suitable site where you believe an item to be. Blindly searching an area may produce undesired results. For this reason, please note the following instructions:

- What are you looking for (graves, tunnels, buried objects, …)? If you are looking for big objects you can enlarge your distance between the impulses (measuring points), for small objects use smaller distances.

- Inform yourself about the area you choose for measurement. Is it useful to search at this place? Are there historical indications, which confirm your speculations? What type of soil is present at this area? Are there good conditions? Is correct data recording possible?

- Your first measurement in an unknown area has to be large enough to get representative scan values (e.g. 40 impulses, 20 scan lines).

- What is the expected shape of the object you are going to detect? If you are looking for an angular metal box, the identified object in your scan image should have a form according to your expectations.

- To get precise scan values concerning the depth measurement, the object has to be in the center of the scan image, which means it has to be surrounded by normal reference values (normal ground). If the object is at the side of the scan image and not totally visible a correct depth measurement is not possible.

- If possible there should be only one single object in your scan image. Otherwise, this will influence the correctness of the depth measurement.

- You should do at least two control scans to make sure your results are valid. So you can also recognize and isolate mineralized ground.

After conducting the geophysical measurement according to the previous hints and our Ground Scan Guide, the recorded scan data needs to be analyzed. In the following sections all necessary information concerning 3D scan analysis will be provided.

Proper data analysis is necessary when working with any geophysical instrument. Properly configuring the software as well as taking in all necessary factors of the terrain is important to the analysis of the given information.

Looking at the graphic for the first time

Think about what it is that you are looking for. Are you looking for a tunnel? Did you do the right kind of scan to detect a tunnel?

When you are looking for a metal chest or steel box, the first sign on the scan should be a red or orange area that is isolated. If you are looking for a tunnel the scan must be much larger and you will be looking for a blue area, and these color differences are usually very strong from one to the other. Generally speaking, one needs to look at all the colors and also the shapes. Because the unit does work with the naturally occurring magnetic fields, the poles may actually reverse so red is blue and blue is red.

The final result from the given colors if it will be red or blue may lie on the following factors:

- Soil type (for example Loam, Sand, Rock, Concrete, …)

- Scanning an area where there is a lot of debris (for example nails, trash, aluminum cans, construction debris, …)

Color Definition

Under optimum conditions the colors can quickly assist you in finding and identifying the sub-surface object as well as what it is made of. There are occasions when the soil may have be more mineralized than in other areas. Normally speaking the colors mean:

- Blue colors normally are associated with voids, tunnels, cavities, water, disturbed earth and non-metallic items.

- Green colors typically refer to undisturbed soil. Soil that is "normal" so to say for it does not have extreme high amount of mineralized contents.

- Yellow and orange colors typically refer to areas where there are higher amounts of mineralized soil or can possibly be deeper metal objects. Many mixes of concrete also show up in the yellow and orange areas, especially that which is reinforced.

- Red colors are typically associated with metallic sub-surface targets. The red coloration means that a positive signal was received. On occasion areas with highly mineralized soil will also show many areas with red coloration.

As a note, an important element that can be quickly realized via the colors are metal objects made from iron, cobalt and nickel for they are very magnetic. These metals almost always will have a strong positive (red) pole and a strong negative (blue) pole.

Mineralized soil is also an important factor to take into consideration. We mentioned earlier in this manual about making control scans. When you scan an area for example three time over the same starting and stopping points, remember this basic rule, "Real Targets Don't Move!". If in your second and third control scans you realize that nothing is

staying in the same place, most likely there is nothing there and you are looking at a patch of mineralized soil.
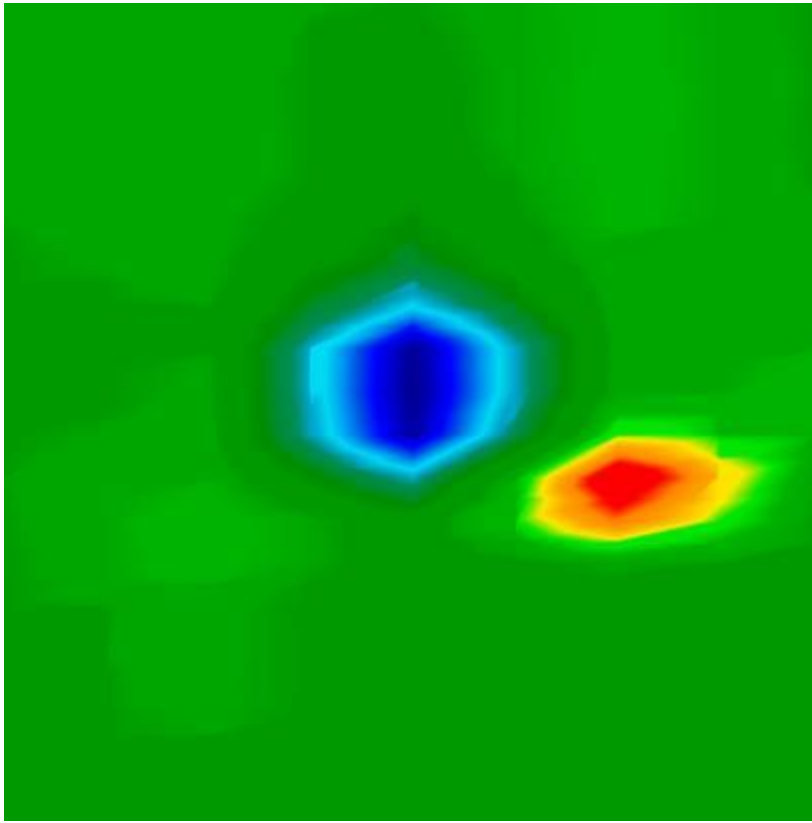

Figure 1: Ferromagnatic signature in OKM Visualizer 3D Studio

In figure 1, a typical ferromagnetic signature is shown. It is not difficult to know the exact characteristics. The red and the blue directly next to one another is the key. Normally the colors will have approximately the same size and shape.

Recognizing the background color

When viewing a scan, try to see which color is dominant throughout. This is your background color that defines your "normal" soil. In standard soils, it will typically be green with some lighter and darker shades. There are conditions where the color may be completely different like blue. This may happen in different soil conditions that have stronger mineralized soils.

Search for anomalies

After you have established what the background color is, now it is time to look for the anomalies. If you see a distinct color difference this may be a possible anomaly. It will be very recognizable from the background whereas when rotating and viewing the suspect will be a large difference.

You can also view the scan from the side. At this point you will see that the difference is so great that you will have to zoom out in order to see the entire scan. This is a time

when a control scan needs to be performed to ensure that there weren't any errors made in the first scan. As is often stated, it is important to remember that real targets do not move.

Now there is also the possibility that you have a scan that has a lot of different colors all at the same time. This usually occurs when one is looking at completely normal soil without any significant properties.

Void Interferences

There are outside forces which can cause interference to your signal. For example some of these interferences are caused by being too close to a radio station, bad weather including lightning, being too close to high powered electrical conduits, ground radar from an airport, high powered speakers and magnets to name a few. These errors you can see in your scan results. Normally these signal interferences can be quickly identified by a single strong spike within the scan often turning the entire scan a dark orange or red color. The signal can be corrected within the Visualizer 3D Studio software.

Position of an anomaly within a graphic

Should you find an anomaly, it is important to situate the anomaly within the middle of the scan and not on an edge. Also you must be able to differentiate it from the background color. This way you will be able to identify the exact location of the target.

If you find an anomaly only on the edge of a scan, change the size of your scan so that the area scanned is including the suspect area. Only when a target is directly in the center of a scan, can a proper analysis be made.

Metal object or mineralisation

At the very beginning it is not always easy to find out the difference between metallic objects and mineralization. Generally, metals are represented in reddish colors, but mineralized deposits in the ground can also include red color signals.

When you come across an area where you see darker oranges and reds in the scan, it is important to determine if it is indeed a metallic object or if the ground is highly mineralized. Naturally soils that are highly mineralized will quickly be known for all the scans in the area will show nearly the same.

For the beginner this can be very frustrating to decipher the difference. And there are even areas of soil which have high concentrations of iron that will show red. This is where the control scans are imperative, take care as to all of the details during a control scan to ensure that it is performed properly.

Here are some important notes how to distinguish a real object from a mineralization (please take note that the following information are based on the usage of the standard color scheme "Red-Green-Blue"):

- **Form or shape**
  Does the object have a recognizable shape (for example right angle edges, circle, etc...)? This is one of the biggest key factors to take into consideration. Can you repeat the scan with the same results? Is the anomaly more than on one point? When doing the analysis, is there more than one measure point to the object. If when going over the target with the cross hairs does the target only take one measure point?

- **Color**
  Are there many reds, oranges and yellows in the scan? In the event there are, most likely that is mineralized soil and there is nothing there. Upon performing control scans, you will realize that the reds will move.

- **Control Scans**
  Upon performing additional scans over a given area and the target does not move and the shape does not radically change, then you may be looking at a real target. When conducting a control scan be sure that your entire work area is clear from any unwanted debris. Using the "Magnetometer" now is a wise choice to ensure that there is not any unwanted debris. Also it is advisable when doing the scans to use the "Parallel" mode to lower the chance of error.

Please read section Modifiers to get more information about how to detect mineralization with the modifier functions!

Additional tools for Data Analysis in Visualizer 3D Studio

The Right Sidebar of Visualizer 3D Studio offers various options that help to analyze and optimize your scan images.

	Soil Types Applying the proper soil type is one of the essential keys to determine the correct depth of potential objects.
	Scan Information / Characteristics Another important step is to apply information regarding the scan field itself (e.g. field length and width).
	Bookmarks It might be helpful to set markers or bookmarks at special scan points to add important notes (e.g. for any PDF Report generation).

Modifiers	Special modifiers or mathematical algorithms can by applied to optimize and improve the collected scan data.
Visualization	Besides mathematical improvements that are changing the scan data directly, there are many options to improve the visual representation of the scan image without changing scan data.
Transformations / Views	Many transformation functions can be used to move, scale or rotate the scan image to get the best view of all the scan data.

3D Analysis: Soil Types

Assigning the correct soil type is essential for any depth measurement. The provided soil types in Visualizer 3D Studio are defined with special soil characteristics like dielectric constant, relative permeability, mineralization and humidity. All those parameters are necessary to calculate the approximate depth of potential targets within the scan images.

Click the [icon] button on the Right Sidebar to toggle the Soil Type Panel that is shown in figure 1.
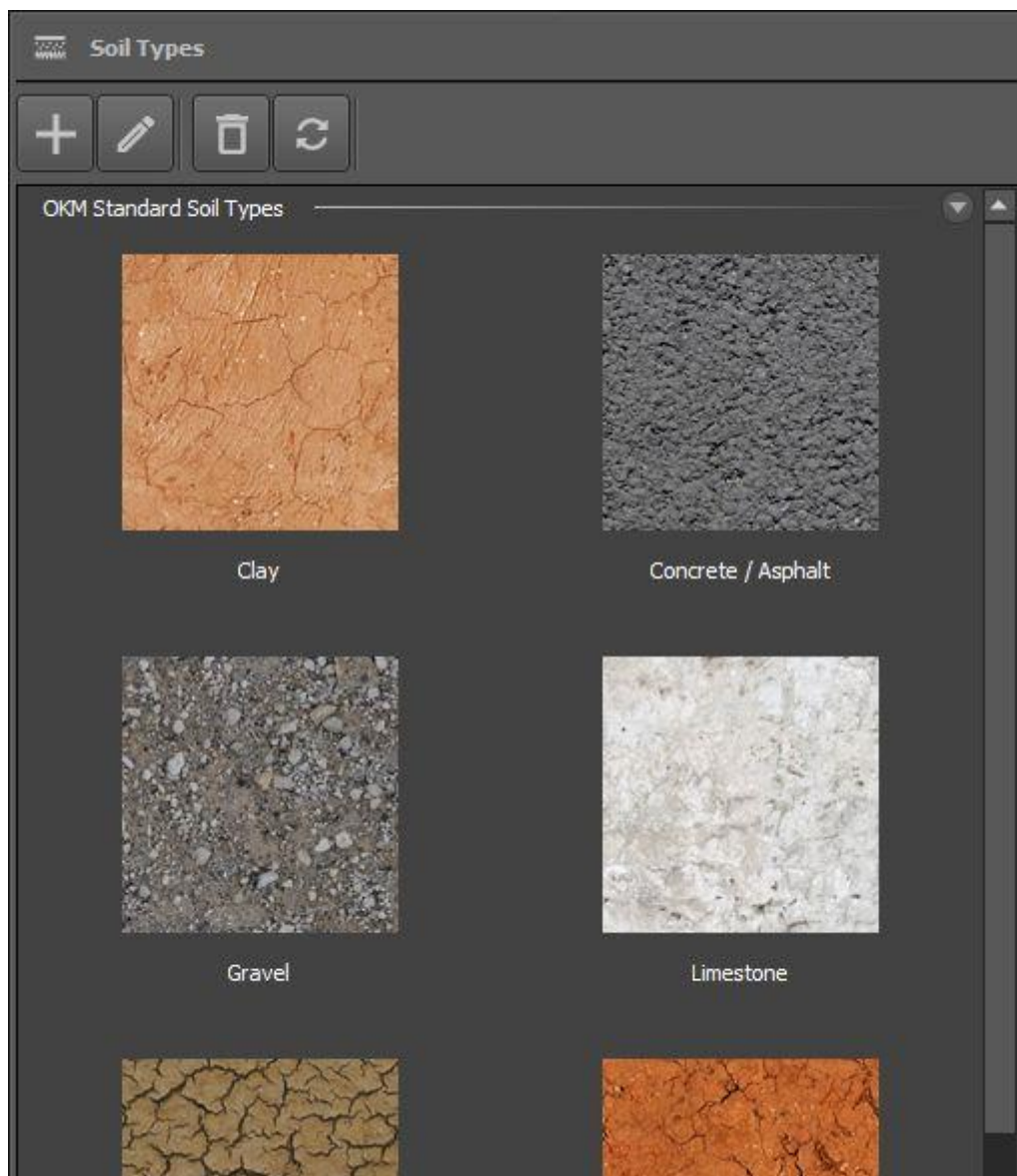
Figure 1: Soil Type Panel

On top of the panel is a toolbar and right beneath is the list of all soil types (the soil type library). There are different categories of soil types:

- **OKM Standard Soil Types**
  These soil types are OKM specific soil types that has been introduced with the first version of Visualizer 3D.

- **USDA Soil Types (only Professional Edition)**
  This soil type taxonomy has been developed by the United States Department of Agriculture and the National Cooperative Soil Survey.

- **OKM GPR Soil Types (only Professional Edition)**
  These soil types are based on the OKM Gepard GPR soil types (optimized for ground penetrating radar).

- **User Defined Soil Types (only Professional Edition)**
  This is the place where your own and individual soil types are located. Read section Adding and editing soil types to learn how to create your very own soil type definition!

- **Temporary Soil Types**
  This category is only used if you open scan images that contain soil types that are not defined in your own library.
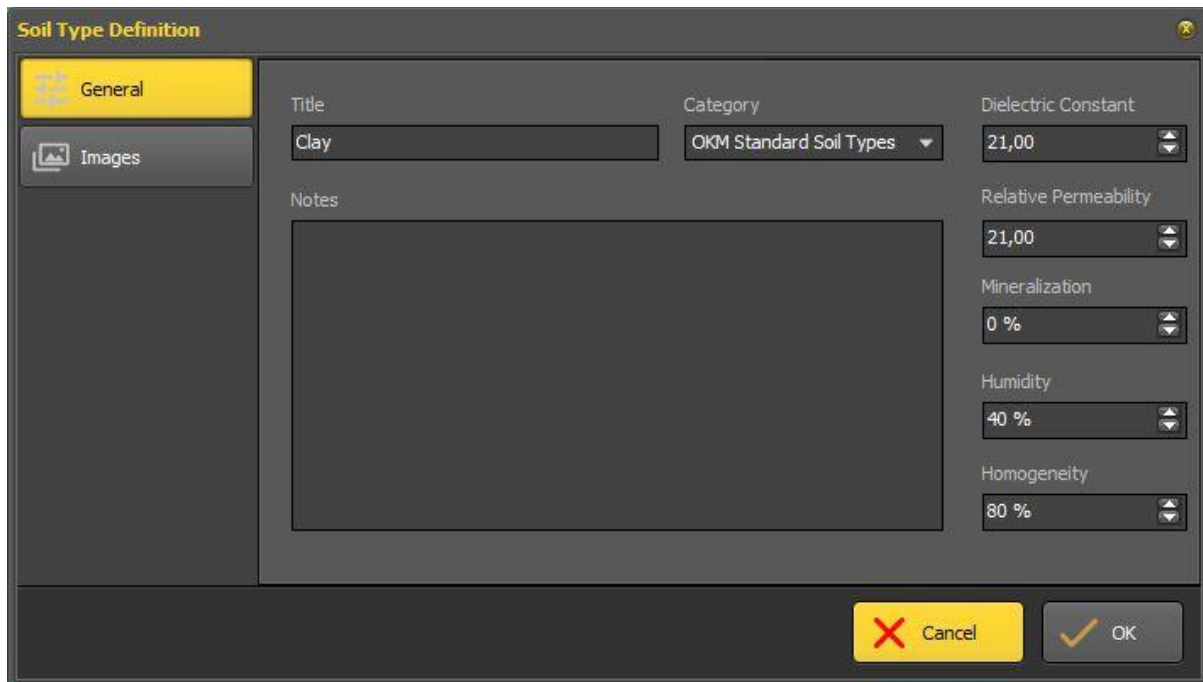
The toolbar contains the following buttons:

	Add Soil Type (only Professional Edition) Push this button to add a new soil type into the library. Read section Adding and editing soil types for more details!
	Edit Soil Type (only Professional Edition) Push this button to change the parameters of the selected soil type. Read section Adding and editing soil types for more details!
	Delete Soil Type (only Professional Edition) Push this button to delete the selected soil type from your library.
	Refresh List Push this button to reload the list of soil types in case it got out of sync.

Adding and editing soil types

All users of the Professional Edition of Visualizer 3D Studio have the possibility to add and edit own soil types with very specific and individual soil characteristics. After

clicking the ⊞ button or the ✎ button, the Soil Type Dialog from figure 2 will appear on screen.

Figure 2: Soil Type Dialog - General

In the first step you must define all the important general soil parameters:

- **Title**
  Here you can enter the name of the soil type you are going to define.

- **Category**
  You can only add new soil types into the category *User Defined Soil Types*.

- **Notes**
  Use this text field to enter any additional information that might be of interest regarding the soil type.

- **Dielectric Constant**
  The Dielectric Constant is a measure of the conductivity of electric fields. The higher the value, the lower the penetration depth. This is particularly relevant for scans with the Ground Penetrating Radar.

- **Relative Permeability**
  In electromagnetism, permeability is the measure of magnetization that a

material obtains in response to an applied magnetic field.

- **Mineralization**
  This value defines the mineralization (the metal content) of the underground in percent. Higher values will reduce the depth indication.

- **Humidity**
  This value defines the humidity of the underground in percent. Higher values will reduce the depth indication.

- **Homogeneity**
  This value defines the regularity and compactness of the underground. Higher values will increase the depth indication.

After defining the general information, you may also assign textures to your soil type. In figure 3 the corresponding settings of the Soil Type Dialog are shown.
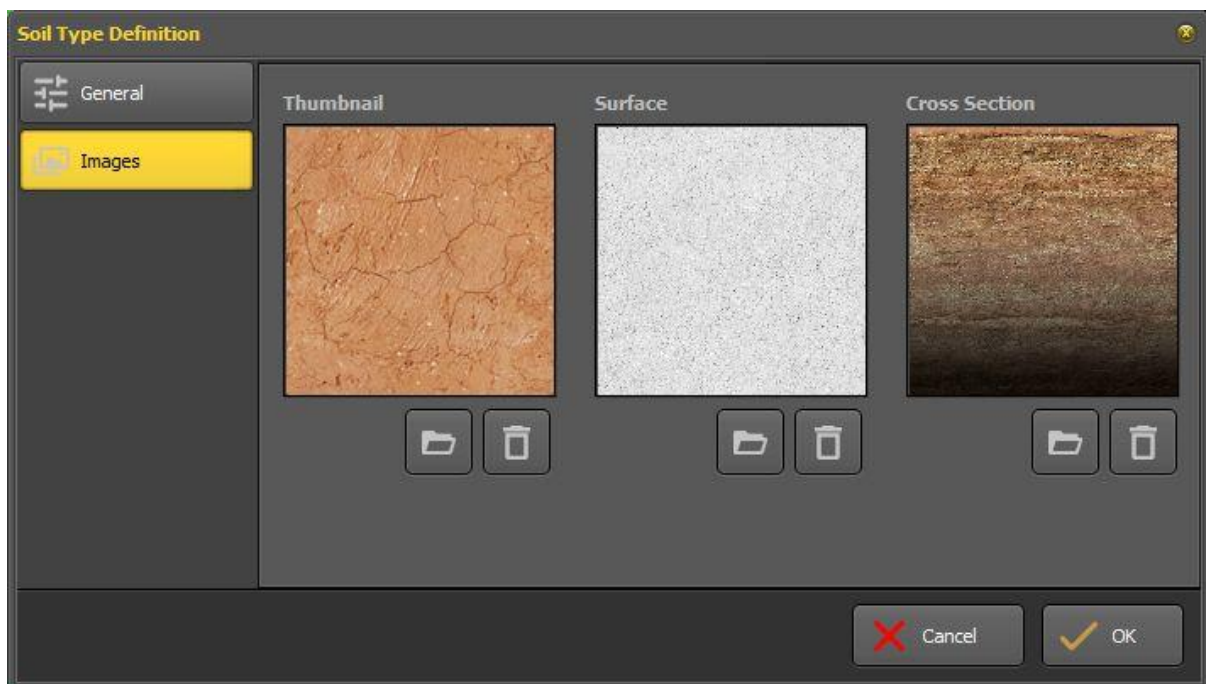
Figure 3: Soil Type Dialog - Images

There are three textures that can be assigned to your individual soil type:

- **Thumbnail (A)**
  This texture is used to represent the soil type in the soil type library.

- **Surface (B)**
  This texture is used on top of each scan image to represent the ground surface

and its structure.

- **Cross Section (C)**
  This texture is used to represent the cross section (depth level) of the scan image.

In figure 4 all the mentioned textures are indicated once more to understand the final place where the textures are applied to.
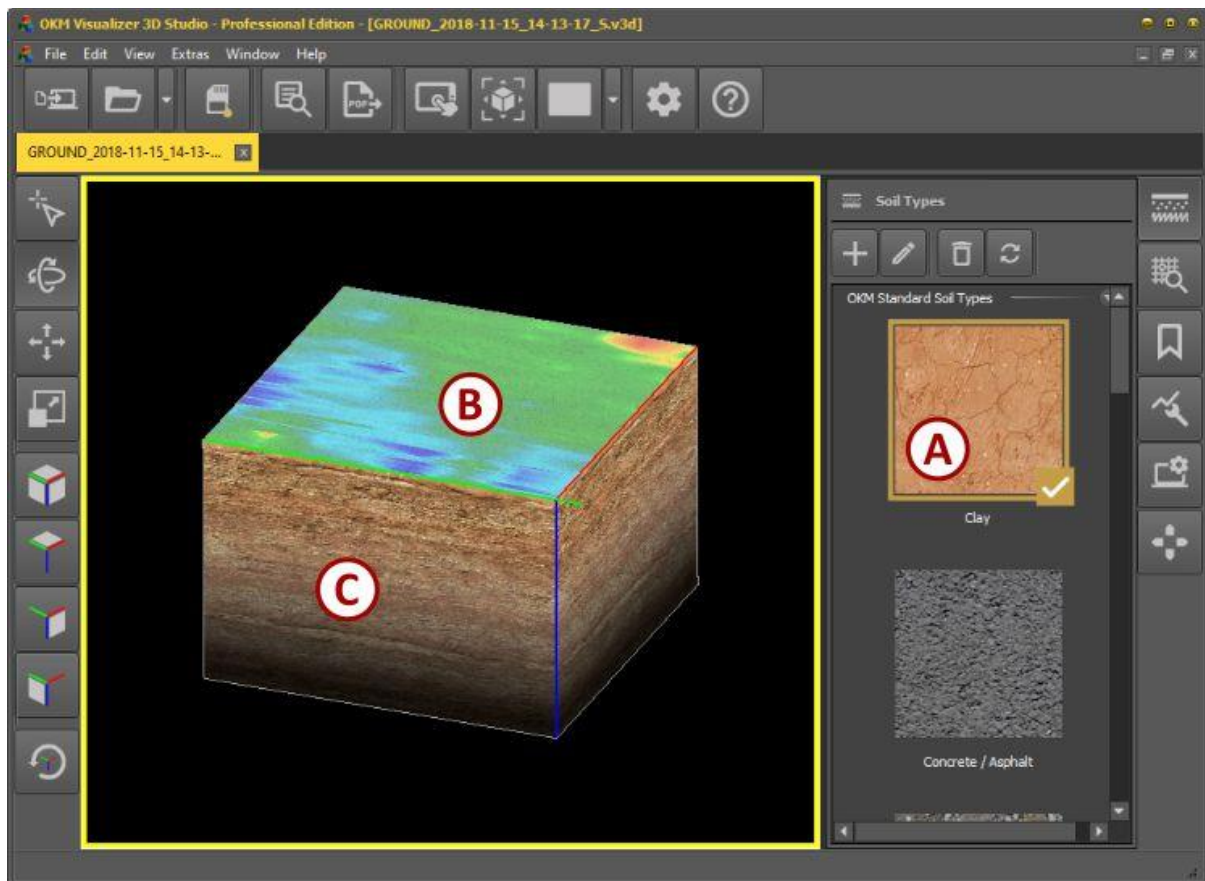
Figure 4: Soil Type Textures

The more precise your selected soil type matches your scan area, the more accurate your depth measurement will be. All the standard soil types that are defined in Visualizer 3D Studio representing the general average of the worlds soil types. If you want to make more accurate depth measurements you must define individual soil types.

Without the proper soil type settings the depth measurement will be inaccurately.

3D Analysis: Scan Information / Characteristics

The Scan Information Panel that is located on the Right Sidebar provides general information regarding the scan image (e.g. date and time, field length and width) as well as information of each scan value (e.g. position, depth, GPS coordinates).

Figure 1 shows the Scan Information Panel with its toolbar and its three categories of information.
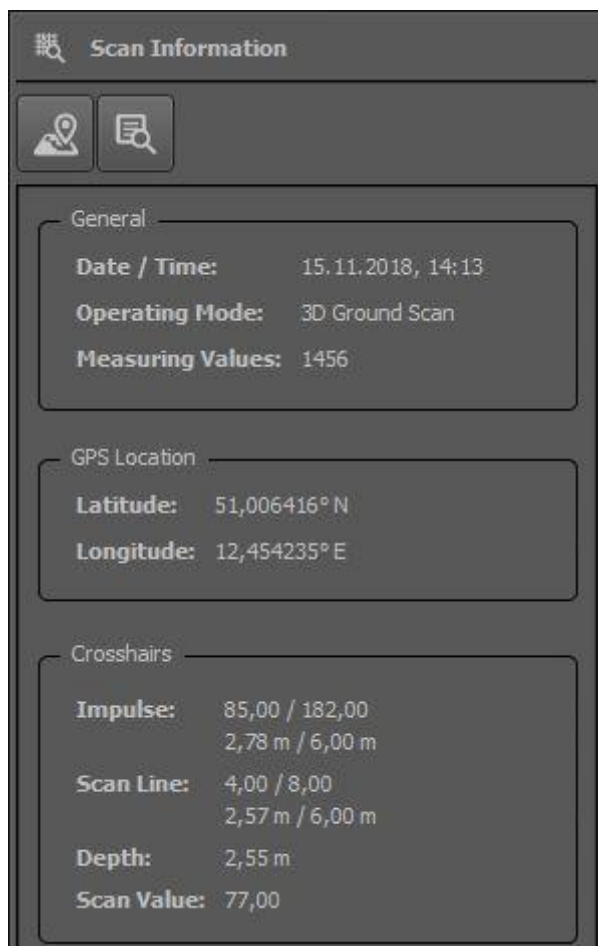
Figure 1: Scan Information Panel

The toolbar of this panel contains following buttons:

	Open Google Maps Push this button to open Google Maps in your webbrowser to indicate the location of the current measurement. This button is only enabled if valid GPS coordinates are attached to the current measurement.
	Edit Characteristics Push this button to edit the characteristics of the current scan image (e.g. field

> length and width, project title and notes, soil type, etc.). Read subsection Editing Characteristics for further details!

The information categories that are displayed in the Scan Information Panel are:

- **General**
  This category contains information about the date and time when the scan was taken as well as the operating mode that has been used to conduct the current measurement. Additionally it provides the total number of scan values.

- **GPS Location**
  This category provides location information like Longitude and Latitude of the current scan value (the value at the crosshairs).

- **Crosshairs**
  The last category provides all information regarding position and depth of each scan value.

  - *Impulse* … indicates the distance to the starting point (red axis).

  - *Scan Line* … indicates the distance to the right side of the scan area (green axis).

  - *Depth* … indicates the depth of the selected scan value (blue axis). The depth value depends on the selected soil type.

  - *Scan Value* … indicates the raw value of the measured data. This value is mostly interesting for support issues (and must be enabled in the General Preferences).

Editing Characteristics

The basis of each 3D scan analysis is information. You must provide as much information regarding the measurement as possible. Therefor click either in the Main Toolbar or the toolbar of the Scan Information Panel. The dialog from figure 2 will appear on screen.

Figure 2: Characteristics Dialog - General

General

In the *General* category you can enter following information:

- **Project Title**
  Give your project a descriptive name. This title will also appear on any [PDF Report](#) that you are going to create.

- **Notes**
  This text field can be used to add any additional information that might be necessary to be written down (e.g. description of environment or measurement conditions).

- **Scan Mode**
  Select the proper scan mode that has been used to record the measurement. Especially for older scan files this value must be applied manually.

- **Field Length**
  Enter the length of the scan area to determine correct position information.

- **Field Width**
  Enter the width of the scan area to determine correct position information.

- **Latitude**
  Enter the GPS Latitude of your scan area to mark its position for Google Maps.

- **Longitude**
  Enter the GPS Longitude of your scan area to mark its position for Google Maps.

Scan Field Overlay

You can add a photograph of your scan area (preferably from bird's view) and overlay it with your scan image to get a better indication of the position of potential targets within your measurement.

Figure 3 shows an example of that kind of image that has been included in the scan image.
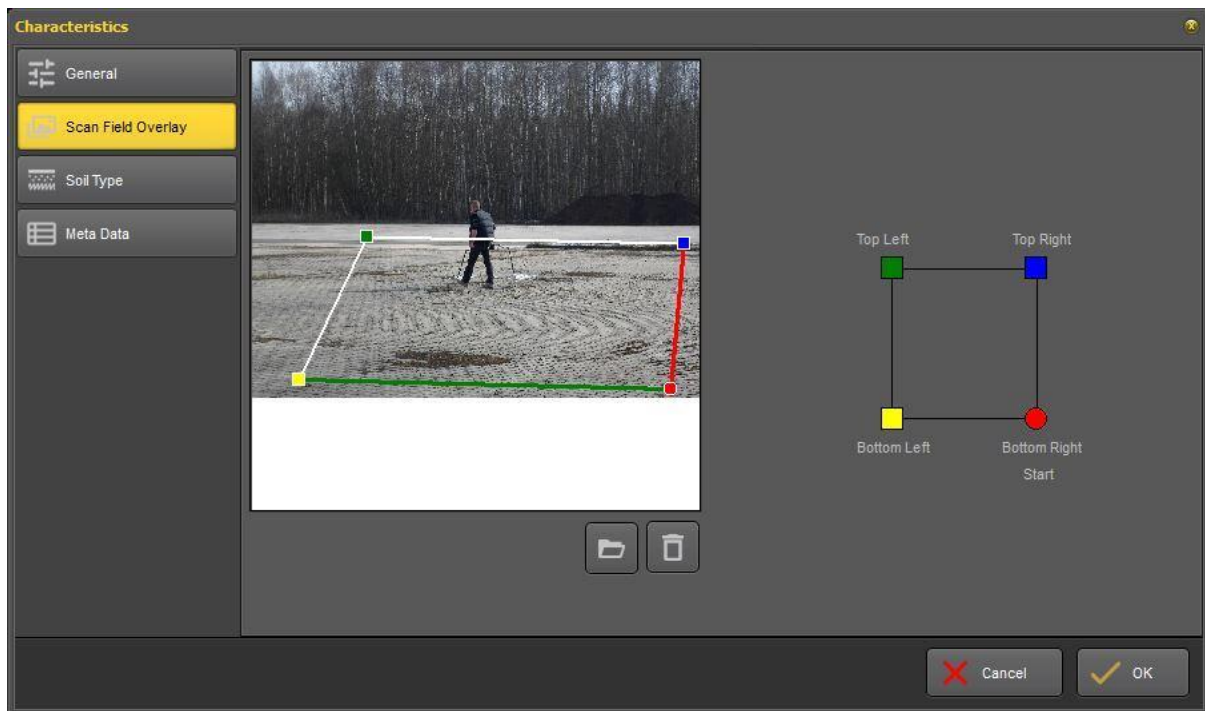
Figure 3: Characteristics Dialog - Scan Field Overlay

Use the [folder] button to open an image from your hard disk and the [trash] button to delete the assigned image.

After opening an image you have to adjust the mapping of the image. Move your mouse pointer over the colored squares and while holding the left mouse button down, you move the square to the appropriate corner of the scan area in your image. Only then the image will be mapped correctly on top of your scan image.

Soil Type

You should also set a proper soil type. Figure 4 shows the list of soil types.
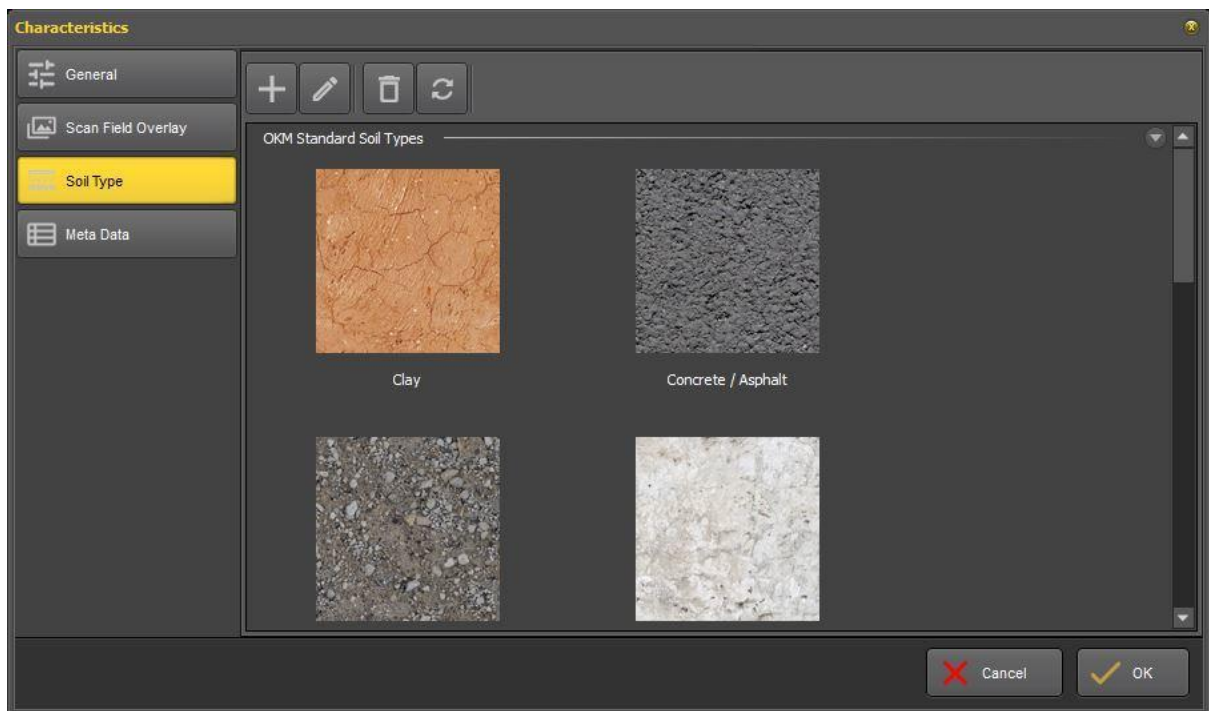
Figure 4: Characteristics Dialog - Soil Types

Please choose the most relevant soil type from this list to make sure the depth calculation is as precise as possible.

Meta Data

Added in 3.1.0

In this section you may enter additional information based on pairs of name and value, e.g.

- **Scan Direction:** North-East

- **Scan Field:** B-2

- **Weather Conditions:** rainy, wet
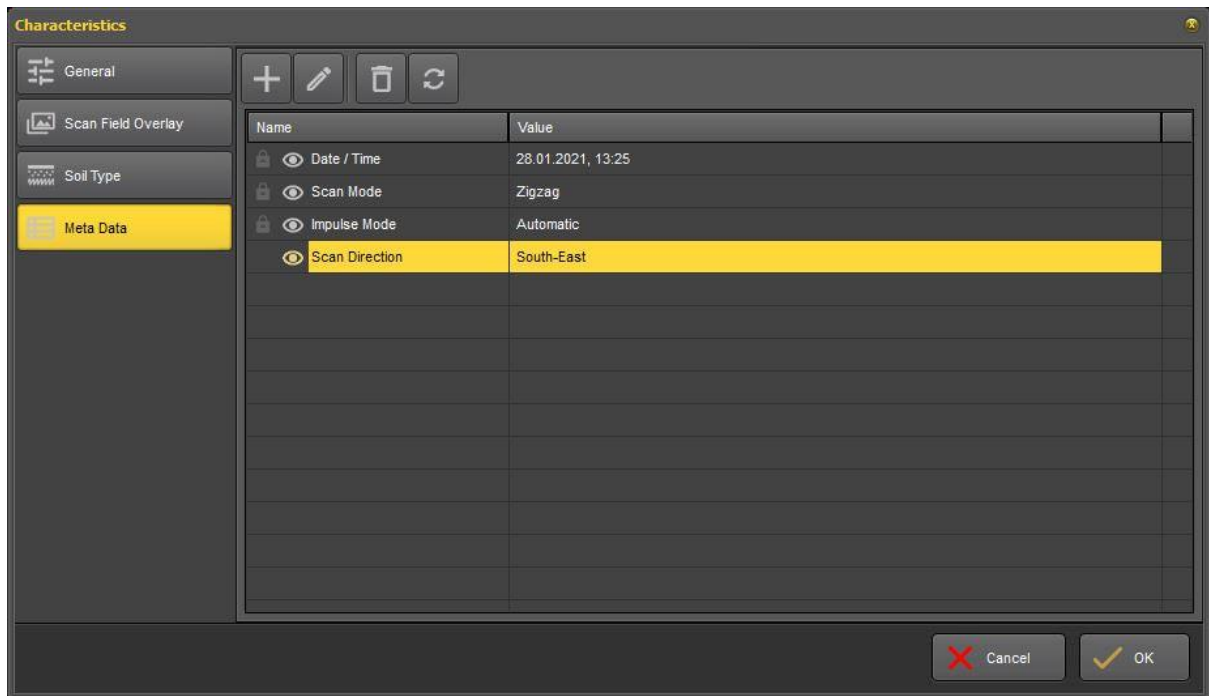
Figure 5: Characteristics Dialog - Meta Data

Depending on your individual settings, those information can be included in the PDF Report.

3D Analysis: Bookmarks

Professional Edition

Bookmarks are a very useful tool to set special markers with additional information at certain measuring points within the scan images. Not only can you mark the position itself but also mark a whole region around the scan value and add additional descriptive information.

This section gives an overview about using and creating bookmarks.

Please be aware that creating and editing bookmarks is limited to the Visualizer 3D Studio - Professional Edition only!
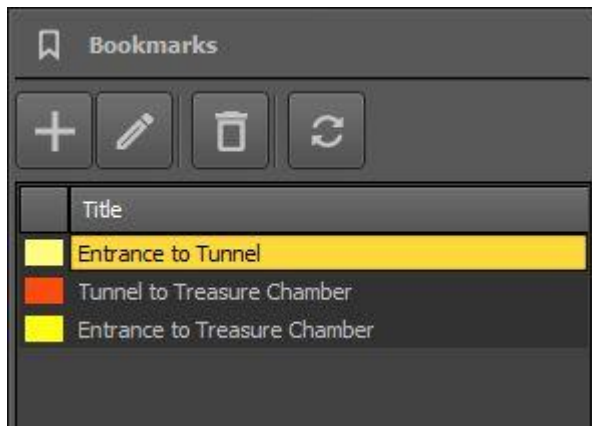
Figure 1: Bookmark Panel of the Right Sidebar

Figure 1 displays the Bookmark Panel of the Right Sidebar that consists of a toolbar on the top and a bookmark list right below. The toolbar contains following buttons:

	Add Bookmark Push this button to create a new bookmark at the position of the crosshairs (3D cursor). After pushing the button, the dialog from figure 2 will appear on screen to enter all the detailed information.
	Edit Bookmark Push this button to edit the selected bookmark at the crosshairs. After pushing the button, the dialog from figure 2 will appear on screen to change all the detailed information.
	Delete Bookmark Push this button to delete the selected bookmark at the crosshairs.
	Refresh List Push this button to refresh the list of bookmarks in case it is out of sync.

Navigating the bookmarks

There are several methods to select a certain bookmark or to go through all existing bookmarks easily.

One way is to simply click onto one of the entries in the bookmark list. Then the crosshairs (3D cursor) will jump to the according bookmark which becomes selected.
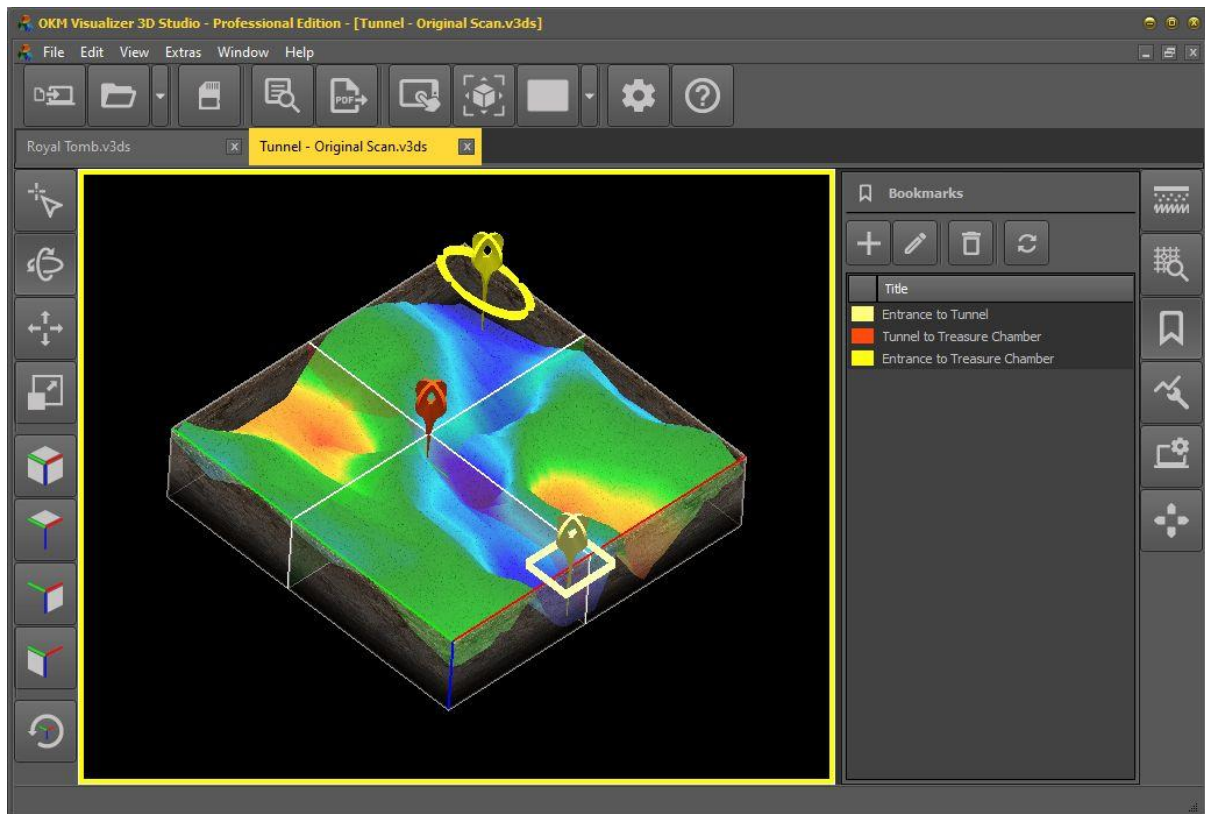
Figure 2: Example scan image with bookmarks

Another way is to position the crosshairs manually by mouse (when in picking mode or by holding down the Alt key when pushing the mouse button) or arrow keys onto the according measuring point.

Alternatively, you may also use a special shortcut to jump to the next bookmark, which is **Ctrl + Alt + B**. Continue executing this shortcut until you reach the bookmark of your choice.

Creating and editing new bookmarks

When you like to add a new bookmark at a certain measuring point, you first have to set the crosshairs (3D cursor) to that very point (also when you want to edit an existing bookmark). Then you can push the [+] button from he toolbar of the Bookmark Panel to bring up the dialog from figure 3.

Figure 3: Bookmark Dialog to enter additional information

In the Bookmark Dialog you can add/edit all the information that can applied to the measuring point:

- **Color**
  Click the color box to change the color of the bookmark representation. Depending on the scan image color of the selected measuring point this color box is preconfigured with the appropriate inverse color.

- **Title**
  Enter a short title of the bookmark to make it as easy as possible to identify it later within the list of bookmarks.

- **Notes**
  Use this text field to enter any additional information or remarks regarding the selected measuring point.

- **Outline**
  Next to the visual bookmark indicator, you may also select an additional outline (area border) around the bookmark center. There are three different options available:
    - *None:* Do not show any outline at all.

- - *Rectangle:* Show a rectangular outline with the dimensions defined with Impulses and Scan Lines.

  - *Circle:* Show a circular/elliptical outline with the dimensions defined with Impulses and Scan Lines.

- **Impulses**
  This value defines the height of the outline measured in impulses.

- **Scan Lines**
  This value defines the width of the outline measured in scan lines.

Besides the information you can add into the input fields, additional information like GPS Location and Crosshairs Information are provided.

All those information and data can be included in the PDF Report that can be generated by Visualizer 3D Studio.

3D Analysis: Modifiers

Modifiers are special functions to improve or optimize your scan images based on its recorded measuring values. Figure 1 shows the Modifiers Panel that is located in the Right Sidebar of the Visualizer 3D Studio software.
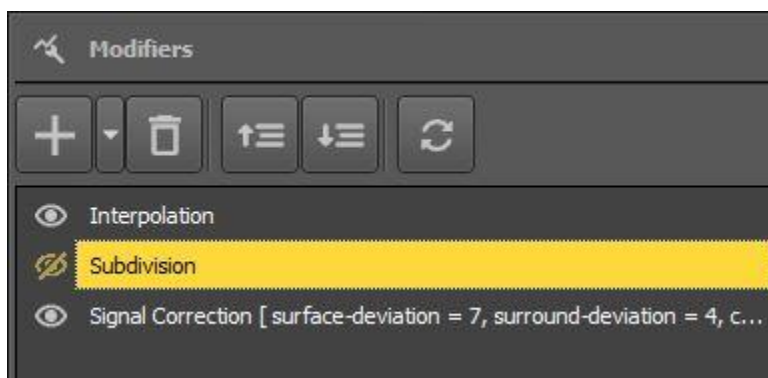
Figure 1: Modifiers Panel of the Right Sidebar

On top of the panel is a toolbar and right beneath the list of added modifiers. This list contains all created modifiers, even if they are not active (which is indicated by the strikethrough eye symbol).

The toolbar contains following buttons:

	Add Modifier Push this button to add a new modifier that should be applied to your current scan image. The popup menu that appears provides all modifiers that are explained in the subsequent subsection.
	Delete Modifier Push this button to delete the selected modifier from the list of all added modifiers.
	Move Modifier Upwards Push this button to move the selected modifier one level up. This will change the order of the modifiers and will also change the outcome when the modifiers are applied to the current scan image.
	Move Modifier Downwards Push this button to move the selected modifier one level down. This will change the order of the modifiers and will also change the outcome when the modifiers are applied to the current scan image.
	Refresh List Push this button to re-apply all modifiers to the raw data of the scan image. This might be necessary if you changed the status of a modifier from active to inactive or vice versa.

Modifiers

You can apply as much modifiers as needed. The order of the modifiers is always from top to bottom, so the first modifier is applied first and then all the other modifiers in the list are applied to the scan image. Please keep in mind that a different order leads to different results.

You can also toggle the status of each modifier by clicking the eye icon. Only active or enabled modifiers are applied to the scan image to change its corresponding data. All inactive or disabled modifieres are skipped.

There are four modifiers in total, that can be used to be applied to your scan images:

- **Interpolation**
  The Interpolation modifier recalculates all scan values to smooth out any spikes that may occur while measuring an area.

- **Subdivision**

  The Subdivision modifier adds additional scan values (calculated by specific algorithms) into the data grid. This gives a much higher resolution of the scan image.

- **Signal Correction**

  The Signal Correction modifier is used to remove error signals or erroneous scan values that might result from wireless interferences or wrong handling of the metal detector like changing the height of the probe while scanning.

- **Rotational Correction**

  The Rotational Correction modifier has been made to correct errors based on the scan mode (Zig-Zag or Parallel) of a conducted measurement and its following data transfer.

All of the modifiers are explained in more detail in the following subsections.

Interpolation

With the Interpolation modifier you can improve the representation of the scan image and eliminate certain irregularities in the measurement data. It is also possible to check potential objects regarding mineralization.

Figure 2 shows the scan image before Interpolation and figure 3 shows the same scan image after applying the Interpolation modifier.
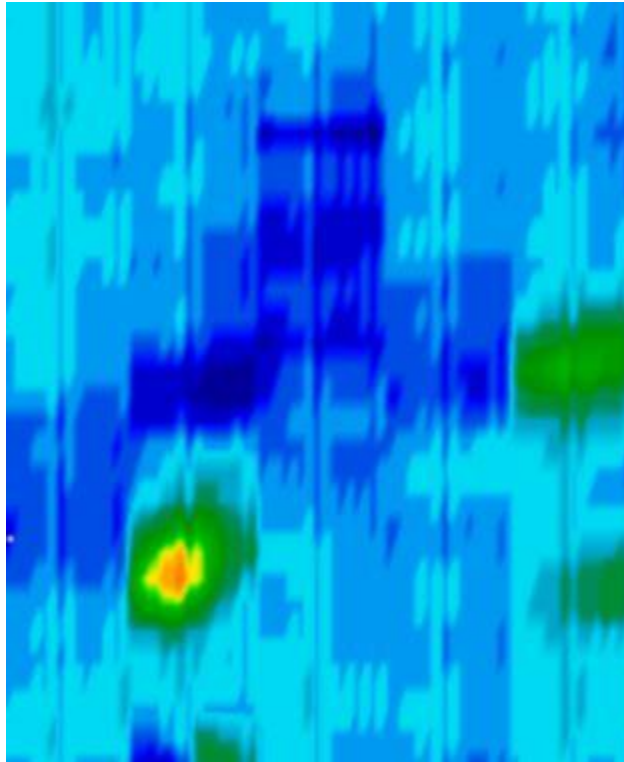
Before Interpolation
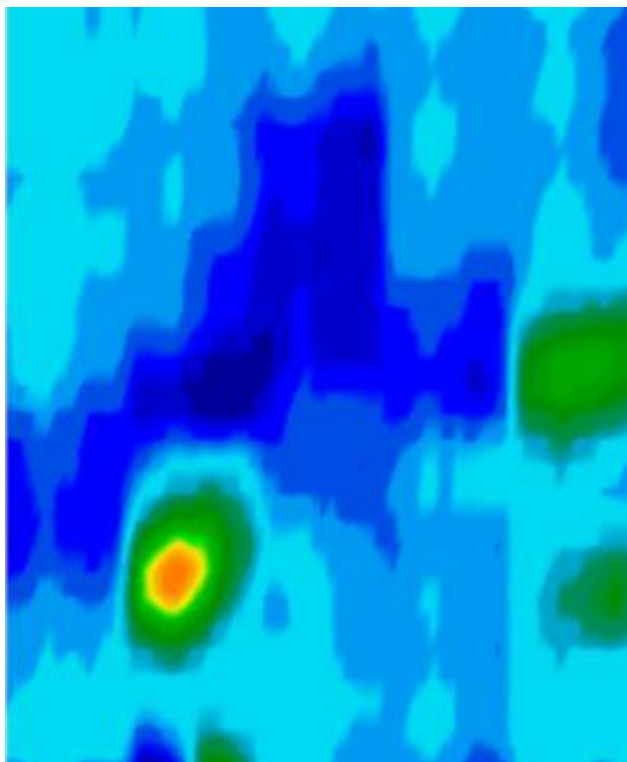
After Interpolation

Figure 2/3: Scan Image before and after Interpolation

The Interpolation modifier is a suitable tool to distinguish real objects from mineralization. When there is a signature of a real metallic object inside the scan image, it will also be visible after using the Interpolation modifier several times. It will also keep the same position, size and shape. If the anomaly disappears or got split into more parts or change its position radically, than it is probably a natural mineralization of the ground.

If you repeat the interpolation process too often, also real objects will disappear from the scan image.

Subdivision

The Subdivision modifier can also be used to smoothen out the spiky signals but furthermore it generates additional scan values to increase the resolution of the scan image.

Figure 4 shows a scan image without any modifier applied, whereas figure 5 shows the same scan image with applied Subdivision modifier.

Before Subdivision
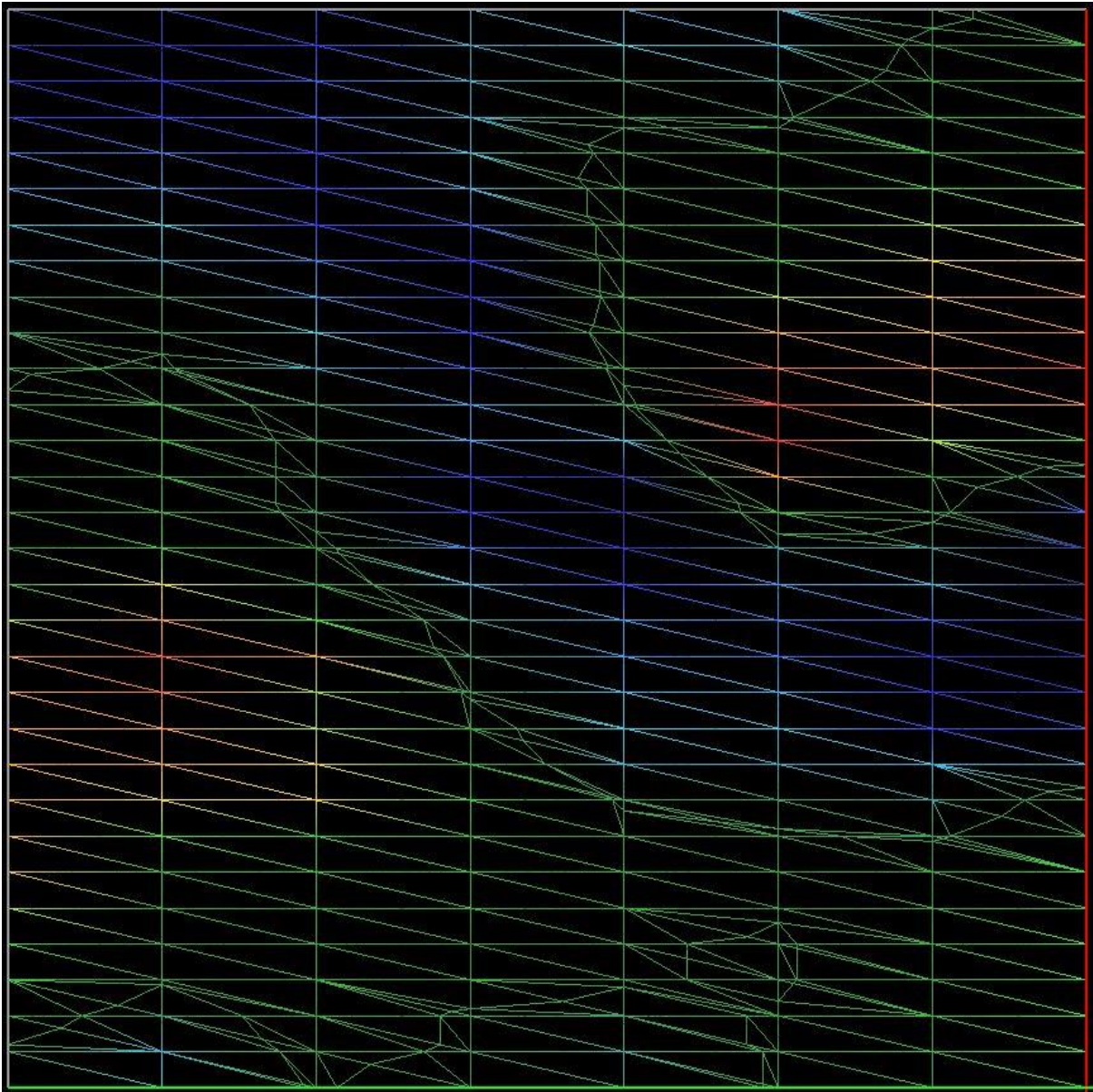
After Subdivision
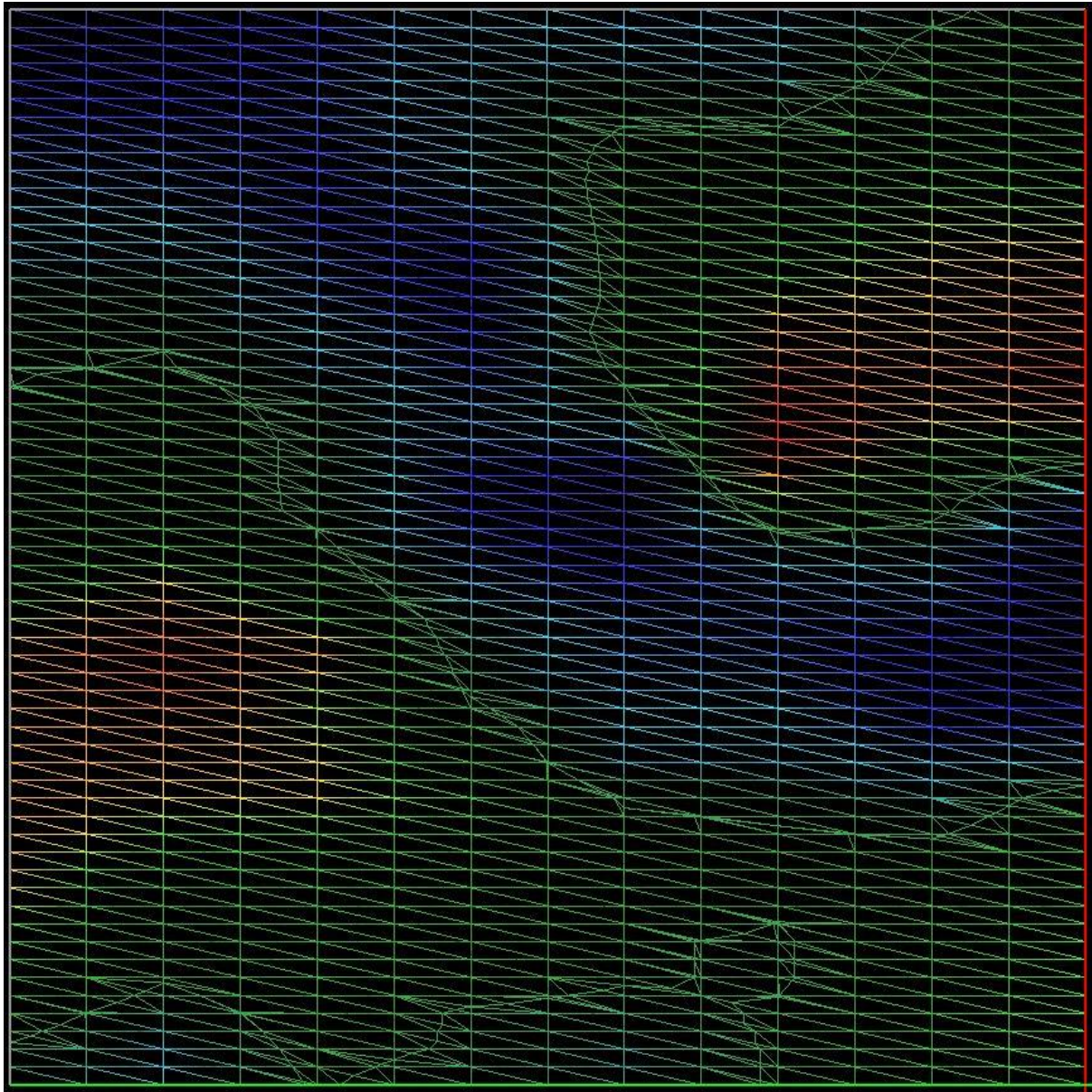
Figure 4/5: Scan Image before and after Subdivision

The chosen wireframe representation of the scan image clearly shows that the number of measured values has been increased by applying the Subdivision modifier.

Please keep in mind that this modifier adds additional data that has not been measured in the field. It is always recommended to record as much real world data as possible. Applying this modifier too often might also slow down your computer, because it has to process more scan values.

Signal Correction

There are very different environmental influences, that can affect the graphical representation of the measurement in a negative way. The Signal Correction modifier is used to eliminate error signals from the graphical representation. Such error signals can

occur by wrong handling of the detector or by small but highly responsive metal targets close to the ground surface.

When selecting the Signal Correction modifier the configuration dialog from figure 6 appears on the screen.
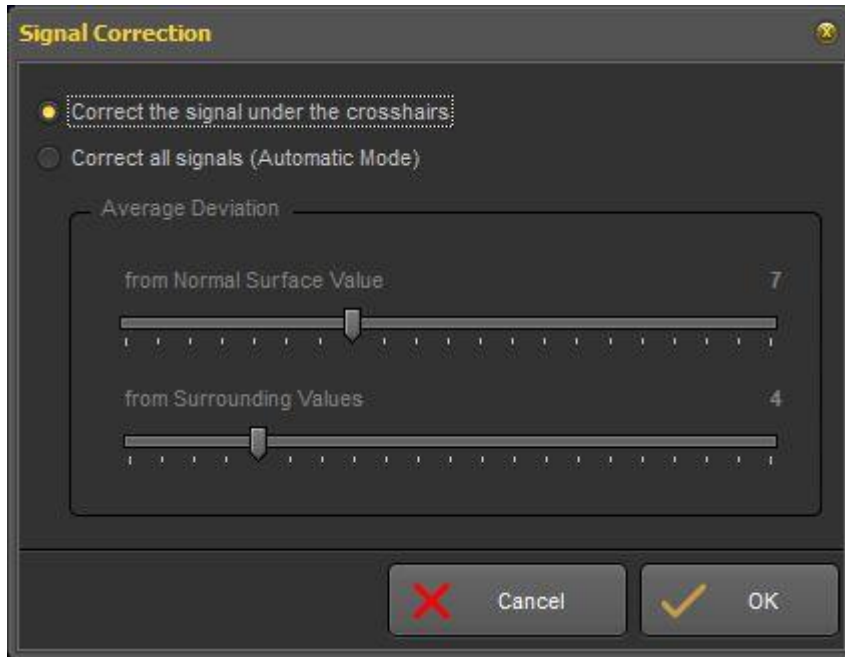
Figure 6: Signal Correction Dialog

In the dialog there are two main options available:

- **Correct the signal under the crosshairs**
  With this option checked, only the scan value at the crosshairs (3D cursor) will be processed and corrected.

- **Correct all signals (Automatic Mode)**
  Check this option to correct all signals of the scan image that match the following subsettings:

  - *Average Deviation from Normal Surface Value*
    This value specifies the minimum deviation of a scan value to the Normal Surface Value (Ground Value). The value "0" means no deviation at all.

  - *Average Deviation from Surrounding Values*
    This value specifies the minimum deviation of a scan value to its adjoining scan values. The value of "0" means no deviation at all.

Figure 7 shows a scan image including two error signals. Often the whole scan image will be colored red or blue completely but the error signals. Another very typical characteristic of an error signal is that it consists of mostly one scan value with an extreme deviation from the surrounding values.

Before Signal Correction
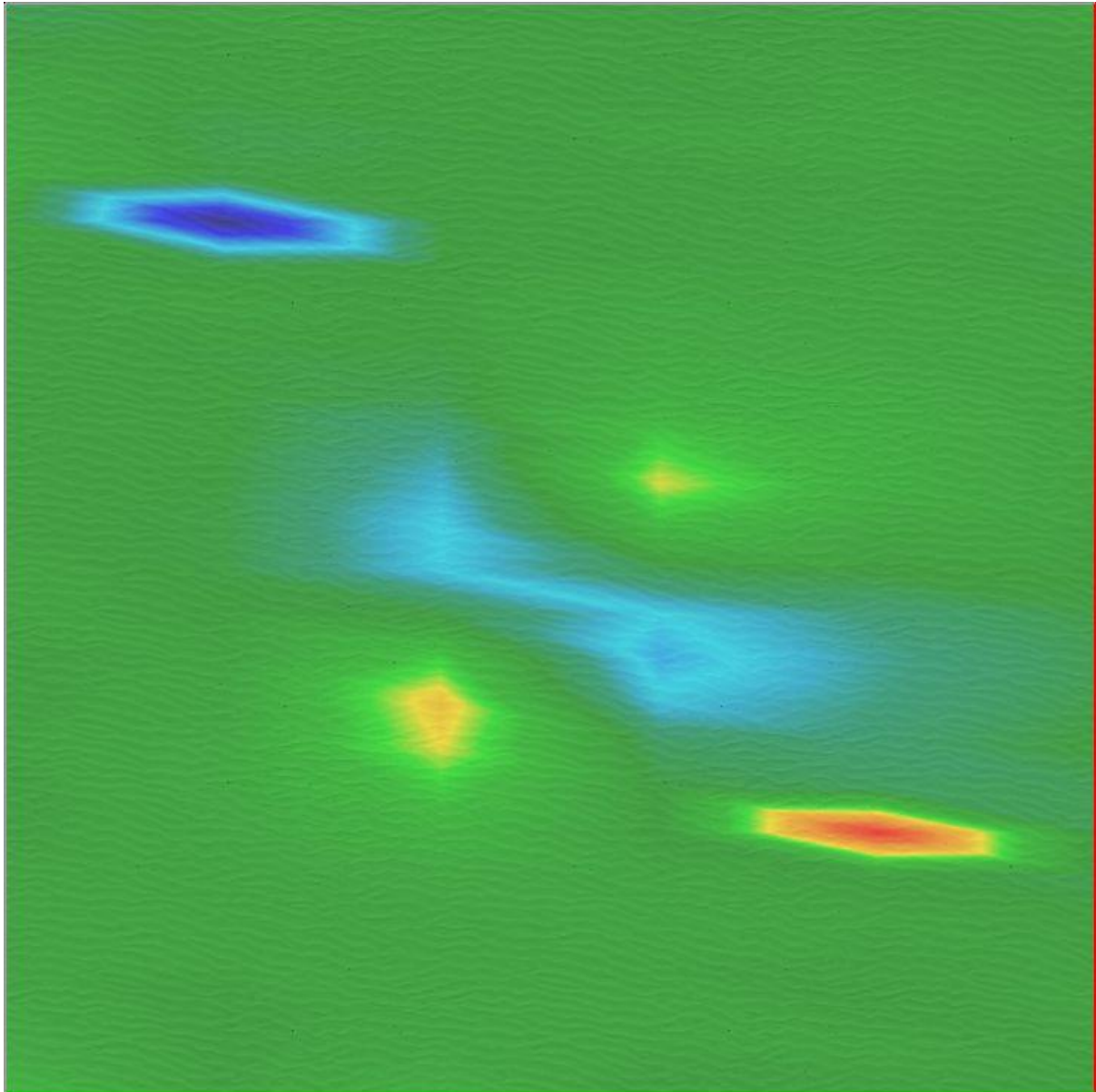
After Signal Correction
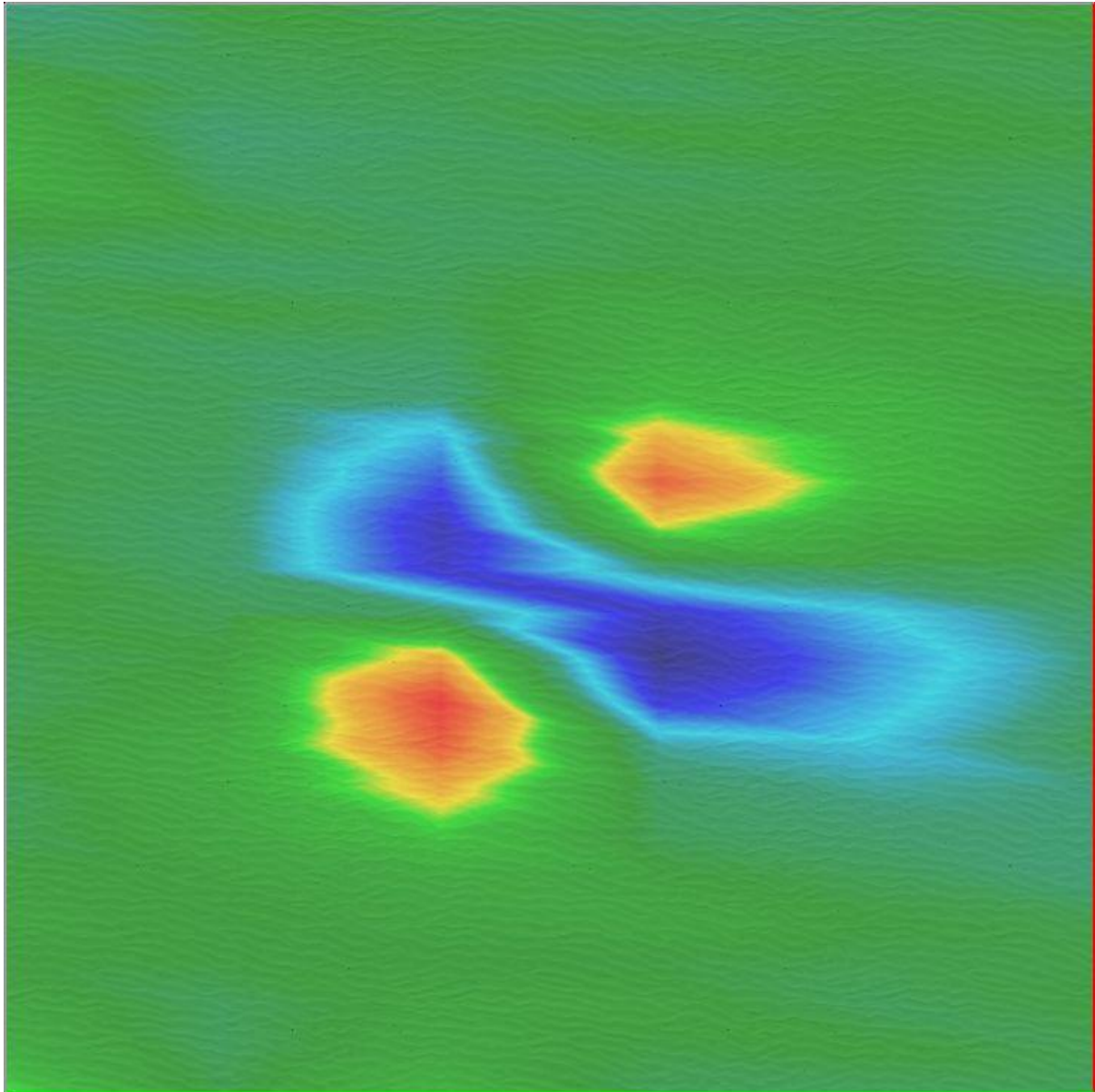
Figure 7/8: Scan Image before and after Signal Correction

Figure 8 shows the same scan image as figure 7, but after applying the Signal Correction modifier. Now the real anomalies become visible, that were hidden before.

Strong signals (e.g. high responsive metals close to the surface) hide weaker signal (e.g. deeper metal objects or cavities).

Rotational Correction

The last modifier that needs to be described is the Rotational Correction modifier, that can be used if the scan mode (Parallel or Zig-Zag) of the actual measurement and the data transfer has been mismatched.

Example: You conducted a measurement in Parallel scan mode but you transferred the scan data by selecting the scan mode Zig-Zag.

In that kind of situation you can use the Rotational Correction modifier to fix the mismatch afterwards.

Figure 9 shows a scan image that was recorded in Parallel scan mode but conducted in Zag-Zag. The typical indications are the red/blue stripes. The scan shows no anomaly that indicates any kind of hidden object.

Before Rotational Correction
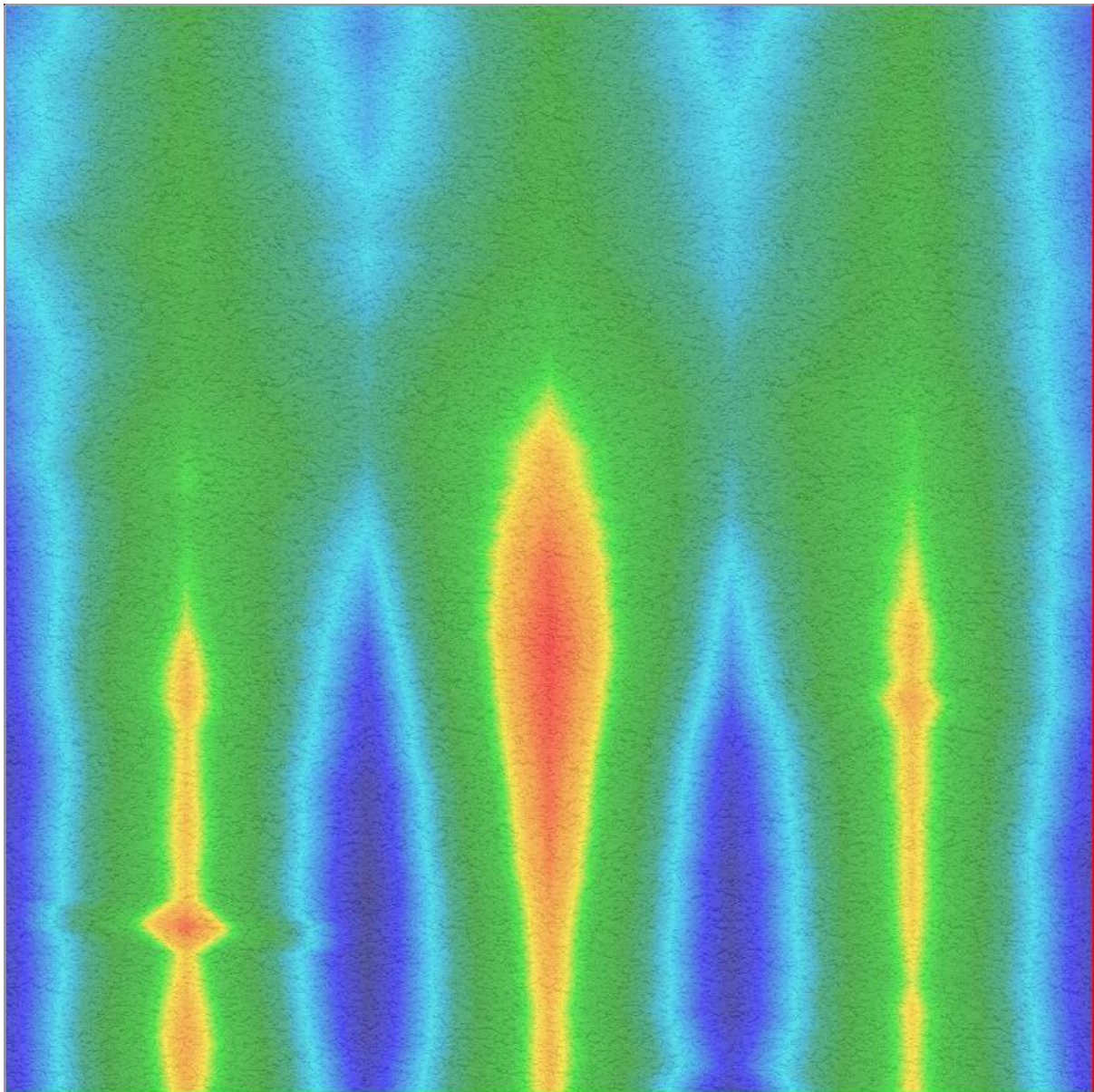
After Rotational Correction
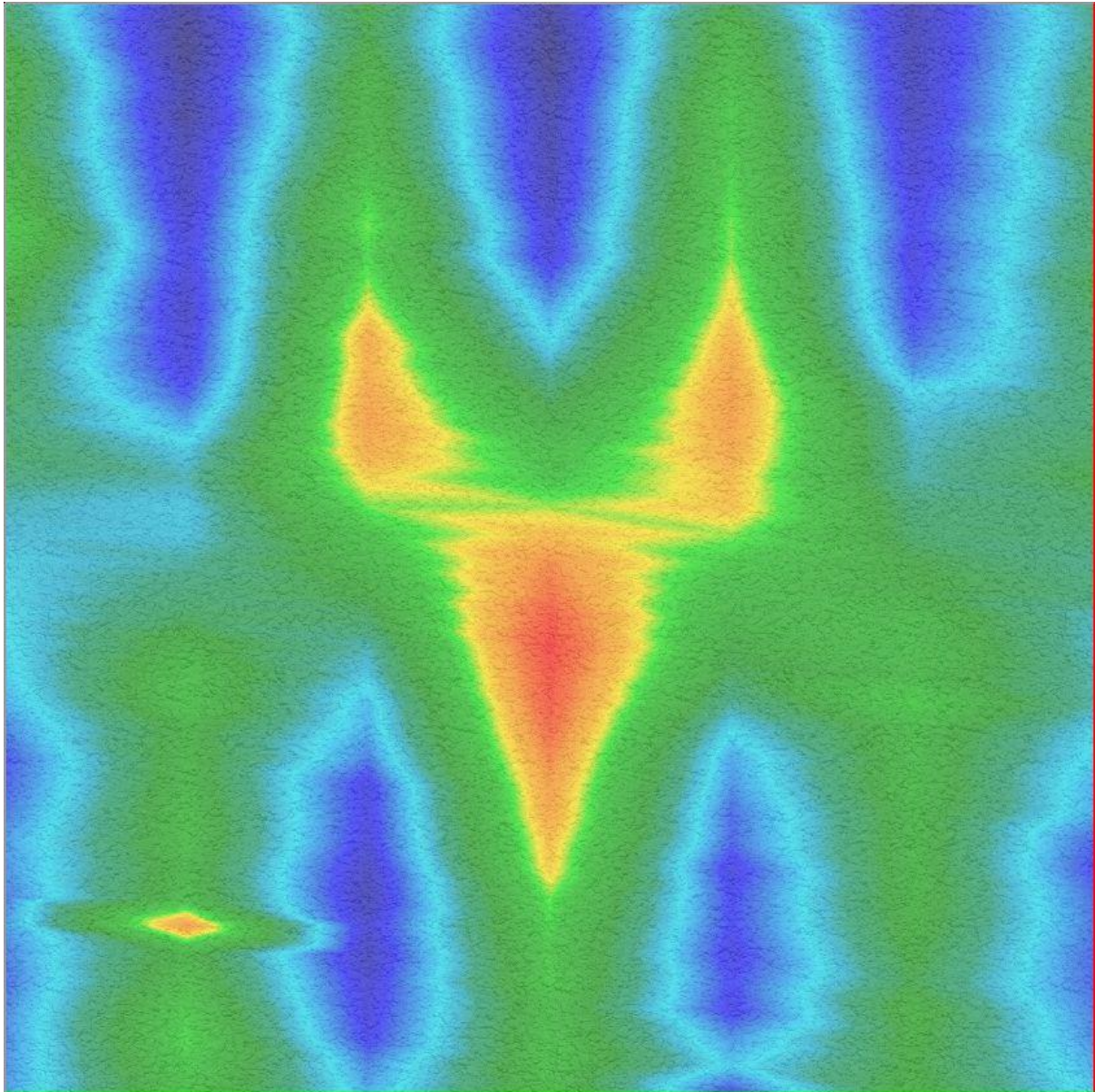
Figure 9/10: Scan Image before and after Rotational Correction

Figure 10 shows the same scan image after applying the Rotational Correction modifier. Now there is some kind of object anomaly visible.

At this point it is recommended to repeat the measurement to get high quality real world data of the scan area.

3D Analysis: Visualization

All options regarding the visual representation of the scan images can be found in the Visualization Panel of the Right Sidebar as shown in figure 1. By clicking the ⬚ button of the sidebar you can toggle the panel accordingly.
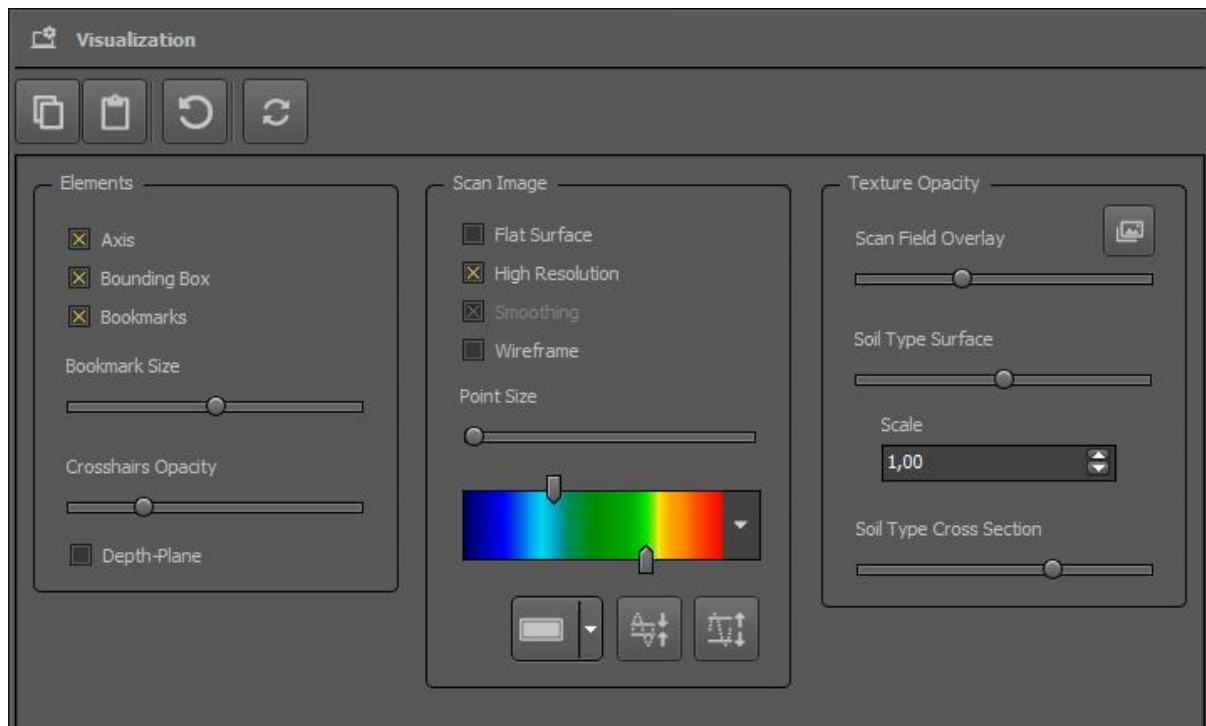
Figure 1: Visualization Panel of the Right Sidebar

The toolbar of the Visualization Panel consists of the following four buttons:

⬚	**Copy Visualization** Push this button to copy the Visualization settings from the current scan image into the clipboard.
⬚	**Paste Visualization** Push this button to apply the Visualization settings from the clipboard to the current scan image.
⬚	**Factory Defaults** Push this button to reset the Visualization settings of the current scan image to factory defaults.
⬚	**Apply Visualization** Push this button to refresh the current scan image by applying all Visualization settings.

The content of the Visualization Panel is categorized in three groups that will be described in the following subsections.

Elements

- **Axes**
  Check this option to enable the axes of the scan image, whereas each axis has a different color:

  - o **Red** = Length of the scan field (impulses)

  - o **Green** = Width of the scan field (scan lines)

  - o **Blue** = Depth of the scan field

- **Bounding Box**
  Check this option to enable the Bounding Box (cubic border) of the scan image.

- **Bookmarks**
  Check this option to show all active bookmarks within the scan image.

- **Bookmark Size**
  The slider can be used to decrease (move slider left) or to increase (move slider right) the size of the displayed bookmark icons.

- **Crosshairs Opacity**
  The slider is used to decrease (move slider left) or to increase (move slider right) the opacity of the crosshairs (3D cursor).

- **Depth-Plane**
  Check this option to enable the Depth-Plane (blue plane) of the crosshairs.

Scan Image

- **Flat Surface**
  Check this option to enable an extra scan image plane that is on top of the scan image. Thus you can see the depth information in any perspective view as well as information from the top view at the same time.

- **High Resolution**
  Check this option to visualize the scan image in a high resolution. Uncheck the

option to improve performance of the display instead.
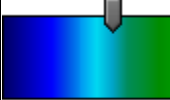
- **Smoothing**
  Check this option to smooth the graphical data (suppresses hard edges). This option is available for certain render views only, otherwise disabled.

- **Wireframe**
  Check this option to visualize the scan image as wireframe, otherwise the scan image is displayed in solid mode.

- **Point Size**
  Move the slider to the right to make the actual scan values visible as data points. This can be useful after applying modifiers that generate additional data points (e.g. Subdivision). The slider can be used to decrease (move slider left) or to increase (move slider right) the size of the data points.

	Color Schema Choose your prefered color schema from this list to visualize the scan image in different colors. Depending on the selected color schema certain anomalies and details may become visible. Depending on the selected color visibility mode (see below), the sliders can be used to remove certain colors from the current scan image.
	Color Visibility Mode Added in 3.1.2 Select one of the color visibility modes to control how the colors are displayed. Depending on the position of the two sliders of the Color Schema different results will be created.

		Inner Colors The colors between both sliders will be visible only.
		Outer Colors The colors before the left slider and the colors after the right slide
		All Colors All colors are visible, ignoring both sliders.

	Increase Anomaly Threshold Push this button to bring more anomalies into view within the scan image.

	This might be helpful to see also hidden anomalies that are hidden by stronger ones.
	Reduce Anomaly Threshold Push this button to draw back anomalies from the scan image to focus the core of the large anomalies.

Texture Opacity

- **Scan Field Overlay**
  This slider regulates the opacity of the Scan Field Overlay (image of the scan field) to visualize the surface of the actual scan area and to ease the localisation of potential anomalies. Pressing allows to set and change the scan field overlay image.

- **Soil Type Surface**
  This slider regulates the opacity of the surface texture of the selected Soil Type.

- **Scale**
  This number can be changed to adapt the scaling of the soil type texture. Normally you just keep this number as it is!

- **Soil Type Cross Section**
  This slider regulates the opacity of the cross section texture of the selected Soil Type.

3D Analysis: Transformations

All transformation settings of the scan images can be found in the Transformation Panel of the Right Sidebar as shown in figure 1. By clicking the button of the sidebar you can toggle the panel accordingly.
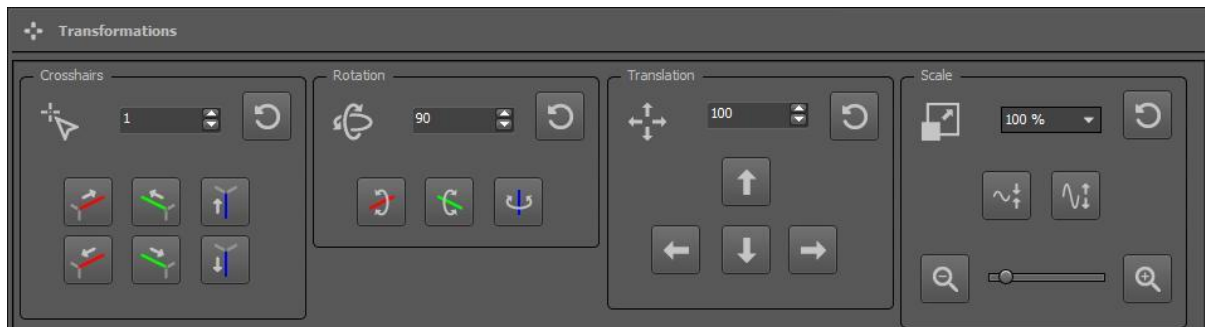
Figure 1: Transformation Panel of the Right Sidebar

The content of the Transformation Panel is categorized in four groups that will be described in the following subsections.

Crosshairs

	Step Value Specify a step value that determines the distance by which the crosshairs will move when using the designated crosshair buttons. To reverse the movement direction, enter a negative value.
	Move crosshairs forward (next impulse) Pressing this button will move the crosshairs forward along the X-axis by the specified step value.
	Move crosshairs backward (previous impulse) Pressing this button will move the crosshairs backwards along the X-axis by the specified step value.
	Move crosshairs left (next scan line) Pressing this button will move the crosshairs left along the Y-axis by the specified step value.
	Move crosshairs right (previous scan line) Pressing this button will move the crosshairs right along the Y-axis by the specified step value.
	Move crosshairs up (decrease depth) Pressing this button will move the crosshairs up along the Z-axis by the specified step value.
	Move crosshairs down (increase depth) Pressing this button will move the crosshairs down along the Z-axis by the specified step value.

	Reset crosshairs Push this button to reset all applied crosshairs transformations.

Rotation

90	**Rotation Value** Enter an angle value in degrees, that is used to rotate the current scan image by using one of the following rotation buttons. Any negative value reverses the rotation.
	Rotation around X-axis Push this button to rotate the current scan image by the entered rotation value around the X-axis.
	Rotation around Y-axis Push this button to rotate the current scan image by the entered rotation value around the Y-axis.
	Rotation around Z-axis Push this button to rotate the current scan image by the entered rotation value around the Z-axis.
	Reset Rotation Push this button to reset all applied rotations.

Translation / Move

100	**Translation Value** Enter a value in pixels, that is used to move the current scan image by using one of the following translation buttons. Any negative value reverses the translation.
	Move Upwards Push this button to move the current scan image by the entered translation value upwards.
	Move Left Push this button to move the current scan image by the entered translation value to the left.
	Move Downwards Push this button to move the current scan image by the entered translation value downwards.

	Move Right
	Push this button to move the current scan image by the entered translation value to the right.
	Reset Translation
	Push this button to reset all applied translations.

Scale / Zoom

	Scale Value
100 % ▼	Select a zoom value from the list to scale the current scan image according to that percentage.
	Scale Depth Down
	Push this button to decrease the visible height of the depth values of the current scan image on screen.
	Scale Depth Up
	Push this button to increase the visible height of the depth values of the current scan image on screen.
	Scale Down
	Push this button to decrease the size of the current scan image on screen.
	Scale Up
	Push this button to increase the size of the current scan image on screen.
	Reset Scale
	Push this button to reset all applied scales.

Save Scan Files

If you have imported scan data from one of your OKM Detectors or changed any existing scan file, you may want to save those changes to your harddisk.

Click ![icon] in the Main Toolbar or File › Save via Main Menu to open the Save Scan File dialog which is shown in figure 1.
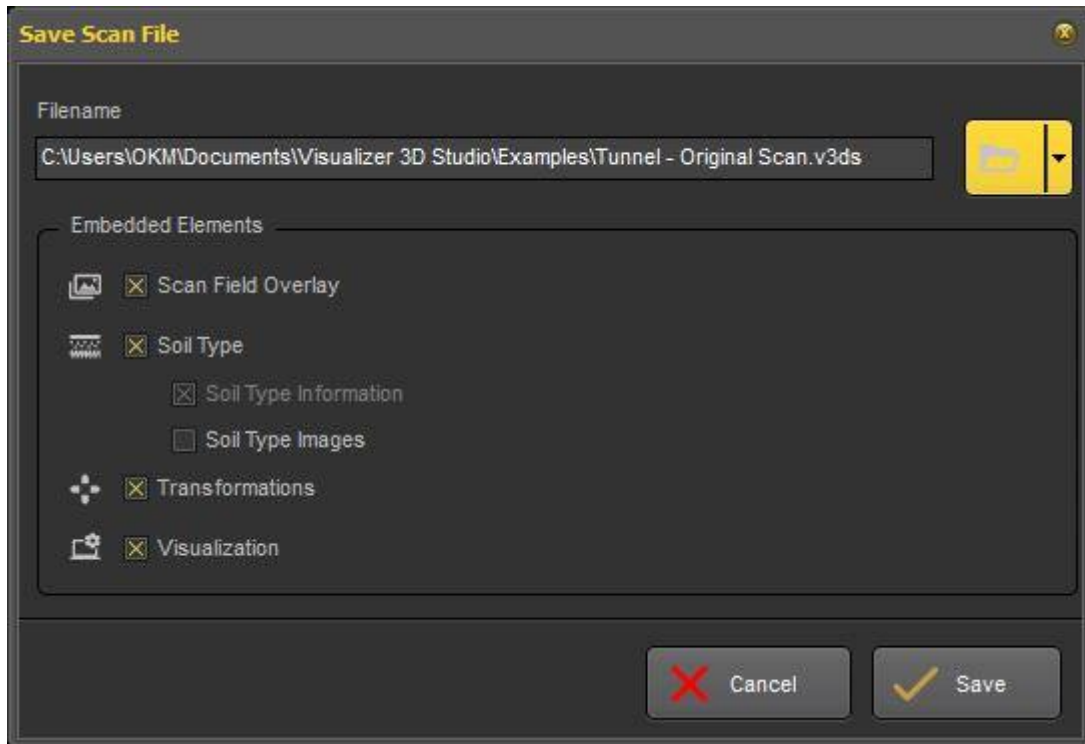
Figure 1: Software dialog "Save Scan File" with several saving options

First, select your designated folder and filename. Then, you need to adjust several options to save your scan file:

- **Scan Field Overlay**
  Check this option to embed the Scan Field Overlay image that is projected onto your scan field (* only available in Professional Edition). Depending on the file size of this image, also your resulting scan file will become proportionally larger. Please read section Scan Information / Characteristics to learn more about adding a Scan Field Overlay!

- **Soil Type**
  Check this option to embed the soil type information into your scan file. If you check **Soil Type Images** as well, the appropriate soil textures will be saved along with your scan data. Be aware, that your resulting scan file will become

proportionally larger.

- **Transformations**
  Check this option to embed your current transformations (rotation, move, scale) along with your scan data. If you have positioned your scan image in an individual way, checking this option makes sure, that the same orientation is applied when opening the file on a different computer or at a later time again.

- **Visualization**
  Check this option to embed all current visualization adjustments (wireframe, resolution, texture settings, etc.) along with your scan data.

Data Export

There are several ways to export your scan image into either an image file or a fully featured PDF report:

- **Export as Image**

Use this option to export your current scan image (the graphical representation of your measurement) into a normal image file (JPG, PNG or BMP).

- **Export as PDF Report** `Added in 3.0.0` Professional Edition

Use this option to export your scan image including all additional information like soil type, field dimensions, bookmarks, etc. into a complete PDF report.

- **Export as CSV** `Added in 3.1.1` Professional Edition

Use this option to export your scan data to a CSV file.

Export as Image

If you like to export your scan image as a standard image file you have to click File › Export › Image via Main Menu to open the Export Dialog from figure 1.
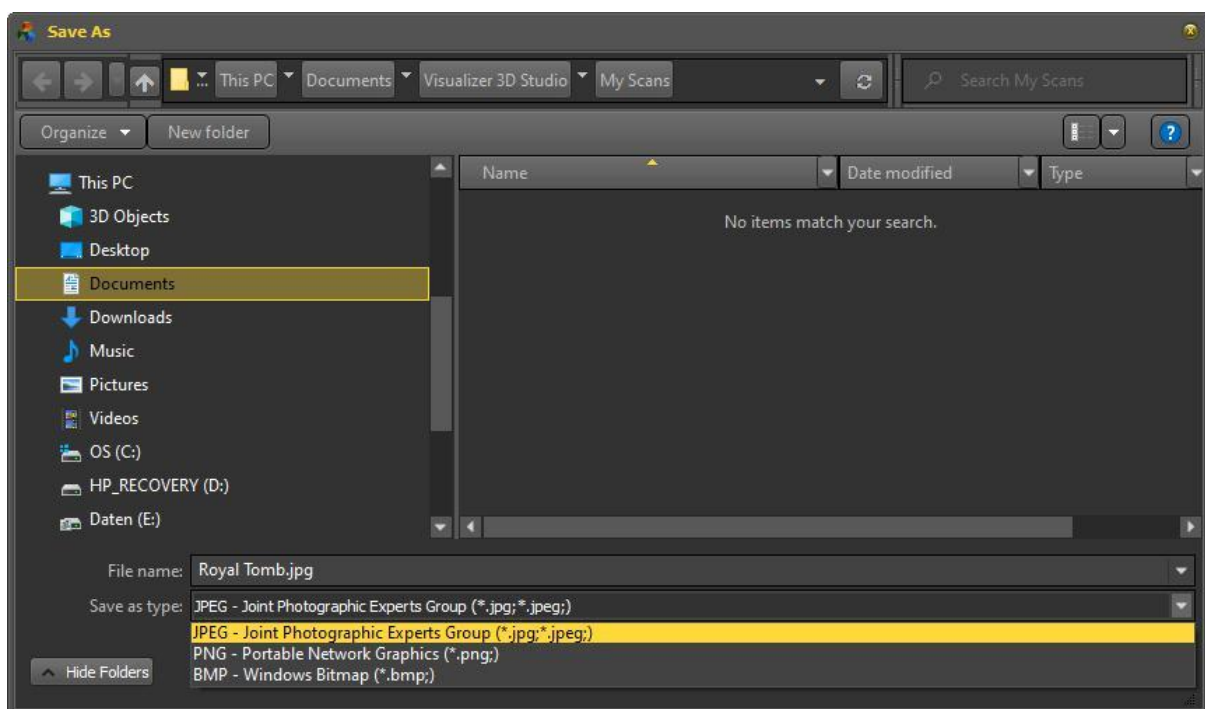
Figure 1: Software dialog "Export as Image"

There are three different image types to choose from:

- **JPG**
  Compressed image file (lossy compression, smallest filesize)

- **PNG**
  Compressed image file (lossless compression, medium filesize)

- **BMP**
  Uncompressed image file (lossless, largest filesize)

After selecting your preferred image type, click on *Save* to start exporting your scan image as an image file. That image can be embedded in any other document, e-mail or report like any other image.

Export as PDF Report

Added in 3.0.0 Professional Edition

If you like to create a clean PDF Report with all collected information (project description, soil type, bookmarks, etc.) for your customers or clients, you need to click ⬛ in the Main Toolbar or File › Export › Export as PDF via Main Menu to open the Export Dialog from figure 1.

Figure 1: Software dialog "Export as PDF" with several export options

First, select the designated folder and filename for your PDF Report. Then, you have to select what kind of information you would like to embed into your generated PDF document.

Following export options are available:

- **Open PDF after Export**
  If this option is checked, the generated PDF Report will be opened right after creating and saving it. Please make sure you have installed a proper PDF Reader onto your computer!
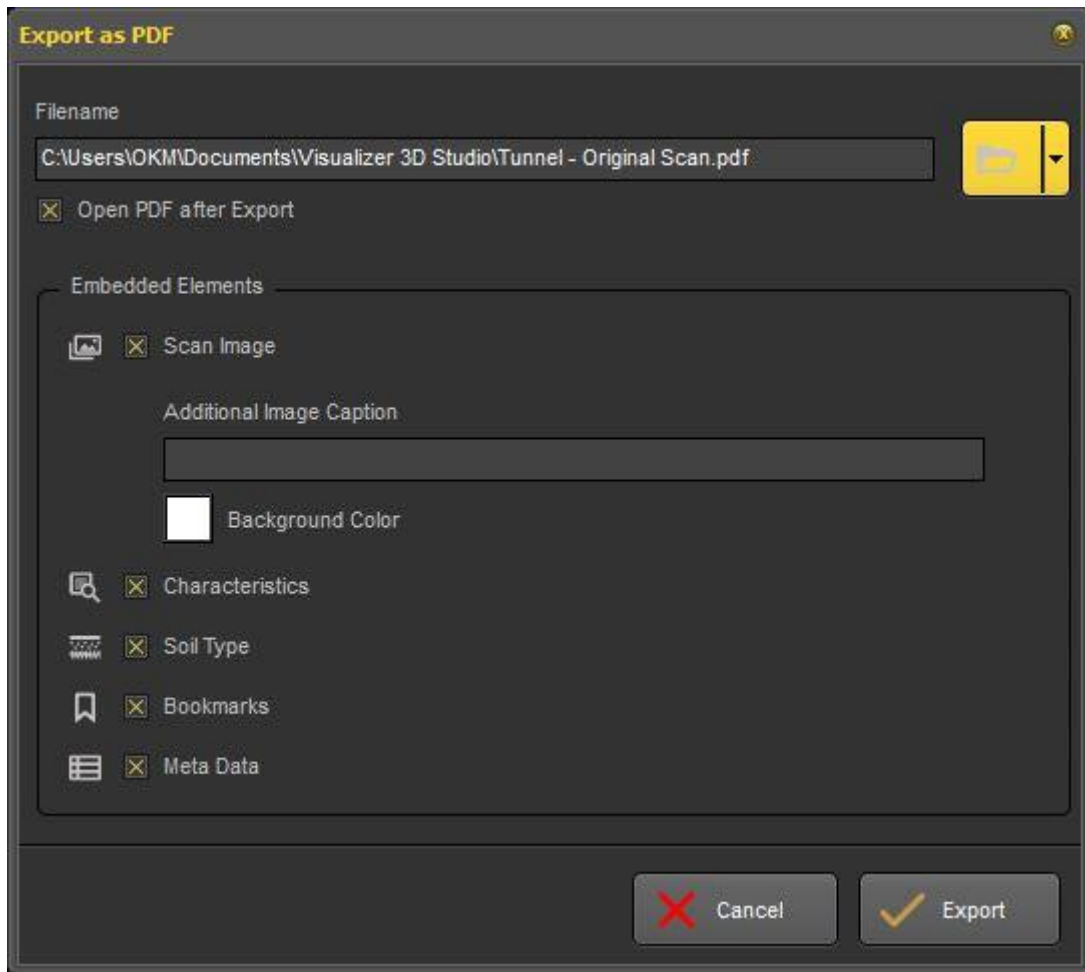
- **Scan Image**
  Check this option to embed the scan image itself into the final PDF Report. The scan image will be placed on the first page of the PDF document in the same way as it is positioned inside the active software window. So, if you like to show the image in top view, you have to rotate the scan image before generating the PDF Report.

- **Additional Image Caption**
  Enter some additional descriptive text into this input field to create an image caption for the scan image. Thus you can give additionals hints for the scan image itself (e.g. "Top view of the scan field").

- **Background Color**
  By default, the background color of the embedded scan image is white to make it cost efficiently printable onto paper. If you prefer another background for the scan image (and only the scan image), you may select another one by clicking the color box and picking a different color.

- **Characteristics**
  Check this option to embed your individual project information (title, description, GPS coordinates, field length and width, operating mode). These kind of information can be added as described in section Scan Information / Characteristics.

- **Soil Type**
  Check this option to embed additional information regarding the selected soil type (dielectric constant, relative permeability, mineralization, humidity, homogeneity). If you are using the Professional Edition of OKM Visualizer 3D Studio, you may add your own soil types as described in section Soil Types.

- **Bookmarks**
  Check this option to embed all of your created bookmarks into the PDF Report. At the end of the PDF document, a complete list of all your individual notes and position markers will be included. Read section Bookmarks to learn more about adding bookmarks to your scans.

- **Meta Data**
  Check this option to embed all of your meta data. At the end of the PDF report, a complete list of all your individual Meta Data will be included.

After adjusting all your export options, click on *Export* to start generating your PDF Report.

Export as CSV

If you need to export all your scan values and scan information, click File › Export › CSV via Main Menu. The resulting CSV file can be used to create spreadsheets for Microsoft Excel or other external software programs. In figure 1 the *Export as CSV* Dialog is shown.
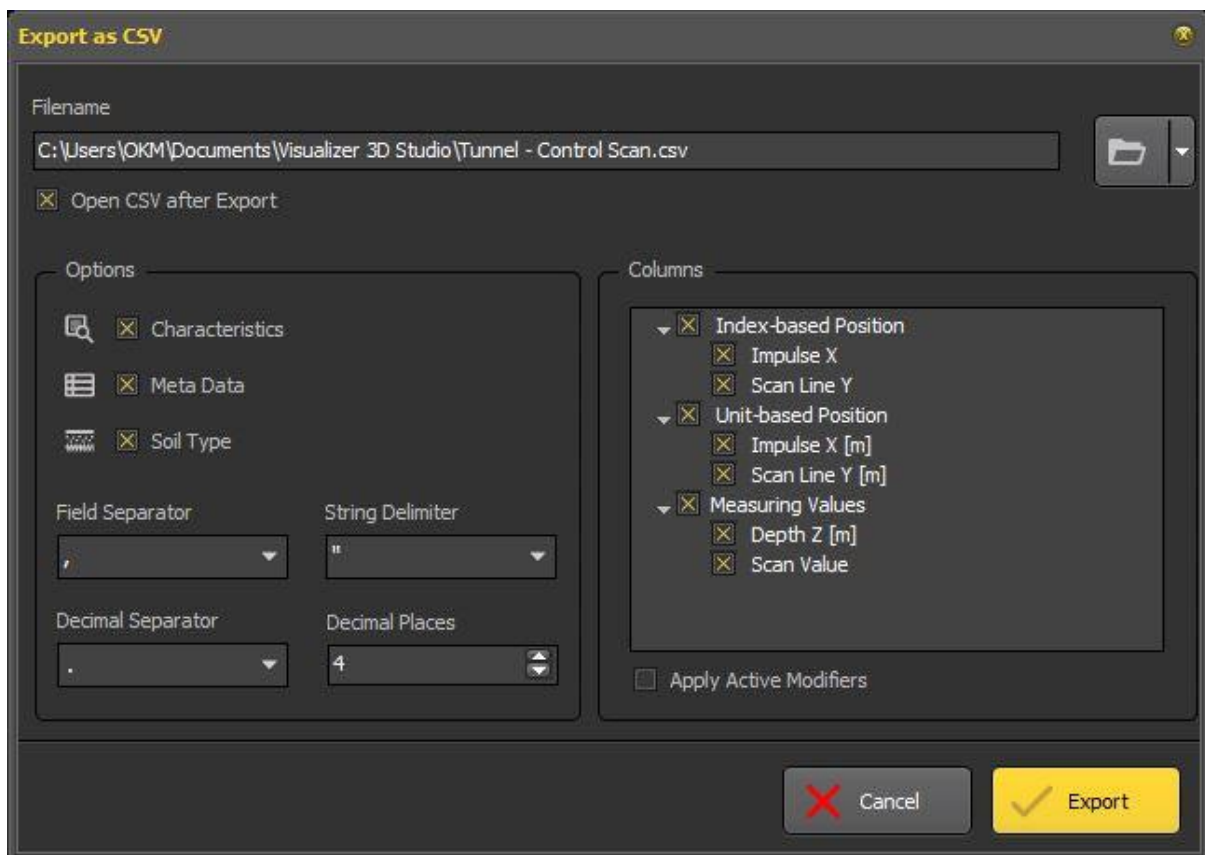

Figure 1: Software dialog "Export as CSV" with several export options

First, select the designated folder and filename for your CSV file. If you check the option *Open CSV after Export,* an external software program, that has been associated with the CSV file extension, will open up after your CSV file has been exported.

For that, you have to select what kind of information you would like to include in your generated CSV file. The file will be created using the UTF-8 character encoding.

Options

Following export options are available:

- **Characteristics**
  Check this option to embed your individual project information (title, description, GPS coordinates, field length and width, operating mode). These kind of information can be added to your measurement as described in section Scan

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- **Meta Data**
  Check this option to include all your individual Meta Data in the exported CSV file.

- **Soil Type**
  Check this option to embed additional information regarding the selected soil type (dielectric constant, relative permeability, mineralization, humidity, homogeneity). If you are using the Professional Edition of OKM Visualizer 3D Studio, you may add your own soil types as described in section Soil Types.

There are some more export options to define the output format of the resulting CSV file itself:

- **Column Separator**
  The column separator, which is a single character, is used to separate all of the selected columns (see below).

- **String Delimiter**
  If one of the selected column contains the character, that has been chosen as column separator, any external program interprets this as the end of the column rather than as part of the text. In order to prevent this, it must have a string delimiter. This string delimiter is placed around each column. The default string delimiter is double quotes (**"**).

- **Decimal Separator**
  Select either comma (**,**) or point (**.**) as your decimal separator of choice.

- **Decimal Places**
  Select the number of decimal places in the range from 0 to 8.

Columns

Additionally, you can decide which columns you want to embed into the resulting CSV file. The number and type of available columns may vary from measurement to measurement. Figure 1, as an example, represents all columns of a Ground Scan.

- **Apply Active Modifiers**
  Check this option if all active Modifiers (Interpolation, Subdivision, etc.) should

be applied before exporting the scan values. If you intend to export raw scan values, as received from the detector itself, keep this option unchecked.

After setting up all your export options and columns, click on *Export* to start generating your CSV export file.

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