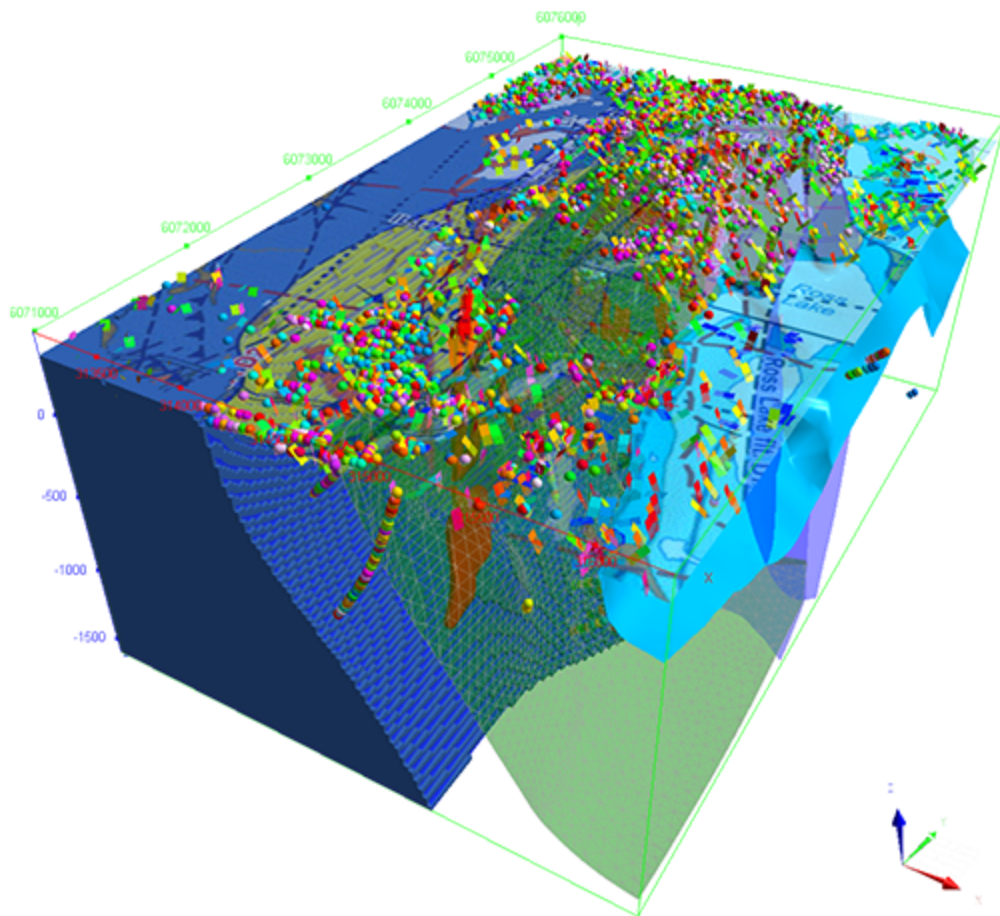


Geoscience ANALYST 2.70 - User guide



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Contact Information

CANADA

Westmount, Quebec

#309 – 310 Victoria Avenue
+1 514 489-1890

Vancouver, British Columbia

#512B - 409 Granville Street
+1 778 329-0430

Sudbury, Ontario

1039 Regional Rd 24
+1 705 479-0114

AUSTRALIA

Brisbane, QLD

Level 1, 39 Sherwood Rd, Toowong
+ 61 7 3720 8321

Perth, WA

45 Ventnor Avenue, West Perth
+ 61 8 9429 8838

General information: info@mirageoscience.com

Licence installation issues: licensing@mirageoscience.com

Technical issues: support@mirageoscience.com

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CHAPTER 1

Introduction

This chapter provides an introduction and overview to Geoscience ANALYST, and provides download and installation instructions.

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About

Geoscience ANALYST is Mira Geoscience's 3D visualization and communication software for integrated, multi-disciplinary earth models and data sets.

Geoscience ANALYST is a unique standalone application allowing you to import 3D geoscientific data and models from standard industry formats, and to change visual parameters to perform contextual queries of data attached to any object.

Scope

This content contained here covers Geoscience ANALYST's entire user interface, including procedures designed to help you develop a working understanding of how to use the software.

By using a practical, task-based approach, the goal of this guide is to get you feeling comfortable using the numerous features of Geoscience ANALYST as quickly as possible so you can effectively incorporate it into your mining and exploration projects.

How to use this guide

It will be useful for you to be familiar with the following conventions used throughout this guide:

- **Bold** denotes clickable elements of the software, and is used for mouse and keyboard commands.
- *Italic* denotes non-clickable elements of the software. When not part of a task, *italic* can also denote elements of a mathematical formula, or simply an emphasized word.
- `Courier New` typeface denotes file names and folders.

System requirements

Operating system

Microsoft® Windows® OS (7 / 8 / 8.1 / 10) x64-bit.

Required hardware

- Processor: x64 architecture required.
- Graphics adaptor: 3D graphics adaptor supporting OpenGL® 3.2.

Recommended hardware

- Processor: Intel® Core i3, i5 or i7, Xeon® or better. AMD Ryzen™, Opteron™, Phenom™, A-series, E-series or better.
- Memory: 4 GB RAM or more.
- Hard Drive: 2 GB of free disk space.

Note: Large data sets will require more memory, hard drive space, and processing power.

Windows virtual machines are unlikely to work properly due to their limited graphics capabilities.

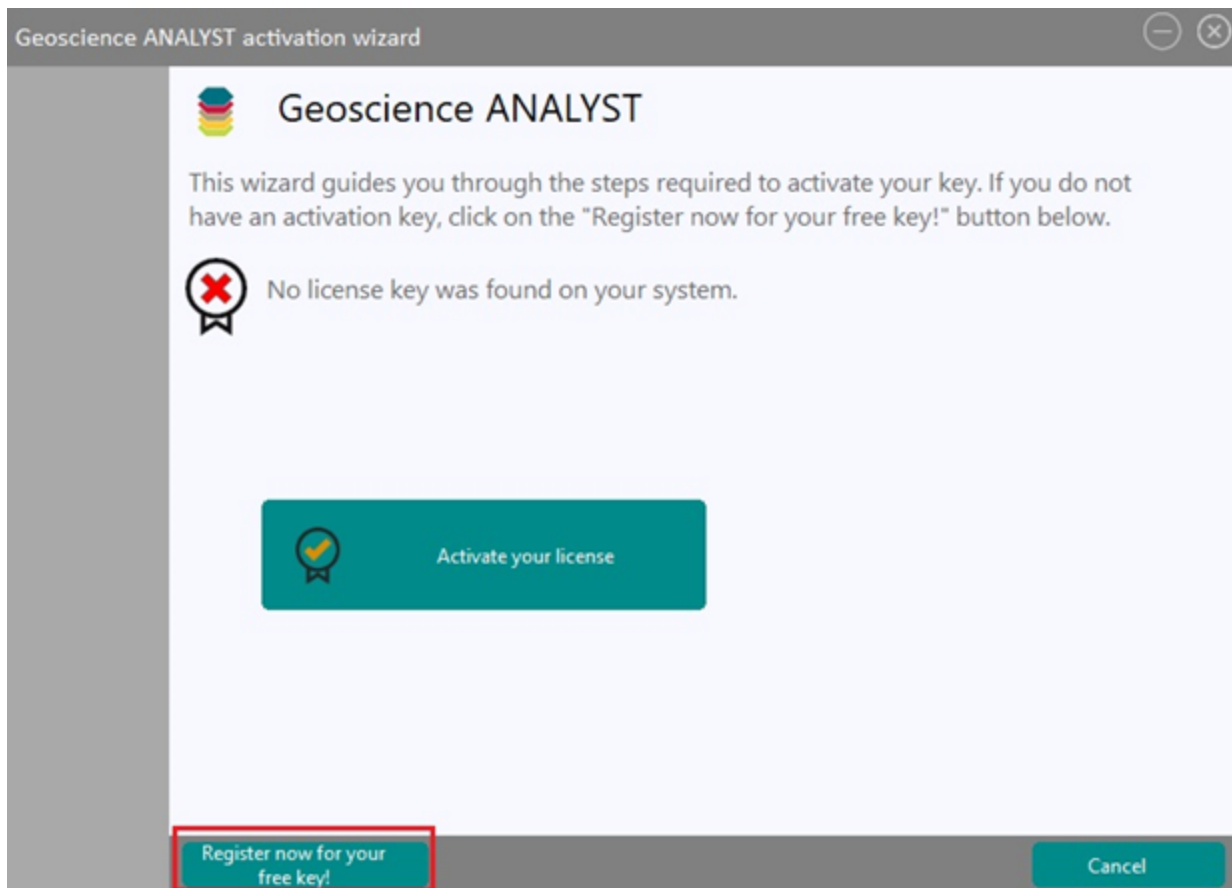
Geoscience ANALYST is untested with Boot Camp installs of Windows on Mac computers. Although some users have reported success with it, we do not provide support for it.

Activating your licence

The first time you open Geoscience ANALYST, the licence wizard will launch and guide you through the licence activation process.

To activate your Geoscience ANALYST licence:

1. Launch Geoscience ANALYST.
2. In the first window of the Geoscience ANALYST licence wizard, click **Register now for your free key!**



3. In the Geoscience ANALYST activation form, complete the fields and click **Send**.

Geoscience ANALYST

Fill-out this form to get your activation key by email. Online activation requires to read and store the information provided in this form along with the IP address of your computer.

Email address

First name

Last name


Company name

Email permissions

Mira Geoscience will use the information you provide on this form to be in touch with you and to provide information concerning your Geoscience ANALYST new releases and updates, and monthly tips. Please let us know if you are interested in getting Mira Geoscience's eNewsletter:

☐ eNewsletter

If you are no longer interested in getting emails about your software, click the unsubscribe link in the footer of any release, update or tip email you receive from us, or contact us at info@mirageoscience.com. We will treat your information with respect. For more information about our privacy practices please visit our website <http://www.mirageoscience.com/legals>. By clicking below, you agree that we may process your information in accordance with these terms.

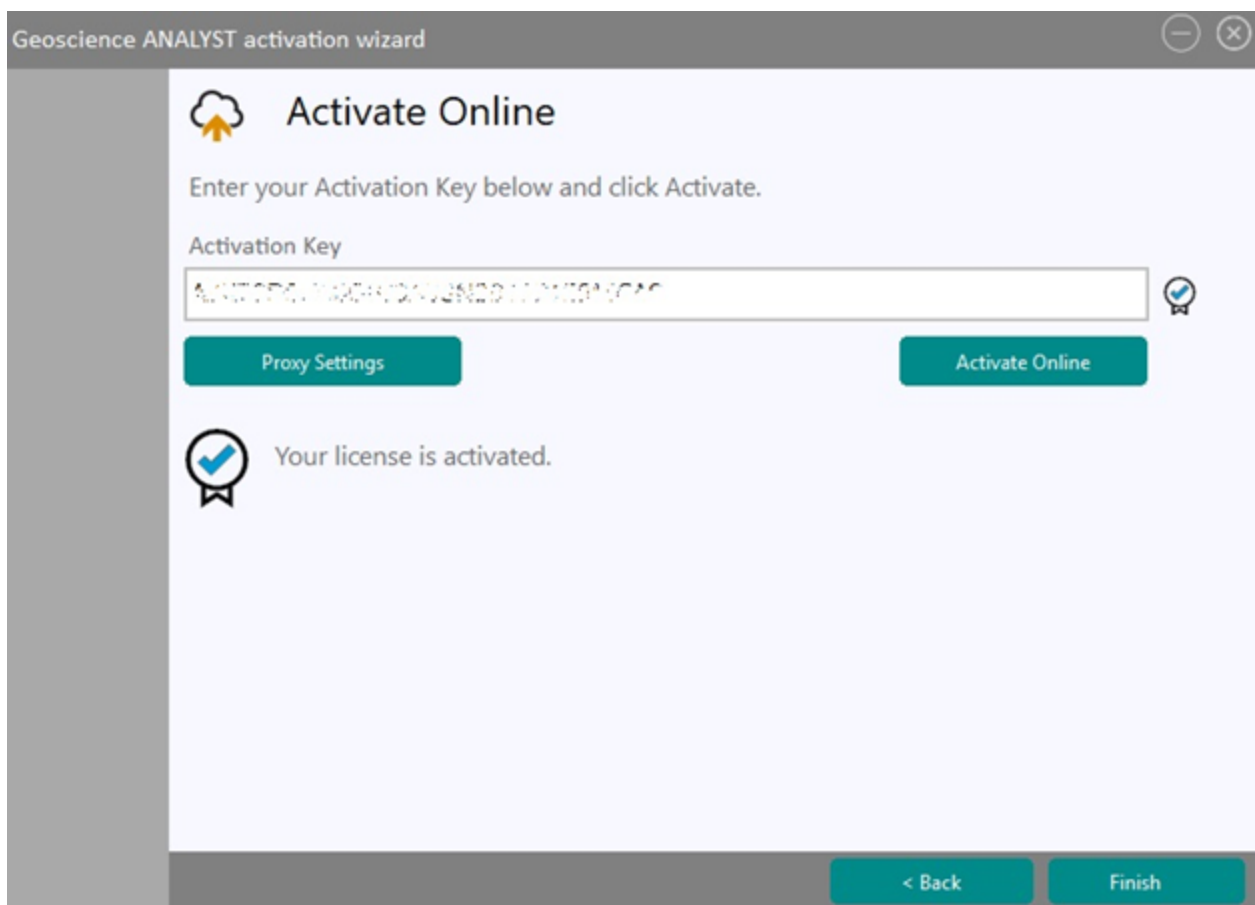


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4. In the Geoscience ANALYST licence wizard *Licence Key Activation* window, select *Activate online*.
5. Read and consent to the Privacy Policy.

6. Enter your activation key in the *Activation Key* field, click **Activate Online**, then click **Finish** once you see the blue check mark indicating the activation was successful.



CHAPTER 2

User interface

This chapter describes the elements that make up the Geoscience ANALYST user interface.

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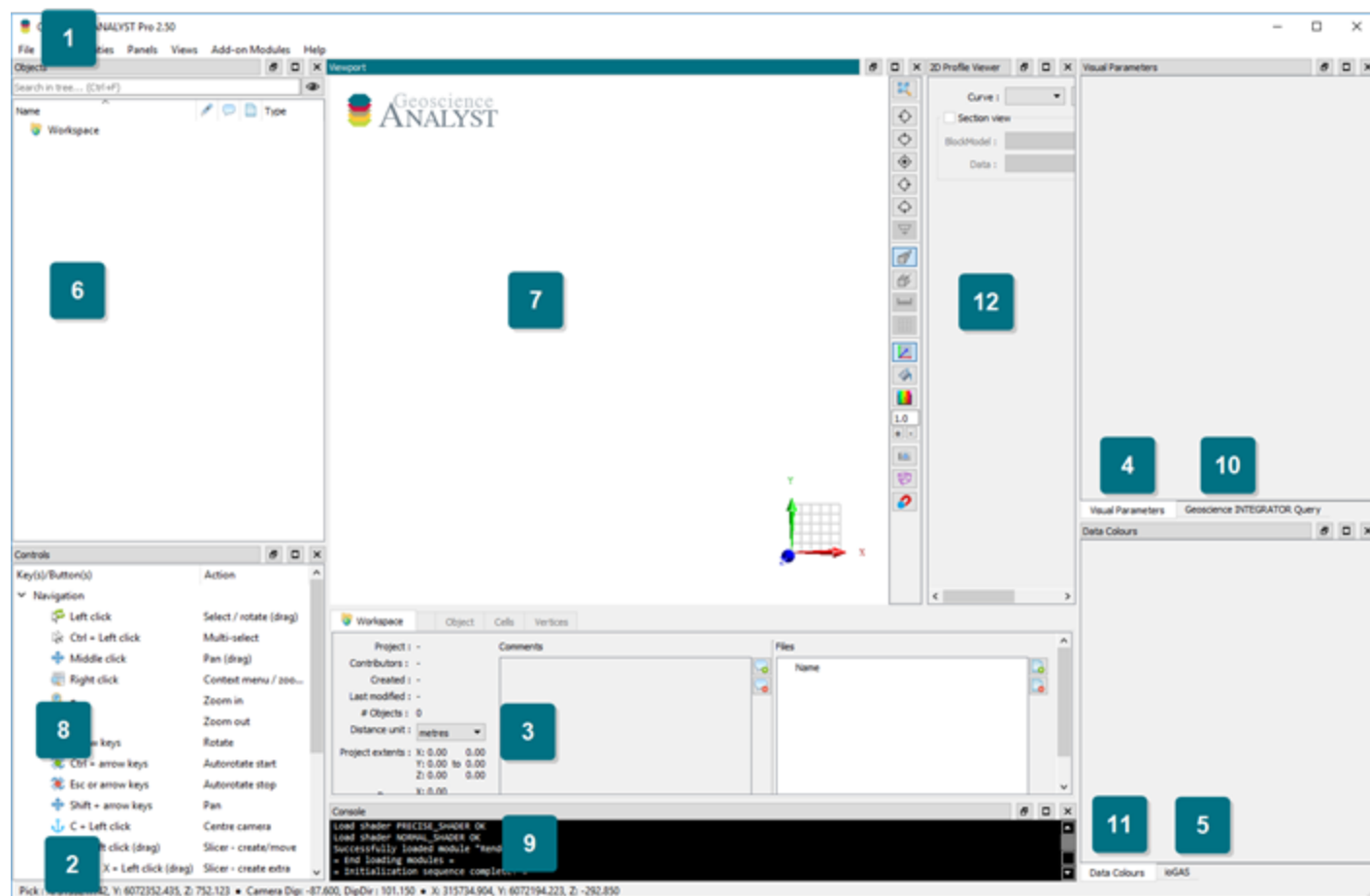


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Overview

An arrangement of panels makes up the Geoscience ANALYST user interface, each playing a specific role helping to both manipulate and interpret data related to the project. You can rearrange these panels side by side, stack them, or place them on top of each other by clicking and dragging them to your desired locations. You can close them by clicking the **X** at the top right, and then open them back into view through the **Panels** menu.



1

Menu bar

Contains the top level drop-down menus.

2

Coordinate display area

This panel provides real-time feedback on the x, y, z coordinates corresponding to the mouse movements and the Viewport's camera dip and dip direction parameters, as well as drillhole name and wireline depth. Saves and reports coordinates of the last *Pick* at the beginning of the display area.

3

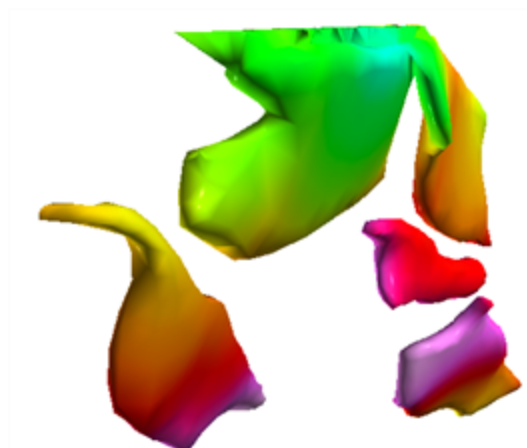
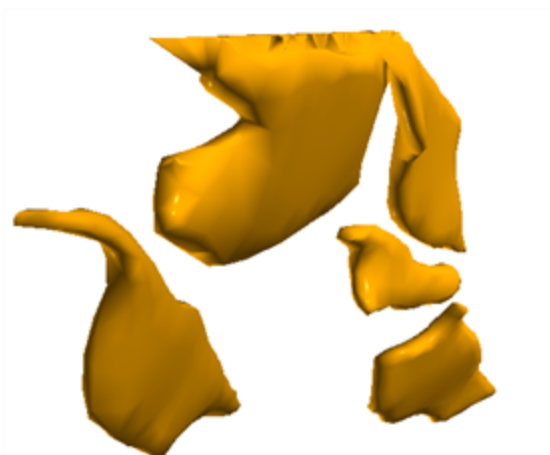
Data Table

This panel displays various levels of information related to the selected object's internal and folder structure. Selecting an object either in the Objects panel or directly in the Viewport performs one or all of the following functions:

- Highlights the data that corresponds to the object in the *Data Table*
- Displays the tab level and the object's immediate parent folder containing meta-data (summary information)
- Displays user comments and attached files

The *Data Table* contains tabs that correspond to the sub-levels of an object, such as nodes, triangles, cells, and logs.

Data level tabs consist of columns containing numeric (float, integer), time, text, and reference type data. By clicking the paint can tool at the top of the column, the object in the Viewport will be coloured by the data according to the Data Colours panel settings, as seen in the image below at right.



The active *Data Table* tab controls the highlight display on objects. For example, a surface with the object tab active will highlight every triangle, whereas the node tab will highlight the selected nodes as yellow cubes.

Selecting rows in the *Data Table*

Clicking on a row will:

- Highlight it
- Highlight the corresponding data point on the object in the Viewport

Holding **Ctrl** and clicking on multiple rows will:

- Multi-select subsequently clicked rows and highlight them
- Multi-select the corresponding data points on the object in the Viewport

Holding **Shift** and clicking on a row followed by another row will:

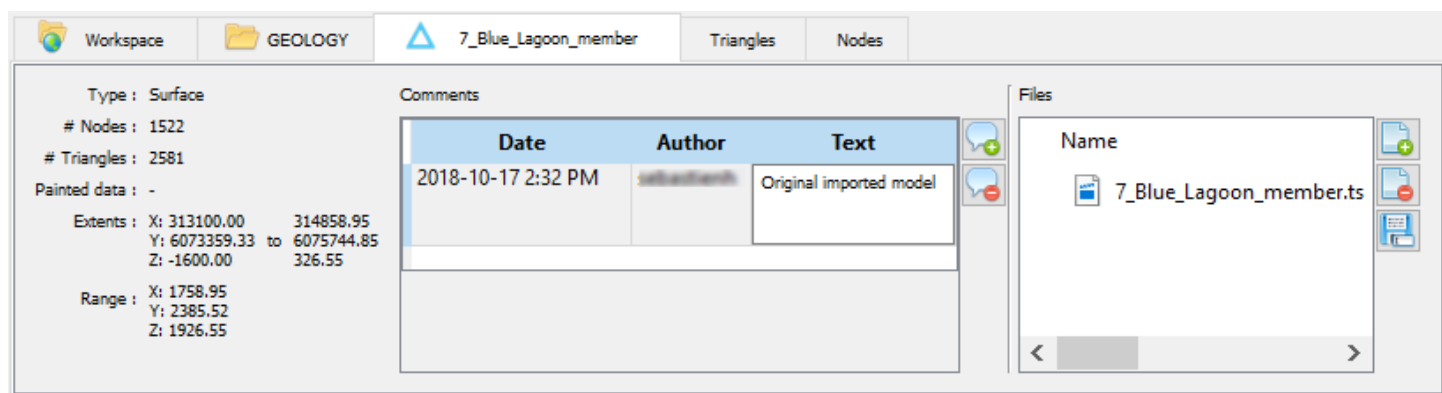
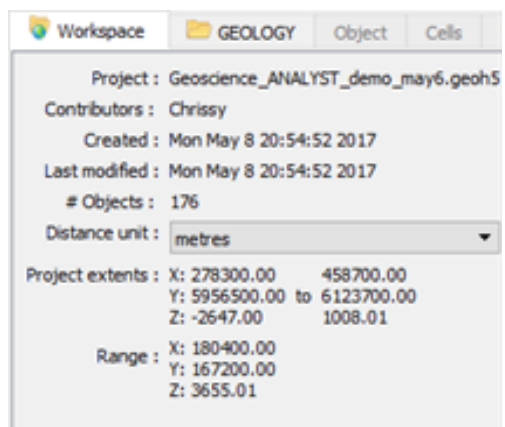
- Multi-select the two rows and any rows between them, and highlight them
- Multi-select the corresponding data points on the object in the Viewport

Sorting data in the *Data Table*

To sort the data between ascending and descending order, click in the header row of a column to toggle on and off the upward and downward facing triangles.

Data Table tabs

The information presented in the *Data Table* depends on the active object type and tab level (workspace, folder, object, or data). You can add, view, and delete comments and files associated with the workspace, folders, and objects (depending on the active tab).



Tab	Components
Workspace	Metadata associated with workspace such as name, contributors, relevant dates, units, and axis ranges.
Folder	Metadata related to the parent folder associated with the selected object.
Object	Metadata associated with the selected object, such as its type, number of nodes and triangles, and axis ranges.

Exporting *Data Table* values


You can save data from the *Data Table* in CSV format in two ways.

	X	Y	Z	x	y	z	alt_b	basemag	DEM
0	312349.705075480.20	0.00312349.75075480.0	375.6	81.10	58453.50	325.60			
1	312357.205075487.00	0.00312357.25075487.0	375.5	80.60	58453.50	325.90			
2	312364.705075493.80	0.00312364.75075494.0	375.4	80.30	58453.50	326.10			
3	312372.305075500.60	0.00312372.35075500.5	375.3	80.00	58453.50	326.40			
4	312380.005075507.40	0.00312380.05075507.5	375.3	79.90	58453.50	326.50			
5	312387.605075514.20	0.00312387.65075514.0	375.4	79.90	58453.50	326.60			
6	312395.405075521.00	0.00312395.45075521.0	375.6	80.00	58453.50	326.70			
7	312403.10 6075527.70	0.00 312403.1 6075527.5	375.8	80.10	58453.50	326.70			
8	312410.90 6075534.40	0.00 312410.9 6075534.5	376.1	80.40	58453.50	326.80			

To export a subset of data from the *Data Table* to the clipboard,

1. Select the desired rows
2. Press **Ctrl+C** to copy
3. Open a program such as Excel, Notepad, etc
4. Press **Ctrl+V** to paste.

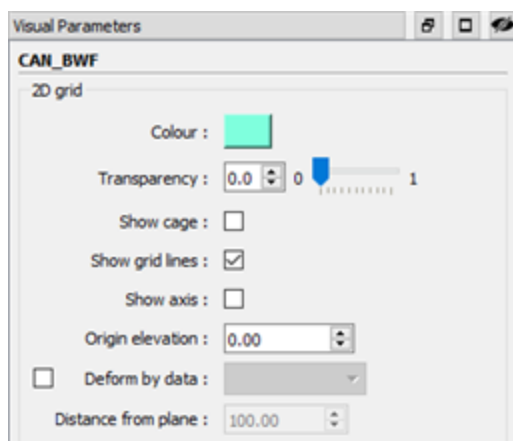
To export an entire table from a tab in the *Data Table* to a CSV file,

1. Click the **Export table to .csv** button  to the left of the displayed table
2. Save it to your desired location.

4

Visual Parameters panel

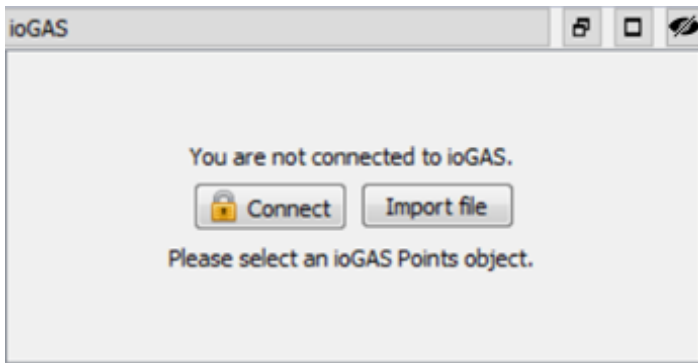
In this panel you can modify and adjust the appearance of selected objects in the Viewport. The list of parameters is specific to the object type, but some are available across multiple objects such as the colour and the level of transparency.



See [Object types](#) for more information regarding object types and their parameters.

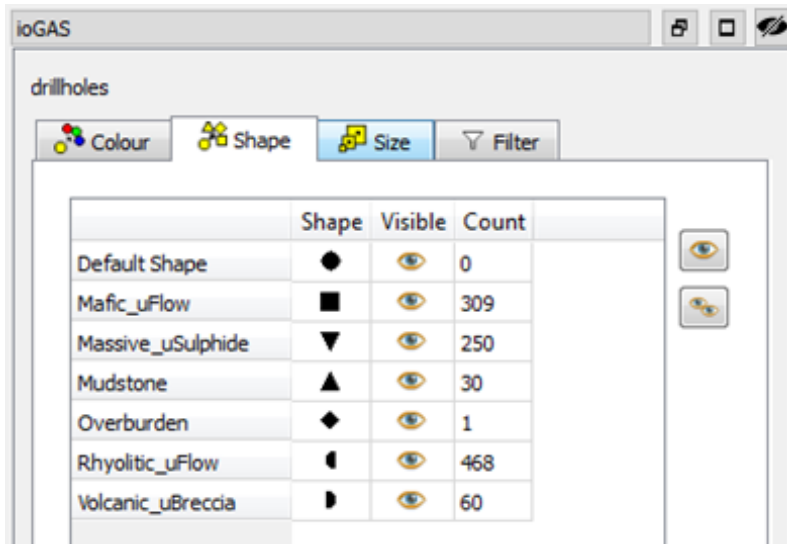
5 ioGAS panel

The ioGAS panel presents various graphical settings available on ioGAS points objects. Press **Connect** to establish a live link with ioGAS (requires the ioGAS link module and Geoscience ANALYST Pro) or press **Import file** to import an ioGAS `.gas` file.



Tip: You can import `.gas` files through the **File / Import** menu as well as simply dragging and dropping the file into the Viewport or Object panel.

Selecting an ioGAS Points object will trigger the panel to update and will display the available colour, shape, size, and filter settings (similar to ioGAS Attribute Manager). When you activate the ioGAS graphics Visual Parameters settings, the nodes will be displayed using these symbols, otherwise they will be displayed using Geoscience ANALYST's normal attribute settings.



To display only the nodes that have specific attributes, click the desired colour, shape, size or filter rows (hold **Ctrl** or left-click and drag to multi-select), then press the **Show selected** button

Only the nodes that have the selected attributes will be displayed, indicated by the eye in the *Visible* column.

The nodes that are not included in a visible row will be invisible. Click the **View all** button to turn on all of the nodes that have an attribute applied to them. The *Count* column indicates how many nodes are included under that attribute setting.

See the [ioGAS Link](#) section in the Geoscience ANALYST Pro chapter for detailed information about ioGas Link.

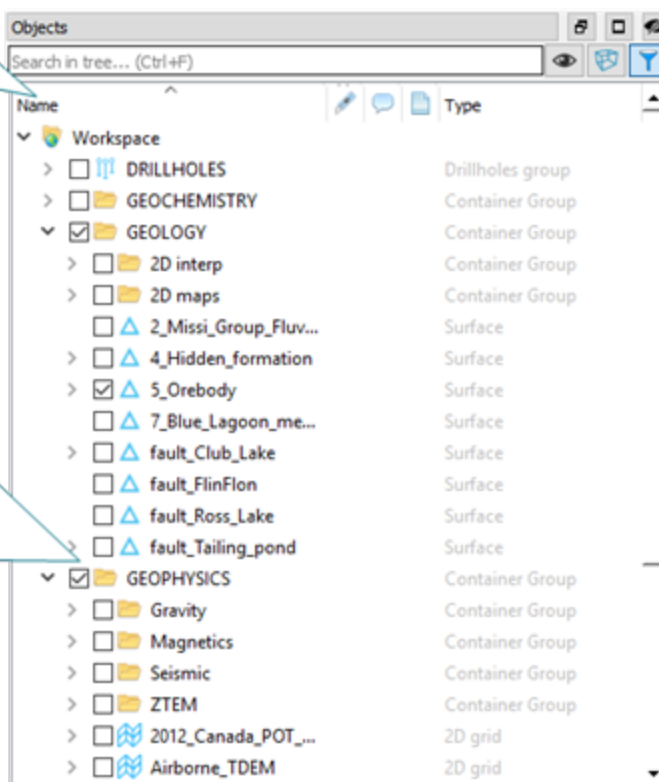
6 Objects panel

This panel lists all the objects, tools, and data available in your workspace.

The **Name** column categorizes each element in the workspace at the folder level, while the **Type** column indicates the file and data types.

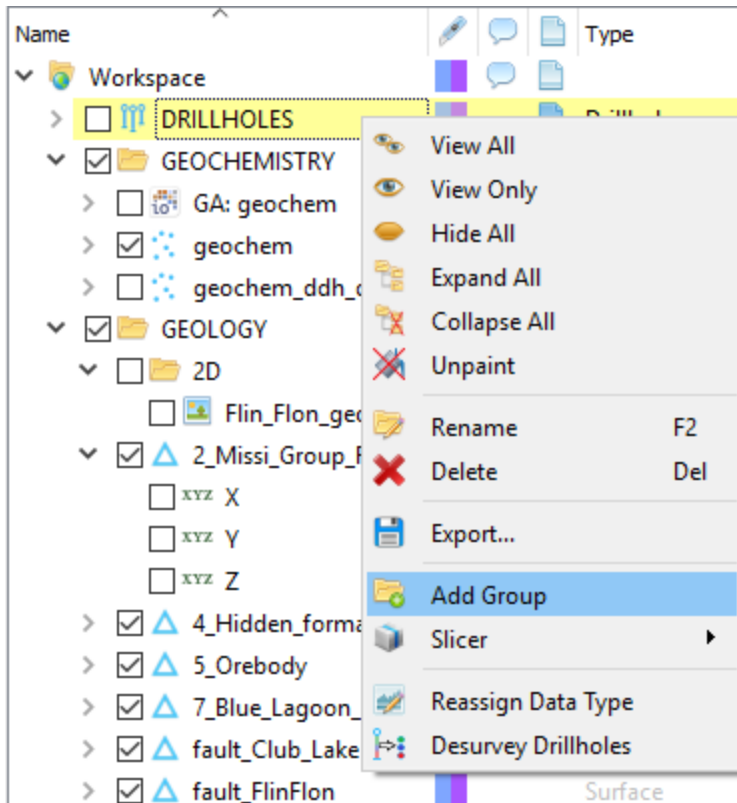
To show and hide objects in the Viewport from the objects panel:

1. In the name column, locate the item corresponding to the object you wish to show or hide in the viewport.
2. In the file's check box next to the entry item, toggle on to show the object and off to hide it.



Note: Highlighting an item in the *Name* column of the Objects panel will select the corresponding object in the Viewport, and vice versa (both will be highlighted in yellow).

You can customize and organize your workspace by creating generic container folders within the existing folders that contain data related to your project. To do this, right-click a parent folder and select **Add group**. You can then name the new folder and drag and drop it to the appropriate location within the object tree.

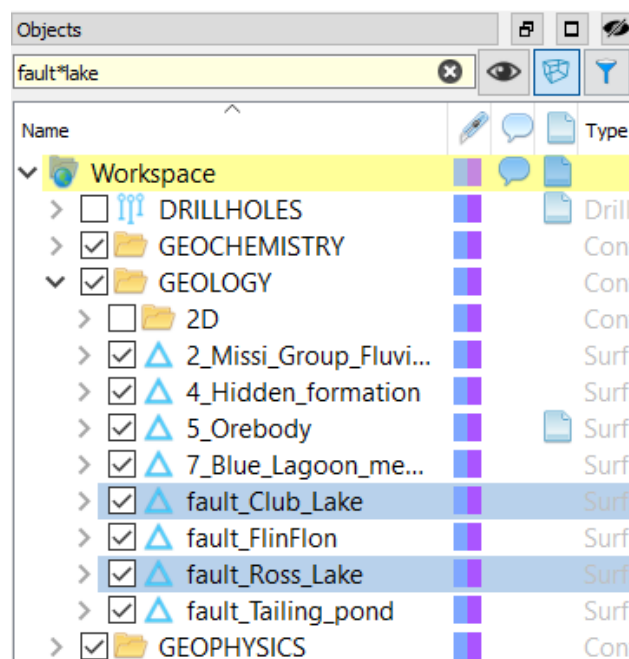
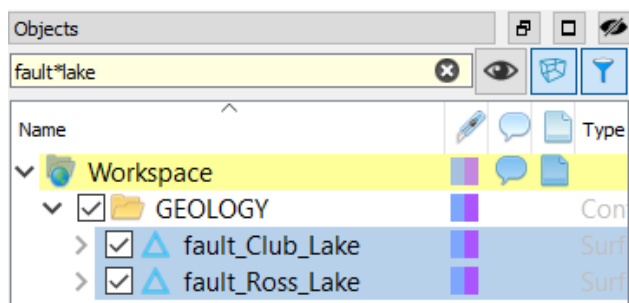


The Object panel's hierarchy is: Folder / object / data. The image above demonstrates this structure and includes some of the icons associated with each level.





Click the arrow in the *Name* and *Type* columns to alphabetically sort the entire list of items.

Searching in the object tree

The search box at the top of the object panel allows you to quickly find group, objects or data from their name. For quick access, press **Ctrl+F** and directly type the name you want to search for. Results of the search query are highlight in blue.

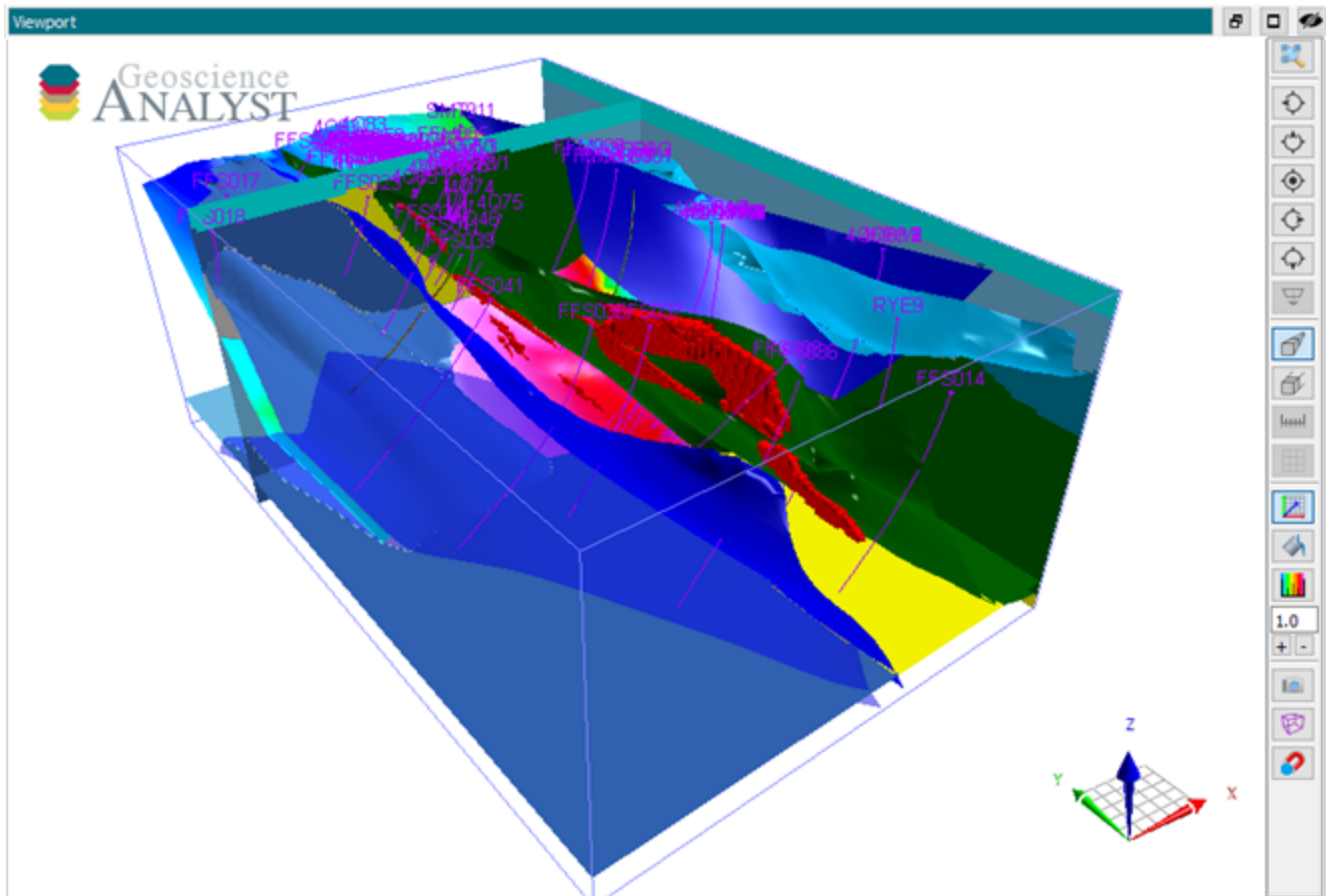


Objects search buttons

Button	Tooltip	Description
		Cancels the search, effectively removing all blue highlights.
	Show search results ONLY	Show in the current active Viewport only the objects returned by the search query, and hide all the other ones.
	Show bounding boxes of results	Shows / Hides in the Viewports blue bounding box(es) for objects returned by the search query. The bounding box(es) will show on all Viewports, even if the objects themselves are not displayed in the Viewport.
	Filter search	filter out from the tree the objects that are not matching the search query. Toggle it off to see again all the objects in the tree.

7 Viewport

The Viewport panel is the 3D space where you view, select, and manipulate objects and models. The vertical toolbar located at the right of the panel provides numerous options and tools to control how you view objects in your workspace.



Selecting objects

Left-clicking an object in the Viewport performs two functions:

- Selection of the object
- Updates selections on corresponding panels

Left-clicking while holding down **Ctrl** allows you to multi-select objects in the Viewport.

Left-clicking the Viewport background will select the **Workspace tab** in the *Data Table* panel and the workspace folder in the Objects panel.

Viewing objects

There are several ways to manipulate the Viewport camera to visualize objects:



Rotate on x, y, z axes (left mouse button)










Pan (middle mouse button), Zoom (mouse wheel)



Zoom (right mouse button)

Viewport toolbar buttons

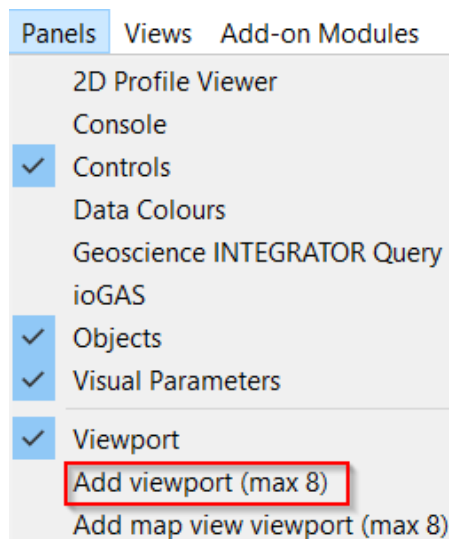
Button	Tooltip	Description
	Global view	Adjusts limits to display all visible objects.
	Look west	Displays the view from the east.
	Look north	Displays the view from the south.
	View from top	Displays the view from the top.
	Look east	Displays the view from the west.
	Look south	Displays the view from the north.
	Look orthogonal to slicer	Adjusts the view to look straight at the active or most recently created slicer.
	Perspective view	Widens the perspective of the Viewport's lens so that objects further from the centre appear smaller. Parallel lines will converge at a distance.
	Parallel view	Objects display isometrically with no size distortions regardless of distance from the lens. Parallel lines will always appear parallel without converging.
	Scale bar	Available when in parallel view; activate to add a scale bar in the lower left area of the Viewport.
	Show grid lines	Displays dynamically coloured, annotated grid lines. Available when in preset views (looking down, north, south, east or west) and in parallel mode. y coordinates are green, x are red, and z are blue to match the x, y, z axis arrows.

Button	Tooltip	Description
	x, y, z axis	Toggles on and off the x, y, z coordinate axis icon.
	Background colour	Allows you to customize the background colour.
	Colour bar	Toggles on and off the colour map that displays the active or most recently-selected painted data.
	Vertical exaggeration	Visually stretches the z dimension of objects. Useful for enhancing flat or regional features.
	Snapshot	Takes a snapshot of the Viewport contents and creates an image file.
	Show selection bounding box	Displays a magenta outline surrounding selections.
	Snap to nearest node or interval top / bottom	Functions requiring digitizing in the Viewport (including tape measure and labels) will snap to the nearest object node or closest interval top or bottom when digitizing on painted drillholes.

Multiple Viewports

Geoscience ANALYST allows you to open additional Viewports within a single workspace, and organize them as you would any other panels: either side by side, or stacked. You can also drag them to a second monitor outside of the main Geoscience ANALYST software window.

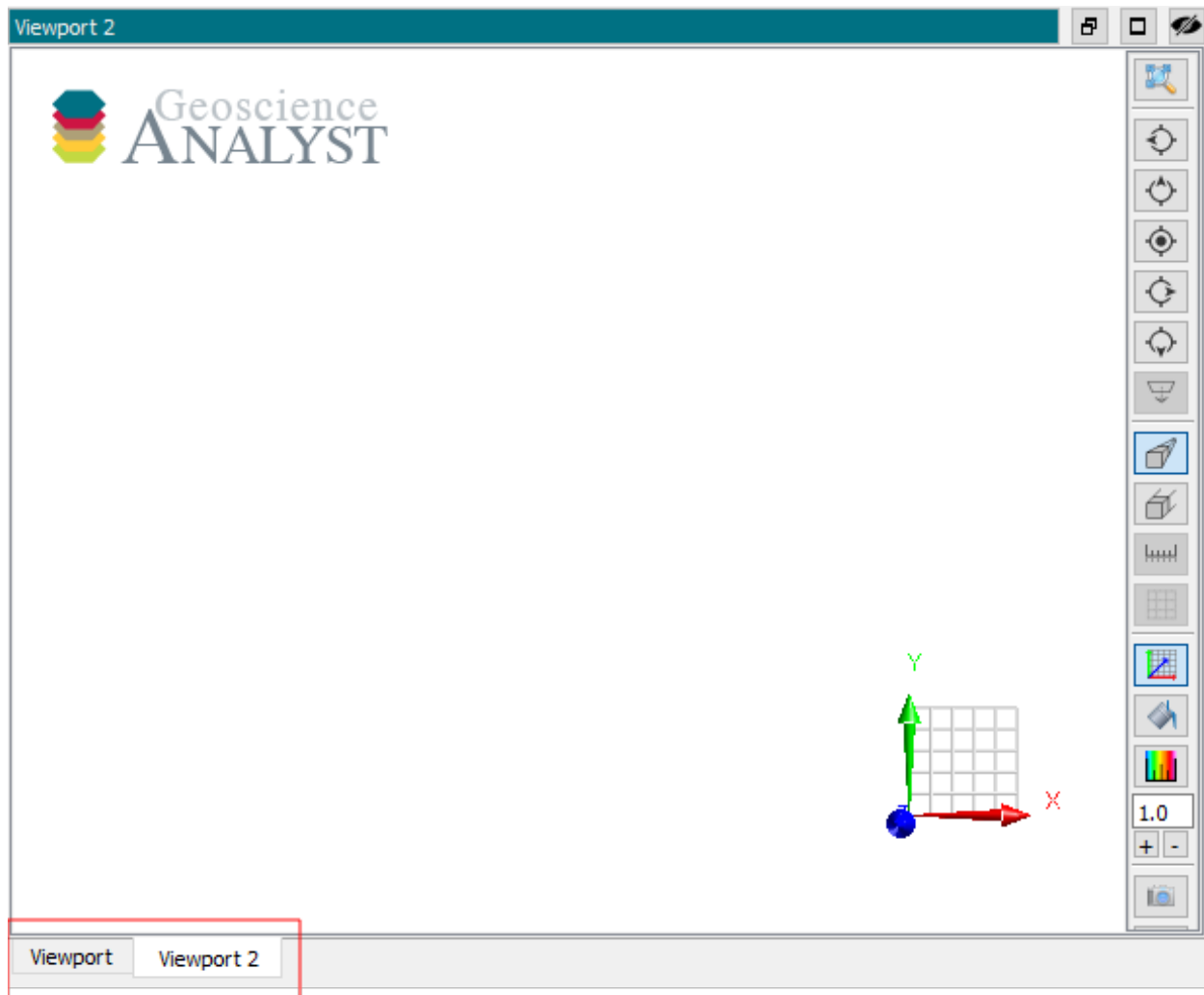
Showing and hiding objects or data from the Objects panel updates the view on the current active Viewport. Having multiple Viewports allows you to view side by side different sets of objects, or the same objects with different painted data. To do so, go to **Panels / Add viewport (max 8)**.



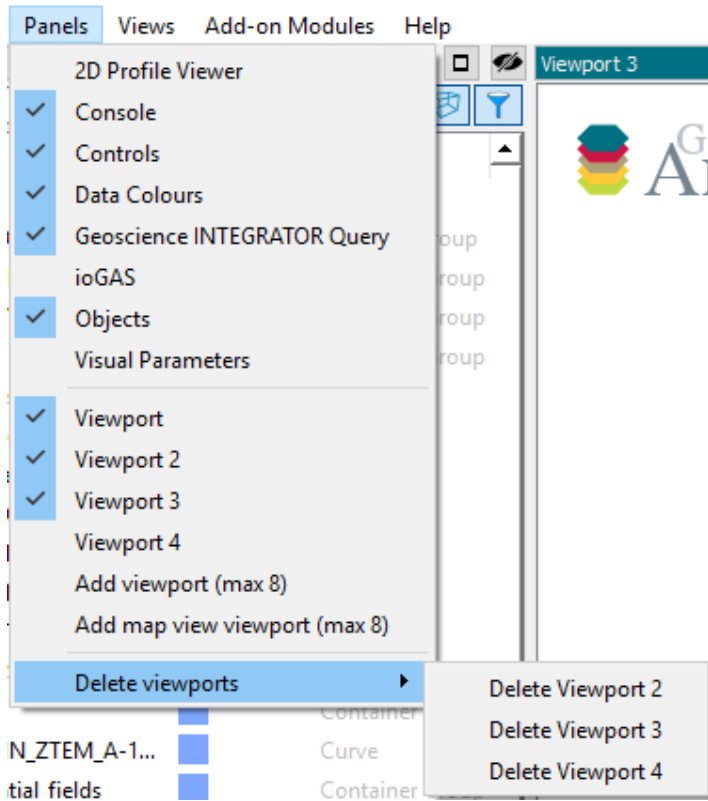
This will create a new 3D Viewport. Choose **Add map view viewport (max 8)** instead to create a Viewport for a [2D map view](#).

You will see the new Viewport(s) as tabs at the bottom of the Viewport panel. You can drag and drop them to view two or more concurrently. The header bar of the selected Viewport will appear a dark teal colour to indicate it is active.

When you select a Viewport, all surrounding panels will instantly update to reflect the data of the selected Viewport.



Viewports are not deleted when closed; they are hidden. You can restore them from the Panels menu by clicking the instance of Viewport you want to display. Click **Delete Viewport** to permanently delete a Viewport. You can display and hide Viewports by toggling on and off the check mark next to the respective Viewport in the contextual menu.



You can hide Viewports by clicking the button at the top right.



Map view Viewports

Map views are useful for displaying 2D map data (for which X and Y but not Z are defined), such as data originating from mine level plans or topographic maps. 3D objects may also be displayed in the Geoscience ANALYST 2D map *Viewport*, in which they appear projected onto the map view.

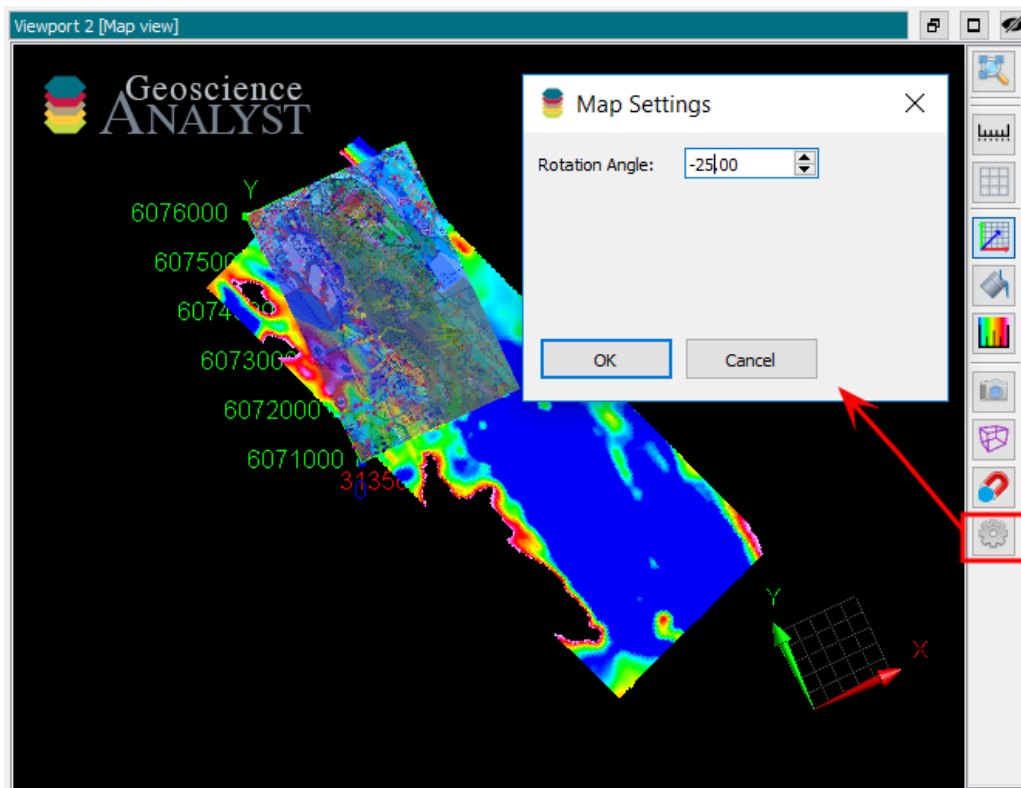
Note: Any geometric operation on a 3D object displayed in map view will use the true Z value. When moving the mouse over, the cursor information shows the actual Z coordinate.

In a map view, objects are displayed in a specific order, according to a priority based on their type: block meshes and surfaces have the lowest priority, then drillholes and lines, and finally points have the highest priority.

Objects of the same type are displayed in the order they were toggled on, from the object tree: the object toggled on last is displayed on top other objects of the same display priority.

Tip: To bring a surface on top of others, simply hide it and show it again.

In a map view, rotations are locked. You can use either the left or the middle mouse button to pan the view. The rotation angle around the vertical axis is fixed and defined through a settings dialogue, accessible from the *Viewport* toolbar.



Controls panel

Located at the lower left of the interface, the Controls panel is a master list containing the following:

- Navigation key commands and mouse buttons with corresponding actions
- The commands to create and manage labels, slicers, views, and tape measures

Key(s)/Button(s)	Action
Navigation	
Left click	Select / rotate (drag)
Ctrl + Left click	Multi-select
Middle click	Pan (drag)
Right click	Context menu / zoom (drag)
+	Zoom in
-	Zoom out
Z	Zoom in
Shift + Z	Zoom out
Arrow keys	Rotate
Ctrl + arrow keys	Autorotate start
Esc or arrow keys	Autorotate stop
Shift + arrow keys	Pan
Shift + W-S-A-D	Pan
C + Left click	Centre camera
X + Left click (drag)	Slicer - create/move
Shift + X + Left click (drag)	Slicer - create extra
X + mouse wheel/arrow k...	Slicer - move along normal
Ctrl + F[1-10]	Save view
F[1-10]	Load view
L + Left click (drag)	Create label
T + Left click (drag)	Create tape measure
T	Show/hide tape measure
I + Left click	Query Imago in browser
Ctrl + C	Copy viewport to clipboard
P + Left click	Create points
O + Left click	Create curve
S + Left click	Create surface
E + Left click	Edit object

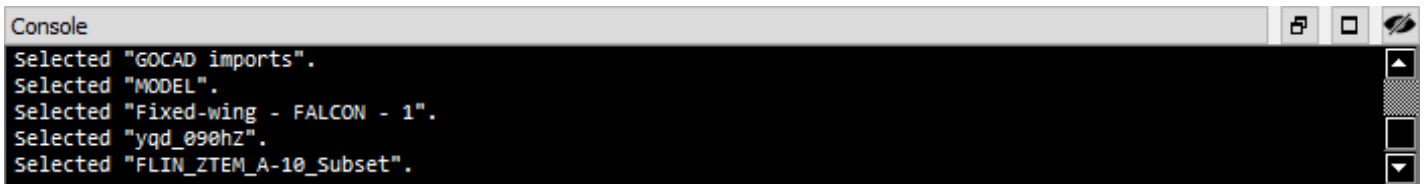
Actions performed in the Viewport will highlight the command in yellow simultaneously in the Controls panel.

With a Geoscience ANALYST Pro licence activated, all of the available object creation and editing functions will display here for reference.

Console panel

This panel contains the following:

- General program and command related-information during a Geoscience ANALYST session.
- Warning messages in yellow, error messages in red. Messages will automatically open the Console panel if it is hidden.



```

Console
Selected "GOCAD imports".
Selected "MODEL".
Selected "Fixed-wing - FALCON - 1".
Selected "yqd_090hz".
Selected "FLIN_ZTEM_A-10_Subset".
  
```

Tip: Consult the console for information if commands and imports do not execute as expected.

Geoscience INTEGRATOR Query panel

This panel allows you to connect to your Geoscience INTEGRATOR server. Geoscience ANALYST is the 3D front end to query and visualize data from Geoscience INTEGRATOR, the software solution by Mira Geoscience for 4D multi-disciplinary exploration and geotechnical data management. See the [dedicated section](#) for detailed documentation on how to connect and to query data.

Data Colours panel

This panel provides options to associate an object's data with specific colour settings, defined via a mapping function or set manually.

The display and available options in the Data Colours panel correspond to the selected and painted data in the Viewport and *Data Table*.

The Data Colours table consists of two interfaces. The histogram view and graph view display when the painted data is float or integer data. The reference data view displays when the painted data is reference data.

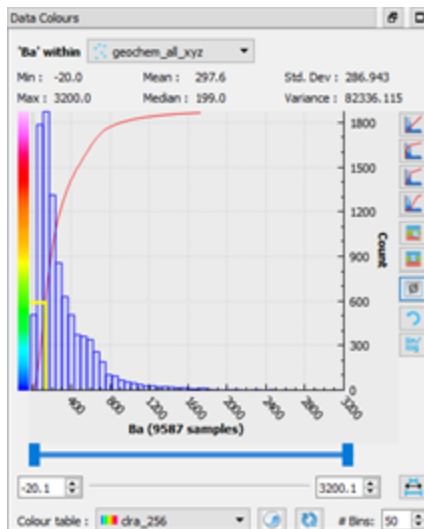
Histogram view: Float and integer data

To display the histogram view in the Data Colours panel, select one or both of the following:

- An object in the Viewport (or its corresponding list entry in the Objects panel)
- A column of float and integer data in the *Data Table* (click the paint can tool)

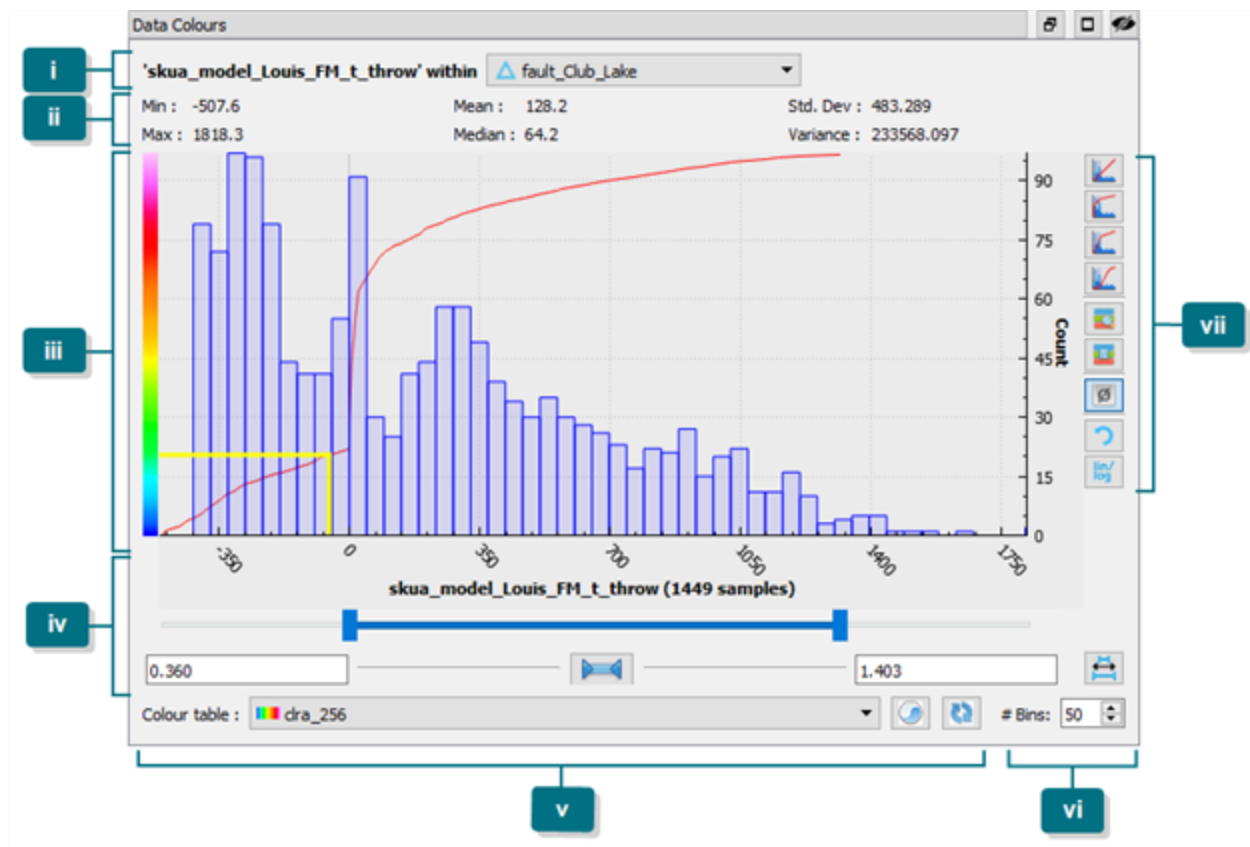
The basic features and functionality of the histogram view are detailed in the images below:

Histogram and graph view



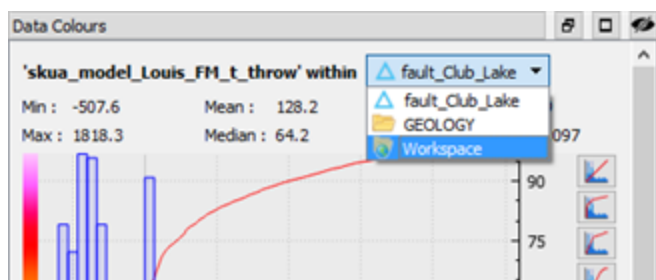
Reference data view

Colour	Class	Count
0	Unknown	
1	1_Air	147234
2	2_Missi_Group_Fluvial_sediments	532259
3	3_Louis_formation	15572
4	4_Hidden_formation	558829
5	5_Orebody	1592
6	6_Millrock_member	287905
7	7_Blue_Lagoon_member	559413
8	8_Club_member	49303



i. Toggle folder menu

This drop-down menu changes the folder level of the selected data. This feature is particularly useful for examining statistics on an individual drillhole versus an entire drillhole group. You can analyze all the drillholes that are in the parent group of the selected drillhole or all the drillholes in the workspace.



ii. Statistics

This section displays the statistics of the selected data. The number of samples displays to the right of the theme name along the bottom of the x-axis.

iii. Histogram and graph

This section displays the histogram data on the x and y axes. The x-axis represents the data range. There are two y-axes:

- The left side represents the user-defined colour bar.
- The right side represents the count.

The yellow right angle line indicates the point of intersection of the selected data value and the corresponding colour.

The red line represents the colour mapping function.

By default, the histogram contains 50 bins.

iv. Data filter slider

This slider controls the low and high clipping values of the data displayed. When objects are painted by data, the values within the limits of the slider will be coloured. On the values below (left) and above (right) the slider bars will appear either grey or transparent, depending on the **Hide nodata/filtered** values setting.

You can set the exact clipping values by entering them in the value boxes at the left and right sides of the data filter bar.



Reset clip values: Click this button to remove the filtering and reset the data filter bar.

v. Colour table menu

This drop-down menu contains a selection of preset colour tables that allow you to paint objects.



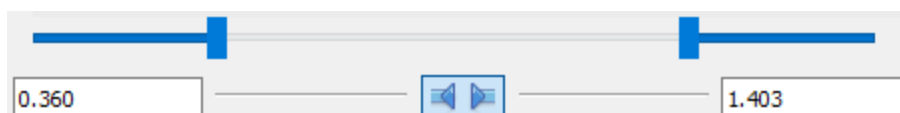
Invert colour table: Switches to the complementary colours of the selected colour table.



Flip colour table: Reverses the colour table, switching the low and high colours.



Inside / Outside range: Displays data outside the defined range. When toggled on, the range is inverted, from displaying results inside the cursors, to outside the cursors.



Tip: You can design custom colour tables by creating ASCII files with three columns, a fixed header, and the RGB values normalized to 256. Save the file in the directory where you have installed Geoscience ANALYST (by default, C:\Program Files\Mira Geoscience\Geoscience ANALYST\tbl).

vi. Bin selection


This value box allows you to specify the number of bins (up to a maximum of 500) displayed in the histogram.

vii. Colour mapping transformations


This section contains:





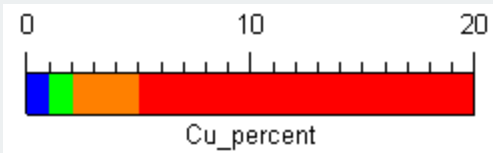


- Four colour mapping transformation functions that determine how colours map to data values
- Two options to load and save custom colour settings
- Hide no-data / filtered values option
- Revert colour settings option
- Toggle scale option



These features allow optimization of data visualization in the Viewport by customizing the colour stretching.

Tip: To view the colour range in the Viewport, click the colour bar button  on the Viewport toolbar menu.

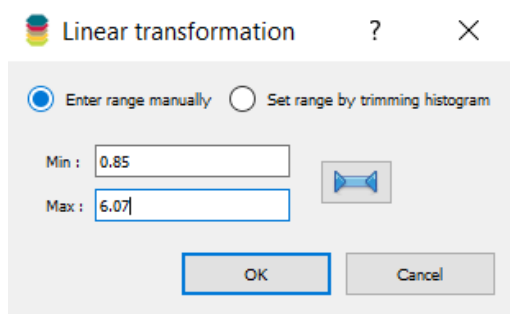
See the table below for a description of each.

Button	Tooltip	Function
	Linear transform	Divides the range of data values linearly into even increments.

Button	Tooltip	Function																								
	Logarithmic transform	Divides the range of data values according to a ln(x) scale (logarithmic normal), and assigns values linearly, and uses the inverse of the log of those values on the colour mapping curve.																								
	Equal area transform	Statistically determines the colour mapping curve so that each colour is evenly distributed across the nodes, cells, triangles, intervals or segments on the painted object.																								
	Cumulative distribution function transform (CDF)	Assumes that the selected data are normally distributed and calculates the colour zoning based on a user-defined normal distribution.																								
	Load colour settings	<p>Click to load a custom colour settings (.clr) or zone (.zon) file, which maps specific data ranges to a defined colour. The format is: start / end value; R, G, B values normalized to 1. If the values range from 0 to 255, add the string <i>int</i> to the header line. The values in the table below will create the <i>Cu-percent</i> colour setting.</p> <table><thead><tr><th>Start</th><th>Red</th><th>Green</th><th>Blue</th></tr></thead><tbody><tr><td>0</td><td>0</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td><td>0</td></tr><tr><td>2</td><td>1</td><td>.5</td><td>0</td></tr><tr><td>5</td><td>1</td><td>0</td><td>0</td></tr><tr><td>20</td><td>1</td><td>0</td><td>0</td></tr></tbody></table> <div><p>Cu_percent</p></div> <p>Geoscience ANALYST supports {red green blue} or {blk cyn mag yel} columns. The file needs a .tbl extension.</p>	Start	Red	Green	Blue	0	0	0	1	1	0	1	0	2	1	.5	0	5	1	0	0	20	1	0	0
Start	Red	Green	Blue																							
0	0	0	1																							
1	0	1	0																							
2	1	.5	0																							
5	1	0	0																							
20	1	0	0																							
	Save colour settings	Saves a .clr file (colour settings file) to your system.																								
	Hide nodata/filtered values	Renders no data and filtered data transparent. Toggled on, the background is blue. Toggled off, the background is grey.																								

Button	Tooltip	Function
	Revert colour settings	Restores the original colour mapping scheme. Functions like an undo.
	Toggle scale type	Switches the histogram x-axis (data) scale (and binning) from linear to logarithmic.

When you click a colour mapping transformation button, the appropriate dialogue box will appear, such as the *Linear transformation* box. By default, the Min / Max entries for linear, logarithmic, and equal area transformation options will display the low and high values of the data filter slider.



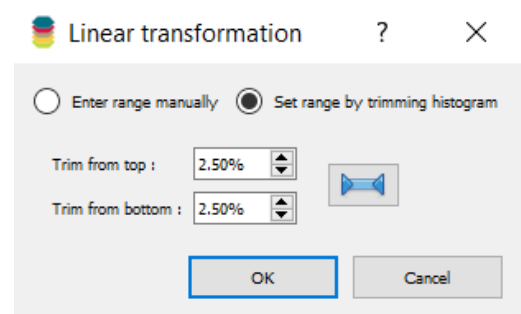
Linear transformation ? X

☒ Enter range manually ☐ Set range by trimming histogram

Min : 0.85

Max : 6.07

OK Cancel



Linear transformation ? X

☐ Enter range manually ☒ Set range by trimming histogram

Trim from top : 2.50%

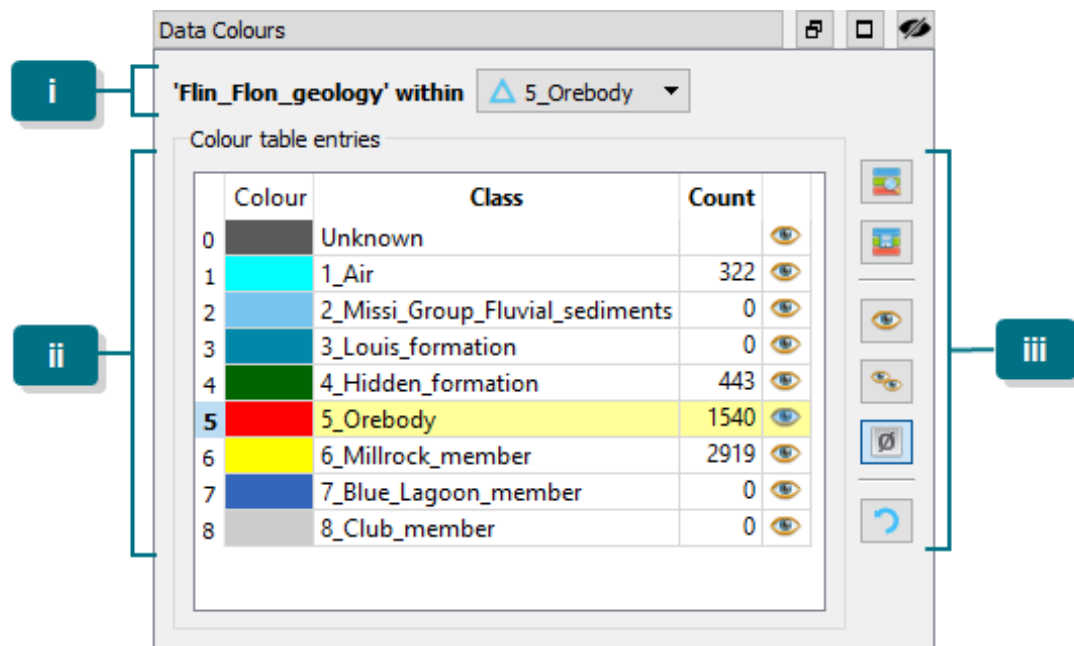
Trim from bottom : 2.50%

OK Cancel

Tip: Toggle the **Inside / Outside range** button  to compute the transformation from values outside of the selected range.

Reference data view

Selecting reference data through the Objects panel, Viewport, or *Data Table* will open the reference data view in the Data Colours panel. The  icon represents reference data in the Objects panel.



i. Toggle folder menu

This drop-down menu changes the folder level of the selected data. This feature is particularly useful for examining statistics on an individual drillhole versus an entire drillhole group. You can analyze all the drillholes that are in the parent group of the selected drillhole or all the drillholes in the workspace.







ii. Colour table entries

This table displays the following:

Column 1	Integer key values mapped internally to each colour classification.
Column 2: Colour	Colour class (user-defined). Edit by clicking a colour and navigating the <i>Select colour</i> window.
Column 3: Class	Class names. Edit by renaming directly in the table.
Column 4: Count	The number of samples or occurrences of each class within the selected data population.
Column 5	Toggle on and off the eye to view the class on the object in the Viewport.

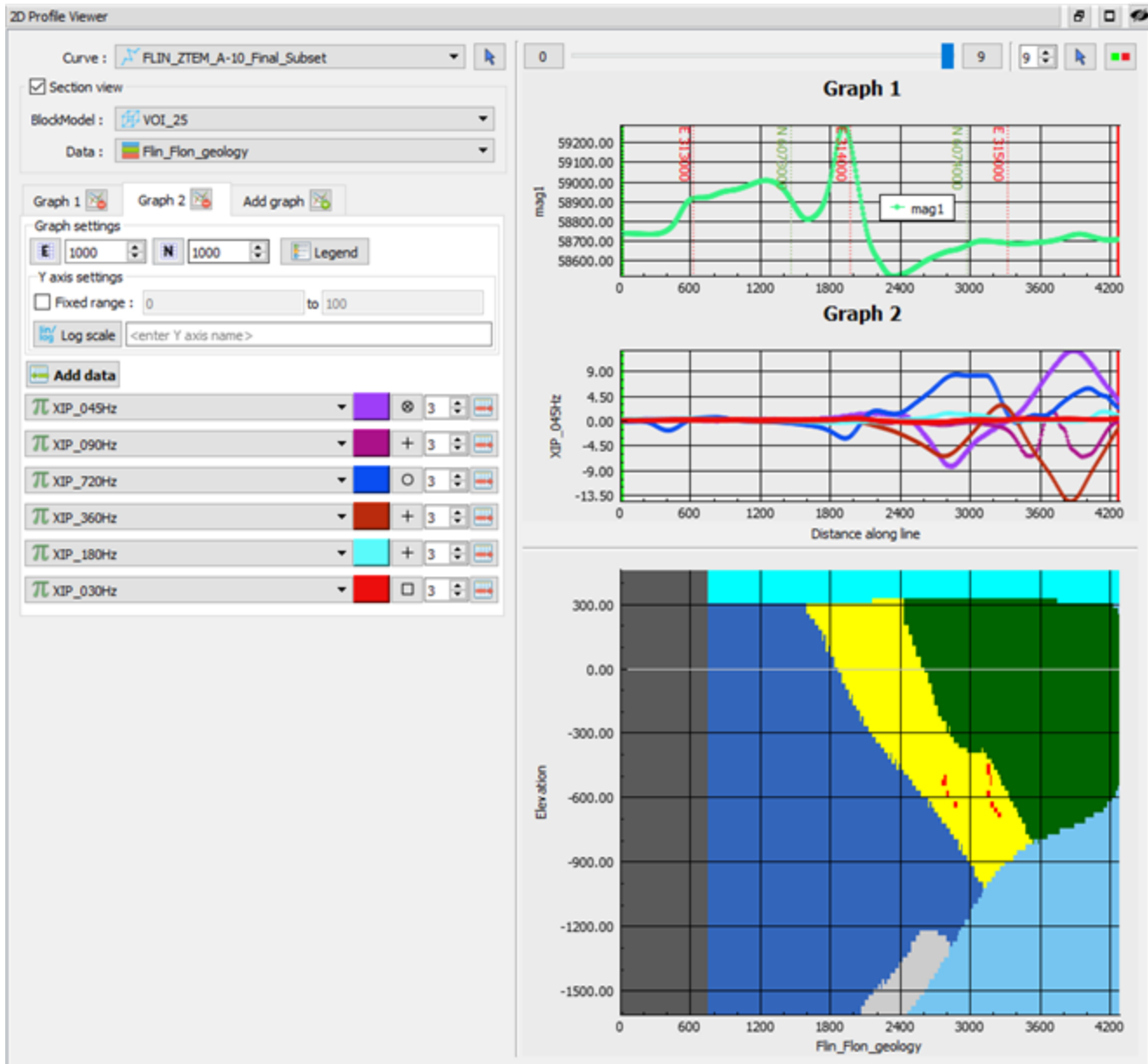
Reference data selected on an object, either directly in the Viewport or via the *Data Table*, will be highlighted in yellow on the colour table entries.

iii. Colour settings and view options

Button	Tooltip	Description																								
	Load colour settings	<p>Loads a classification CSV file. This will update the colours and class names and will rename and re-colour the matching key values according to the entries found in the file. The format is: key values; "class name"; R, G, B values normalized to 1. A sample file that will produce the above reference data scheme is:</p> <table> <tr> <td>1</td><td>"1_Air"</td><td>,0,1,1</td></tr> <tr> <td>2</td><td>"2_Missi_Group_Fluvial_sediments"</td><td>,0.462745,0.772549,0.945098</td></tr> <tr> <td>3</td><td>"3_Louis_formation"</td><td>,0,0.533333,0.666667</td></tr> <tr> <td>4</td><td>"4_Hidden_formation"</td><td>,0,0.392157,0</td></tr> <tr> <td>5</td><td>"5_Orebody"</td><td>,1,0,0</td></tr> <tr> <td>6</td><td>"6_Millrock_member"</td><td>,1,1,0</td></tr> <tr> <td>7</td><td>"7_Blue_Lagoon_member"</td><td>,0.2,0.4,0.733333</td></tr> <tr> <td>8</td><td>"8_Club_member"</td><td>,0.8,0.8,0.8</td></tr> </table> <p>Note: This setting can only load and save classification type CSV files.</p>	1	"1_Air"	,0,1,1	2	"2_Missi_Group_Fluvial_sediments"	,0.462745,0.772549,0.945098	3	"3_Louis_formation"	,0,0.533333,0.666667	4	"4_Hidden_formation"	,0,0.392157,0	5	"5_Orebody"	,1,0,0	6	"6_Millrock_member"	,1,1,0	7	"7_Blue_Lagoon_member"	,0.2,0.4,0.733333	8	"8_Club_member"	,0.8,0.8,0.8
1	"1_Air"	,0,1,1																								
2	"2_Missi_Group_Fluvial_sediments"	,0.462745,0.772549,0.945098																								
3	"3_Louis_formation"	,0,0.533333,0.666667																								
4	"4_Hidden_formation"	,0,0.392157,0																								
5	"5_Orebody"	,1,0,0																								
6	"6_Millrock_member"	,1,1,0																								
7	"7_Blue_Lagoon_member"	,0.2,0.4,0.733333																								
8	"8_Club_member"	,0.8,0.8,0.8																								
	Save colour settings	Saves a .clr file (colour settings file) to your system.																								
	Show selected	Displays a class or classes in the Viewport. To multi-select classes, hold Ctrl while clicking on the rows, or click and drag, then click show selected .																								
	View all	Displays all classes.																								
	Hide nodata/filtered values	Renders no data and filtered data transparent. When activated, the button background displays in blue. Otherwise, no data and hidden classes for reference data display in grey.																								
	Revert colour settings	Restores the original colour mapping scheme.																								

2D Profile Viewer

The 2D Profile Viewer allows easy visualization of multiple graphs of single or multi-channel (groups) numerical data (integer and floats) stored on curve objects.



This panel allows you to:

- Display 2D sections from a BlockModel along the profile lines, which is ideal for comparison of geophysical inversions with line data.
- View selections made in the viewer simultaneously in the Viewport and vice versa with dynamic linking.
- Implement various scaling and graph settings options to create custom views.

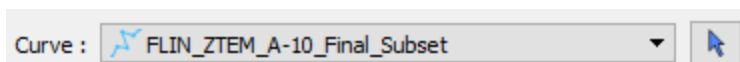
To maximize the profile viewing area, you can hide the settings section (left side of viewer) by sliding the vertical separator all the way to the left.

To view the lines between the first and last line (curve part index), move the horizontal slider located at the top of the graph area left and right using the following methods:

- Clicking and dragging the handlebar.



- Using the keyboard arrows.
- Manually changing the value on the *Curve part index* selector by typing in a new value or pressing the up and down arrows.



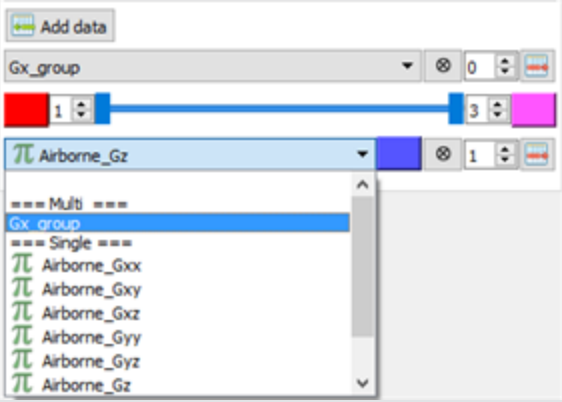



Clicking the green and red squares button will show and hide the start and end of line indicators in the Viewport.

The profile viewing area displays the vertically stacked graphs, and if activated, a painted section view of data stored on a selected BlockModel will display underneath the graphs.

The x-axis represents the distance along the selected curve line. The option of plotting eastings and northings is available through the graph settings area explained below.

Function	Description
Curve	Use the drop-down menu or the selection arrow to select the curve object that contains data to show as profiles.

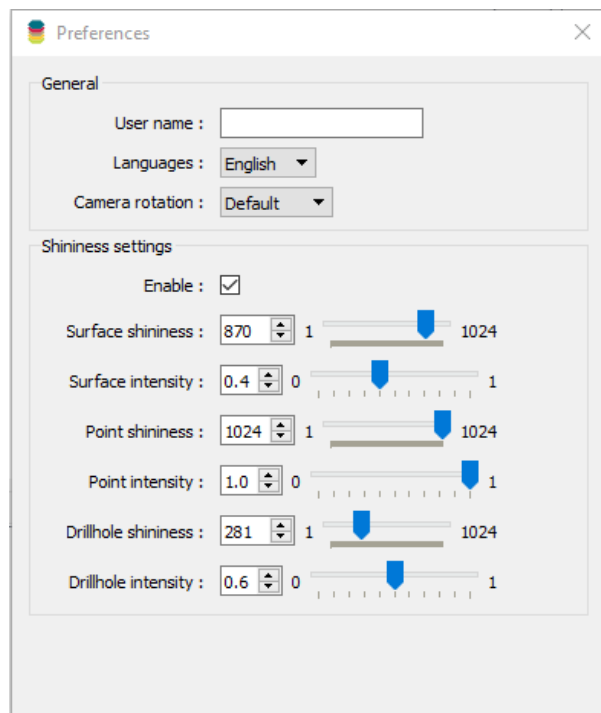
Function	Description
Section view	With a curve object selected, toggle on to activate BlockModel and data selectors. A vertical projection of the section of data associated with the location of the line will display under the graphs view. (The Data Colours panel controls the colour distribution.)
Graph settings: Show easting / northing grid lines	Toggle on and off easting lines in red and northing lines in green on the selected graph. The value entered in the number box next to each of the buttons determines the spacing between grid lines.
Legend	Toggle on and off to display a graph's legend. Right-click on legends in the graph area to access various placement options.
y-axis settings: Fixed range	Toggle on to manually specify the minimum and maximum values for the y-axis scale. This locks the range for all of the lines. Toggle off to recalculate the range on a line to line basis.
Log scale	Toggle between displaying the y-axis values on a linear and logarithmic scale.
y-axis name	The name of the data selected first becomes the name of the y-axis. Click in the <i><enter Y axis name></i> box to overwrite the default with a custom name. Pressing the x button will reset the y-axis name to the default.

Function	Description
Add data	<p>Creates a new data selection row. Select single or multi-element data to display them as profiles on the current graph. The drop-down menu lists grouped data first under the <i>Multi</i> heading, then float and integer data lists alphabetically.</p>  <p>Choose the symbol to plot at sample locations on the graph; use the numerical spin boxes to modify the size of the symbol and the colour boxes to modify the profile colour.</p> <ul style="list-style-type: none">  Adds a graph.  Deletes a graph.  Removes the selected data from displaying as profiles on a graph. <p>Drag and drop graph tabs to reorder graphs.</p> <p>With grouped data, the colours in between will be interpolated based on your defined first and last colours. You can define a subset of grouped data to display by modifying the slider and / or numerical spin boxes. This will redistribute the first and last Data Colours across the data subset.</p>

Tip: You can copy the profile panel contents to the clipboard by pressing **Ctrl+left-click**.

Preferences

By going to **Edit / Preferences**, you can open the dialogue box where you control the following elements of the workspace:



General

Parameter	Description
<i>User name</i>	Text field where you can enter and modify your user name.
<i>Languages</i>	Drop-down menu to toggle between languages.
<i>Camera rotation</i>	Drop-down menu to toggle between the default or free-form use of the camera in the Viewport.

Shininess settings

Parameter	Description
<i>Enable</i>	Check box to toggle on and off the radiance / shine of objects in the Viewport.
<i>Surface / Point / Drillhole shininess / intensity</i>	Use the spin box or slider to adjust the shine and intensity of the corresponding object in the Viewport.

Saving workspaces

When you save a workspace in Geoscience ANALYST, it creates, or updates, a `.geoh5` file on disk. All configurations and files in the workspace are saved, except for the Preferences. Any settings made in the Preferences are saved on the local machine for the current user, and will apply globally to all workspaces you open. (See also the [Preferences](#) section.)

When you close Geoscience ANALYST, the panel configuration will be saved on the local machine for the current user, and restored the next time you open the software. However, multiple Viewports arranged to view simultaneously will not appear side-by-side after saving, closing and re-opening; they will be presented in tab form where you can rearrange them to view simultaneously if needed.

Workspace file lock

When an instance of the application opens a workspace file (`.geoh5`), a lock file is created on disk that prevents another instance from opening the same file for editing. The file will open in other instances of the application as read-only. You can see that a workspace is in read-only mode when indicated in the title bar of Geoscience ANALYST. When a workspace is open in read-only mode, you can still use editing tools and modify the workspace, but you will have to perform a *Save Workspace As...* to a new location. When opening a workspace file that is already locked, the Console panel will display a message telling you that the file is read-only.

This lock mechanism works for both local drive and shared drives.

It is possible that a remote instance of Geoscience ANALYST terminates unexpectedly and leaves a lock file in a shared drive. In this event, you can manually delete the lock file, listed next to the `.geoh5` file, and suffixed with `.geoh5.lock`, as long as you have administrative rights on the server or folder.

Before doing so, it is recommended to find the user of the machine that created the lock and confirm that it is safe to remove the lock.

Note: A file also appears locked if you only have read permissions on the folder it is stored in. There is no `.geoh5.lock` file in this case, since it could not be created.

About GEOH5 format

A Geoscience ANALYST project (`.geoh5` file) is referred to as a **workspace**, which is saved on disk using the HDF5 file format. The widely used HDF5 technology provides high-performance, dynamic read / write access to data, while offering the following advantages:

- Open-specification, cross-platform format guarantees that the data within remains accessible in the future.
- Easily extensible for future needs.

- Single file output is ideal for sharing data.
- Benefits from many existing tools and libraries in several languages (including Python and MATLAB for data analysis).
- Flexible hierarchical structure is ideal for Geoscience ANALYST's object-oriented data structures, allowing for fast development.

Note: Workspaces saved in GEOH5 format with the current version cannot be opened with versions earlier than 2.30.

CHAPTER 3

Object types

This chapter describes the object types you will work with in Geoscience ANALYST.

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Overview of object types

This section presents each object type in detail, focusing on Visual Parameters, auto-generated, and user-defined metadata, and lists the type of import filters for each.

Geoscience ANALYST supports the following object types:

- Points 
- Curves 
- Surfaces 
- Drillholes 
- 2D Grids 
- BlockModels 
- GeolImages 
- Maxwell plates 

Information from the *Data Table*

The *Data Table* contains tabs with information related to the selected object. The presented information is specific to each object type, as detailed further in this chapter.

The *Data Table* also presents a **Folder** tab, exposing information tied to a container folder, and a **Workspace** tab with information related to the current open workspace.

Workspace tab

The **Workspace** tab is always available in the *Data Table*, regardless of the object selected, and presents a variety of information relevant to the entire workspace.

Function	Description
Project	Name of current workspace.
Contributors	List of users who have contributed in the workspace.
Created	Creation date of the workspace.
Last modified	Date of the last saved version.
# Objects	Total number of objects (including tools) in the workspace.

Function	Description
Distance unit	Select between metres or feet.
Project extents	x, y, and z limits of all objects.
Range	Total x, y, and z distance range of all objects.

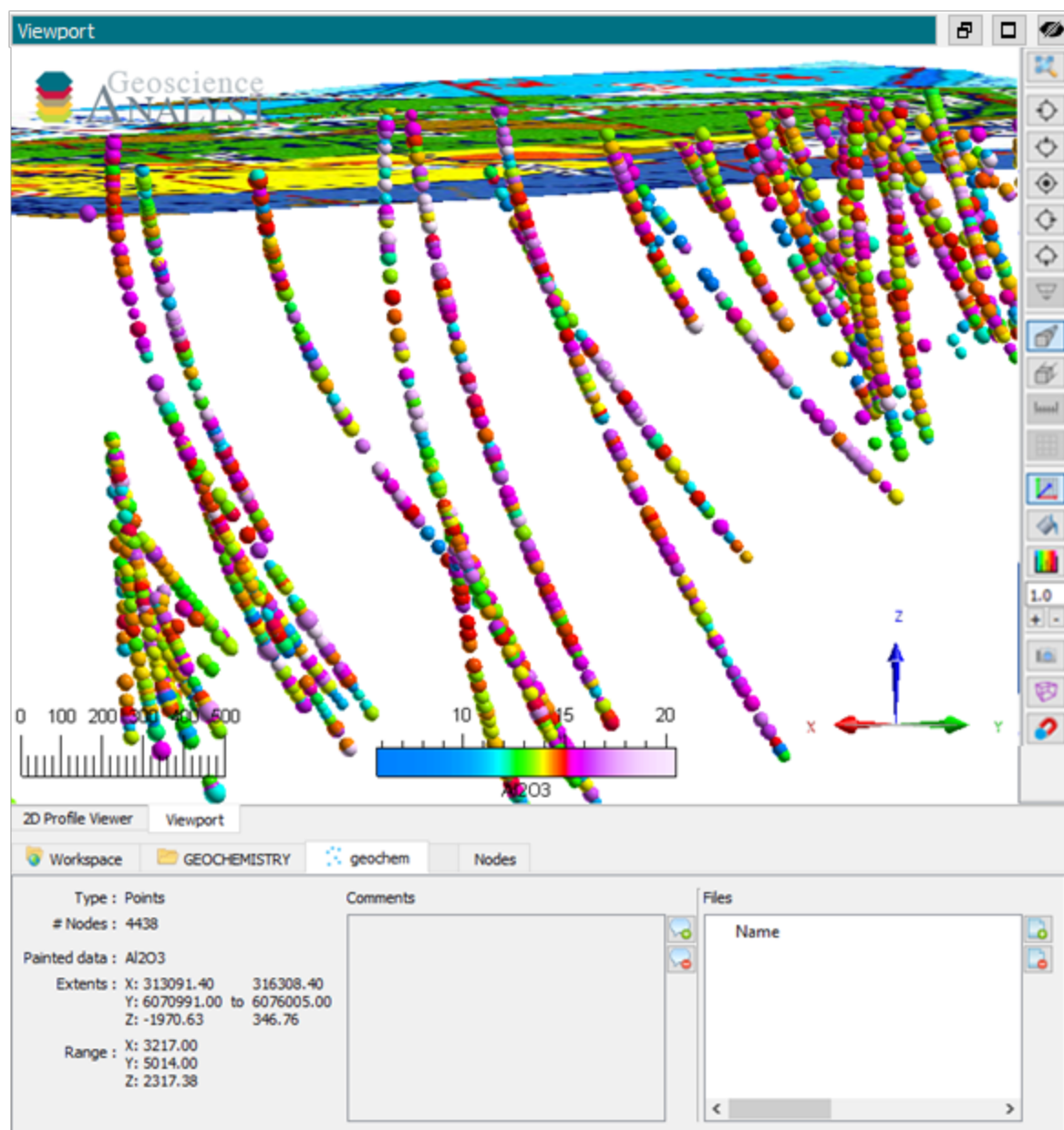
Folder tab

The **Folder** tab presents meta-data about the parent folder containing the selected object. Geoscience ANALYST uses a special folder type for grouping drillholes. The table below demonstrates an example of the summary information available for a generic container folder. As with the *Data Table* tab for the active workspace, the folder tab for the selected object can be attributed with user-defined comments and files, which you can attach for additional information.

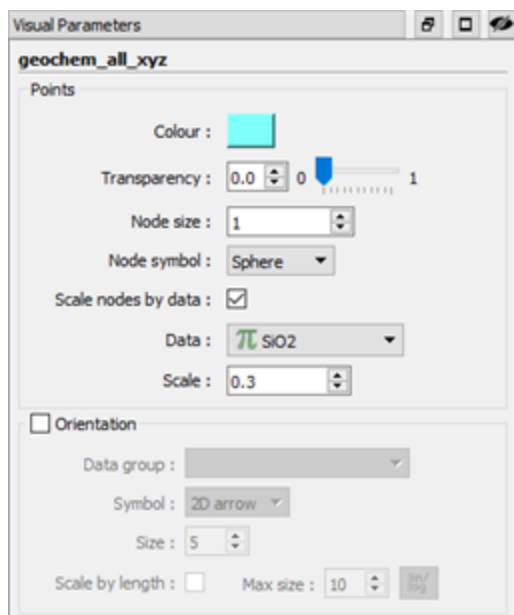
Function	Description
Type	Selected container.
# Objects	Total number of objects contained in the folder.
Limits	x, y, and z limits of all objects.
Range	Total x, y, and z distance range of all objects contained in the folder.

Points

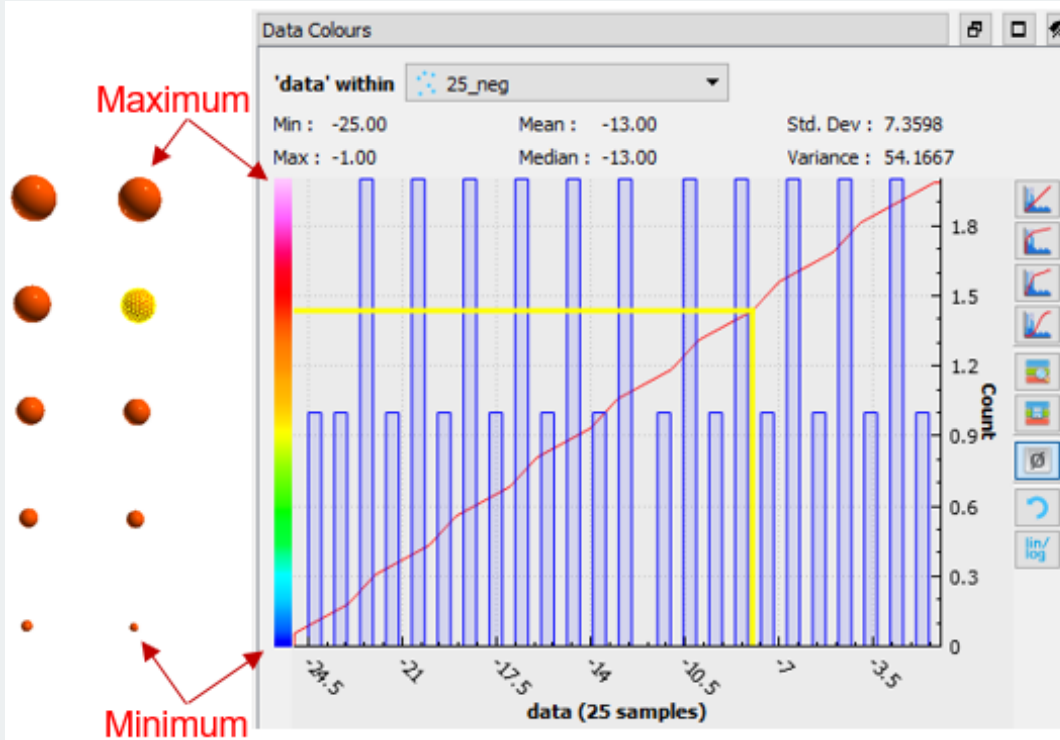
Points are the simplest object type among all the data structures, representing a collection of nodes defined by their x, y, z coordinates.




Points can store information and data of all types at the object and node levels. The Visual Parameters panel contains the graphical settings designed to allow you to specify how points look in the Viewport as presented in the table below.



Visual Parameter	Description
<i>Colour</i>	Corresponds to the colour of unpainted nodes.
<i>Transparency</i>	Allows you to modify the transparency setting (0 to 1) of the object: 0 is opaque and 1 is fully transparent. The transparency level also applies to painted points.
<i>Node size</i>	For 2D symbols: Size in pixels of the entire node. For 3D symbols: True distance in pixels between the centre and edge of the symbol.

Visual Parameter	Description
<i>Node symbol</i>	A collection of 2D and 3D shapes you can select to modify the appearance of the nodes.
<i>Scale nodes by data</i>	<p>Allows you to make the node size proportional to the selected data value. Check the box to scale the nodes by data. Once checked, the data selector box will activate, where you can choose which data you want to scale by.</p> <p>The amplitude is proportional to the index of the colours table. See the Data Colours panel section for more details.</p> 
<i>Data</i>	The float or integer data used for scaling the size of the nodes.
<i>Scale</i>	The scaling factor used to re-size the nodes.

Visual Parameter	Description
<i>ioGAS graphics</i>	<p>This is an extra option available only for ioGAS Points objects. When toggled on, the ioGAS visual parameter and data colour settings supersede those of Geoscience ANALYST.</p> <p>The nodes inherit the colour, size, shape, and filter attribute settings saved from ioGAS. You cannot edit these settings without the ioGAS link module but you can turn them on and off through the ioGAS panel described here. Toggle off to revert back to Geoscience ANALYST graphic settings.</p>
<i>Orientation</i>	<ul style="list-style-type: none"> • Data group: Selects an orientation data group (3D vector, Dip direction, and Dip or Strike and dip). You can create, modify, and delete data groups through the Utilities / Group Data tool explained here. • Symbol: Selects the orientation node symbol (2D arrow, 3D arrow or plate). • Size: Modifies the size of the orientation symbols. • Scale by length: Available on 3D vector data groups only; click to scale the orientation symbols by length. • Max size: Sets the maximum size of the orientation symbols. • lin/log:  Toggle between linear and logarithmic scaling of the orientation symbols.

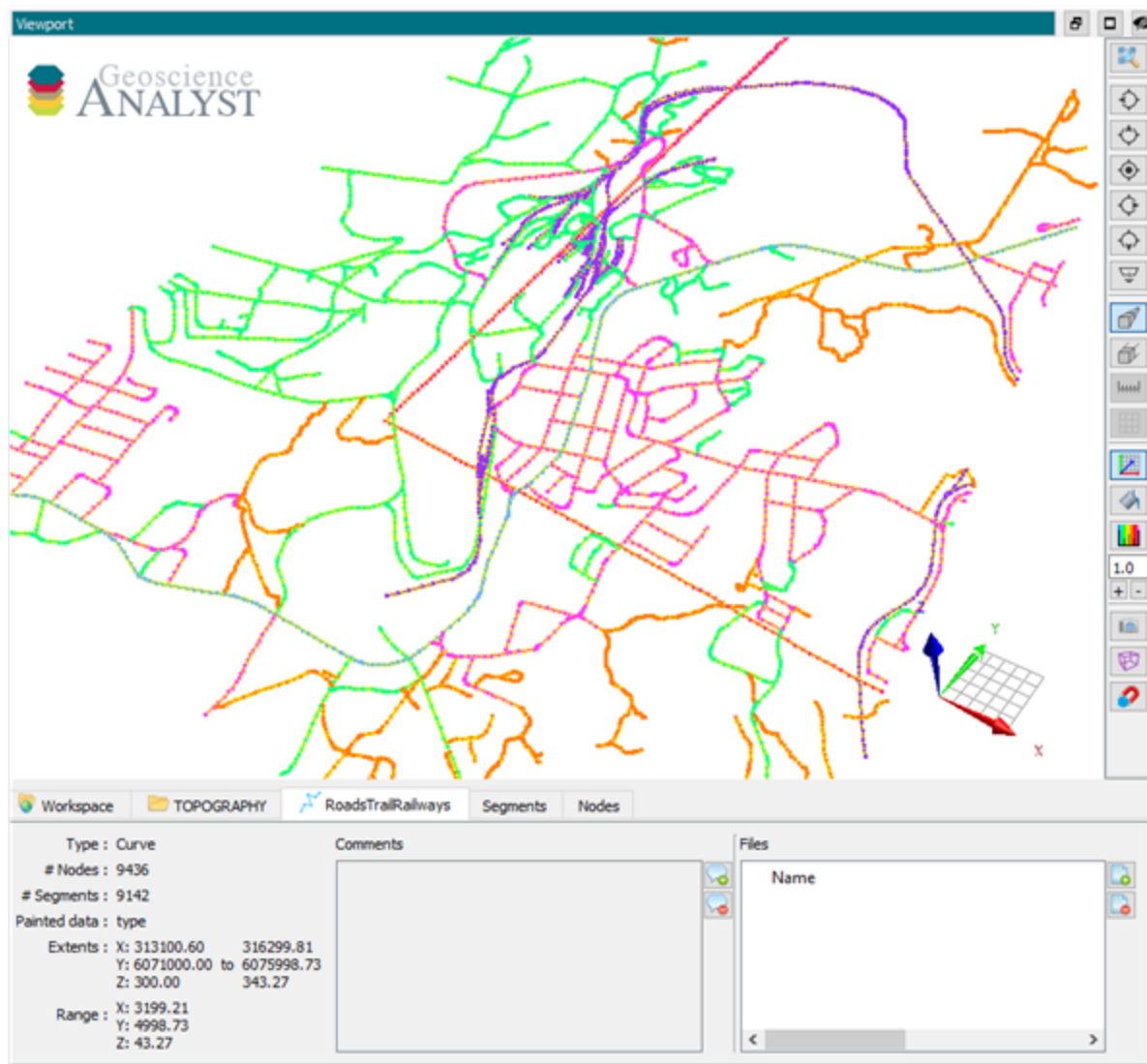
You can view metadata that corresponds to a selected points object via its associated tab in the *Data Table*. For example, if the selected points were named *geochem*, the tab with that title would contain the associated metadata, as demonstrated in the metadata summary in the *Data Table*.

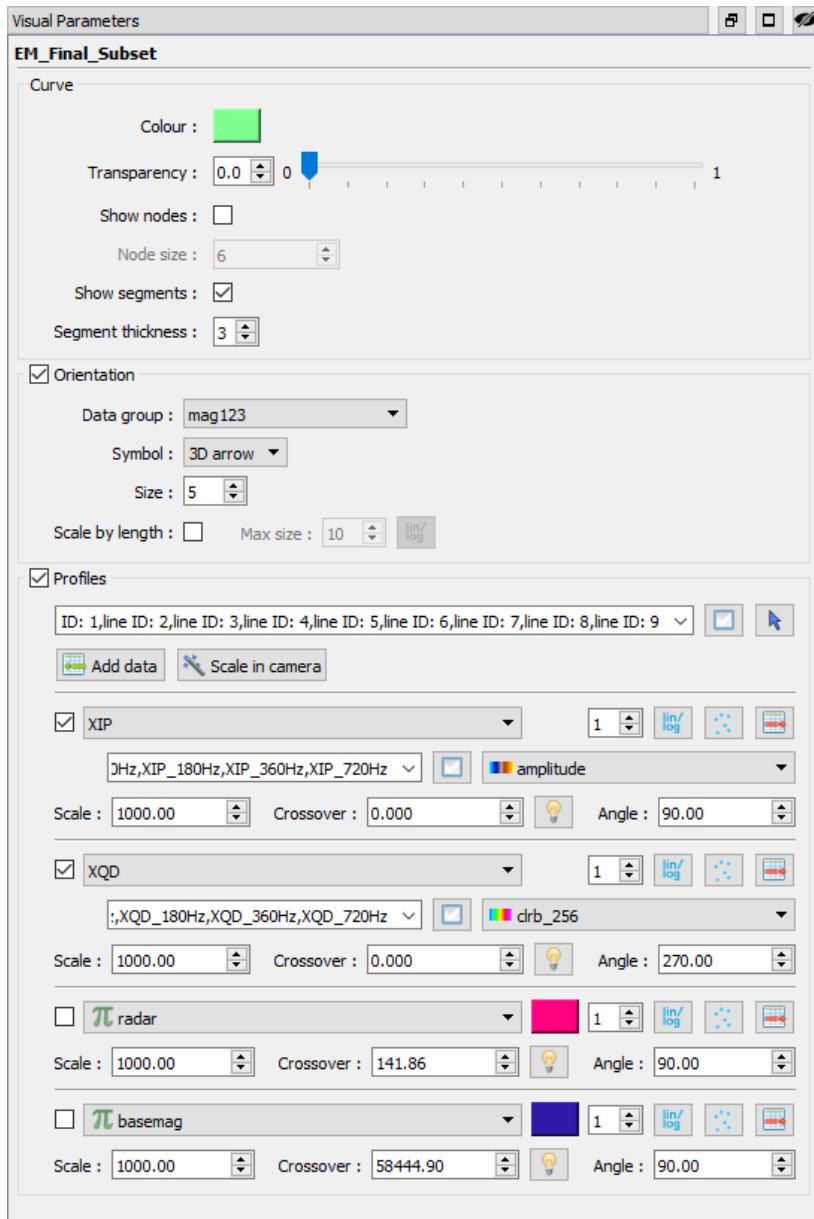
You can create points with the following importers:

- AutoCAD (.dxf, .dwg)
- GOCAD PointsSet (.vst)
- ASCII Column CSV (.csv)
- UBC-GIF Observation (.obs)
- ESRI Shapefile (.shp)
- Datamine binary points (.dm)
- ioGAS (.gas): creates a special ioGAS points object with an extra ioGAS graphics option.


Curves







Curves are an object type defined by nodes and the segments linking them. You can associate data of any type to nodes and segments. When you select a curve, the *Data Table* displays tabs for the object, segment, and nodes of the curve.







Visual Parameter	Description
<i>Colour</i>	Corresponds to the colour of unpainted curves.
<i>Transparency</i>	Allows you to modify the transparency setting (0 to 1) of the object: 0 is opaque and 1 is fully transparent. The transparency level also applies to painted curves.
<i>Show nodes</i>	Toggles on and off the display of nodes.

Visual Parameter	Description
<i>Node size</i>	Modifies the size of the nodes.
<i>Show segments</i>	Toggles on and off the display of segments.
<i>Segment thickness</i>	Modifies the thickness of the segments.
<i>Orientation</i>	<ul style="list-style-type: none"> • <i>Data group</i>: Selects an orientation data group (3D vector, Dip direction, and Dip or Strike and dip). You can create, modify, and delete data groups through the Utilities / Group Data tool explained in a later section of this document. • <i>Symbol</i>: Selects the orientation node symbol (2D arrow, 3D arrow or plate). • <i>Size</i>: Modifies the size of the orientation symbols. • <i>Scale by length</i>: Available on 3D vector data groups only, click to scale the orientation symbols by length. • <i>Max size</i>: Sets the maximum size of the orientation symbols. • <i>lin/log</i>:  Toggle between linear and logarithmic scaling of the orientation symbols.

Visual Parameter	Description
Profiles	<ul style="list-style-type: none"> Line selector: This parameter is only available on single curve selections. Selects which lines to display profiles on in the Viewport. If there is no Line ID property set on the curve, the selection is based on the part number referred to as the line ID. Toggle the Unselect/Select all button  /  to quickly include all or none of the lines in the selection. Arrow: Clicking the arrow icon and a line in the Viewport switches between displaying and hiding the profiles on that line. Add data: Creates a new data selection row. Select grouped or non-grouped data to display them as profiles on the curves in the Viewport. The drop-down menu lists grouped data first under the Multi heading, then float and integer data lists alphabetically. Scale in camera: Enters mode allowing you to adjust profile scales interactively in the Viewport. Left-click on a profile will rescale all data in a group, while right clicking will rescale only the selected data profile. The selected data will be unselected from the group and a new data row will be added. <div data-bbox="553 936 1511 1087" style="background-color: #f0f0f0; padding: 10px; border: 1px solid #ccc;"> <p>Tip: To revert back to the group settings, delete the new row or hide the profile and reselect it in the data group selector. Press Esc to exit out of edit mode.</p> </div> <ul style="list-style-type: none"> Show/hide profile: Clicking this check box allows you to visualize the profile in the Viewport. To the right, select the profile colour (single data only), and width, using the spin box. <ul style="list-style-type: none"> Toggle pseudo log scale:  Toggle between linear and pseudo log scaling of the profiles (pseudo log uses a arcsinh function and accepts negative values). Show nodes:  Displays nodes on the profiles where the data samples are. Remove data:  Removes the profile row. Scale (spin box): Maximum distance the profiles will extend from the curve. The scaling depends on the absolute minimum and maximum values in the data type as well as the crossover value. Crossover (spin box): The data value plotted at the curve line (axis datum). Use data type's minimum value as crossover:  Automatically

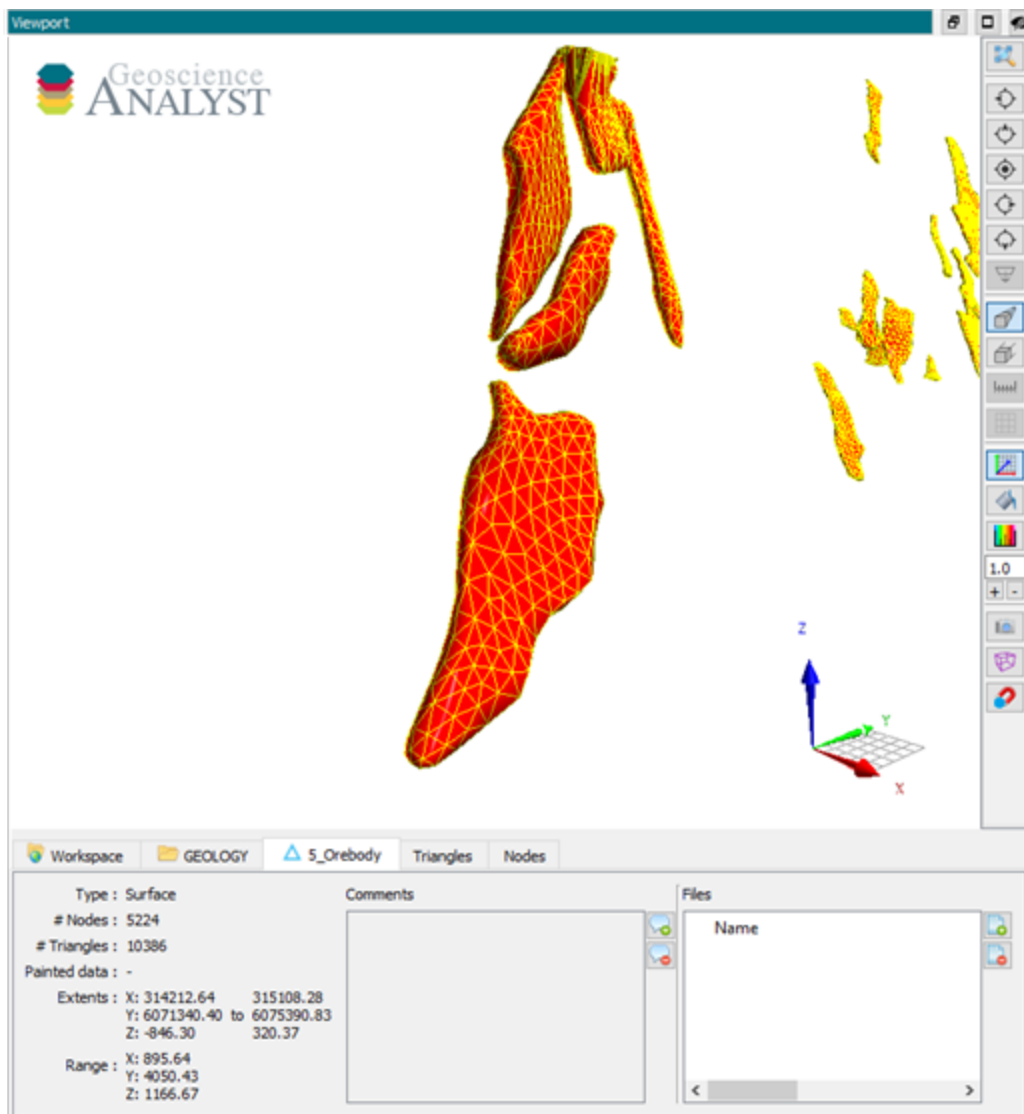
Visual Parameter	Description
	<p>readjusts the crossover to be the absolute minimum value of the selected data type. Note that this will include all data in the workspace that is assigned the same data type as the selected data.</p> <ul style="list-style-type: none"> • <i>Angle</i>: The orientation of the profiles with respect to the curve's general direction. <p><i>Multi-element</i> data group specific settings are as follows:</p> <ul style="list-style-type: none"> • Name of multi-element data group: Lists all of the data contained in the data group. Select which ones to display in the Viewport by adding a check-mark in the box beside the data name. • Unselect/Select all:  /  Allows you to quickly select or unselect all data in the group. You can create, modify, and delete data groups through the Utilities / Group Data command. • <i>Colour table</i>: Selects a colour table to colour the profiles. The colours will be linearly interpolated across each data in the order they are listed in the group.

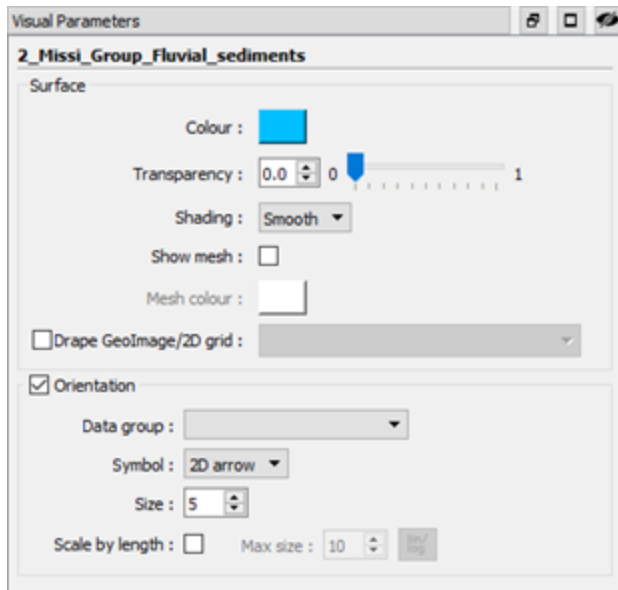
You can create curves with the following importers:

- AutoCAD (.dxf, .dwg)
- Geosoft databases and x, y, z files (.gdb, .xyz)
- GOCAD Curve (.pl)
- ESRI shapefile (.shp)
- Datamine binary string (.dm)
- AMIRA TEM (.tem)


Surfaces

Surfaces are an object type defined by triangles and nodes. You can associate data of any type to the nodes and triangles of a surface. When you select a surface, the *Data Table* displays tabs for the object, triangles, and nodes.





Visual Parameter	Description
<i>Colour</i>	Corresponds to the colour of the unpainted surface.
<i>Transparency</i>	Allows you to modify the transparency setting (0 to 1) of the object: 0 is opaque and 1 is fully transparent. The transparency level also applies to painted surfaces and draped Geolimages.
<i>Shading</i>	There are two options to modify the appearance of the surface: <ul style="list-style-type: none"> • Smooth shading: Interpolates colour changes across triangles to minimize the appearance of the triangle's edges. • Flat shading uses one colour for each triangle to make edges appear more pronounced.
<i>Show mesh</i>	When shown, the mesh represents how the nodes are connected to create triangles.
<i>Mesh colour</i>	The mesh colour is independent of the surface colour.

Visual Parameter	Description
<i>Drape GeolImage / 2D grid</i>	Selecting a GeolImage or 2D grid from the drop-down menu will drape the image or painted 2D grid data vertically onto the surface. The draped image takes precedence over the painted status of the surface.
<i>Orientation</i>	<ul style="list-style-type: none"> • <i>Data group</i>: Selects an orientation data group (3D vector, Dip direction and dip, or Strike and dip). You can create, modify, and delete data groups through the Utilities-Group Data tool explained in a later section of this document. • <i>Symbol</i>: Selects the orientation node symbol (2D arrow, 3D arrow or plate). • <i>Size</i>: Modifies the size of the orientation symbols. • <i>Scale by length</i>: Available on 3D vector data groups only, click to scale the orientation symbols by length. • <i>Max size</i>: Sets the maximum size of the orientation symbols. • <i>lin/log</i>:  Toggle between linear and logarithmic scaling of the orientation symbols.

You can view metadata that corresponds to selected surfaces via the tab associated with that surface in the *Data Table*. For example, if the selected surface was *5_Orebody*, the tab with that title would contain the metadata associated with that surface.

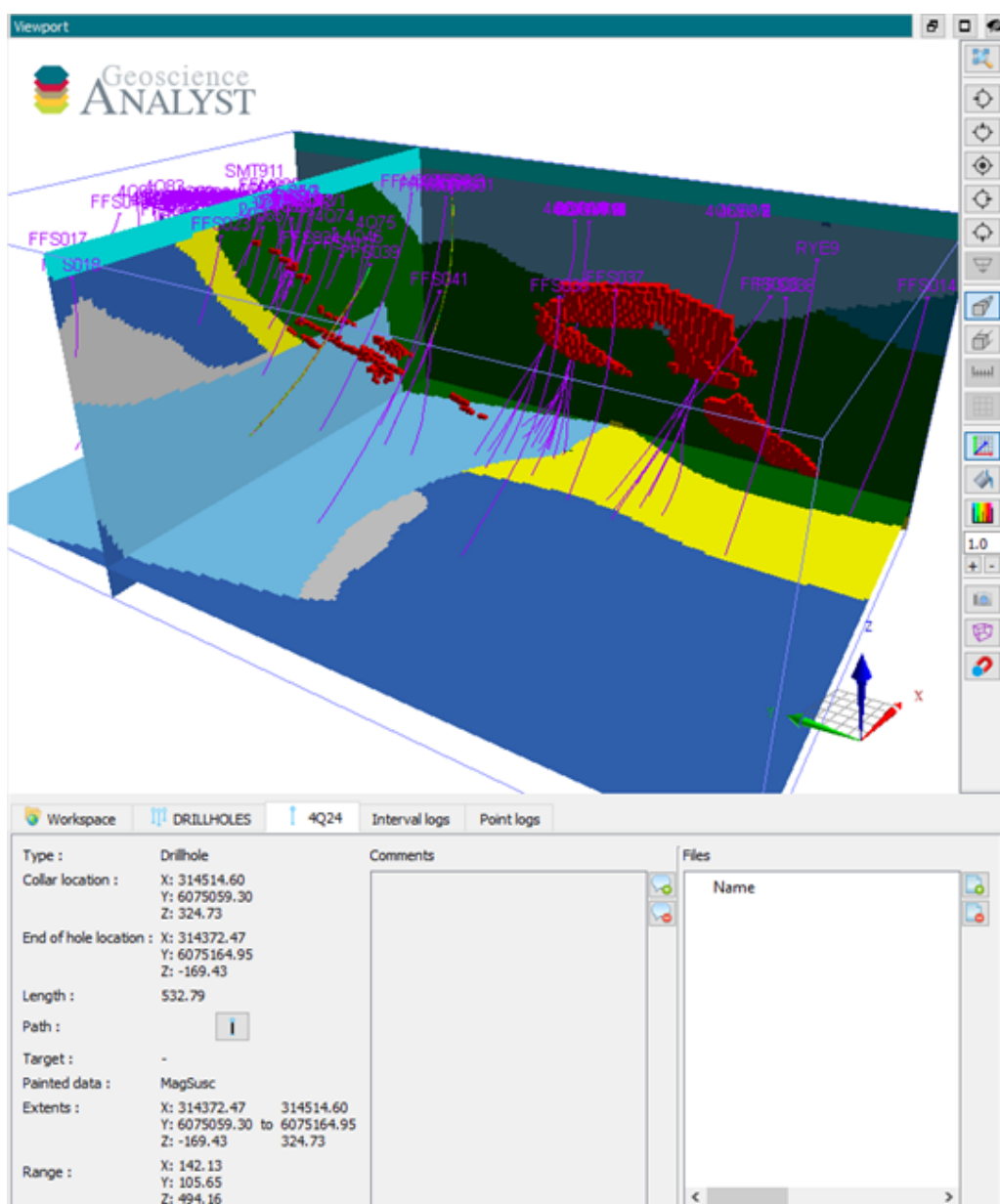
You can create surfaces using the following importers:

- AutoCAD (.dxf, .dwg)
- GOCAD Surface (.ts)
- UBC-GIF Topography (.topo)
- Datamine binary wire-frame(.dm)

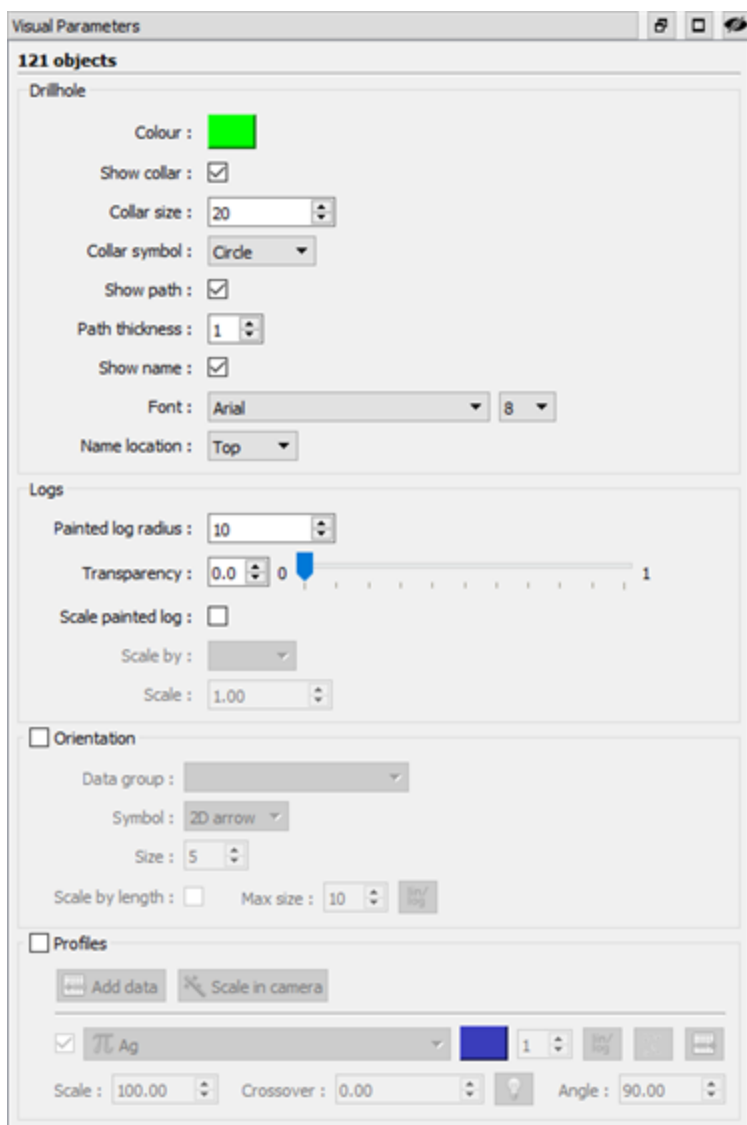
Drillholes

Drillholes are an object type that hosts a variety of information expressed as logs of data collected along their 3D paths. In Geoscience ANALYST, drillhole objects can store three types of logs:

- Discrete interval logs used to store reference type data (such as rock type) over a depth interval.
- Numerical interval logs used to store numerical data measured over a depth interval (such as assay data).
- Point logs hosting numeric values at specific measured depths (such as wireline data).







The Visual Parameters panel contains the options to allow you to set the graphical settings to determine the way drillholes look in the Viewport, as presented in the table below.





Visual Parameter	Description
<i>Colour</i>	Corresponds to the colour of the drillhole trace, name, and collar.
<i>Show collar</i>	Displays the location of the top of the drillhole with a symbol.
<i>Collar size</i>	Displays the collar symbol size expressed in pixels.

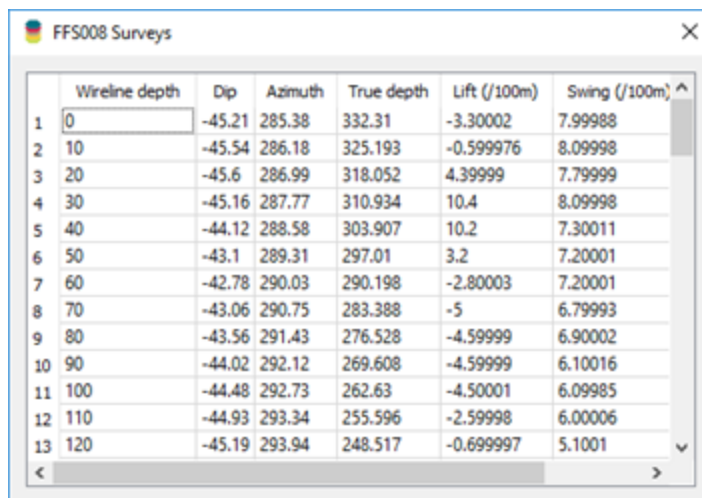
Visual Parameter	Description
<i>Collar symbol</i>	A collection of shapes you can select to modify the appearance of a drillhole collar.
<i>Show path</i>	Shows the 3D trajectory of the drillhole.
<i>Path thickness</i>	Path thickness expressed in pixels.
<i>Show name</i>	Displays individual drillhole names in the Viewport.
<i>Font</i>	Allows you to modify the font and font size of the drillhole names.
<i>Name location</i>	Allows you to display the drillhole name either at the top or bottom of the path.
<i>Log symbol</i>	Allows you to select whether you want to display the log as a line or a cylinder. Only lines are available for 2D Viewports. When there are several drillholes, displaying as lines improves the performance of 3D rendering.
<i>Painted log radius</i>	Allows you to modify the drillhole cylinder radius. (Drillhole logs only display as cylinders around the drillhole path.)
<i>Transparency</i>	Allows you to modify the transparency setting (0 to 1) of the painted property: 0 is opaque and 1 is fully transparent. The transparency level does not affect the drillhole path, name, and collar.
<i>Scale painted log</i>	As with points objects, the painted log cylinder radius can be proportional to float or integer data.
<i>Scale by</i>	Float or integer data to scale the painted log by.
<i>Scale</i>	The scaling factor used to re-size the painted drillhole log.

Visual Parameter	Description
Orientation	<ul style="list-style-type: none"> • <i>Data group</i>: Selects an orientation data group (3D vector, Dip direction and dip, or Strike and dip). You can create, modify, and delete data groups through the Utilities-Group Data tool explained in a later section of this document. • <i>Symbol</i>: Selects the orientation node symbol (2D arrow, 3D arrow or plate). • <i>Size</i>: Modifies the size of the orientation symbols. • <i>Scale by length</i>: Available on 3D vector data groups only, click to scale the orientation symbols by length. • <i>Max size</i>: Sets the maximum size of the orientation symbols. • <i>lin/log</i>:  Toggle between linear and logarithmic scaling of the orientation symbols.

Visual Parameter	Description
Profiles	<ul style="list-style-type: none"> • Add data: Creates a new data selection row. Select grouped or non-grouped data to display them as profiles curves in the Viewport. The drop-down menu lists grouped data first under the Multi heading, then float and integer data lists alphabetically. • Scale in camera: Enters mode allowing you to adjust profile scales interactively in the Viewport. Then: <ul style="list-style-type: none"> ◦ Left click on a profile along the drillhole path and drag to rescale all data in a group. ◦ Right click instead to rescale only the selected data profile. The selected data will be unselected from the group and a new data row will be added. <div data-bbox="613 688 1511 840" style="border: 1px solid #00728f; background-color: #f0f0f0; padding: 10px; margin: 10px 0;"> <p>Tip: To revert back to the group settings, delete the new row or hide the profile and reselect it in the data group selector. Press the escape button to exit out of edit mode.</p> </div> <ul style="list-style-type: none"> • Show/hide profile: Clicking this check box allows you to visualize the profile in the Viewport. To the right, select the profile colour (single data only), and width, using the spin box. <ul style="list-style-type: none"> ◦ Toggle pseudo log scale:  Toggle between linear and pseudo log scaling of the profiles (pseudo log uses a arcsinh function and accepts negative values). ◦ Show nodes:  Displays nodes on the profiles where the data samples are. ◦ Remove data:  Removes the profile row. • Scale (spin box): Maximum distance the profiles will extend from the drillhole. The scaling depends on the absolute minimum and maximum values in the data type as well as the crossover value. • Crossover (spin box): The data value plotted along the path (axis datum). • Light-bulb: Automatically readjusts the crossover to be the absolute minimum value of the selected data type. Note that this will include all data in the workspace that is assigned the same data type as the selected data. • Angle: The orientation of the profiles with respect to the drillhole's general trajectory. <p>For interval data, the profile line connects back to the path when it meets a location with no data value.</p>

Visual Parameter	Description
	<p><i>Multi-element</i> data group specific settings are as follows:</p> <ul style="list-style-type: none"> Name of multi-element data group. Lists all of the data contained in the data group. Select which ones to display in the Viewport by adding a check-mark in the box beside the data name. Unselect/Select all:  /  Allows you to quickly select or unselect all data in the group. You can create, modify, and delete data groups through the Utilities / Group Data command. Colour table: Selects a colour table to colour the profiles. The colours will be linearly interpolated across each data in the order they are listed in the group.

You can view metadata that corresponds to a selected drillhole via the tab associated with that drillhole in the *Data Table*. For example, if the selected drillhole was *FFS008*, the tab with that title would contain the metadata associated with that drillhole, as demonstrated in the metadata summary in the *Data Table*.



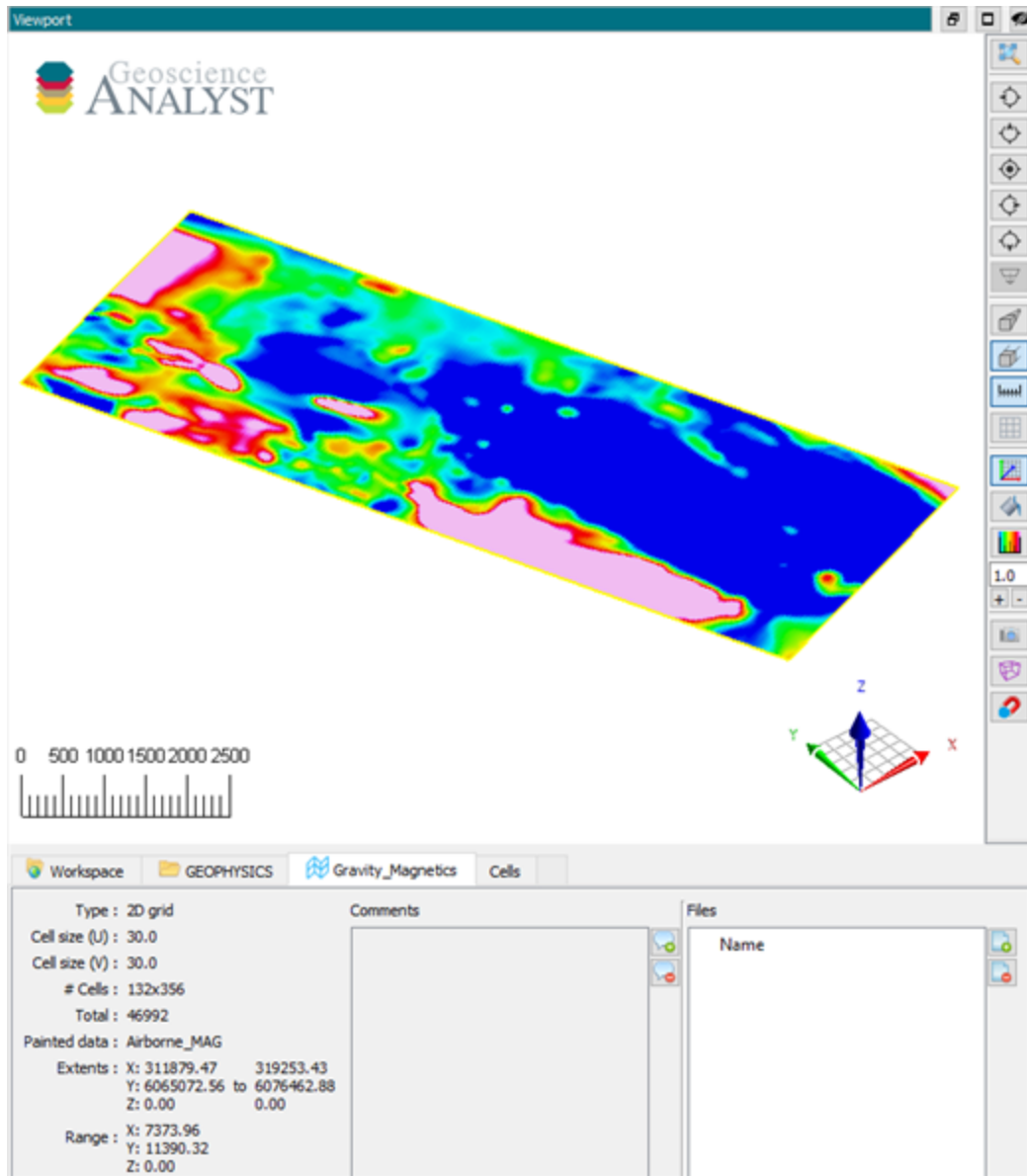
	Wireline depth	Dip	Azimuth	True depth	Lift (/100m)	Swing (/100m)
1	0	-45.21	285.38	332.31	-3.30002	7.99988
2	10	-45.54	286.18	325.193	-0.599976	8.09998
3	20	-45.6	286.99	318.052	4.39999	7.79999
4	30	-45.16	287.77	310.934	10.4	8.09998
5	40	-44.12	288.58	303.907	10.2	7.30011
6	50	-43.1	289.31	297.01	3.2	7.20001
7	60	-42.78	290.03	290.198	-2.80003	7.20001
8	70	-43.06	290.75	283.388	-5	6.79993
9	80	-43.56	291.43	276.528	-4.59999	6.90002
10	90	-44.02	292.12	269.608	-4.59999	6.10016
11	100	-44.48	292.73	262.63	-4.50001	6.09985
12	110	-44.93	293.34	255.596	-2.59998	6.00006
13	120	-45.19	293.94	248.517	-0.699997	5.1001

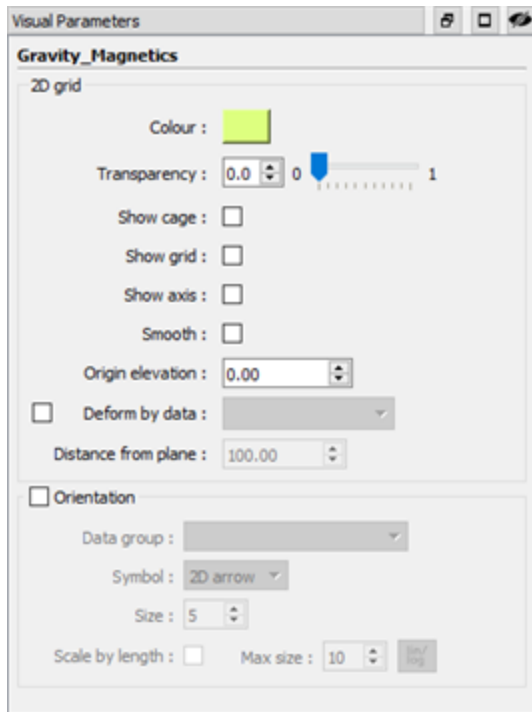
You can create drillholes using the following importers:

- GOCAD Well (.wl)
- ASCII drillholes (.csv)
- Datamine binary drillhole (.dm)

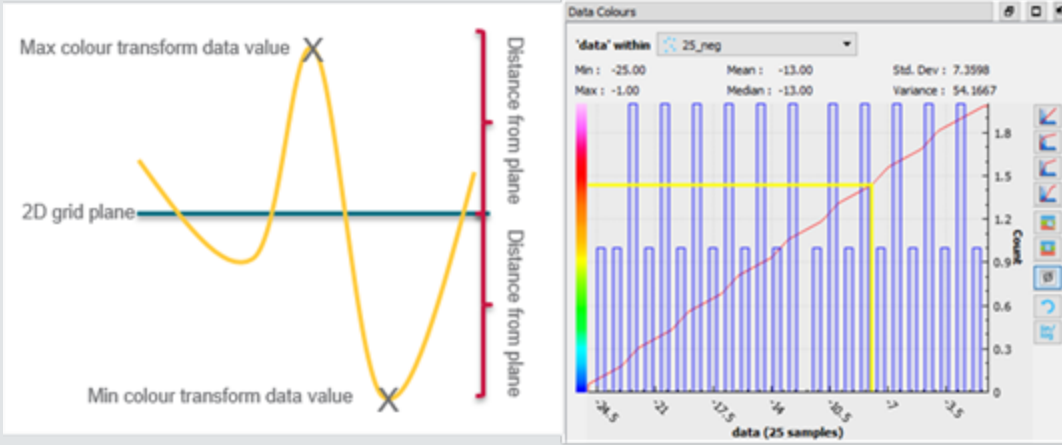

2D Grids

2D grid objects support regularly gridded data such as geophysical data sets. Cell centres store the data and can hold data of any type. You can deform the grids by data and adjust the elevation of the origin through the Visual Parameters panel options.





Visual Parameter	Description
<i>Colour</i>	Corresponds to the colour of the cage, grid, and unpainted section.
<i>Transparency</i>	Transparency setting (0 to 1) of the sections and grid lines: 0 is opaque and 1 is fully transparent. The transparency level does not affect the cage and labels.
<i>Show cage</i>	Outline of the 2D grid.
<i>Show grid</i>	Outline of every cell displayed.
<i>Show axis</i>	Coordinates of the U (red) / V (green) axis are labelled.
<i>Smooth</i>	When painted, option to smooth the colours along the cell edges.
<i>Origin elevation</i>	z location of the 2D grid origin.

Visual Parameter	Description
<p><i>Deform by data & Distance from plane</i></p>	<p>Check the box to deform the 2D grid by data. Once checked, the data selector box will activate.</p> <p><i>Distance from plane</i> controls the extent of deformation measured orthogonal to the axis plane. The amplitude scaling (distance the cell plots away from the plane) is proportional to the index of the colours table. See the Data Colours panel section for more details.</p>  <p>The diagram illustrates the 'Deform by data' process. A horizontal blue line represents the '2D grid plane'. A yellow curve oscillates above and below this plane. The peaks and troughs of the curve are marked with 'X' and labeled 'Max colour transform data value' and 'Min colour transform data value' respectively. To the right of the curve, a vertical red line with tick marks is labeled 'Distance from plane'. The 'Data Colours' panel on the right shows a histogram of 'data (25 samples)' with a color bar on the left. The histogram has a red curve overlaid, and a yellow vertical line is drawn at a specific data value. The panel also displays statistics: Min: -25.00, Max: -1.00, Mean: -13.00, Median: -13.00, Std. Dev: 7.3598, and Variance: 54.1667.</p>
<p><i>Orientation</i></p>	<ul style="list-style-type: none"> • <i>Data group</i>: Selects an orientation data group (3D vector, Dip direction and dip, or Strike and dip). You can create, modify, and delete data groups through the Utilities-Group Data tool explained in a later section of this document. • <i>Symbol</i>: Selects the orientation node symbol (2D arrow, 3D arrow or plate). • <i>Size</i>: Modifies the size of the orientation symbols. • <i>Scale by length</i>: Available on 3D vector data groups only, click to scale the orientation symbols by length. • <i>Max size</i>: Sets the maximum size of the orientation symbols. • <i>lin/log</i>:  Toggle between linear and logarithmic scaling of the orientation symbols.

The corresponding *Data Table* tab provides the following information when a 2D grid is selected:

- Object type
- U and V cell sizes
- Number of cells (U x V)
- Total number of cells, currently painted data if any

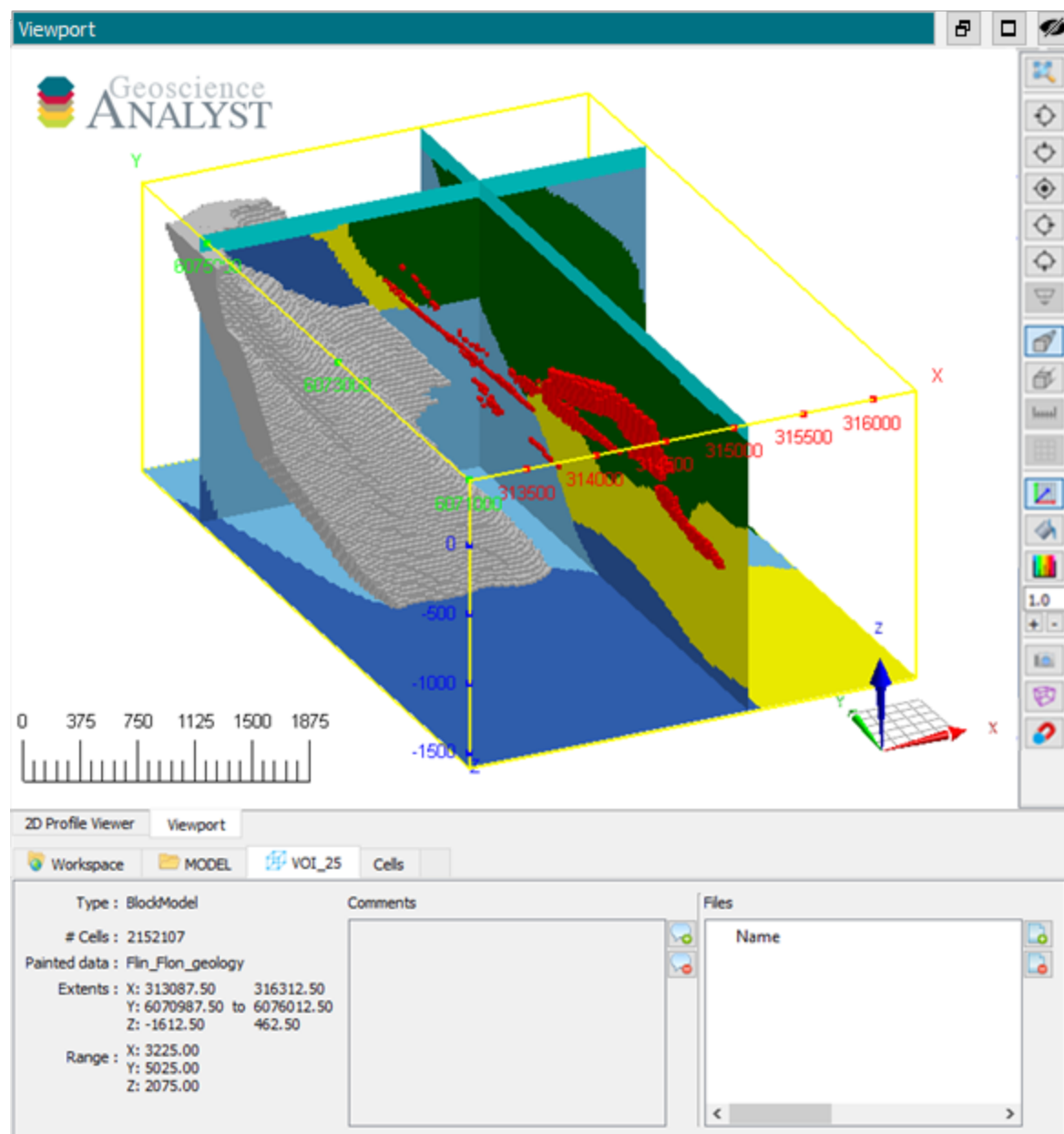
- Object limits
- x, y, z ranges

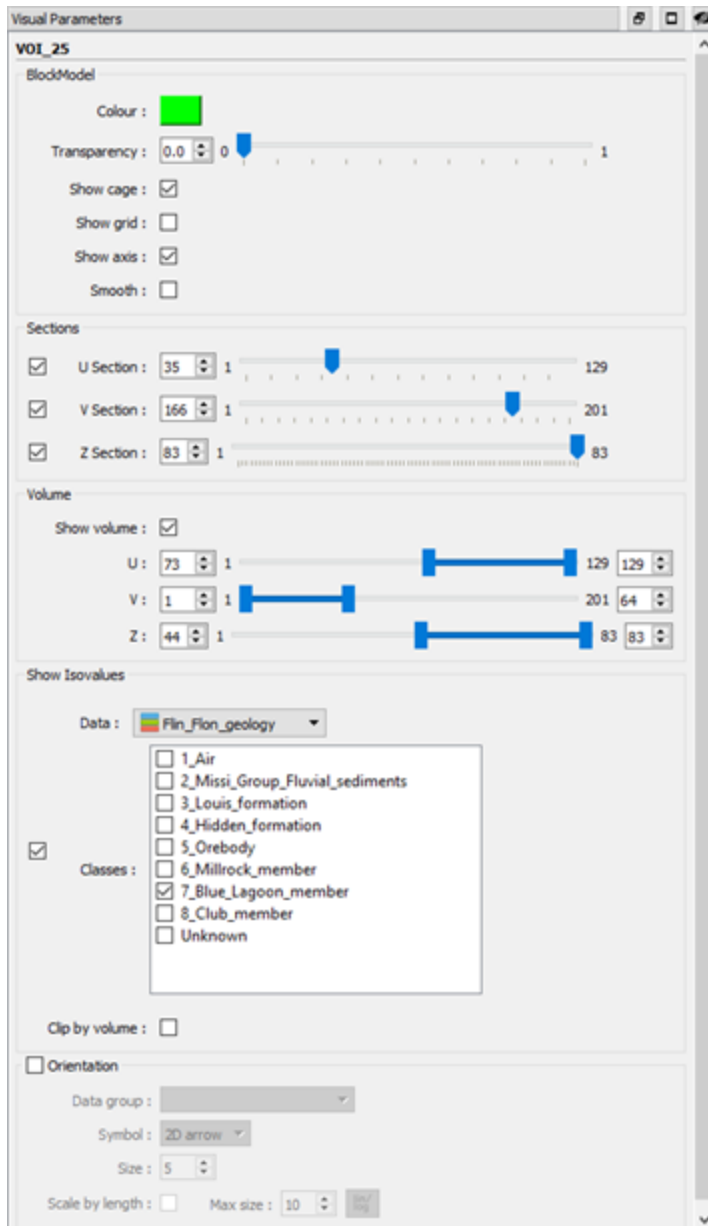
2D grid objects are created when importing the following files:

- Geosoft Grid files (`.grd`)
- Non-image 2D GOCAD Voxet files (`.vo`)

BlockModels

BlockModels represent an important data structure as they are the 3D rectilinear grids used to host resource models, geologic models, and inversion / imaging results. BlockModel cells can hold data of any type.





When you select a BlockModel, the following parameters become available in the Visual Parameters panel:

Visual Parameter	Description
<i>Colour</i>	Corresponds to the colour of the cage, grid, unpainted sections, volumes, and iso-values.

Visual Parameter	Description
<i>Transparency</i>	Allows you to modify the transparency setting (0 to 1) of the object: 0 is opaque and 1 is fully transparent. The transparency level does not affect the cage and labels.
<i>Show cage</i>	Displays the outline of the BlockModel.
<i>Show grid</i>	Displays a grid on the entire BlockModel, outlining each cell on sections and volumes.
<i>Show axis</i>	Displays the coordinates of the BlockModel.
<i>Smooth</i>	Allows you to smooth edges on painted sections and volumes of a BlockModel by interpolating coloured contours.
<i>Sections</i>	<p>Controls the U, V, and Z sections that makeup the BlockModel, providing the following options:</p> <ul style="list-style-type: none"> • Check box: Toggle on and off to display and hide section of the BlockModel. • Number box: Enter precise values to arrange BlockModel sections' linear positioning on its axis. • Sliders: Slide left and right to adjust BlockModel sections' linear positioning on its axis.
<i>Volume</i>	Toggles on and off a cuboidal 3D sub-volume of the BlockModel. You can modify the dimensions and position of the sub-volume by adjusting the U, V, and Z axis sliders, as well as by entering values in the number boxes.
<i>Isovalues</i>	<p>Toggles on and off a 3D sub-volume of a BlockModel that represents the cells corresponding to the shell of a numeric data range for floats and integers and a selected list of classes for reference data.</p> <ul style="list-style-type: none"> • Step: Increment to increase or decrease the iso-values range. • Clip by volume: You can clip the shape of the iso-values by the BlockModel volume.
<i>Orientation</i>	<ul style="list-style-type: none"> • Data group: Selects an orientation data group (3D vector, Dip direction, and Dip or Strike and dip). You can create, modify, and delete data groups through the Utilities-Group Data tool explained in a later section of this document. • Symbol: Selects the orientation node symbol (2D arrow, 3D arrow or plate). • Size: Modifies the size of the orientation symbols. • Scale by length: Available on 3D vector data groups only, click to scale the orientation symbols by length. • Max size: Sets the maximum size of the orientation symbols.

You can view metadata that corresponds to a selected BlockModel via the tab associated with that BlockModel in the *Data Table*, as demonstrated in the metadata summary in the *Data Table*.

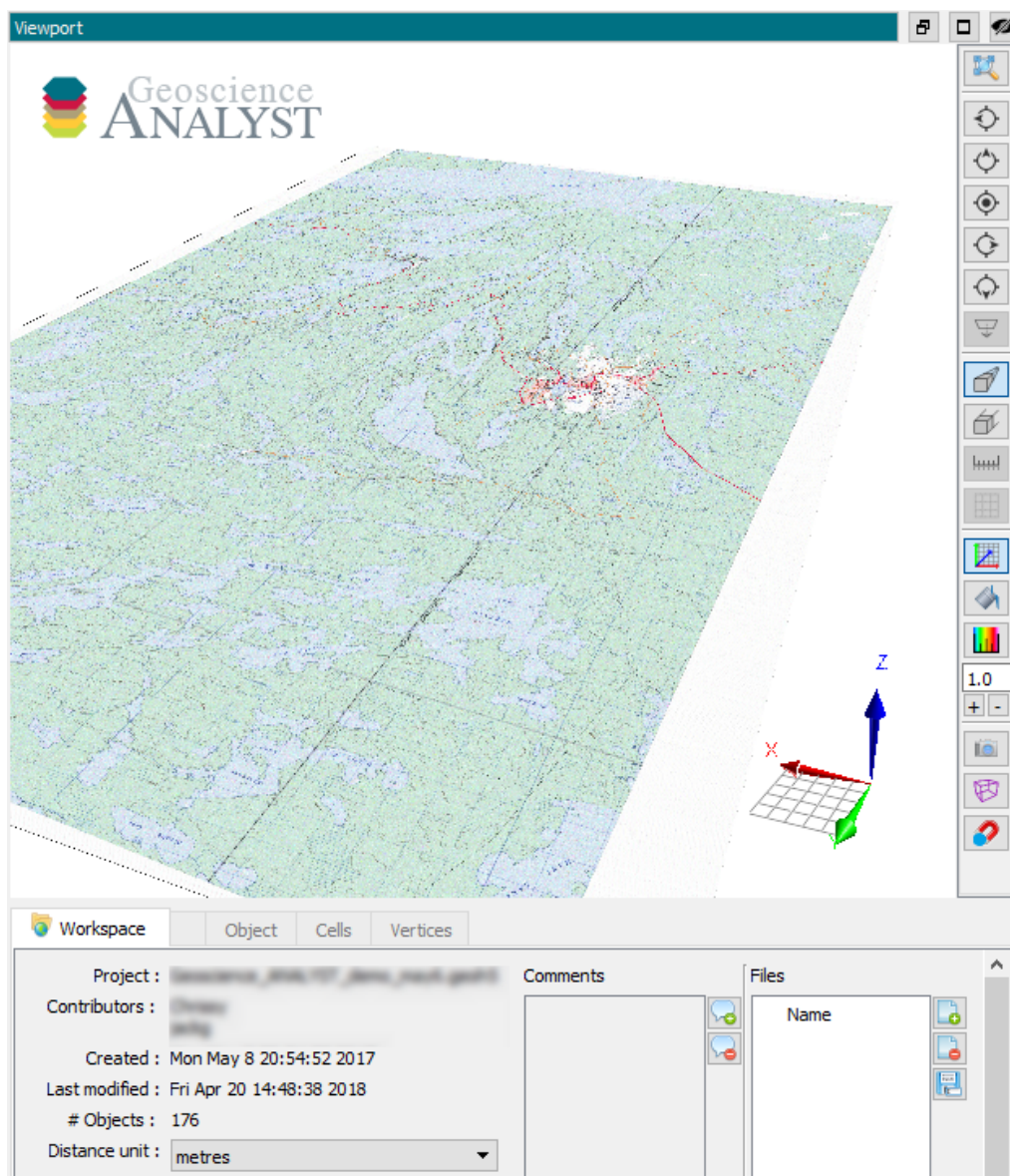
You can create BlockModels by importing the following file types:

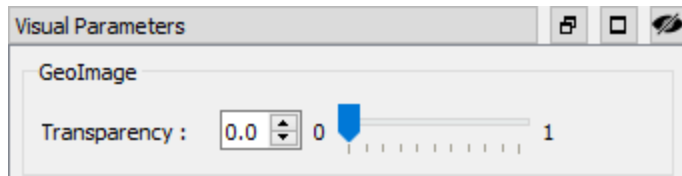
- 3DGOCAD Voxet (.vox)
- UBC-GIF Mesh (.msh)
- Datamine binary BlockModel (.dm)

Geolimages

Geolimages are a simple object type used to house georeferenced images. It is possible to import images that are either horizontal or arbitrarily oriented, such as geological maps and air photos.

Geolimages can be rendered transparent through the Visual Parameters panel using the transparency modification slider, where 0 is opaque and 1 is fully transparent and texture draped on surfaces via the surface's visual parameter options.





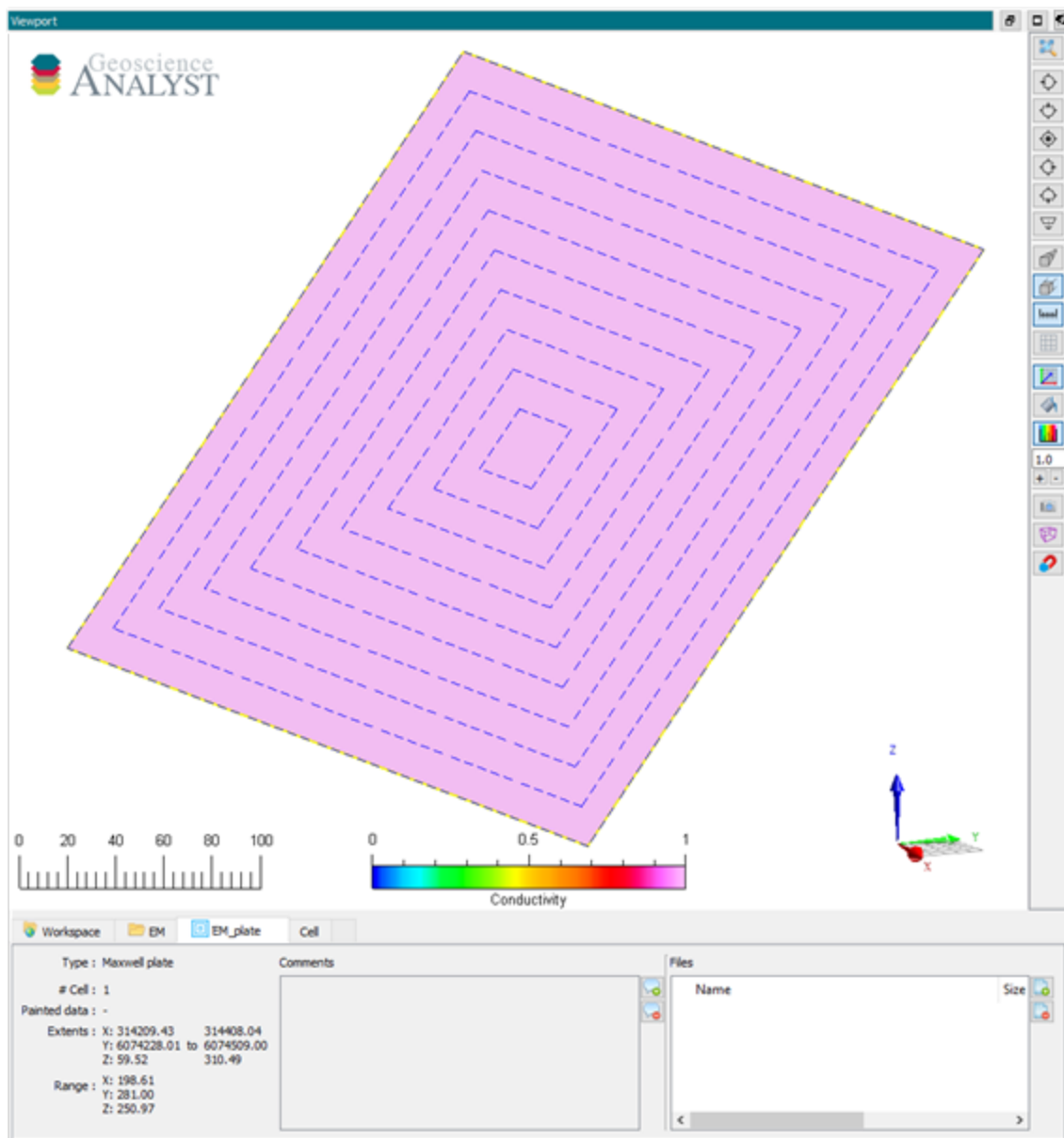
You can view metadata that corresponds to a selected GeoImage via the tab associated with that GeoImage in the *Data Table*, as demonstrated in the metadata summary in the *Data Table*.

You can create GeoImages by importing the following file types:

- Image files (.jpg, .png, etc.)
- GOCAD 2D image Voxets (.vo)

Maxwell plates

Maxwell plates are a simple object type that represent conductors as modelled in EMIT's Maxwell electromagnetic modelling software. The plate objects can contain conductivity, conductivity thickness, cole-cole parameters, and be rendered as thick plates.





Maxwell plate objects are created when importing Maxwell plate (.pte) files as well as from Maxwell broadcasts with the Maxwell link module.

Visual Parameters


1

Plate

Colour : 

Transparency :  0

Ribbons

Colour : 

Number :

Skew :

Geometry

X :

Y :

Z :

XYZ increment :

Dip :

Dip direction :

Rotation :

Strike length :

Depth extent :

☐ Thickness :

Visual Parameter	Description
<i>Colour</i> (plate)	Colour of the plate.
<i>Transparency</i>	Allows you to modify the transparency setting (0 to 1) of the object: 0 is opaque and 1 is fully transparent.
<i>Colour</i> (Ribbons)	Colour of the internal lines drawn on the plates representing the eddy current flow in the plates.
<i>Number</i>	Number of ribbons.
<i>X/Y/Z</i>	Location of the top centre of the plate.

Visual Parameter	Description
<i>x, y, z increment</i>	Increases / decreases step value of the x, y, z changes when using the up / down arrows.
<i>Dip</i>	Dip of the plate (0-90 degrees where 0 = horizontal).
<i>Dip direction</i>	Azimuth at which the plate is dipping (0-360 degrees).
<i>Strike length</i>	Length of the top and bottom edge of the plate.
<i>Depth extent</i>	Dip extent or width of the plate edges.
<i>Thickness</i>	Toggle this option to display the plate with thickness.
<i>Rotation</i>	Plunge of the plate (-180 to 180 degrees).
<i>Orientation</i>	<ul style="list-style-type: none"> • <i>Data group</i>: Selects an orientation data group (3D vector, Dip direction, and Dip or Strike and dip). You can create, modify, and delete data groups through the Utilities-Group Data tool explained in a later section of this document. • <i>Symbol</i>: Selects the orientation node symbol (2D arrow, 3D arrow or plate). • <i>Size</i>: Modifies the size of the orientation symbols. • <i>Scale by length</i>: Available on 3D vector data groups only, click to scale the orientation symbols by length. • <i>Max size</i>: Sets the maximum size of the orientation symbols.

Note: To modify plate geometry and data, you must have the Maxwell link module and Geoscience ANALYST Pro.

You can view metadata corresponding to a Maxwell plate via the *Data Table* tab associated with that object.

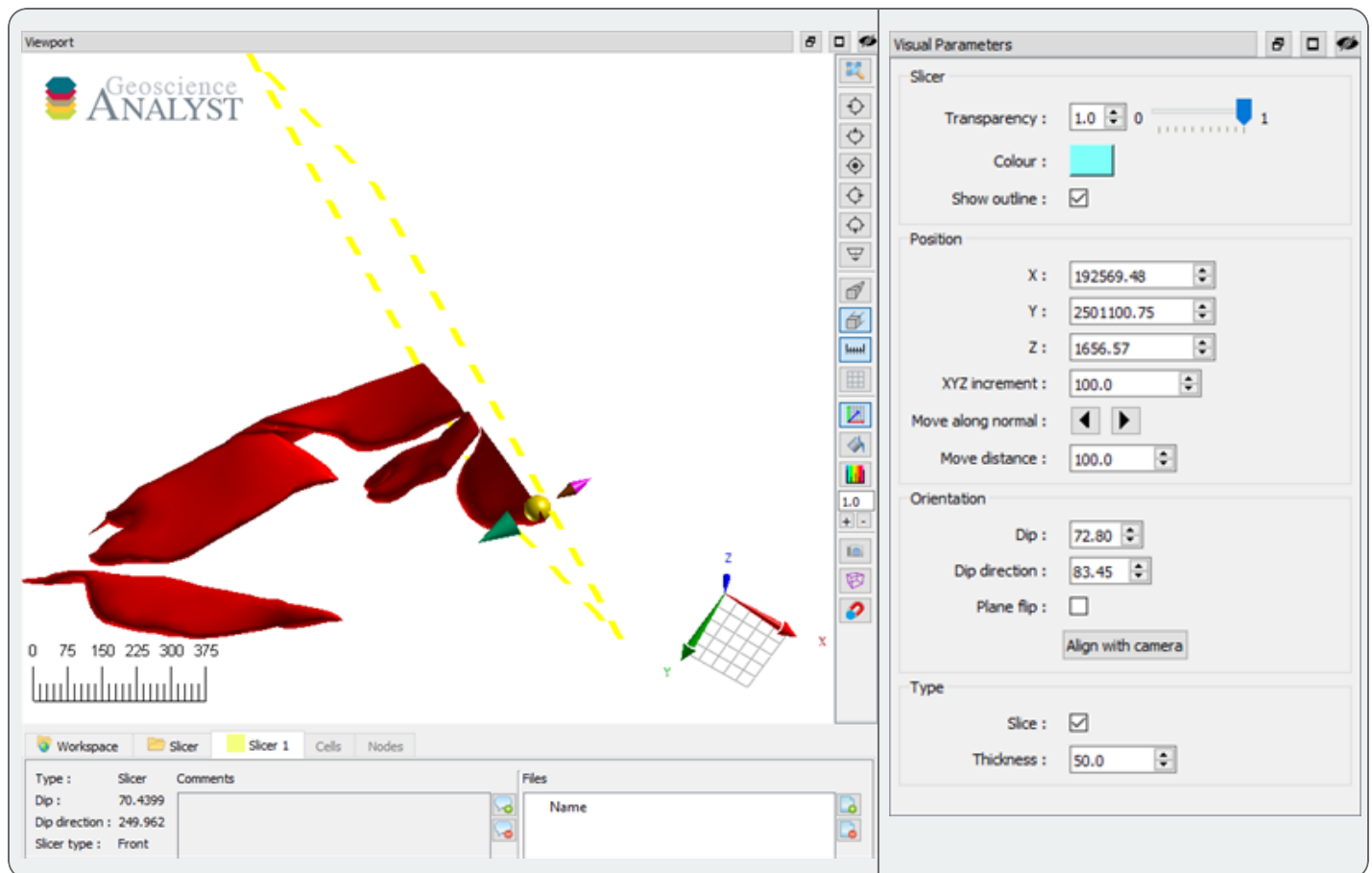
Special objects

Located in the Objects panel within the tools folder upon creation, special objects perform specific functions. The tools available are:

- Slicers
- Labels

Slicers

The slicer tool allows you to crop objects in the Viewport relative to an arbitrary plane. It is possible to apply one or more slicers to one object, a selected set of objects, or all objects in a workspace.



Tip: See the [Tools and tips](#) chapter to learn how to create and work with slicers.

The Slicer section of the Visual Parameters panel contains the components designed to allow you to modify the slicer tool, as presented in the table below:

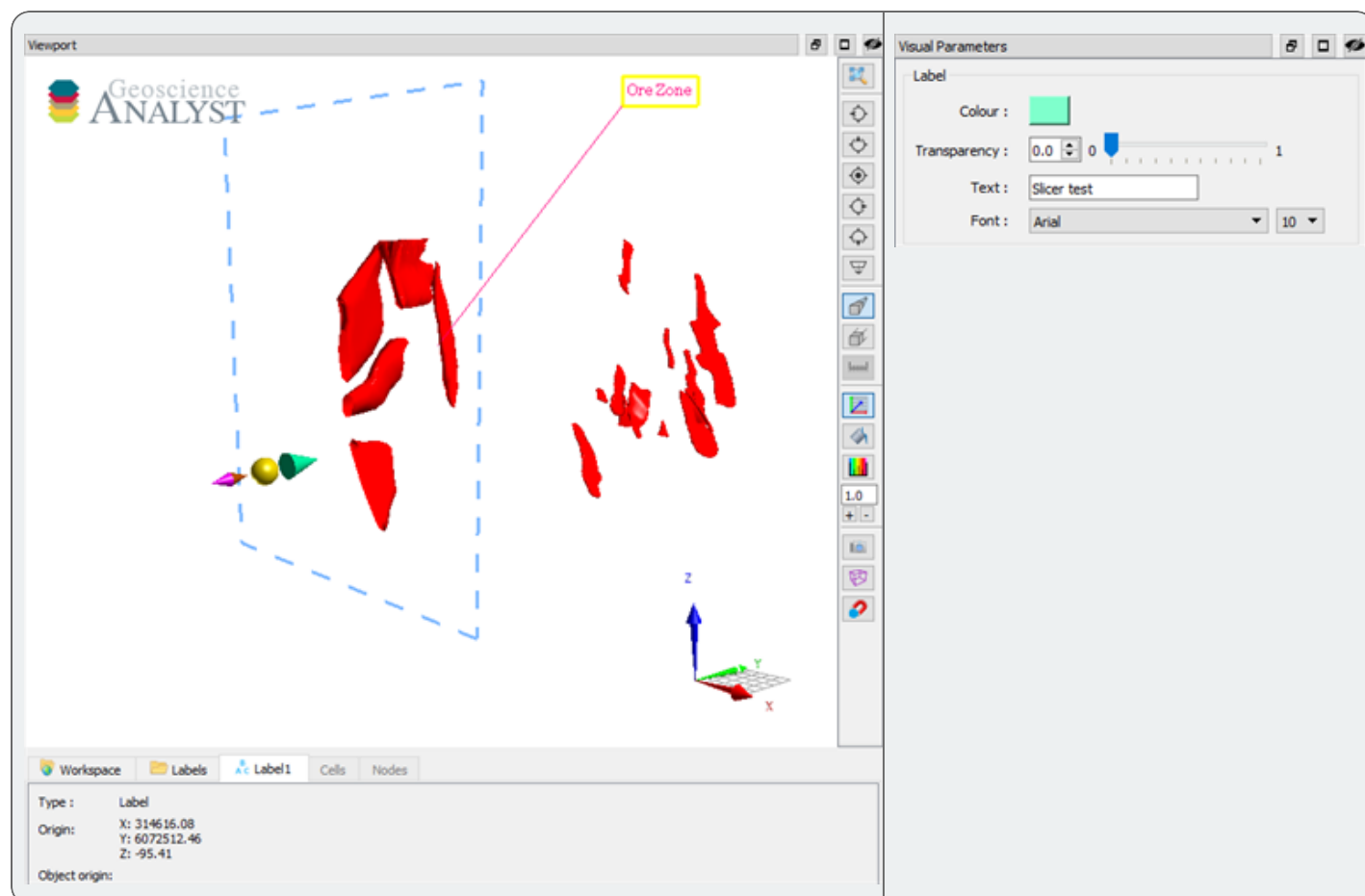
Visual parameter	Description
<i>Transparency</i>	Allows you to modify the transparency setting (0 to 1) of the slicer plane: 0 is opaque and 1 is fully transparent.
<i>Colour</i>	Corresponds to the colour of the slicer outline cage, and represents the slicer object in of the Objects panel.
<i>Show outline</i>	Displays the outline of the slicer's perimeter.
<i>Position</i>	Indicates the x, y, z position of the slicer, and when toggled on in the Viewport, the 3D manipulator.
<i>XYZ increment</i>	Allows you to adjust the increment value in the x, y, z positioning. For example, if you set the x, y, z increment to 200, clicking the up or down arrows on the number boxes of any axis (x, y, or z) will increase or decrease the value by 200.
<i>Move along normal</i>	Allows you to move the slicer in opposing directions along the plane of its axis.
<i>Move distance</i>	Allows you to adjust the increment value that the <i>Move along normal</i> arrows perform.
<i>Orientation</i>	Contains components that allow you to control dip and dip direction.
<i>Dip</i>	Allows you to adjust the dip of the slicer from 0° to 90°.
<i>Dip direction</i>	Allows you to adjust the dip direction of the slicer from 0° to 360°.
<i>Plane flip</i>	Inverts the plane and displays the perspective from the opposing side of the slicer.
<i>Align with camera</i>	Modifies the geometry of the slicer to be aligned with the camera.
<i>Slice</i>	Toggles the slicer type between a cropping plane and a slice.
<i>Thickness</i>	Allows you to adjust the thickness of the slicer.

You can view metadata that corresponds to selected slicers via the tab associated with those slicers in the *Data Table*, as illustrated in the following table:

Metadata	Description
Type	The selected object type, e.g., Slicer.
Dip	The slicer dip (0 to 90 degrees.)
Dip direction	The dip direction of the slicer.
Slicer type	Describes the type of slicer, either slice, front or back.

Labels

The labels tool allows you to attach text annotations to objects within the Viewport. This can help you to more easily differentiate between objects and simplify the workspace.



You can modify the graphical and text settings of labels through the Visual Parameters panel as presented in the table below:

Visual parameter	Description
<i>Colour</i>	Corresponds to the colour of a label's text, outline box, and line.
<i>Transparency</i>	Allows you to modify the transparency setting (0 to 1) of the label: 0 is opaque and 1 is fully transparent.
<i>Text</i>	Allows you to edit the label text.
<i>Font</i>	Allows you to select fonts and adjust the font size.

You can view metadata that corresponds to selected labels via the tab associated with those labels in the *Data Table*. For example, with the label *Ore Zone* selected, the tab with that title will contain the metadata associated with that label, as demonstrated in the metadata summary in the *Data Table*, and as illustrated in the following table:

Metadata	Description
Type	The selected object type, e.g., Label.
Origin	The x, y, z origin of the label.
Object origin	If digitized on an object, the object's name will be listed here.

CHAPTER 4

Importing and exporting

This chapter describes how to import files and export objects in Geoscience ANALYST.

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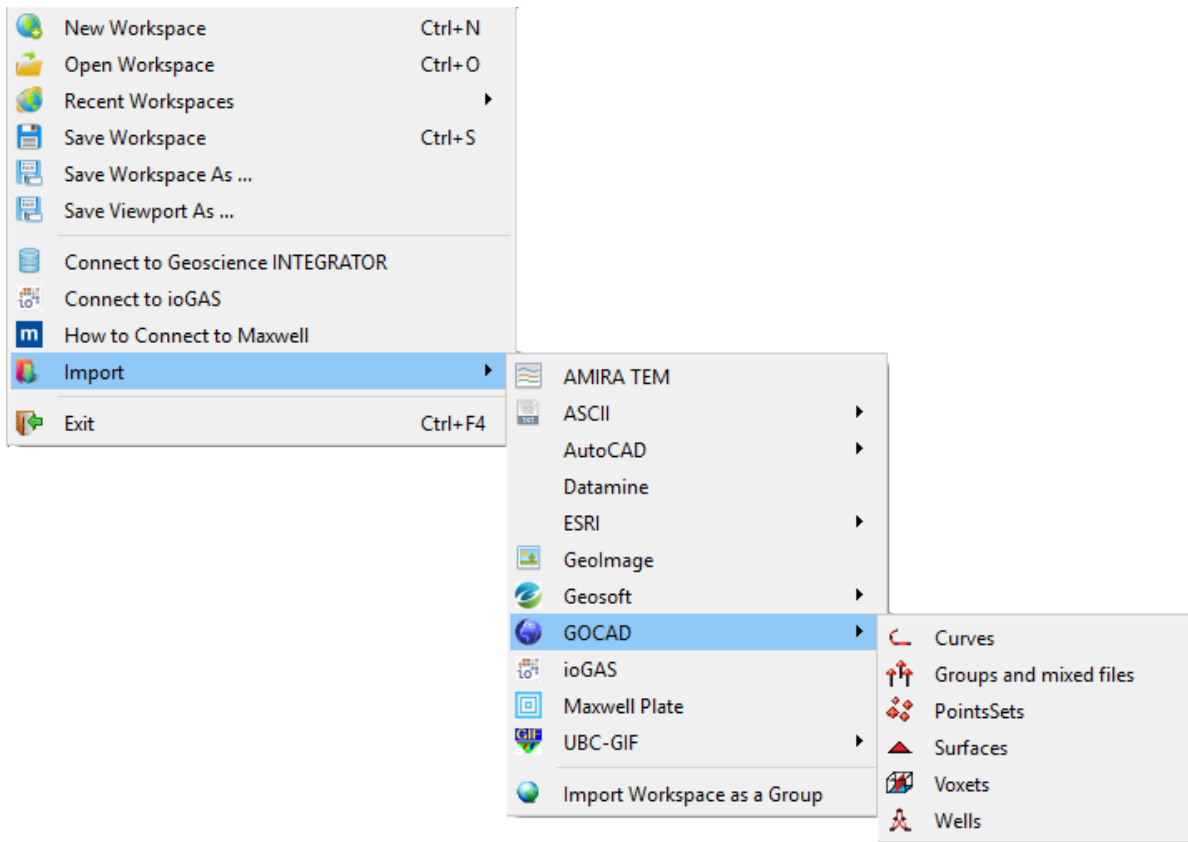


Importing files into Geoscience ANALYST

There are two ways to import the files into Geoscience ANALYST: through the File menu, and by dragging and dropping.

To import files via the File menu:

1. Go to **File / Import**.
2. Select the file type and object, if applicable.



To import files by dragging and dropping:

1. Locate your file using the file browser.
2. Drag and drop it onto the *Viewport* or *Objects panel* so Geoscience ANALYST can auto-detect the file type extension and launch the appropriate import filter.

Note: Drillhole data cannot be imported by dragging and dropping.

Note: If you are using the Viewport in a secondary monitor, you will have to drag and drop to the Objects panel instead of directly onto the Viewport.

To import Geoscience ANALYST workspaces on disk:

1. In the Geoscience ANALYST **File** menu, click **Import**, then in the contextual menu, click **Import Workspace as a Group**.
2. In the finder window, locate and open the `.geoh5` file you want to view.

The information exchange between projects is facilitated by exporting parts of workspace files or importing existing workspaces as group containers within your ongoing sessions.

The table below indicates the data and file types that you can import. You can click the file type for more information:

- [AMIRA TEM](#) drillhole, surface and airborne EM survey files and loops (`.tem`)
- [ASCII](#) column and drillhole (`.csv`)
- [AutoCAD](#) (`.dxf`, `.dwg`)
- [Datamine](#) binary points, strings, wire-frames, drillholes and block model (`.dm`)
- [ESRI shape](#) (`.shp`)
- [GeolImage](#) (`.jpg`, `.jpeg`, `.bmp`, `.gif`, `.png`, `.tif`, `.tiff`)
- [Geosoft](#) XYZ files, databases, and grids (`.xyz`, `.gdb`, `.grd`)
- [GOCAD Mining Suite](#) PointsSets, Curves, Wells, Surfaces, Voxets and mixed (`.vs`, `.pl`, `.wl`, `.ts`, `.vo`, `.gp`, `.mx`)
- [IoGAS](#) (`.gas`)
- [Maxwell plates](#) (`.pte`)
- [UBC-GIF](#) observation, 3D mesh, 3D model, and 3D topography (`.obs`, `.msh`, `.den`, `.topo`)
- [VP Suite models](#) (`.geoh5`)

AMIRA TEM files

When importing AMIRA TEM files, curves are created in a folder called TEM import. The importer automatically assigns the line ID property as well as multi-element and orientation data groups for quick profile and orientation visualization. If loop information is available, curves representing the geometry will be created in the same folder.

Import AMIRA TEM file

Name: 100N

Required fields:

X-coordinate	RX_GPS_EASTING
Y-coordinate	RX_GPS_NORTHING
Z-coordinate	RX_GPS_ELEV

Additional fields: Global NDV Setting: -999,-99999

	COLUMN	NDV	TYPE
48	CH6	-999,-99999	Float
49	CH7	-999,-99999	Float
50	CH8	-999,-99999	Float
51	CH9	-999,-99999	Float

Data preview:

	STN	RDNG	EAST	NORTH	RL	RX_GPS_EAST
1	100.00	0	100.00	100.00	0.00	312421.55
2	100.00	0	100.00	100.00	0.00	312421.55
3	100.00	0	100.00	100.00	0.00	312421.55
4	100.00	1	100.00	100.00	0.00	312421.41
5	100.00	1	100.00	100.00	0.00	312421.41
6	100.00	1	100.00	100.00	0.00	312421.41
7	100.00	2	100.00	100.00	0.00	312422.97

OK Cancel

ASCII files

Geoscience ANALYST has two types of ASCII CSV import utilities:

- **Column-based files:** Creates points objects.
- **Drillholes files:** Creates drillholes from a series of column-type files, including collar and optional survey and data files.

ASCII Column-based files

When importing either via the file menu or the drag and drop method, the *Import points* window will appear, allowing you to set the parameters of the data so that Geoscience ANALYST can accurately represent it.

Import points

Name:

Required fields:

X-coordinate	X
Y-coordinate	Y
Z-coordinate	Z

Additional fields: Global NDV Setting:

	COLUMN	NDV	TYPE
1	X	-999,-99999	Float
2	Y	-999,-99999	Float

Data preview:

	X	Y	Z	Cs	Al2O3%	E
1	192500.1968	2501020.442	2053.357422	7	12.4	1665
2	192500.3218	2501020.308	2039.358887	22	13.4	218
3	192500.4468	2501020.174	2025.360596	32	15.02	302
4	192500.5515	2501020.062	2013.611938	31	14.65	244
5	192500.6511	2501019.955	2002.463135	10	13.77	101
6	192500.7637	2501019.834	1989.864624	25	13.69	239
7	192500.885	2501019.704	1976.266113	45	13.23	242

Option	Description
Name	Name of the points object created within a new or existing folder called ASCII Importers.

Option	Description
Required fields	Allows you to choose the x, y, z coordinates (easting, northing, and elevation columns). The importer will try to auto-detect appropriate fields according to the header name (e.g., x, y, z, easting, northing, elevation). If the utility does not detect any fields from the CSV, it will consider the first three columns as x, y, and z.
Additional fields	Allows you to select the NDV (no-data value) and theme (referenced or float) for each column in the imported CSV file. The utility predicts the theme based on the previewed values of the first 256 entries of the CSV file. For text entries, it suggests referenced data. For numerical entries, it suggests float data. If it does not auto-select the optimal type, you can choose the correct one using the drop down menu.
Global NDV setting	Allows you to enter custom no-data values for individual columns. When entering the values in the global NDV setting, separate them by commas and click Apply . This will add the values to every column at once. You must enter the entire value as shown in the data preview, e.g., 0.01 must be entered rather than .01.
Data preview	Displays a preview of the first 256 entries in the ASCII file.

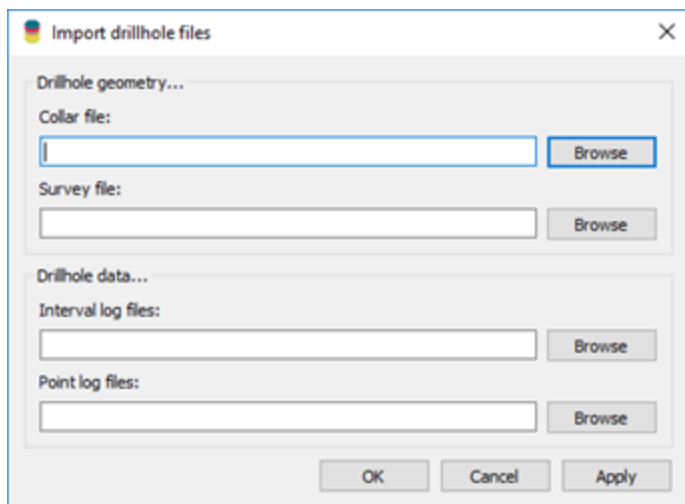
ASCII Drillhole files

When importing ASCII Drillhole files, you must do so via the file import method, as multiple files and data parameter settings are required.

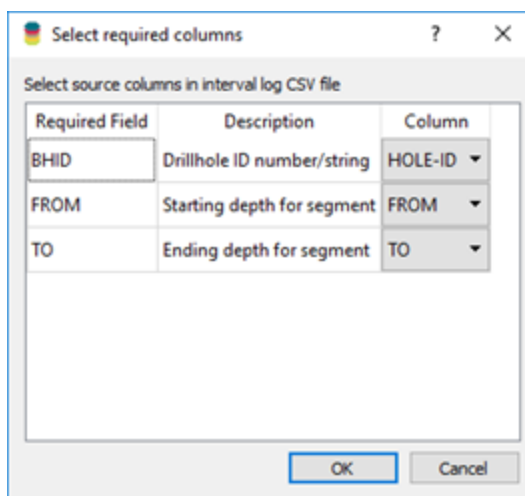
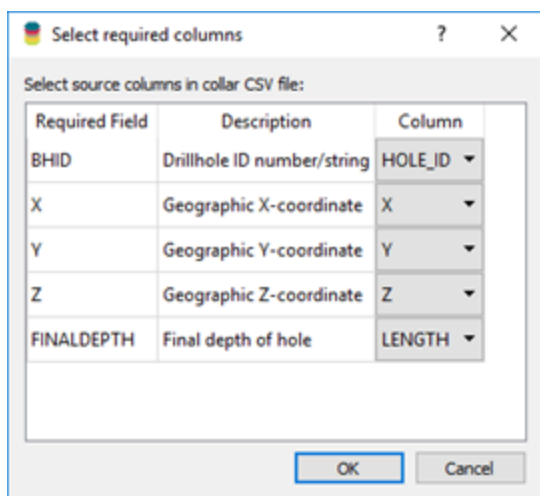
Before loading, the *Import drillhole files* dialogue box presents you with the following options, as indicated in the table below:

Option	Description
Collar file	Allows you to browse locally to select the desired drillhole collar file.
Survey file	Allows you to browse locally to select the desired survey file. If left blank, the importer will assume all holes are vertical. If the importer cannot find a drillhole in the survey file but finds one in the collar file, the import importer will create it vertically.
Interval log files	Allows you to select one or more data files related to drillhole intervals. All files must be in the same directory.
Point log files	Allows you to select one or more data files related to drillhole points. All files must be in the same directory.

To import ASCII drillhole files:



1. In the *Import drillhole files* window, click **Browse** to select the collar, survey, and data files on your local drive.
2. Click **OK**.
3. In the *Select required columns* window, determine if you need to re-map required fields with different columns than the import auto-detection utility suggests using the drop-down column selectors.
4. Repeat step 3 with each of the file types, as they appear in sequence.



Select required columns

Select source columns in survey CSV file:

Required Field	Description	Column
BHID	Drillhole ID number/string	HOLE_ID
DEPTH	Depth down hole	DISTANCE
AZIMUTH	Azimuth reading	AZIMUTH
DIP	Dip reading	DIP

OK Cancel

Select required columns

Select source columns in point log CSV file:


Required Field	Description	Column
BHID	Drillhole ID number/string	WellName
DEPTH	Depth down hole	From

OK Cancel

Note: Negative dips create downward trending drillholes, while positive dips create upward trending drillholes, which may occur in underground drilling.

AutoCAD files

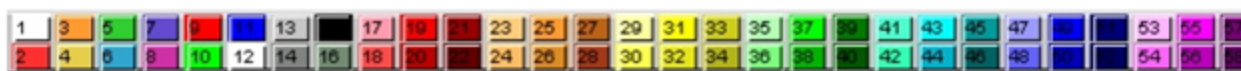
You can create points, curves, and surfaces by importing AutoCAD .dwg and .dxf files, from a wide variety of AutoCAD-related applications. In the Objects panel, Geoscience ANALYST stores imported files in a folder called AutoCAD imports. AutoCAD objects are organized in a sub-folder for each layer.

 This icon denotes an AutoCAD text file, which the system imports as a text type specific to this file type in the Objects panel.

Datamine files

You can import and convert binary Datamine point, string, wire-frame, block model, and drillhole assay type files. Geoscience ANALYST stores imported files in a folder created upon import called *Datamine imports* within the Objects panel.

The original Datamine colours are preserved on the created points, curves, and surface objects through an integer data value called COLOUR, which automatically maps to a custom built-in Datamine colour table and colour mapping curve, according to the following legend:



Additional Datamine properties and themes

Property and / or theme	Conversion type in Geoscience ANALYST
Non-discrete numerical	Float or integer.
Discrete alphanumeric	Reference data.
Block model	BlockModels. If the cell distribution is irregular, the importer creates an additional points object at the centroids, preserving all data. The BlockModel derives its dimensions and cell sizes from parameters in the Datamine binary header (e.g., largest XINC, YINC, ZINC). The data held on the points object is transferred to the BlockModel cells.
Wire-frame	Surfaces. The data is stored at the node or triangle level.
Drillhole type	Paths (drillhole traces) and properties (imported as interval and point logs).

ESRI shapefiles

Geoscience ANALYST can import ESRI shapefiles (.shp), which is a format for GIS software that describes vector features such as points, curves, and polygons.

Note: Make sure the .shp files are available and located in the same directory as the .shp without them.

The import utility allows you to either drag and drop the .shp into the Viewport, or use the file import method on your local directory. Point files will import as points, and polyline and polygon-type files will import as curves.

Data from the ESRI shapefile converts in Geoscience ANALYST as follows:

Shapefile theme	Geoscience ANALYST generic theme
FTString	Reference. (May import as text in some cases. Class colours are randomly generated).
FTInteger	Integer.
FTDouble	Float.

Project files (.geoh5)

.geoh5 file. See the section on [Saving workspaces](#) to find more about this file format.

Note: When importing a .geoh5 file, the system does not import non-moveable folders such as labels and slicers or any saved views.

GeoImage files

Geoscience ANALYST is compatible with several image file types, each of which create GeoImage objects when imported. They are:

- .jpg/.jpeg
- .gif
- .bmp
- .tif/.tiff

Additionally, Geoscience ANALYST supports two types of georeferenced ASCII files:

- World files: horizontally oriented images (plan maps)
- Location .csv files: horizontally and vertically oriented images (plan maps and sections)

Geo-referencing with the world file format

Line	Coordinates
1	X component of the pixel width (x-scale)
2	Y component of the pixel width (y-skew)
3	X component of the pixel height (x-skew)
4	Y component of the pixel height (y-scale)
5	X-coordinate of the centre of the upper left pixel
6	Y-coordinate of the centre of the upper left pixel

For example, the world file required to import and georeference an non-rotated plan map with 3.5x3.5m cells originating at 1900E, 55000N would look like:

```
3.5  
0.00  
0.00  
-3.5
```

```
1900
55000
```

Geo-referencing with the location .csv file format

The location .csv file consists of three lines identifying the coordinates of the top left, top right, and bottom left corners of the image, delimited by commas.

Line	Coordinates
1	top left corner x, y, z coordinates
2	top right corner x, y, z coordinates
3	bottom left corner x, y, z coordinates

For example, the location file required to import and georeference a NE trending vertical section that goes from 3100 m to 2500 m elevation would look like:

```
6600,16400,3100
6800,17010,3100
6600,16400,2500
```

To automatically georeference the image upon import, an associated world or location file must exist in the image folder and be named the same as the image file. The world file should also have the same extension suffix with a “w” (e.g., .jpgw), while the location file must be comma-delimited with a .csv extension.

Note: If both world and location files are present in the folder, the importer will use the world file by default. If neither a world nor location file is detected, the image will import as a horizontal GeolImage originating at 0, 0, 0 and each pixel will be 1x1 units in size.

Geosoft files

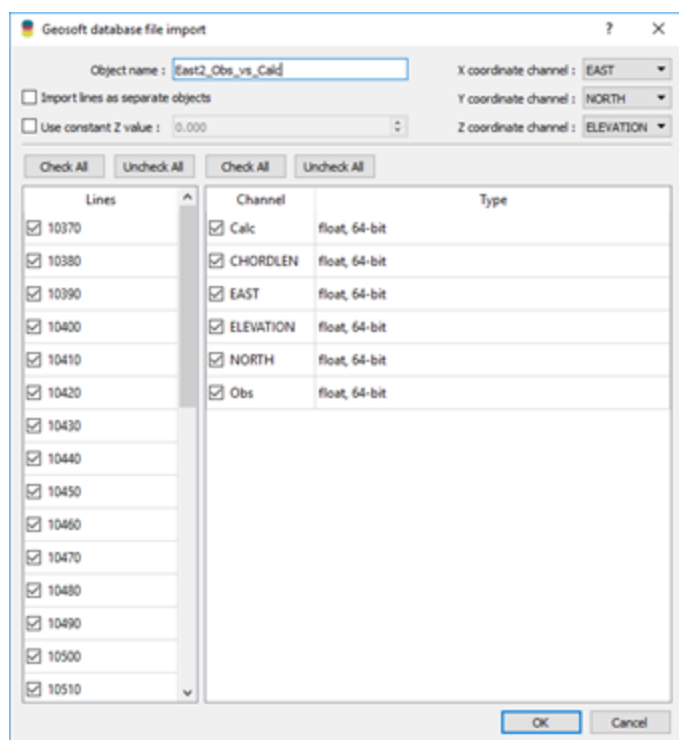
Geoscience ANALYST imports the following Geosoft file types:

- Databases
- Grids
- XYZ ASCII files

Note: You must have an active Geosoft account to import Geosoft binary files into Geoscience ANALYST.

Geosoft databases

Geoscience ANALYST imports Geosoft .gdb files as curves with associated data, representing geophysical survey lines. When importing either via the file menu or the drag and drop method, the *Geosoft database file import* window presents you with a series of options and information associated with the file, as illustrated in the image below:



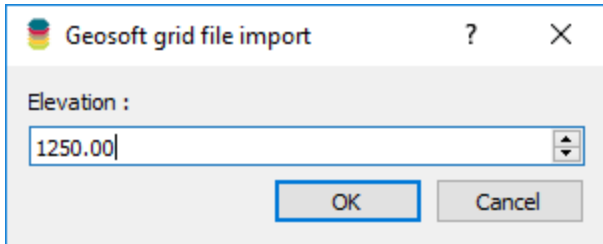
Option	Description
Import lines as separate objects	Selecting the check box allows you to import each line as a separate curve, each of which is named according to the Line ID. Leaving the check box unchecked will import the geophysical survey lines as one curve.
Use constant Z value	Assign a constant z value to all curves if the data is 2D.
x, y, z coordinate channel	Allows you to assign different fields to the x, y, and z axes.

Note: The type column lists Geosoft data formatting, and maps it to appropriate themes (e.g., float, integer, date). Unknown types will import as float data, so text entries may not import as expected.

Geosoft grids

Geoscience ANALYST imports Geosoft `.grd` files as 2D grids.

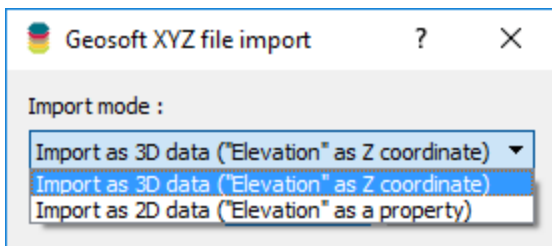
The data will import as floats. If the importer detects an associated `.grd` files). Otherwise, it will be horizontal and the *Geosoft grid file import* dialogue box will pop up, allowing you to enter the elevation.



Elevation: Select the z coordinate to assign to the 2D grid origin.

Geosoft XYZ files

Geosoft `.xyz` files import as curve objects along with their associated data, representing geophysical survey lines. When importing either via the file menu or the drag and drop method, the *Geosoft XYZ file import* window allows you to set the elevation, as illustrated in the image below:



Note: Geoscience ANALYST will attempt to correctly assign themes. For example, data values with the format 13:12:36.00 that have an accompanying comment date field //Date 2003/11/04 will be tagged as a DateTime property. If the data assignment is unsuccessful, it will be assumed to be text.

GOCAD Mining Suite files

You can import supported GOCAD files either via the file menu or the drag and drop method.

All properties import as float data, with the exception of discrete properties associated with a classification such as geology codes, which will import as reference data.

The following table illustrates the GOCAD objects and their behaviour once imported into Geoscience ANALYST:

GOCAD object	GOCAD file extension	Geoscience ANALYST object	Preserved attributes
PointsSets	.vs	Points	Colour, node, symbol, size and shape, painted status
Curves	.pl	Curves	Colour, node size and status, segment thickness and status, painted status
Surfaces	.ts	Surfaces	Colour, mesh and painted status
Wells	.wl	Drillholes	N/A
Voxets	.vo	BlockModels or GeolImage	Displayed sections and painted status
Drillhole groups	.gp	Drillholes within a drillholes group	N/A
Miscellaneous groups	.gp	Miscellaneous objects within a folder named according to the group	N/A
Mixed	.mx	Miscellaneous objects	N/A

Tip: If the headers of the imported GOCAD files do not include the class entries, the numerical key values will be imported rather than the classification names. To update the class names and colours, export the classification from GOCAD as a CSV file, navigate to the Data Colours panel of the reference data in question, and load it via the *Load colours* settings button.

ioGAS files

When imported, ioGAS (.gas) files will create a unique ioGAS Points object. The new object appears in a folder called ioGAS imports that is created upon import if does not already exist in your workspace. With an ioGAS file imported, you will see the *ioGAS graphics* check box in the Points section of the Visual Parameter setting allowing you to view (but not edit) the ioGAS points. This feature permits the advanced visualization settings from ioGAS to be compatible with Geoscience ANALYST's 3D environment and viewed alongside other model components.

Maxwell plate files

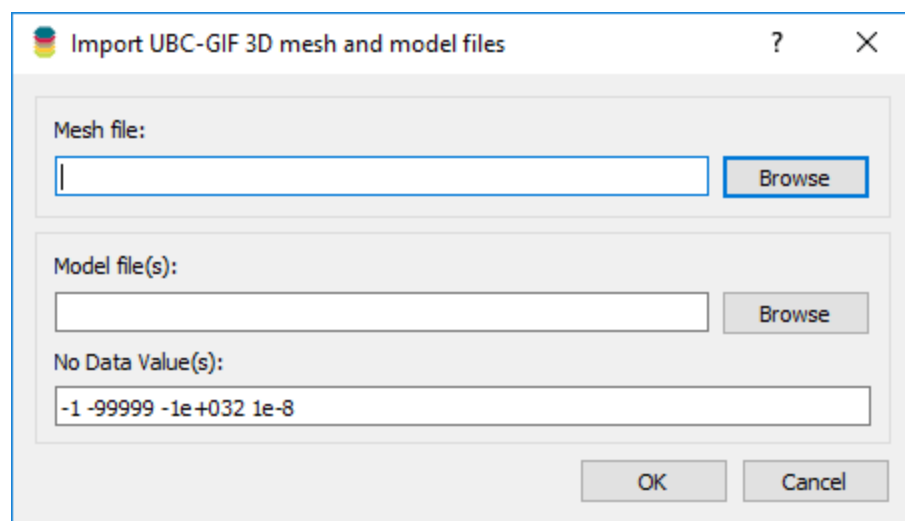
When importing a plate file (.pte), a plate object is created, with its thickness status and cole-cole parameters. The [Maxwell link module](#) must be activated in order to modify the geometry of imported plates.

UBC-GIF files

Geoscience ANALYST can import UBC-GIF files (University of British Columbia Geophysical Inversion Facility) of different types, as illustrated in the following table:

File type	Description
3D mesh and model files	3D mesh files create BlockModels upon import and associated model files as data stored on their cells in a folder called <i>UBC imports</i> . You can modify the suggested default no-data value field.
3D Topography files	Imports as a surface object.
Observation files	Imports as a points object.

Below the import dialogue for **3D mesh and model files**:



The screenshot shows a Windows-style dialog box titled "Import UBC-GIF 3D mesh and model files". It contains three main sections: "Mesh file:" with an empty text box and a "Browse" button; "Model file(s):" with an empty text box and a "Browse" button; and "No Data Value(s):" with a text box containing the values "-1 -99999 -1e+032 1e-8". At the bottom right are "OK" and "Cancel" buttons.

Note: If you import the model file via the drag and drop method, the importer will not launch the interim dialogue, thus using the default no-data values.

Importing VP Suite models

Geoscience ANALYST allows you to import models from the Mira Geoscience VP Suite, software for 3D modelling and inversion programs for gravity, gravity gradient, total magnetic field, and magnetic gradient data, and for time-domain electromagnetics (TEM) data.

To open a VP model in Geoscience ANALYST:

1. Open a command prompt and type **VPutility inputFile.geoh5**.
2. In the Geoscience ANALYST **File** menu, click **Import**, then in the contextual menu, click **Import Workspace as a Group**.
3. In the finder window, locate and open `.geoh5` created by VPutility.

Exporting objects from Geoscience ANALYST

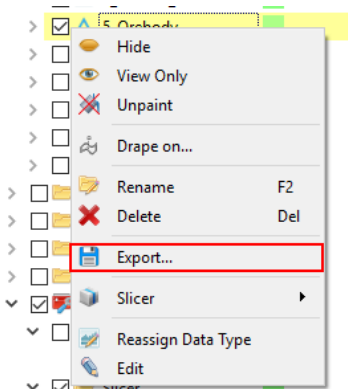
Geoscience ANALYST allows you to export certain objects, depending on their type:

- P Points, curves, and surfaces to GOCAD ASCII files (.mx).
- Drillholes to CSV: collar, survey, interval and point log .csv files.
- Any objects to a Geoscience ANALYST workspace file (.geoh5).

Exporting to points, curves, and surfaces GOCAD ASCII

To export a selection of one or several objects to a .mx) file:

1. In the Objects panel, right-click the object or folder you wish to export (hold **Ctrl** key for multi-selection).
2. In the contextual menu, click **Export**.



3. In the *Export* dialogue box, name the file and click **Save**.

GOCAD .mx files support generic data types (float, integer, and reference) stored on nodes and basic object attributes (colour, node size, etc.).

Note: Data on surface triangles and curve segments is NOT supported by GOCAD .mx file format.

Exporting drillholes to CSV





When exporting a selection of one or several drillholes to CSV, several .csv files get created:

- One for collars (suffixes with `collar`)
- One for surveys (suffixes with `survey`)
- One for interval logs (suffixes with `interval logs`)
- One for point logs (suffixes with `point logs`)

To export drillholes to CSV:

1. In the Objects panel, right-click the object or folder you wish to export (hold **Ctrl** key for multi-selection).
2. In the contextual menu, click **Export**.
3. In the *Export* dialogue box, navigate to the desired output folder, type a file name and click **Save**.

If typing `long_holes` as a file name, you should then find four files on disk:

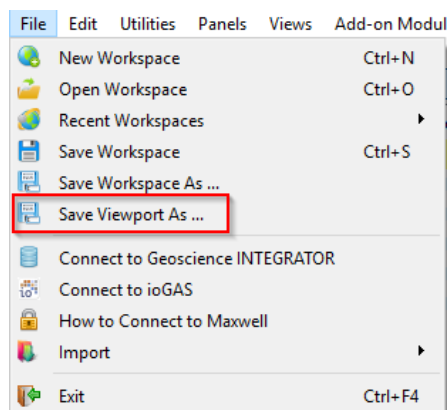
 `long_holes survey.csv`
 `long_holes point logs.csv`
 `long_holes interval logs.csv`
 `long_holes collar.csv`

Note: If you select any other object type with the drillhole(s), you will receive an error message, and be forced to deselect the unsupported objects before exporting the drillholes again.

Exporting as a .geoh5 workspace file

Any configuration you create in the Viewport, you can save as a workspace:

1. In the Menu bar, click **File / Save Viewport as**.
2. In the *Export* dialogue box, navigate to the desired output folder, enter a file name and click **Save**.



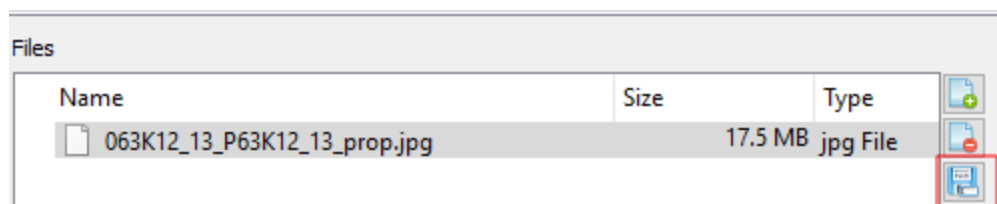
The new workspace file contains:

- All the objects visible in the current viewport, and their visual parameters
- The settings of the current viewport
- The saved views of the current viewport

Note: A folder is not saved if its check box in the Object panel is not checked, or if no other items within the folder are checked. Geoscience INTEGRATOR query folders are always exported, whether they are checked or not so that query results are available in the exported workspace.

Saving files from within a workspace to disk

If you have files such as maps, PDFs, and images, you can save them directly to disk by clicking the **Save As** button at the right of the window that contains the file. This allows you to avoid having to open and save the file in the file's native software.



CHAPTER 5

Integration with Geoscience INTEGRATOR

This chapter describes how you can connect to Geoscience INTEGRATOR to query your data, retrieve them and use them within Geoscience ANALYST.

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Integration with Geoscience INTEGRATOR

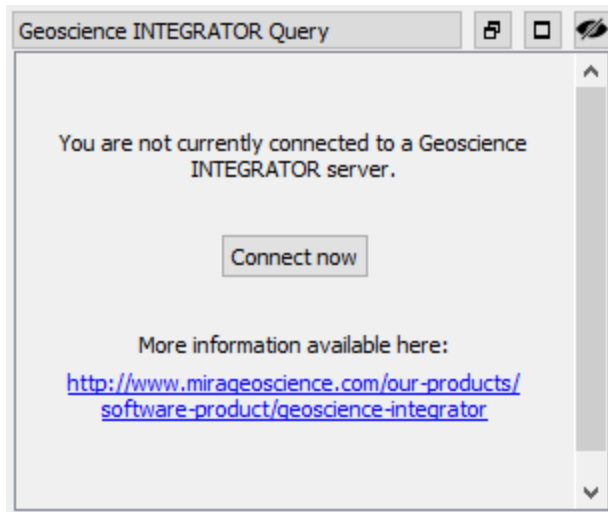
Geoscience ANALYST serves as the 3D viewer for the Geoscience INTEGRATOR data management system, the software solution by Mira Geoscience for 4D multi-disciplinary exploration and geotechnical data management. It allows you to query and visualize data in a Geoscience INTEGRATOR server.

The Geoscience INTEGRATOR Query panel

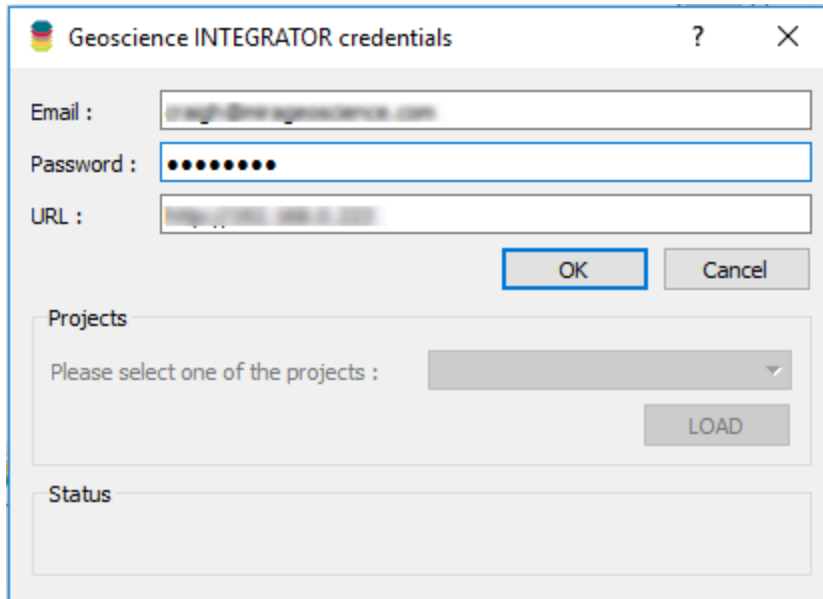
This panel allows you to interact with your Geoscience INTEGRATOR projects. First connect to a project, then optionally define data filters from high level parameters (*Data set search*), and ultimately download the data as objects in your Geoscience ANALYST workspace. Data can be visualized along with other data in 2D or 3D *Viewports*.

To connect to the Geoscience INTEGRATOR server

1. In the *Geoscience INTEGRATOR Query* panel, click the **Connect now** button.

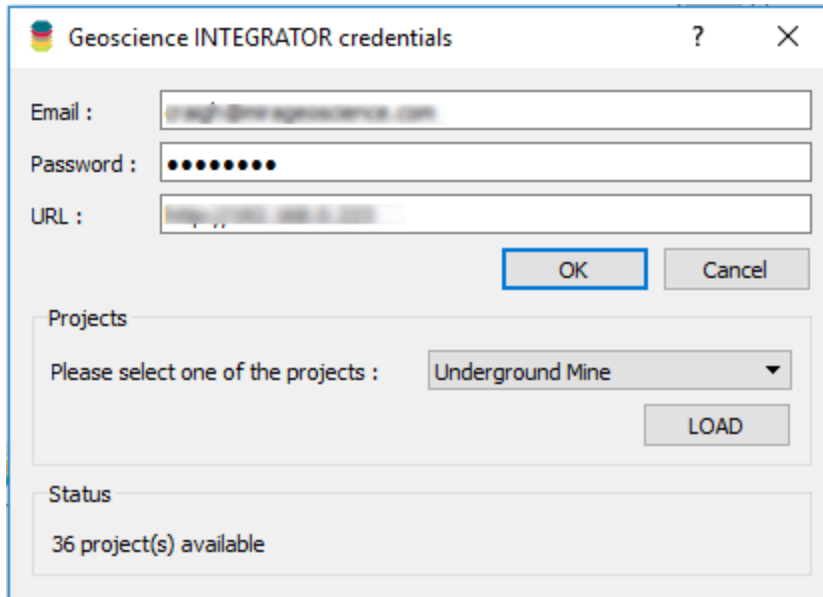


2. In the *Geoscience INTEGRATOR Credentials* dialogue, enter your email, password, and the URL of a Geoscience INTEGRATOR server. Click **OK**.



The dialog box titled "Geoscience INTEGRATOR credentials" contains three input fields: "Email :" with the text "craig@bmc.geoscience.com", "Password :" with ten black dots, and "URL :" with the text "http://192.168.1.100". Below these fields are "OK" and "Cancel" buttons. A "Projects" section follows, with the text "Please select one of the projects :" and a dropdown menu. A "LOAD" button is positioned to the right of the dropdown. At the bottom is a "Status" section.

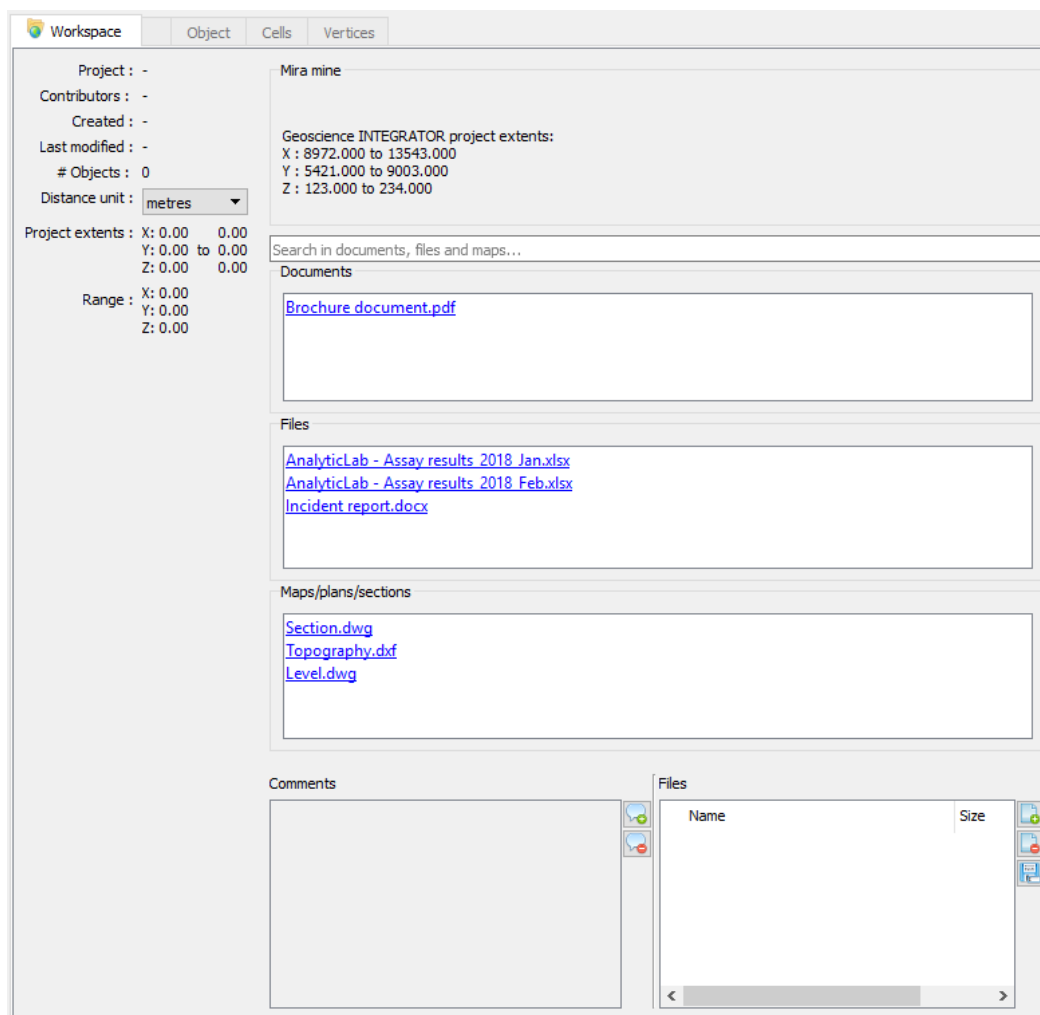
3. In the drop-down menu of the *Projects* section of the credentials dialogue box, select the desired Geoscience INTEGRATOR project and click **LOAD**.



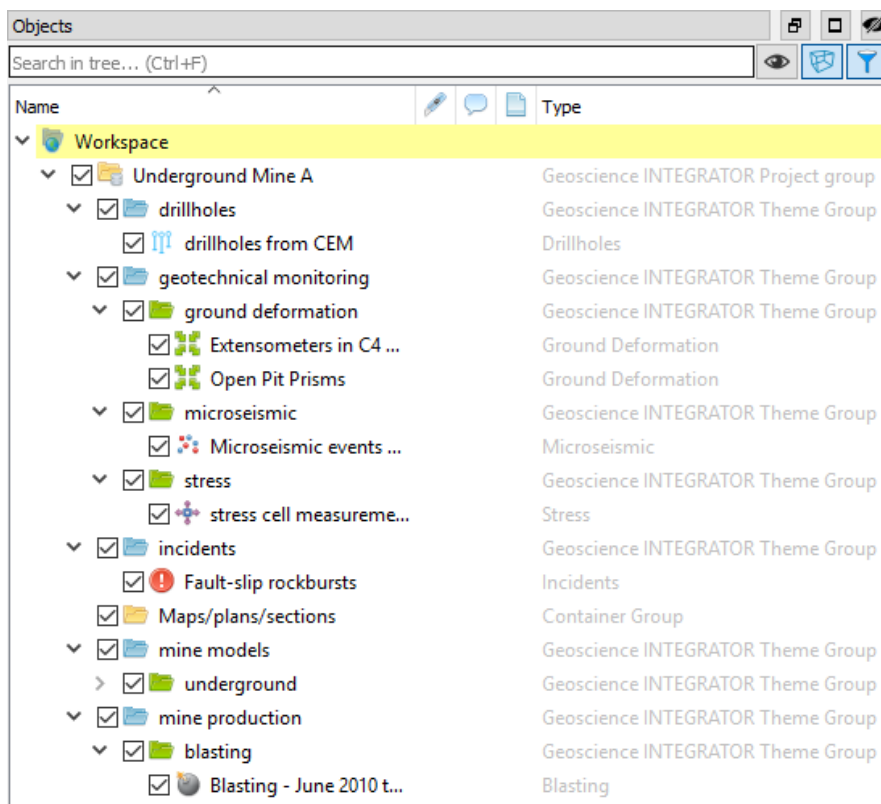
This dialog box is identical to the previous one, but the dropdown menu in the "Projects" section now displays "Underground Mine". The "LOAD" button remains disabled. The "Status" section now displays the text "36 project(s) available".

Overview of the project content

Once you have loaded a Geoscience INTEGRATOR project, you will see the project summary information displayed in the **Workspace** tab of the *Data Table* (below the *Viewport*). This includes the project's name and description, the x, y, z extents of the project data, and a list of the documents, files and maps/plans/sections stored in the Geoscience INTEGRATOR project.



In the Geoscience ANALYST *Objects panel*, you can see all the data sets available organized under folders.



Note: At this point, you have not loaded records from Geoscience INTEGRATOR yet. Geoscience ANALYST only loaded the list of data sets with a quick summary of what they contain as well as the list of files of all types to inform you on what is available for import.

Data sets and themes

In the Geoscience INTEGRATOR data management system, data sets are grouped under themes designed to organize the data based on their nature or subject. Having data grouped in themes helps you to locate your data intuitively.

Geoscience INTEGRATOR groups some themes together under a more general folder name. For example, you would find extensometer data in the *Ground deformation* theme, which is grouped under the *Geotechnical monitoring* folder with the *Microseismic* and *Stress* themes.

Data sets appear in grey if they have no queryable records. Such data sets generally link to data stored as binary files rather than database tables.

From Geoscience ANALYST, you can download the data files, and open them in a dedicated application, or import them directly into the current workspace if their file type is supported by Geoscience ANALYST's import filters. See section about [Importing objects](#) for a list and description of supported file formats.

Data set search tool

This feature allows you to find data sets based on parameters defined at the data set level, including its 3D bounding box. It does not return the actual data within data sets; it just identifies data sets that match the search parameters and displays their bounding boxes in the *Viewport*.

The *Data set search* tool will appear in the *Geoscience INTEGRATOR Query* panel when you select the *Project group* folder or any folder of the *Theme group* type from the *Objects panel*.

Note: *Data set search* is available only when connected to Geoscience INTEGRATOR, and only performs searches on data sets in the project you are connected to.


Geoscience INTEGRATOR Query


Data set search




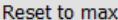
☒ Name

☐ Description

☒ Bounding box


From : X : Y : Z : 


To : X : Y : Z : 

 X extent  Y extent  Z extent 

☐ Metadata

contains





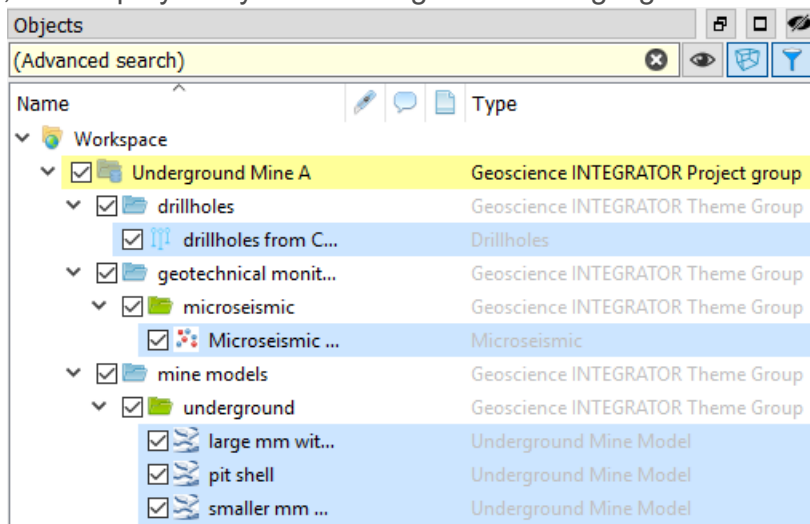
Find

There are four parameters available to search for data sets:

Parameter	Description
<i>Name</i>	Will return data sets containing the queried string of characters in their names.

Parameter	Description
<i>Description</i>	Will return data sets containing the queried string of characters in their descriptions.
<i>Bounding box</i>	<p>Will return data sets whose bounding boxes intersect your volume of interest.</p> <p>By default, the <i>From</i> and <i>To</i> parameters are set to the extents of the entire data set. To modify the bounding box extents:</p> <ol style="list-style-type: none"> 1. You can define new <i>From</i> and <i>To</i> locations by either clicking on the corresponding target button to the right, entering new values in the text boxes, or using the up and down arrows. 2. You can drag a line in the <i>Viewport</i> to nominate the x, y, and z extents. We recommend setting a view from top to draw the x and y extents, and from a side view when drawing the z extent. 3. Click Reset to max to revert to the entire x, y, z extents. <p>Note that the search bounding box you are defining is shown directly as a red box in the <i>Viewport</i>.</p>
<i>Metadata</i>	<p>Will return data sets depending on their metadata.</p> <p>You can choose a metadata field from the drop-down menu and add an operator such as Is, Is not, Contains, or Does not contain.</p> <p>Because metadata presence is customized per data set in Geoscience INTEGRATOR, Is present and Is absent confirm metadata presence or absence on the data set, while Is and Is not search the actual values of the field.</p> <p>You can click the + button to add metadata search fields and combine with previously created ones.</p>

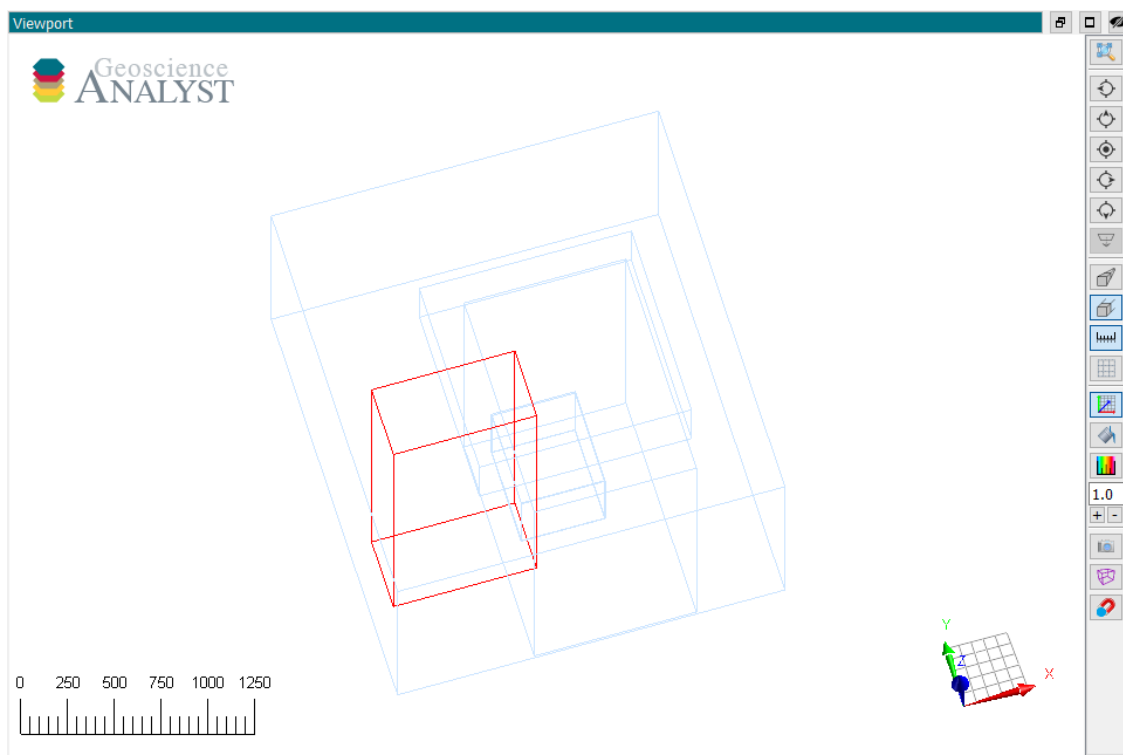
After clicking **Find**, the *Objects panel* collapses the folders that have no result, expands the ones that do, and displays only the resulting data sets highlighted in blue.



See the general chapter on [the User Interface](#) for detailed explanations of buttons at the top of the *Objects* panel.

Tip: After cancelling the search, the parameters remain as is in the *Data set search* tool, ready to **Find** again.

In the *Viewport*, you can see a blue bounding box for each data set that matches the search criteria. It is helpful to locate data sets in 2D or 3D *Viewports*, relatively to each other, and to other objects in the workspace.



Note: At this point, you have not downloaded records from Geoscience INTEGRATOR yet. You have just identified pertinent data sets.

Data set summary tab

At any time, you can select a data set in the *Objects panel* to consult all its summary information in a data set tab (bearing the name of the data set) in the *Data Table* under the *Viewport*, next to the *Workspace* tab.

The screenshot shows a software interface with a tabbed window. The active tab is titled 'Blasting - June 2010 to June 2011'. Above this tab are three smaller tabs: 'Workspace', 'Object', 'Cells', and 'Vertices'. The main content area displays a hierarchical tree structure under a 'Summary' heading. The tree includes sections for 'Neighbourhoods', 'Tags', 'Files', 'Properties', 'Year', and 'Contractor', each with its own list of items.

- ▼ Summary
 - Bounding maximum : X : 4943 Y : 1119 Z : 1922
 - Bounding minimum : X : 4775 Y : 940 Z : 1784
 - Count : 1060
 - Description :
 - Maximum Date : 2011-06-27 19:55:00
 - Minimum Date : 2010-06-27 23:31:00
 - StdDev*2 bounding maximum : X : 4934 Y : 1092 Z : 1922
 - StdDev*2 bounding minimum : X : 4782 Y : 979 Z : 1819
- ▼ Neighbourhoods
 - Level_1910
 - Level_1885
 - Level_1860
- ▼ Tags
 - 10/15/2010 Event
 - Shifts
 - Documents
- ▼ Files
 - [FOG 1324 1.JPG](#)
 - [mine_development.ts](#) (Data file)
 - Maps/plans/sections
- ▼ Properties
 - date [blasting] (date) [2010-06-27 23:31:00 to 2011-06-27 19:55:00]
 - type_of_explosive [blasting] (classification)
 - x [blasting] (numeric) [4775.67 to 4942.4] Mean: 4857.82
 - y [blasting] (numeric) [940.033 to 1118.27] Mean: 1035.14
 - z [blasting] (numeric) [1785 to 1921.61] Mean: 1877.04
- ▼ Year
 - 2010
- ▼ Contractor
 - OBD services
 - Drill-Blast Experts

Concepts from Geoscience INTEGRATOR

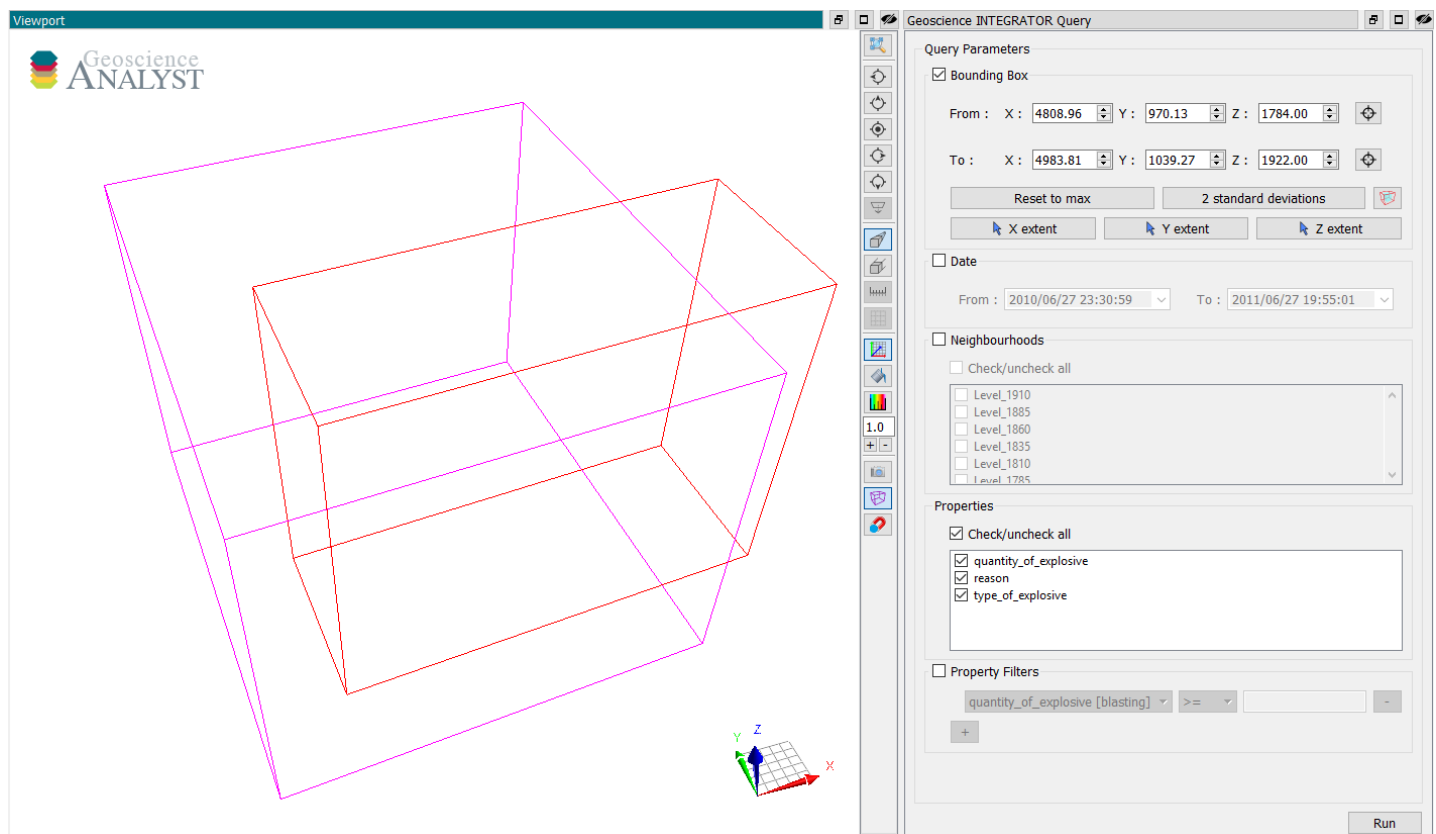
Attribute	Description
<i>Bounding max/min</i>	The X, Y, Z extents of the data set.
<i>Count</i>	The number of elements in the data set.
<i>Date max/min</i>	The earliest and latest dates in the data set (only for time-related themes).
<i>Neighbourhoods</i>	Volumes of space that you want to refer to by name rather, than by coordinates. They correspond to actual volumes that can be defined in Geoscience INTEGRATOR.
<i>Tags</i>	Text identifiers that can be assigned to data in Geoscience INTEGRATOR.
<i>Shifts</i>	Intervals of time within a 24-hour period. They are configured from Geoscience INTEGRATOR.
<i>Documents</i>	Files available at the system level.
<i>Files</i>	Files of various types available within a project.
<i>Maps/plans/sections</i>	Drawing files available within a project. It has the advantage of previewing the list of layer names to help you choose the right one based on its content. Typically from AutoCAD files (. dxf, . dwg).
<i>Properties</i>	List of data properties available for the data set.
<i>Metadata</i>	Geoscience INTEGRATOR allows the users to create custom metadata fields to further document high level parameters of data sets.

Retrieving data from Geoscience INTEGRATOR

Query Parameters tool

When you select a data set from the *Objects panel*, besides the data set summary tab, you also have access to the *Query Parameters* tool in the *Geoscience INTEGRATOR Query* panel. It exposes filters for selecting data from the selected data set, and importing them into Geoscience ANALYST.

By default, all filters are set to include all the records from the data set. Restrict the filters to retrieve only a pertinent subset of data. You can enable and disable each filter independently by toggling on and off the check box in front of it.



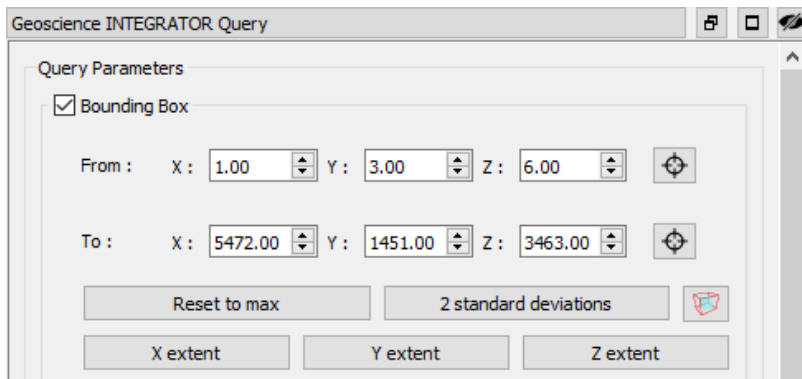
When you have set the desired combination of filters, you can click **Run** at the bottom of the *Geoscience INTEGRATOR Query* panel to send the query to the Geoscience INTEGRATOR server.

Geoscience ANALYST will only load the records that match all the filters into the Objects panel under a folder named "Query" followed by the date and time the query was run. The folder can be renamed more appropriately by the user.


Note: Connecting to another Geoscience INTEGRATOR project will remove from the workspace any data imported from data sets, unless the *Save queries* box is checked when switching to the other project.

Bounding box

The bounding box filter will restrict the data based on x, y, and z limits. By default, the *From* and *To* parameters are set to the extents of the entire data set. This option is available on all data themes that have x, y, z coordinates.




To modify the bounding box extents:

1. You can digitize new *From* and *To* locations by either clicking on the corresponding target button  to the right, or entering new values in the text boxes, or using the up and down arrow buttons.
2. You can drag a line in the *Viewport* to nominate the x, y, and z extents. We recommend setting a view from top to draw the x and y extents, and from a side view when drawing the z extents.
3. Click **Reset to max** to revert to the entire x, y, and z extents.

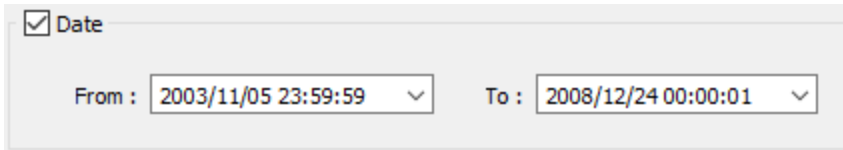
Note: The search volume you are defining is displayed directly as a red box in the *Viewport*.

To generate a bounding box that covers the area where most data is concentrated, click **2 standard deviations**. This will give a bounding box encompassing approximately 95% of the data, centred on the data set centroid. It is a convenient way to see the bounds, ignoring possible outliers.

Tip: On top of the red box reflecting the search volume, you can turn on the magenta box to see the complete extent of the selected data set by clicking the **Show selection bounding box** button  in the toolbar of the *Viewport*.

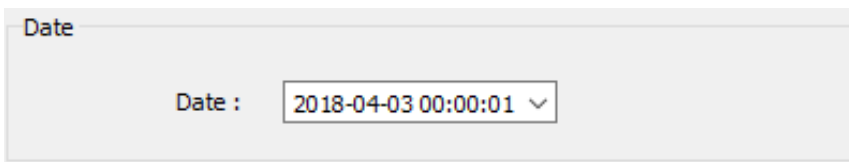
Date

This option filters time-based data. You can select a date from the calendar in the drop-down, or type it in the text box.



A user interface for a date filter. It features a checked checkbox labeled 'Date'. Below it, there are two date range inputs: 'From : 2003/11/05 23:59:59' and 'To : 2008/12/24 00:00:01', each with a small downward arrow indicating a dropdown menu.

Another version of this filter is available to query the themes containing objects with time-related data. Because these themes can hold many data for each object, and Geoscience ANALYST can only show one property value at a time per object, you need to provide a time-stamp value and retrieve data for a specific time-stamp. The system will return the values of the closest instant record, on or before that time-stamp.

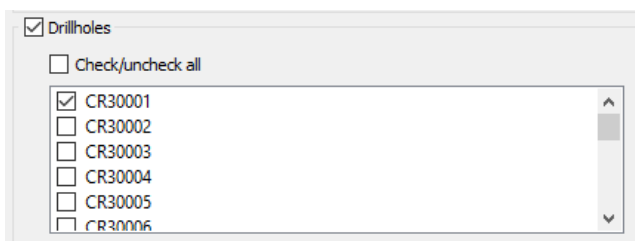


A user interface for a date filter. It features a label 'Date' followed by a text input field containing '2018-04-03 00:00:01' and a small downward arrow indicating a dropdown menu.

Note: If you are familiar with the Geoscience INTEGRATOR web interface, this filter on the *Underground* theme returns the compiled values, like the *Mine model compilation* does in Geoscience INTEGRATOR: the closest record in time is evaluated per property, then, for each property, the corresponding time-stamp is used to retrieve values on all the points. The time-stamp actually used may thus differ from one property to another. You can think of it as a snapshot of the data that shows the most recent state for any property at the given date.

Object-specific options

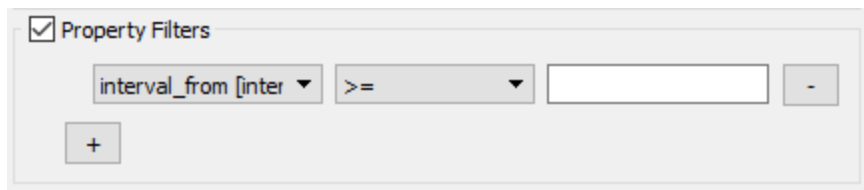
This option refers to objects that may differ from theme to theme. For example, on the *Drillholes* theme, it refers to *Drillholes*. In *Ground deformation* theme, it refers to *Stations*, etc.



A user interface for object-specific options. It features a checked checkbox labeled 'Drillholes'. Below it, there is an unchecked checkbox labeled 'Check/uncheck all'. A list box contains several object IDs: CR30001 (checked), CR30002, CR30003, CR30004, CR30005, and CR30006. The list box has a scrollbar on the right side.

Property Filters

This option filters by property values. Press the **+** button to add another property filter. You can add as many as you wish.




The nature of the data in a theme will determine the query behaviour and options available in the property filter.

- Text: *Is* is the only option available. You must enter the entire character string in the text box.
- Classification and binary: *Is* is the only option available. Expand using the down arrow and select one or more classes to import.
- Float, integer, and date: select one of the available operations and enter a value in the text box.

Neighbourhoods, Shifts, Properties, Tags, and Groups

For *Neighbourhoods*, *Shifts*, *Properties*, *Tags*, and *Groups*, simply toggle on, using the check-box, and select among the available items in the project to import them. These options only appear if values are defined for the selected data set.

The *Properties* section lists all available properties in a data set. Select the ones you wish to load.



Note: Interval data is not supported and will appear greyed out in the *Geoscience INTEGRATOR Query Properties* panel.

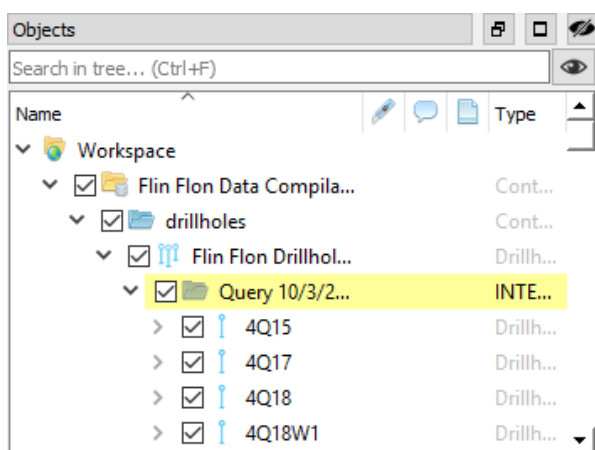
Viewing query results

After you run the query from the *Query Parameters* tool, you have actual records from Geoscience INTEGRATOR loaded into Geoscience ANALYST.

Geoscience ANALYST stores the query result data on special object types, depending on the theme in the *Objects panel*. For example, *microseismic events* are a special points object that stores the data on nodes referred to as *Events*.

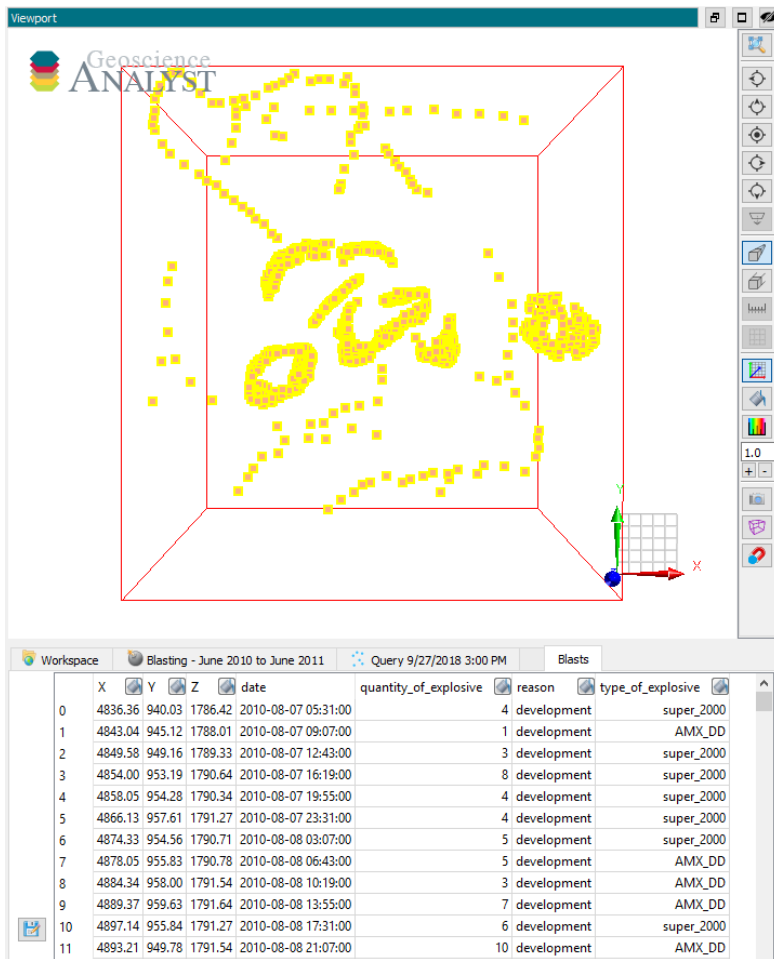
For data sets in themes that have mandatory groups (e.g., observation points), the system stores the data imported on objects, named according to the group, and located in a timestamped folder within the data set group.

Similarly, drillholes are individual objects located within a timestamped folder (highlighted in image below), within the drillholes data set group.



All other queries will be objects that are named according to a time-stamp directly under the data set folder.

The *Viewport* displays the retrieved data in 3D. The *Data Table* now has a Query tab containing a summary of the query results and the objects tab containing the detailed records.



You can interact with the rows of the objects tab (paint, sort, etc.) as described in the [Data Table](#) section.

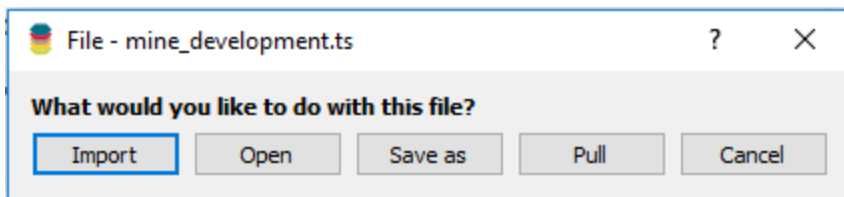
Note: Any change you make to the rows and values in the objects tab with Geoscience ANALYST Pro will not be saved back to Geoscience INTEGRATOR, because data can only be pulled from it, not written to it. Changes, however, will be preserved when saving the workspace as a `.geoh5` file, or when exporting to other formats.

Project files, maps, and documents

The Geoscience INTEGRATOR web interface has three different file repositories, depending on the nature of the file. The Document library (system level), the File manager and the Maps/plans/sections (project level). This is why files are split into the *Documents*, *Files* and *Maps/plans/sections* lists.

You can find the project files, maps, and documents listed in the **Workspace** tab and the **data set** tab of the *Data Table*. The **Workspace** tab has a search bar to help you locate files of interest. The suffix (*Data file*) that follows a file is a flag set from the Geoscience INTEGRATOR web interface, to indicate that it should contain data usable from some software (not necessarily supported by Geoscience ANALYST).

Clicking on a file link will display a selection of options:

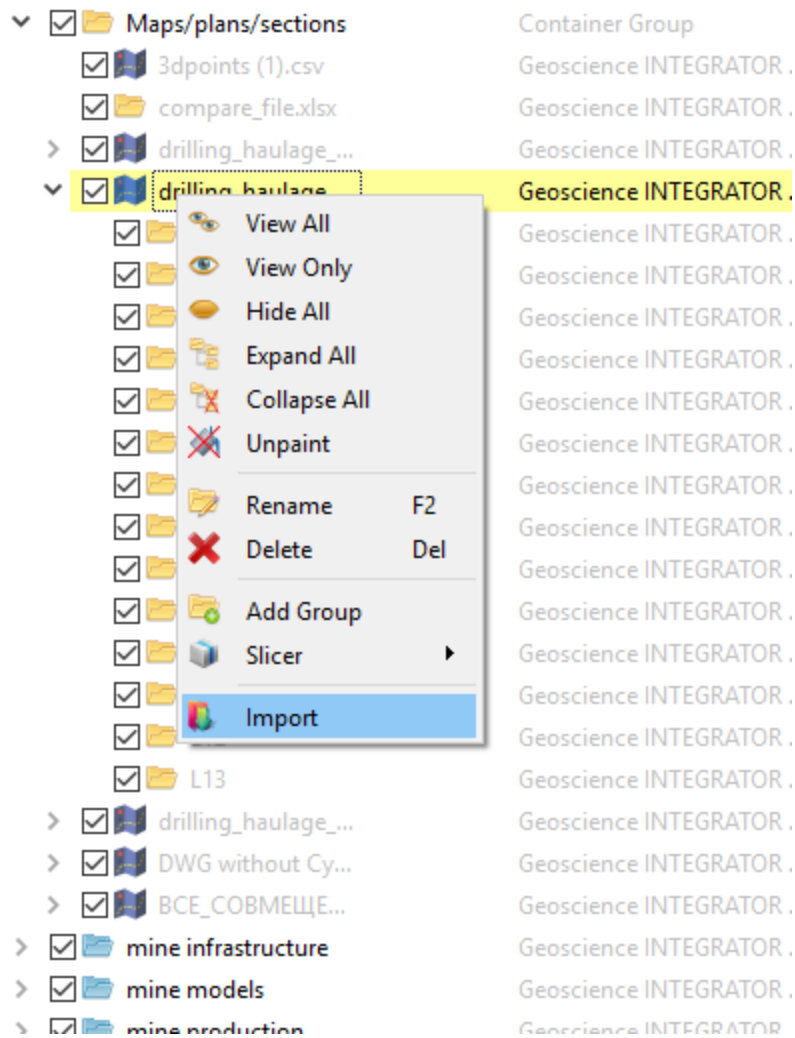


- **Import:** Imports the file under the project or data set name in the Objects panel. The data file has to be in a format supported by Geoscience ANALYST, for example GOCAD surface files (.ts), AutoCAD files (.dwg) or simply .csv files. If not, the button will not be available. See section about [Importing objects](#) for a list of supported file formats.
- **Open:** The system will pull the file and try to open it using the program associated to that file type on your computer. For example, a photo file saved with the extension .jpg will open in an image viewer application.
- **Save as:** Downloads the file to your computer.
- **Pull:** Downloads the file and store it within in the Geoscience ANALYST workspace. The file is now available to work offline.
- **Cancel:** Cancels the file selection.

Preview of layer names for *Maps/plans/sections* items



This icon indicates elements in the *Object panel* that correspond to files uploaded in Geoscience INTEGRATOR in the *Maps/plans/sections* page. In the likely case of AutoCAD files (.dxf or .dwg), there will be a sub-folder per layer under each file, as a preview to help you choose the best drawing before importing it. These folders will be empty until the file is imported to Geoscience ANALYST. To import the file, right-click the map item and select **Import** from the contextual menu. Or import from the file list in the *Data Table* as explained above.



Note: Similarly to data imported from data sets, connecting to another Geoscience INTEGRATOR project will removed any loaded maps / plans / sections from the workspace, unless the *Save queries* box is unchecked when switching to the other project.

CHAPTER 6

Tools and tips

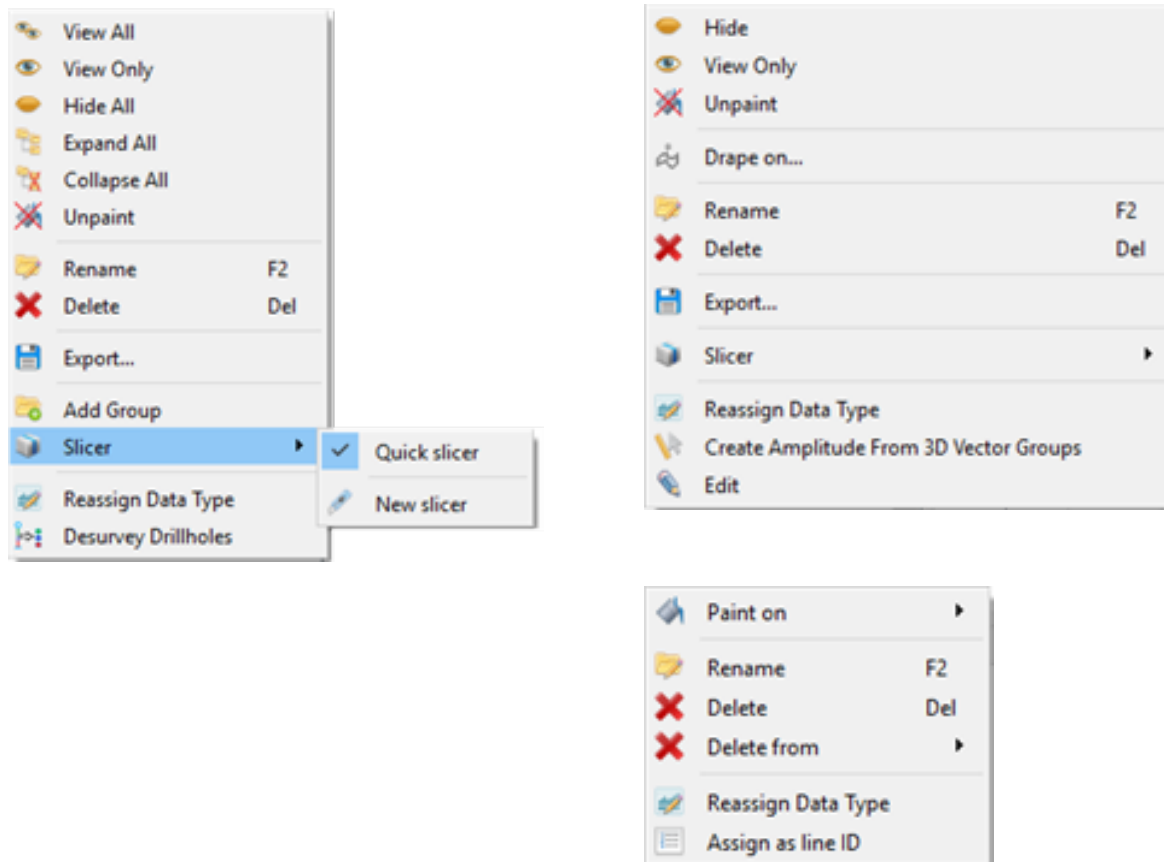
Tools and tips to make the most of your data.

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Contextual menus

You can use the contextual menu to apply functions by right-clicking folders, objects, and data in the Objects panel, as seen in the images below.



Function	Description
View all (Folders)	Displays all objects in the selected folder, including any sub-folders.
View only (Folders)	Hides everything in the Viewport except the objects in the selected folder, including any sub-folders.
Hide all (Folders)	Hides everything in the selected folder, including any sub-folders.

Function	Description
Expand all (Folders)	Expands the list of all objects and their data in the selected folder, including any sub-folders.
Collapse all (Folders)	Displays the list of all objects and their data in the selected folder, including any sub-folders.
Unpaint	Unpaints selected object or all objects under the selected folder, including any sub-folders.
Rename (F2)	Allows you to edit the selected object or folder name.
Delete (Del)	Allows you to delete the selection.
Export	<p>Exports the object and / or folder contents to a supported file format.</p> <ul style="list-style-type: none"> • Export points, curves, and surfaces to a GOCAD ASCII .mxf file. • Export drillholes to collar, survey, interval and point log CSV files. <p>Unsupported objects in the selected folder will not export, and an error will display. Modify the selection to only include exportable objects.</p>
Add Group (Folders)	Creates a new empty container group folder in the selected folder.
Slicer	<p>Allows you to apply existing or add new slicers to the selection.</p> <p>If created, a new slicer will appear in the middle of the selection limits bounding box. By default, it will span east-west and clip everything to the south of the plane.</p>
Drape on... (Objects)	<p>The Drape function is for draping any vector object (points, curves, and surfaces) onto a surface object. This is used mainly to drape objects on topography. The drape function will appear at the top of the Controls panel and the cursor will change to an icon, indicating that a surface 'target' displayed in the <i>Viewport</i> needs to be clicked on. (If the object being draped is larger than the target surface, the part of the object being draped that falls outside the X-Y bounds will be given Z values equal to the Z value of the closest point of the target surface.)</p> <p>Pressing Esc will abort the function.</p>
Edit (Objects)	Available with Geoscience ANALYST Pro, selecting this option will initiate edit mode allowing the selected object to be edited using the various key based functions, as detailed in the Controls panel.

Function	Description
Desurvey drillholes (Drillhole objects)	Available only through Geoscience ANALYST Pro.
Transfer data to drillholes (Points objects)	Available only through Geoscience ANALYST Pro.
Paint on (Object data)	<p>A method of painting that allows you to automatically paint one or more objects with a single click. You can show the data on an object or across multiple objects by painting on the property (via the Objects panel and <i>Data Table</i>). In the case of multiple objects, they need to share same properties. The paint action can be applied:</p> <ul style="list-style-type: none"> • At the object level: paints only the selected object by the data (e.g., distance to drillholes). Alternatively, click to add a check-mark in the box to the left of the data name. The painted data column will automatically scroll to become visible in the <i>Data Table</i>. • At a folder or workspace level: paints all objects by the selected data if it exists (e.g., distance_to_drillholes) in the chosen folder, or in the entire workspace. Only the parent folder of the selected object, and its ancestors, are available for painting.
Reassign data type (folder that contains object with data)	Launches the <i>Reassign Data Type</i> dialogue box allowing you to reassign data types to an existing data type or to a new one you can create. Data Colours settings (e.g., colour table, low and high clip values) and statistical information are shared among data that have the same type. Enter text in the <i>Filter by name...</i> to display only the data types that contains the string.
Create Amplitude from 3D Vector Groups (folders that contain at least one object with at least one 3D vector data group, or object that contains at least one 3D vector data group)	Automatically creates new amplitude properties on the selected objects that contain the 3D vector data groups. One property per data group will be named according to the data group and suffixed by amplitude.
Assign as line ID (float, integer and reference data on curve objects)	Accompanying utility to the Profiles in Visual Parameters. This utility assigns a data as the Line ID which are presented in the Profile section of the Visual Parameters, allowing you to select a subset of lines to display profiles on in the Viewport.

Reassign Data Type

Objects : △ 5_Orebody ⏏ ✓

Data : distance_to_drillholes ⏏

☒ Use existing ☐ Create new

Filter by name...

Name	Units	Description	Primitive Type	Colour Table File
2012_Canada_P...			Float	clra_256
Ag			Float	clra_256
Airborne_Gxx			Float	clra_256
Airborne_Gxy			Float	clra_256
Airborne_Gxz			Float	
Airborne_Gyy			Float	clra_256

Ok Cancel Apply

Reassign Data Type

Objects : △ 5_Orebody ⏏ ✓

Data : distance_to_drillholes ⏏

☐ Use existing ☒ Create new

Data Type Name: Units:

Description:

☐ Create separate types for each data instance

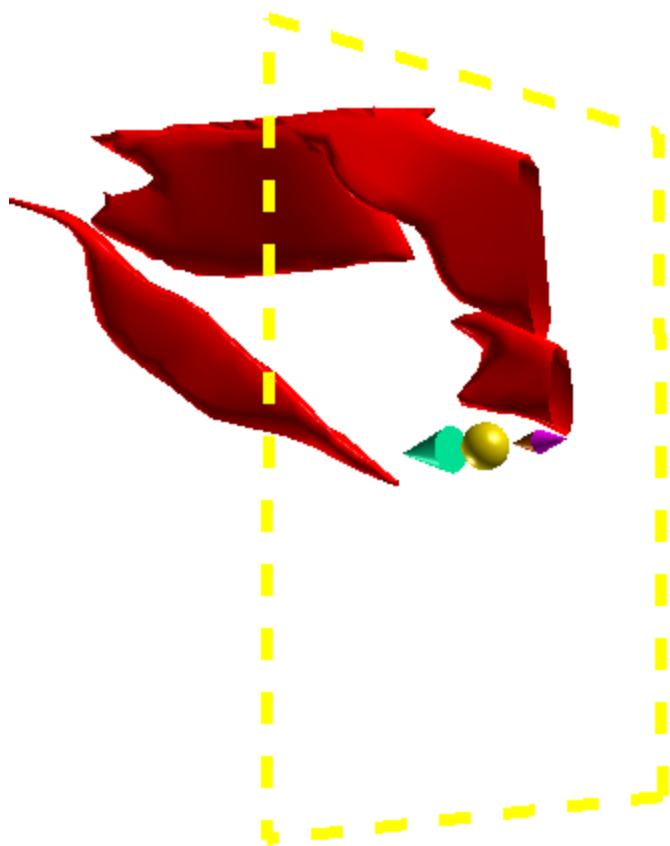
Ok Cancel Apply

Slicers


Slicers are an effective way to create restricted 3D views of objects in the Viewport. You can apply slicers to one or more objects.

To create a slicer:

1. Select a folder or object you wish to apply a slicer to and right-click to open the contextual menu.
2. Select **Slicer/ New slicer**. The slicer will appear (rectangle with dashed perimeter).



To manage the slicer tool in the Viewport:

1. Press and hold the **X** key to activate the slicer navigation tool. 
With it, you can perform a number of functions:
 - a. **Click and drag sphere:** With the yellow sphere, sweep slicer and move it to new positions.
 - b. **Click and drag arrow:** Move the green arrow in a circular motion to adjust the dip and dip direction of the slicer.

- c. **Incremental arrow:** With the magenta dual-direction arrow, click either side of the arrow to move slicer incrementally in opposing directions.
- d. **Left and right arrow keys:** Move slicer incrementally in opposing directions.
- e. **Mouse wheel:** Move slicer incrementally in opposing directions.
- f. **Plus and minus keys** (number pad only): move slicer incrementally in opposing directions.

The portion of the sliced object opposite the direction of slice movement becomes transparent when sliced.

Tip: Deactivate a slicer by turning it off in the Viewport. Objects will no longer be clipped. You can turn on / off multiple slicers on an object with no need to re-open contextual menu for each slicer.

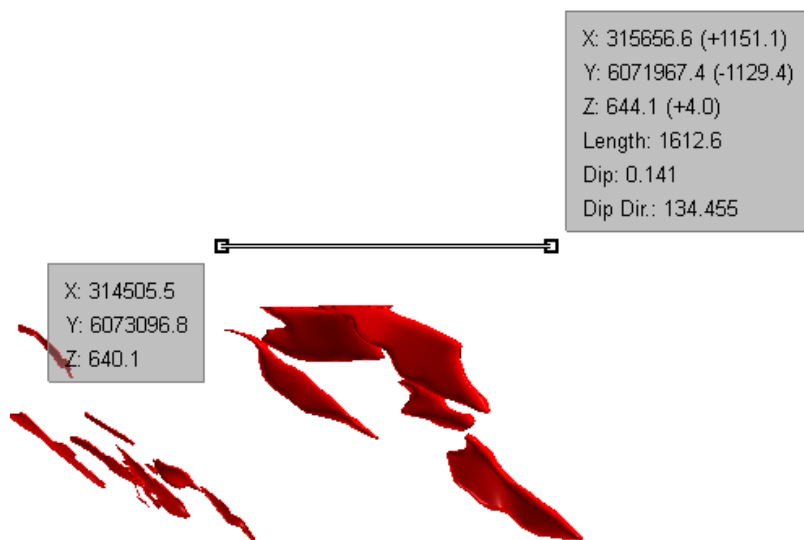
Tip: To learn more about using slicers in Geoscience ANALYST, [visit online](#) to view a short video tutorial.

Tape measure

The tape measuring tool allows interactive measuring of 2D and 3D distances in the Viewport.

To use the tape measure, press the **T** key and click and drag to create a line between two end points. At each end point, you will see a box containing information about the points and the line:

- The x, y, z coordinates of the start and end points
- Cumulative 2D distances
- Total length, dip, and dip directions of the line



The end points snap to an object in the forefront of the viewing area. To hide the measuring tape from view, press the **T** key.

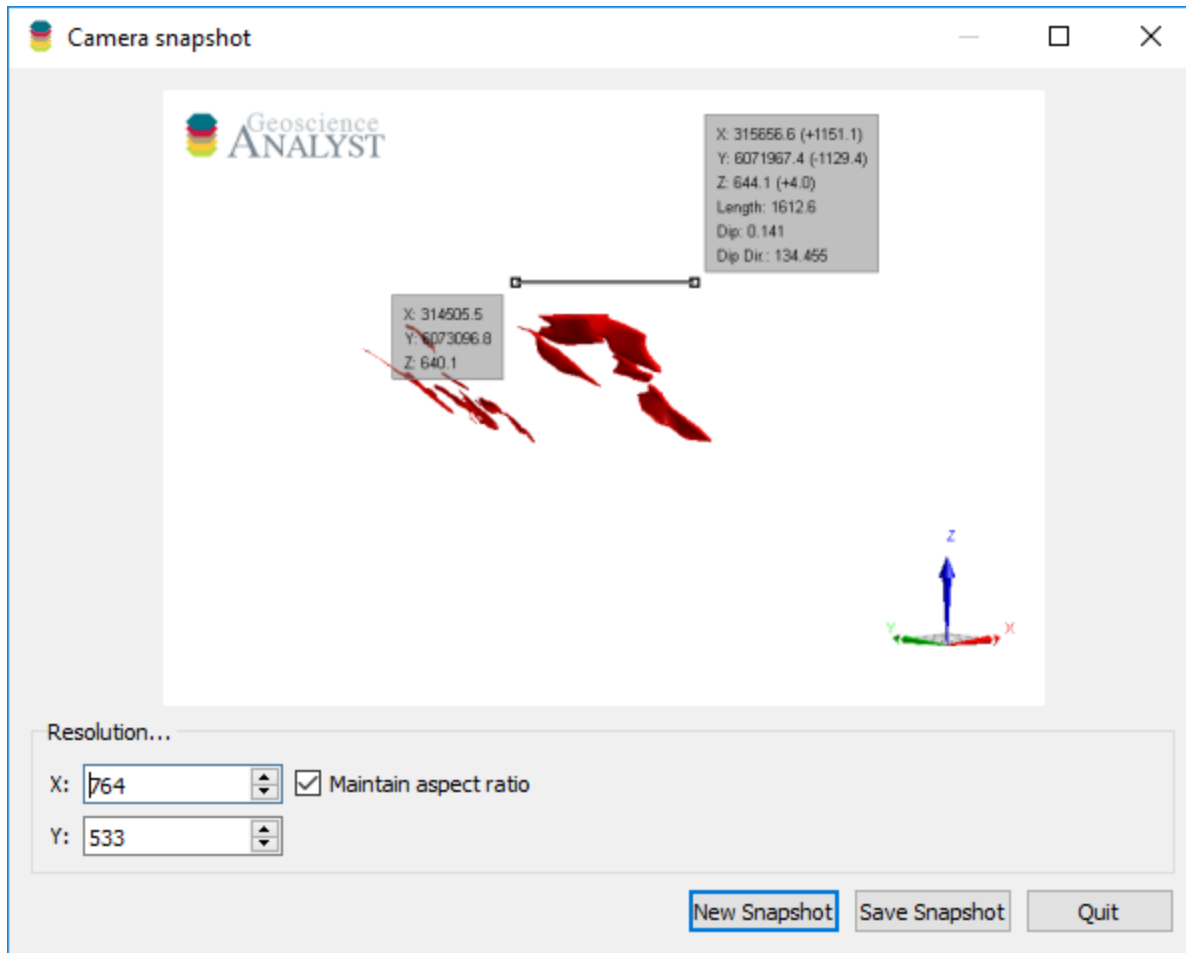
Snapshots

You can take a snapshot of the state of your workspace in the Viewport by clicking the camera button



in the toolbar on the right side of the Viewport.

Specify the resolution of your snapshot in the *X* / *Y* text boxes and click **New Snapshot** to see the changes. When you are satisfied with the image, click **Save Snapshot** to save it to your hard drive.



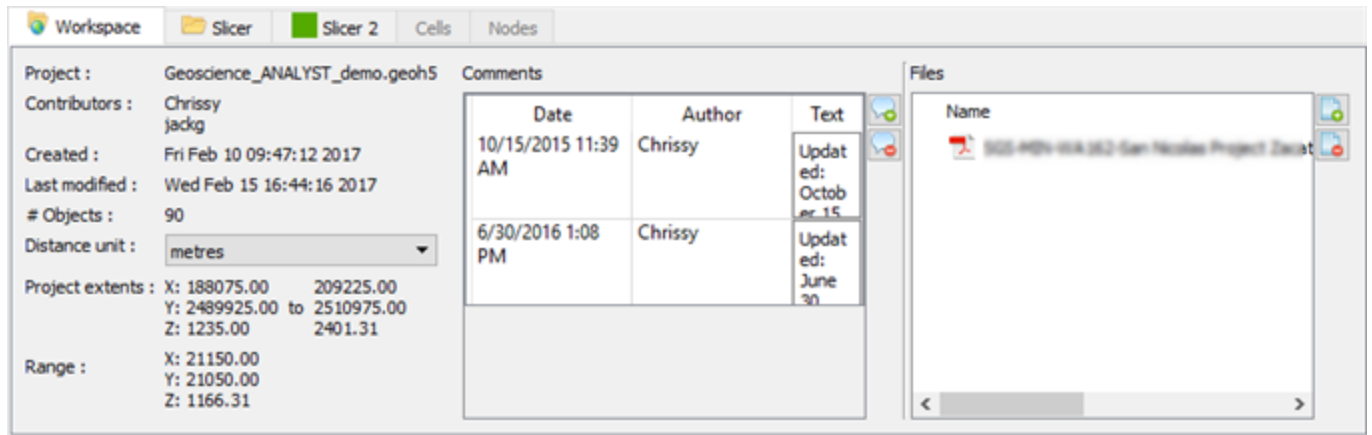
Additionally, you can use **Ctrl+C** and **Ctrl+V** to copy and paste scenes from both the Viewport and the 2D Profile Viewer. Once copied, you can paste the copies to image and text editors.

Comments and attachments

You may want to attach comments and files to your workspace to use as reference and to share with colleagues. This is done in the *Data Table* at the folder and object level.

To make comments and attach files:

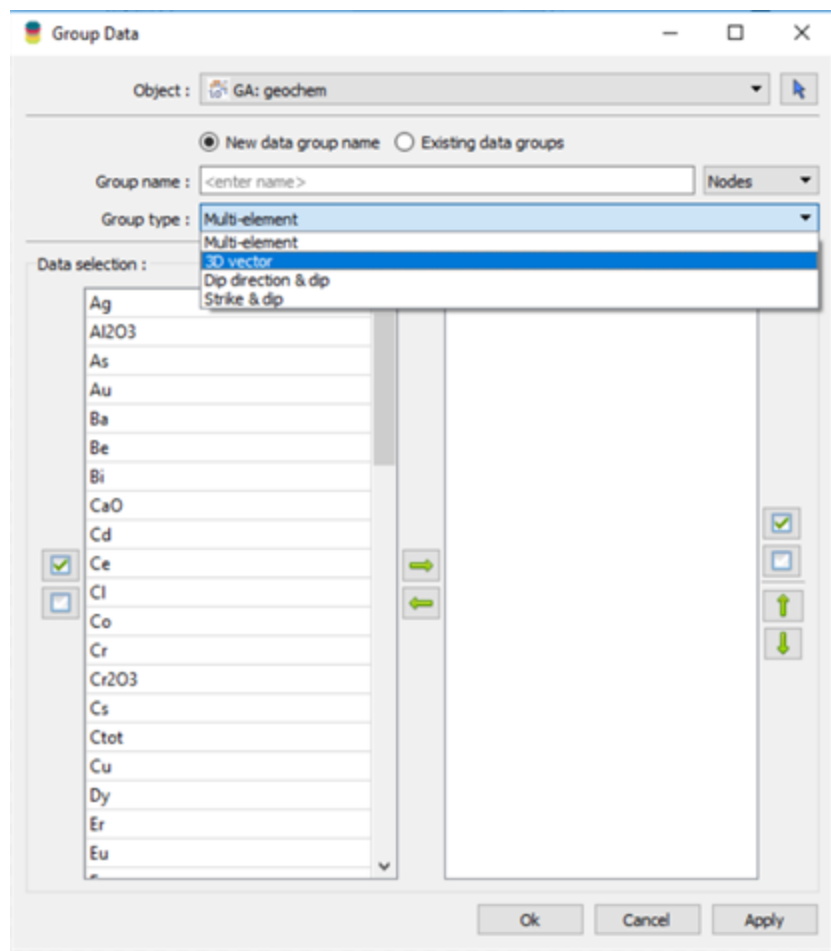
1. In the *Data Table*, click the tab of the desired folder or object.
 - a. Click **Add comment** to make a comment.
 - b. Click **Add file** to attach a file.



Saving the project preserves the state of the comments and files.

Utilities menu: Group data

This utility allows manual creation of multi-element and orientation (3D vector, dip direction and dip, and strike and dip) data groups from user-selected properties. This is a companion tool to use in conjunction with the Profiles and Orientation sections of the Visual Parameters, allowing you to define and view several single element data together such as EM time channels simultaneously. It allows you to take advantage of data groups to visualize special symbols like arrows and tablets in Visual parameters such as Profiles and Orientations.



Function	Description
Object	Use the drop-down menu to select the object that contains numerical data you want to group.

Function	Description
New data group name / Existing data groups	Determines whether you are creating a new data group (type name in text box) or selecting an existing group (choose from drop-down menu).
Nodes / segments / triangles / cells	Use the drop-down menu to select at which level the data resides on the selected object. The selected object type will determine the choices available.
Group type	Use the drop-down menu to select a multi-element group type or one of three available orientation type data groups (3D vector, Dip direction and dip, or Strike and dip). 3D vector type requires you to select 3 properties (typically x, y and z direction components), whereas the dip direction / dip and strike / dip options requires two properties ordered accordingly when moved to the right panel.
Data selection	<p>In the left window, select the data to add to the group in the right window by using the green arrows.</p> <p>To multi-select data, click and hold the left mouse button while dragging.</p> <p>Use the check boxes to select and deselect all.</p> <p>To re-order data, use the up and down arrows. Ordering matters when using the 2D Profile Viewer, as the data is listed and viewed in the order the group is created.</p>

Note: If you press **OK** but the *Group Data* dialogue box remains open, an error message will display in the Console containing information on why the operation could not be performed.

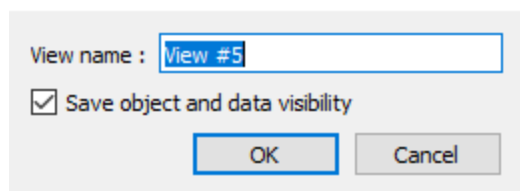
Viewport: Preserving and saving views

Geoscience ANALYST allows you to capture and preserve several points of view of configurations in the Viewport, along with the list of visible objects and their visual parameters. You can then revisit the view on command.

Saving active Viewport as a view

To create a view:

1. Arrange objects in the Viewport in a configuration you want to be able to preserve and recall for future reference.
2. Press **Ctrl+F1** (or **F2** through **F10**).
3. In the dialogue box, give the view a name (optional), and either leave the *Save object and data visibility* box checked, or un-check it.



4. Click **OK**.

Note: When you check the box in the *Save object and data visibility* dialogue, Geoscience ANALYST preserves everything currently visible such as painted data and Visual Parameters settings. Un-checking the box preserves only the point of view.

You can now proceed with the manipulation of your object(s), and the configuration captured by the view can be recalled by pressing the corresponding F-key (**F1** through **F10**), or from the *Views* menu in the menu bar.

Note: Saving / restoring views does not apply to 2D Viewports.

Copying views to clipboard

Geoscience ANALYST allows you to take quick snapshots of views in the Viewport and the 2D Profile Viewer that you would like to save as an image in the clipboard and paste in other applications. To do so, select a view and type **Ctrl+C** followed by **Ctrl+V** in separate editing software.

Tip: The current viewport can also be exported as a `.geoh5` workspace file, with all the visible objects and saved views. See the section about [exporting objects](#).

CHAPTER 7

Geoscience ANALYST add-on modules

Geoscience ANALYST has several paid add-on modules that enhance its functionality and bring significant added value.

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Add-on Module: Geoscience ANALYST Pro

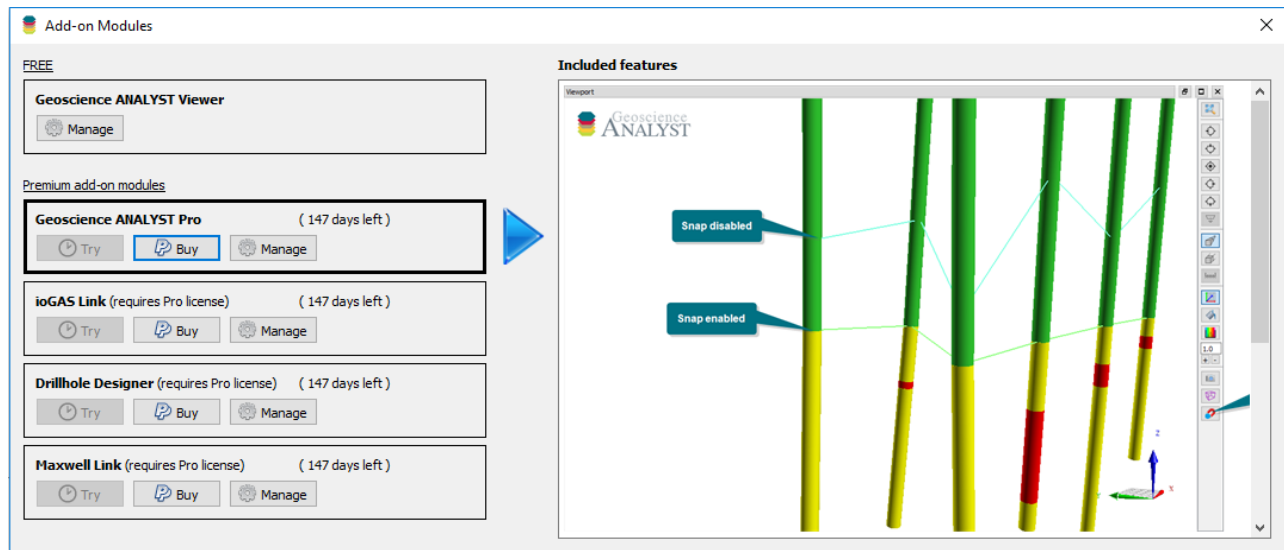
To complement the free viewer, Geoscience ANALYST Pro is available as a paid add-on module and is a prerequisite to the other add-on modules, ioGAS Link, Drillhole designer, and Maxwell Link. It offers basic object and data editing and creation functionality among other useful data analysis tools and utilities.

To activate a Geoscience ANALYST Pro licence:

1. In the menu bar, open the **Add-on Modules** menu and click **Try/Buy/Activate Module(s)**.



2. In the *Add-on Modules* dialogue box, select the **Buy** button in the Geoscience ANALYST Pro box. You will be directed to the Mira Geoscience website to complete the transaction.



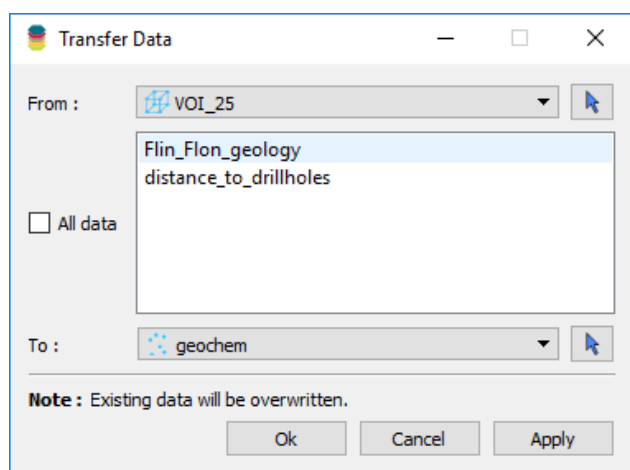
3. Retrieve your licence key that we emailed to you and press **Manage** to launch the registration wizard. (Follow the same procedure as the free viewer licence activation steps [described earlier](#) in this guide.)
4. Restart Geoscience ANALYST to access the upgraded functionality of Geoscience ANALYST Pro.

Transfer data

You can transfer BlockModel and 2D grid data to points, curves, and surfaces with Geoscience ANALYST Pro.

To transfer data:

1. Go to the **Utilities** menu, then click **Transfer Data**.
2. Select a BlockModel or 2D grid object in the **From** drop-down menu that you want to transfer data from.
3. Select a BlockModel or 2D grid object in the **To** drop-down menu that you want to receive the transferred data from.
4. Click **Apply** to run the command, **Cancel** to close the dialogue, or **OK** to run the command and close the dialogue at once.



You can either transfer all data or select one or several to transfer by clicking to highlight the desired data name in the list.

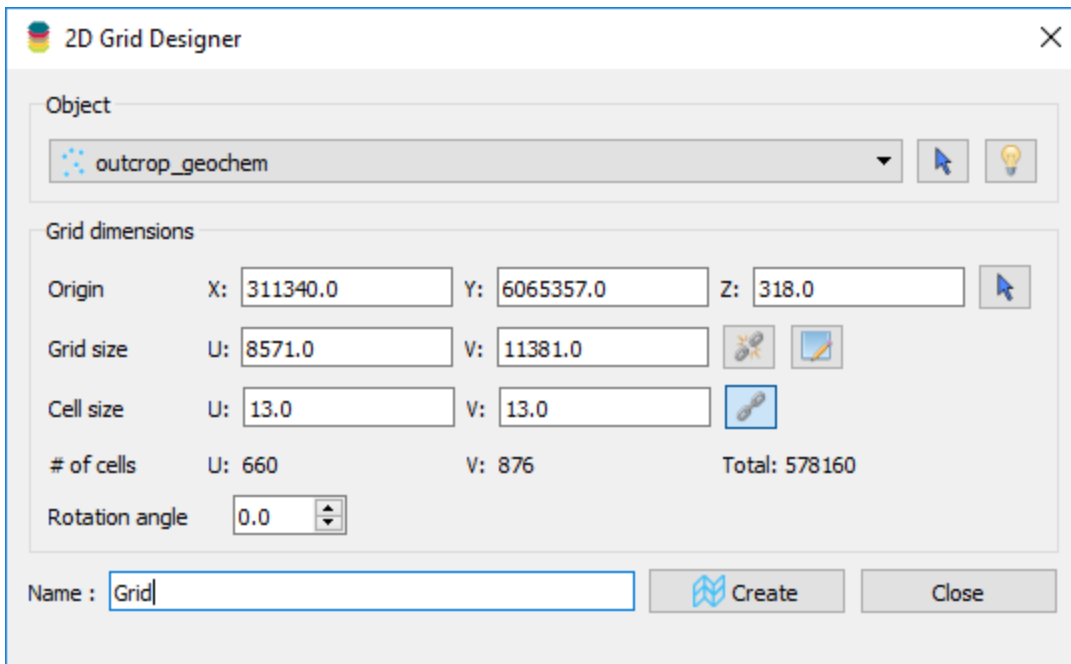
The utility transfers data value of the closest BlockModel cell centre to the nodes of the destination object. For 2D Grids, both numerical and reference data are vertically transferred to the nodes of the destination object. In the case of numerical data, a linear interpolation is applied, while in the case of reference data, the transfer is done to the closest node.

If data of the same name exists on the destination object, it will be overwritten with the new values.

2D grid designer







The 2D grid designer allows you to quickly design and create new horizontal 2D grid objects. Some of its key features are as follows:

- A suggestion component that recommends appropriate grid specifications including origin, dimensions, and cell sizes based on the X / Y geometry and data distribution of a selected object.
- A rectangle digitizing tool allowing you to draw a non-rotated (with respect to the X and Y directions) outline directly in the Viewport.
- User-control of all values including rotation angle.
- Manual locking of the grid and cell sizes to ensure the U and V entries are identical.
- A preview of the grid and origin axis will display along with the number of cells that the suggested grid contains.



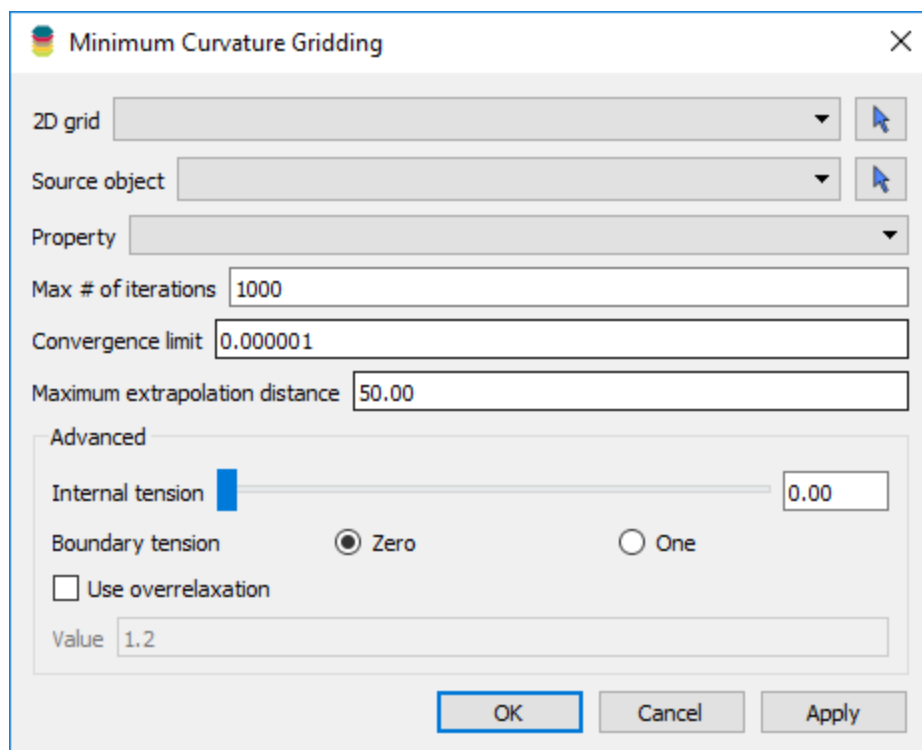
The screenshot shows the '2D Grid Designer' dialog box. It has a title bar with a close button. The 'Object' section contains a dropdown menu with 'outcrop_geochem' and two icons (a mouse cursor and a lightbulb). The 'Grid dimensions' section contains several input fields and icons: 'Origin' with X: 311340.0, Y: 6065357.0, and Z: 318.0; 'Grid size' with U: 8571.0 and V: 11381.0; 'Cell size' with U: 13.0 and V: 13.0; and '# of cells' with U: 660, V: 876, and Total: 578160. There are also icons for locking and a rotation angle input field set to 0.0. At the bottom, there is a 'Name' field with 'Grid' and 'Create' and 'Close' buttons.

Field	Value
Object	outcrop_geochem
Origin X	311340.0
Origin Y	6065357.0
Origin Z	318.0
Grid size U	8571.0
Grid size V	11381.0
Cell size U	13.0
Cell size V	13.0
# of cells U	660
# of cells V	876
Total cells	578160
Rotation angle	0.0
Name	Grid

Function	Description
Object	<p>Optionally, select the point, curve, surface or 2D grid to base the 2D grid suggestion on.</p> <p> Use the Pick origin arrow to click directly on the object in the Viewport.</p> <p> Press the Suggest dimensions button and the utility will auto-fill the origin, grid, and cell size entries with appropriate values based on the selected object for a grid oriented parallel to the X and Y axis orientations.</p>
Origin X / Y / Z	The Cartesian coordinates of the 2D grid origin. You can enter the values manually, digitize them in the Viewport using the arrow tool, or have them suggested.
Grid size U / V	<p>The length of each of the axes of the grid.</p> <p> Click to activate the locking feature. This ensures that any modifications are proportional on both axes.</p> <p> Click to draw a grid manually in the Viewport.</p>
Cell size U / V	<p>The length of the sides of each cell of the grid.</p> <p> Click to activate the locking feature. This ensures that any modifications are proportional on both axes.</p>
# of cells U / V / Total	Displays the number of U and V cells as well as the total number of cells. When modified, the totals update in real-time.
Rotation angle	Enter a rotation angle to apply to the 2D grid relative to 0 degrees to the north.
Name	Enter a name for the new 2D grid object.
 Create	Click to generate the new 2D grid object.
Close	Click to close the dialogue and hide the preview of the 2D grid.

Minimum curvature gridding

This utility allows you to interpolate data stored on points, curves, or surfaces in the X/Y plane onto 2D grid objects. The minimum curvature gridding algorithm generates a smooth interpolation while trying to honour the input data set as closely as possible. Several parameters are available to fine-tune the end results, including adjusting the extents of the smoothing, and the extrapolation distance.



The dialog box titled "Minimum Curvature Gridding" contains the following controls:

- 2D grid:** A dropdown menu with a selection button.
- Source object:** A dropdown menu with a selection button.
- Property:** A dropdown menu.
- Max # of iterations:** A text input field containing "1000".
- Convergence limit:** A text input field containing "0.000001".
- Maximum extrapolation distance:** A text input field containing "50.00".
- Advanced section:**
 - Internal tension:** A slider bar with a value of "0.00" displayed.
 - Boundary tension:** Two radio buttons, "Zero" (selected) and "One".
 - Use overrelaxation:** An unchecked checkbox.
 - Value:** A text input field containing "1.2".
- Buttons:** "OK", "Cancel", and "Apply" at the bottom right.

Function	Description
2D grid	Select the 2D grid object to store the results of the interpolation.
Source object	Select the points, curves or surface object that has the numerical data to interpolate.
Property	Select the data to interpolate.
Max # of iterations	Enter the maximum number of iterations to interpolate to reach the convergence limit.
Convergence limit	The level of precision that the algorithm is trying to achieve. If the change in the cell's average value between iterations is less than the convergence limit then convergence occurs. The algorithm then stops and the new 2D grid property is created.

Function	Description
Maximum extrapolation distance	If the distance from the centre of a grid cell to the closest data point is greater than the distance entered, the cell's data value is assigned a no data value.
Internal tension	<p>Move the slider bar to adjust the Internal tension from 0 to 1. The right / left / up / down keyboard arrow buttons will increase or decrease the value by .01. Left clicking on the slider bar will increase or decrease the value by 0.1.</p> <p>Gridding results may have large oscillations and extraneous inflection points, which you can minimize by relaxing the global minimum curvature constraint by adjusting the tension settings. The minimum curvature solution is perturbed locally near constraining data which is beneficial in situations where there are large variations over short distances in the property being interpolated.</p>
Boundary tension	<p>Set to Zero to turn off, or to One to turn on, which allows you to control singularities in the minimum curvature equations (i.e., when boundary tension = $\pi/4$).</p> <p>The minimum curvature solution near grid edges are flattened which is beneficial in situations where the regional field decays as the distance from the source region increases.</p>
Use overrelaxation	Toggle on to apply an over relaxation value, which accelerates the convergence rate. Generally, as the number of grid cells increase, the over relaxation parameter should also be increased.
Value	Allows you to enter the value when <i>Use overrelaxation</i> is on.




Connecting to Imago (Beta)

Geoscience ANALYST Pro allows you to connect to the Imago platform for geoscientific imagery. To do so, type **I+Left-click** on a drillhole to open the Imago portal in your web browser and display data related to the selected drillhole and depth, as long as the data exists in Imago for the selected drillhole name and depth. If not, the Imago web page will report that the data was not found.

Note: You will need an Imago account to view the drillhole data.

Creating and editing objects

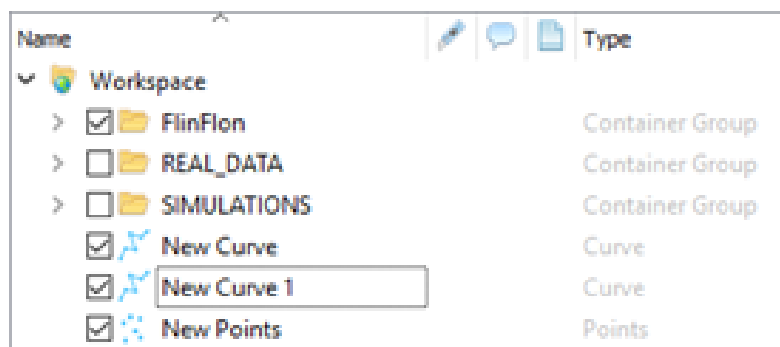
Having a Geoscience ANALYST Pro licence allows you to create points, curves, and surface objects in your workspace through the following digitizing commands found at the bottom of the Controls panel:

 P + Left click	Create points
 O + Left click	Create curve
 S + Left click	Create surface

To create objects in Geoscience ANALYST Pro:

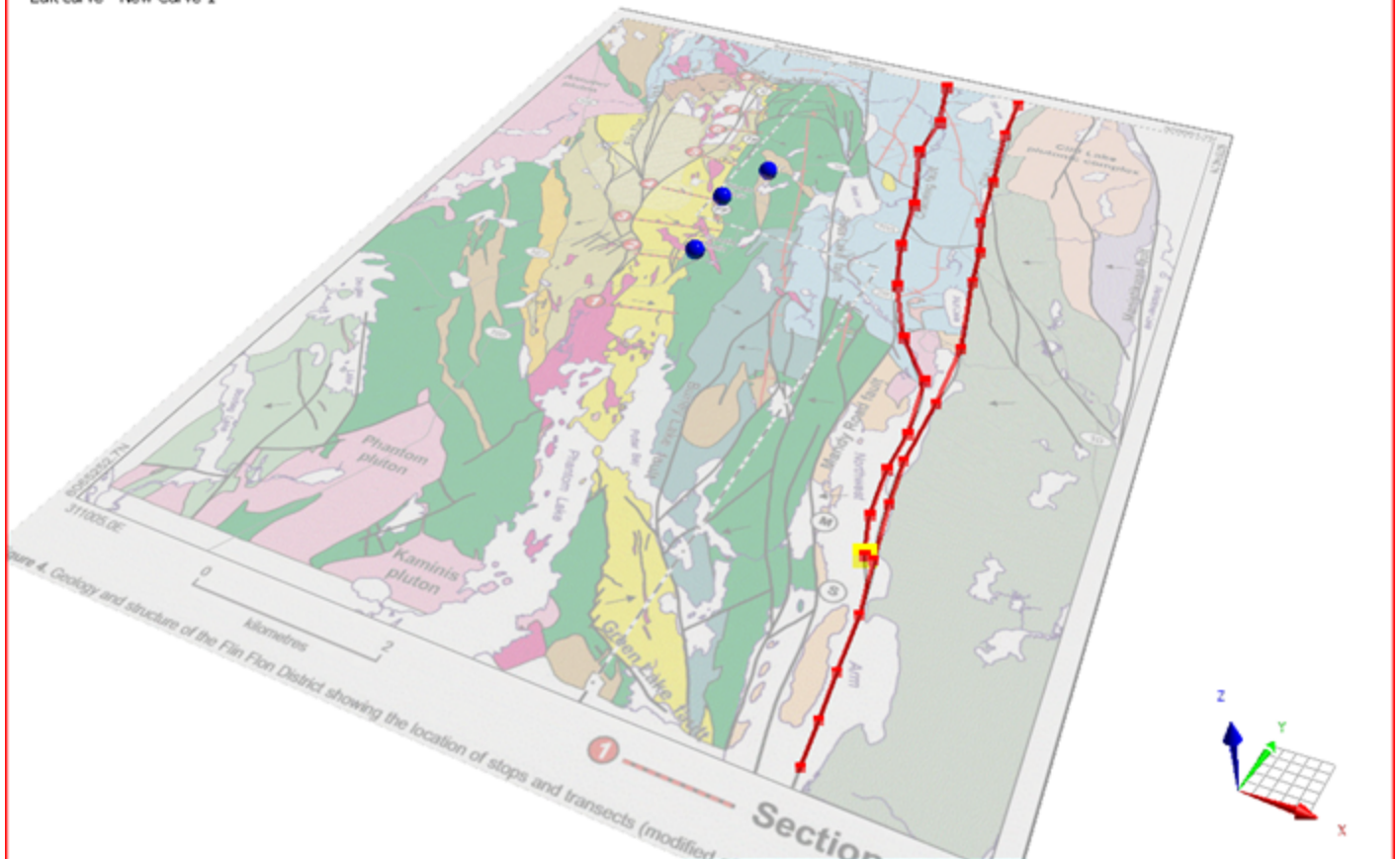
- **Points:** Hold down **P** and left-click in the Viewport to digitize a node. Subsequent clicks will generate more nodes.
- **Curves:** Hold down **O** and left-click twice in the Viewport to digitize a segment. Subsequent clicks will generate more segment nodes.
- **Surfaces:** Hold down **S** and left-click three times in the Viewport to digitize a triangle. Subsequent clicks will generate more triangle nodes.
- Press **Esc** to exit the edit mode. The *Object* dialogue box will display where you can name the newly-created object.

The root *Workspace* folder in the Objects panel will contain the entries for all newly-created objects. You can drag and drop them under other folders if desired.



Object creation: Use cases

This section illustrates three practical applications for object creation as it relates to [points](#), [curves](#), and [surfaces](#).



Use case: Points

Application: Plotting surface expression of mineral deposits on a GeolImage.

Method: On the topographic GeolImage object pictured above, the three blue spheres are points objects digitized onto plots designed to indicate where certain mineral deposits were found.

Clicking on the GeolImage opens the Visual Parameters, where you can make the GeolImage semi-transparent with the slider to help create visual contrast between the digitized objects and the GeolImage.

Holding down **P** while left-clicking the location of the mineral deposits places a node on the location. The points tools available in the Visual Parameters panel help to customize the appearance of the nodes, allowing them to stand out.

Use case: Curves

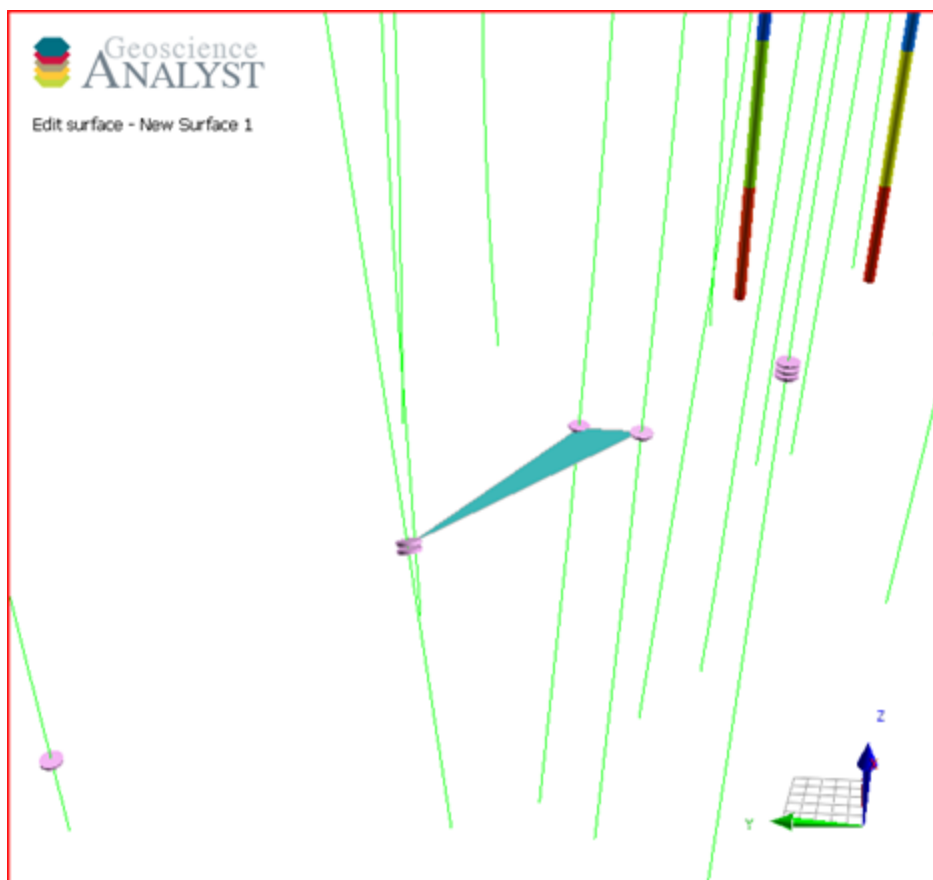
Application: Plotting a geological expression of a fault line.

Method: On the topographic GeolImage object pictured above, the two red lines are curves built from connected nodes, designed to outline and make more prominent two fault lines that join each other.

Clicking on the GeolImage opens the Visual Parameters, where you can make the GeolImage semi-transparent with the slider to help create visual contrast between the digitized objects and the GeolImage.

Holding down **O** while creating nodes by clicking along the original fault line in the GeolImage creates a curve. The curves tools available in the Visual Parameters panel help to customize the appearance of the curves, allowing them to stand out.

Use case: Surfaces



Application: Showing mineralization trends by Isolating and linking high-grade mineral samples in a set of three drillholes.

Method: In the image of the Viewport above, the triangular surface object links isolated high-grade mineral occurrences (purple discs) found in three drillholes within proximity of each other.

1. Choose a set of drillholes.
2. In the *Data Table*, select the **Interval log** tab.
3. Choose a mineral, i.e., *ZN_percent* and paint it by clicking the **paint can** button.
4. In the *Data Colours* panel, use the slider to isolate the Zn occurrence with a value greater than a given percentage. In this case, 10%.
5. Locate the isolated occurrences on the drillhole paths.
6. While holding down **S**, click on one of the occurrences to digitize a node and segment between the two closest occurrences.
7. Continue to hold **S** and click on a third occurrence to digitize the surface.

Snapping objects

By default, a digitized node will snap to the object in the forefront of the Viewport, or onto the centre plane of the camera when clicking on the background.

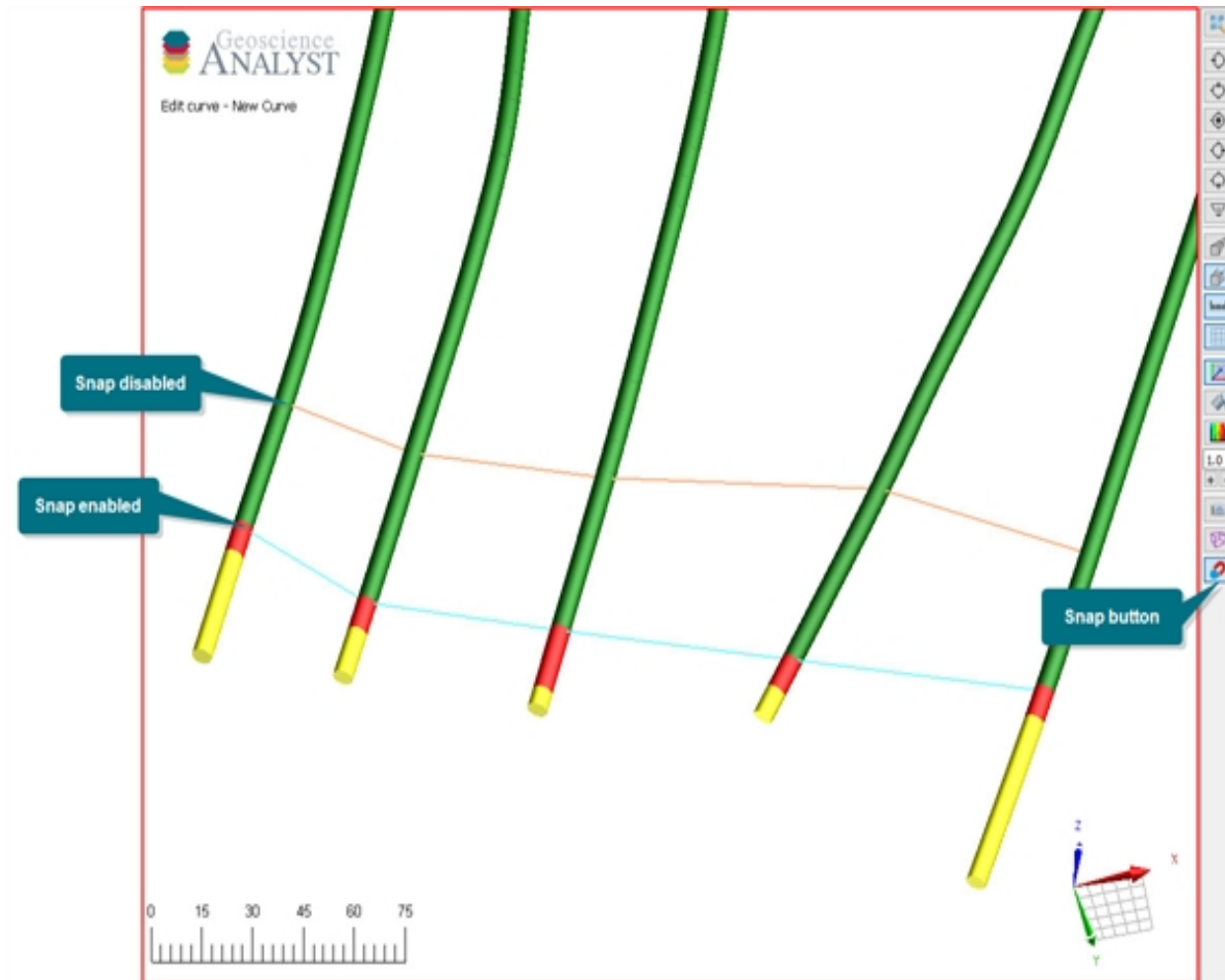


Click the **Snap** button to enable object snapping, located at the bottom of the toolbar in the *Viewport*.

The following describes how snapping functions across commonly used objects in the Viewport:

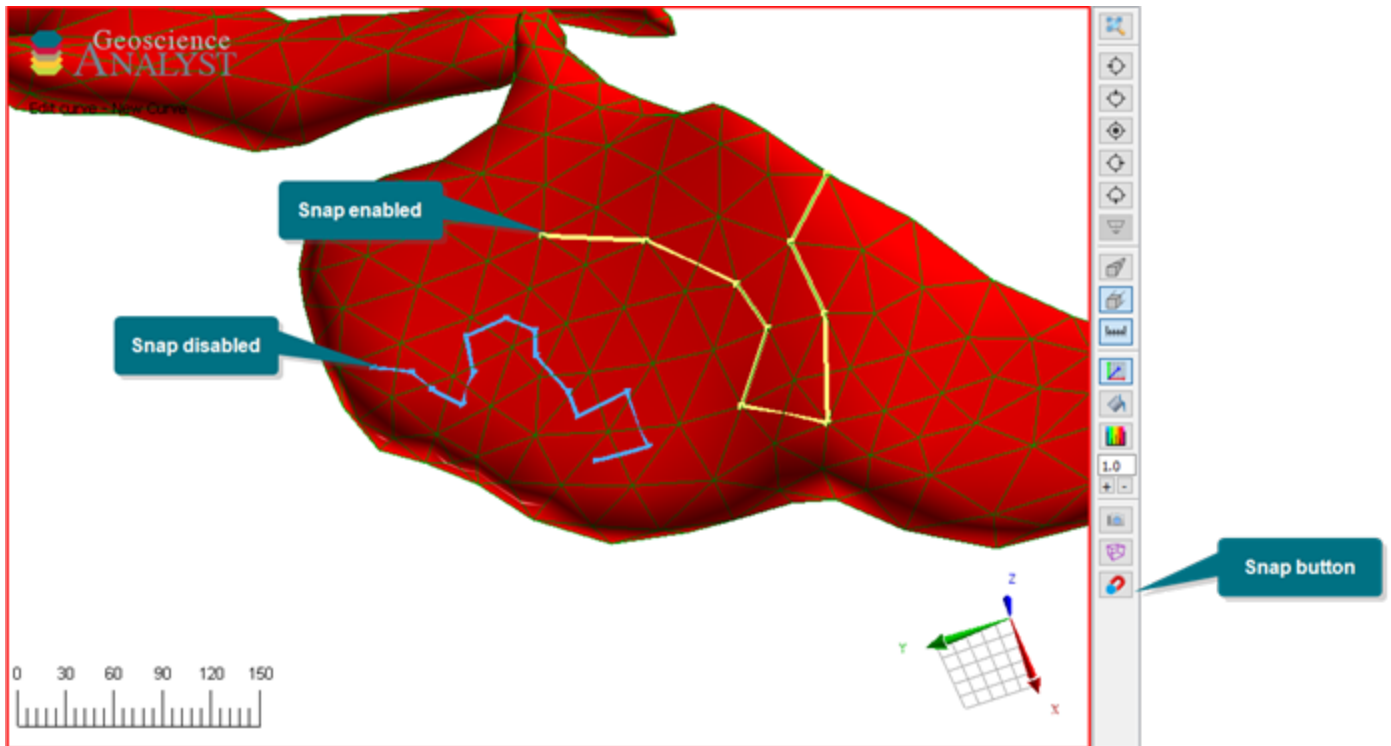
Drillholes:

- Snap enabled: Nodes snap to lithological contacts.
- Snap disabled: Nodes digitize to location where clicked.



Surfaces:

- Snap enabled: Nodes snap to nodes on mesh.
- Snap disabled: Nodes digitize to point where clicked.



BlockModels:

- Snap enabled: Nodes snap to centre of cell.
- Snap disabled: Nodes digitize to location where clicked.

Note: If one of multiple Viewports has snap mode activated, it will be activated across all Viewports.

Editing objects

Having a Geoscience ANALYST Pro licence allows you to edit points, curves, and surface objects in your workspace. There are four ways to enter edit mode:

1. Press **E** and click an object in the *Viewport*.
2. Right-click an object in the Viewport and select **Edit** from the contextual menu.
3. Click object's name in the *Objects panel* and select **Edit** from the contextual menu.
4. Select an object in the *Objects panel* and press **Ctrl+E**.

When in edit mode, the Geoscience ANALYST user interface functions as follows:

- The name of an object being edited displays at the top of the Controls panel, along with the editing tools directly underneath the object. (Curves edit menu shown in the image below.)

- The cursor becomes a cross-hair.
- The border of the Viewport becomes red.
- The name of the object being edited and the fact that it is in edit mode displays at the top left of the Viewport.

Edit curve - New Curve	
	O = Left click
	O = Right click
	I + Left click
	J + Left click
	K + Left click
	Delete + Right click
	Shift + Delete
	Delete + Left click
	Ctrl + Delete
	D + Left click (drag)
	D + Shift + Left click (drag)
	Shift + Left click
	Ctrl + Z
	Ctrl + Y
	Escape
	Add node to end of selected line
	Add node to start of selected line
	New line (2 clicks)
	Join 2 extremities
	Close/open line
	Collapse node/segment
	Collapse selection
	Delete node/segment
	Delete selection
	Move selection
	Move selection (no snapping)
	Select line
	Undo
	Redo
	Exit edit mode

To exit edit mode, press **Esc**.

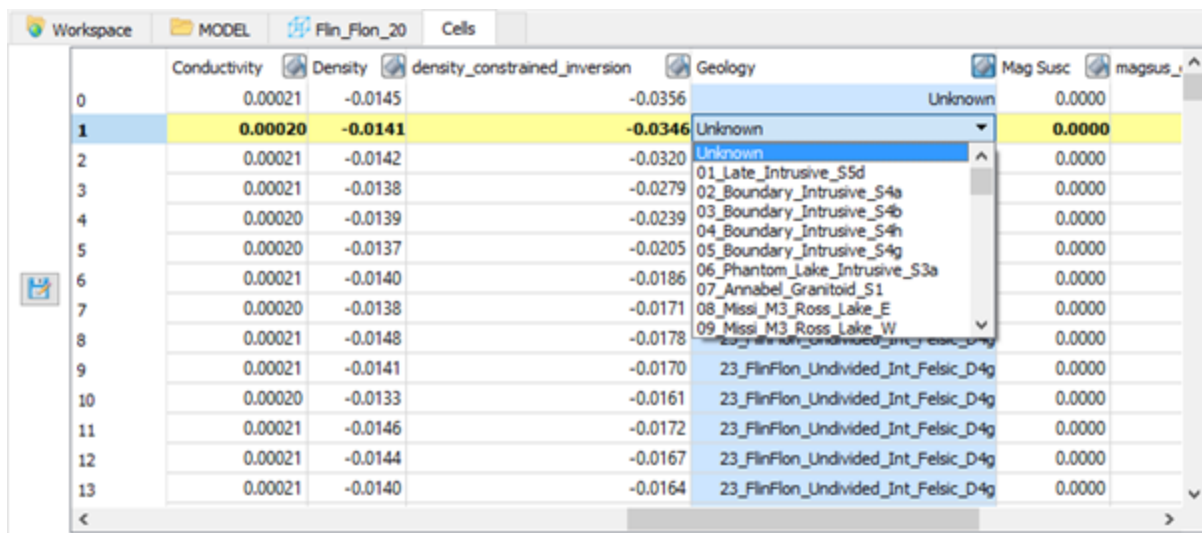
Editing in the *Data Table*

In Geoscience ANALYST Pro, you can edit most *Data Table* entries, with the exception of some geometrical fields including *drillhole FROM* and *TO*, *BlockModel I/J/K*, and linked ioGAS Points x, y, z values (applicable with ioGAS Link).

To edit a value in a *Data Table*, double-click in a cell:

Workspace		GEOLOGY		massive_sulphide		Triangles	Nodes
	X	Y	Z	distance_to_drillholes (m)	distance_to_fault (m)		
0	193150.00	2500440.50	1902.54	25.2	513.9		
1	193140.00	2500440.50	1902.26	24.5	506.1		
2	193150.00	2500433.10	1902.19	32.5	508.8		
3	193140.00	2500431.25	1897.62	33.9	499.6		
4	193160.00	2500430.51	1898.53	36.1	514.8		
5	193140.00	2500445.06	1904.45	19.9	509.2		
6	193130.00	2500438.28	1900.83	29.7	496.7		
7	193150.00	2500450.00	1906.33	16.2	520.3		
8	193160.00	2500440.50	1900.88	29.6	521.3		
9	193140.00	2500450.00	1906.41	14.9	512.5		
10	193130.00	2500450.00	1906.48	19.6	504.7		
11	193140.00	2500459.50	1907.61	5.9	518.3		

In the case of reference data, double-click in the cell to activate the drop-down menu and select the desired class:



The screenshot shows the 'Cells' tab in the Geoscience ANALYST software. A table with 14 rows and 6 columns is displayed. The columns are: Conductivity, Density, density_constrained_inversion, Geology, Mag Susc, and magsus_. Row 1 is highlighted in yellow. A dropdown menu is open for the 'Geology' cell in row 1, showing a list of geological units. The 'Unknown' option is currently selected in the dropdown.

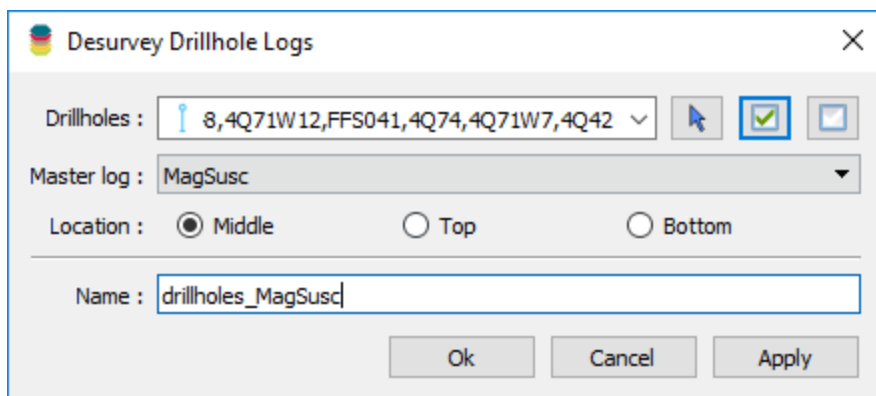
	Conductivity	Density	density_constrained_inversion	Geology	Mag Susc	magsus_
0	0.00021	-0.0145	-0.0356	Unknown	0.0000	
1	0.00020	-0.0141	-0.0346	Unknown	0.0000	
2	0.00021	-0.0142	-0.0320	Unknown	0.0000	
3	0.00021	-0.0138	-0.0279	01_Late_Intrusive_S5d	0.0000	
4	0.00020	-0.0139	-0.0239	02_Boundary_Intrusive_S4a	0.0000	
5	0.00020	-0.0137	-0.0205	03_Boundary_Intrusive_S4b	0.0000	
6	0.00021	-0.0140	-0.0186	04_Boundary_Intrusive_S4h	0.0000	
7	0.00020	-0.0138	-0.0171	05_Boundary_Intrusive_S4g	0.0000	
8	0.00021	-0.0148	-0.0178	06_Phantom_Lake_Intrusive_S3a	0.0000	
9	0.00021	-0.0141	-0.0170	07_Annabel_Granitoid_S1	0.0000	
10	0.00020	-0.0133	-0.0161	08_Missi_M3_Ross_Lake_E	0.0000	
11	0.00021	-0.0146	-0.0172	09_Missi_M3_Ross_Lake_W	0.0000	
12	0.00021	-0.0144	-0.0167	23_FlinFlon_Undivided_Int_Felsic_D4g	0.0000	
13	0.00021	-0.0140	-0.0164	23_FlinFlon_Undivided_Int_Felsic_D4g	0.0000	

Desurvey drillholes

In Geoscience ANALYST Pro, you can desurvey drillhole logs to create a points object.

To desurvey one or several drillholes:

1. In the **Utilities** menu, select **Desurvey Drillholes**.
2. In the *Desurvey Drillhole Logs* dialogue box, select the drillholes you wish to desurvey.
3. From the *Master log* drop-down menu, select a value.
4. Select one of the location buttons, either *Middle*, *Top*, or *Bottom* to determine the x, y, z position of the desurveyed points.
5. Click **Apply** or **OK** to transfer. Apply will run the command and keep the dialogue open. **OK** will run the command and close the dialogue in one step.



Desurvey Drillhole Logs

Drillholes : 8,4Q71W12,FFS041,4Q74,4Q71W7,4Q42

Master log : MagSusc

Location : ☒ Middle ☐ Top ☐ Bottom

Name : drillholes_MagSusc

Ok Cancel Apply

Transfer data to drillholes

To complement the Desurvey Drillholes and ioGAS Link add-on module functionality, the ability to transfer data residing on points to drillholes is available in Geoscience ANALYST Pro. This is particularly useful to re-sample geology logs based on assay data sampling, and allows you to paint by one theme and scale the log cylinders by another.

Note: A text or reference field named HOLE_ID must be present on the points that make up the drillhole as it is necessary to find matching drillholes in the workspace. There must also be FROM and TO float fields to transfer the data as interval logs, or a DEPTH float field to transfer the data as point logs, according to the table below:

Source example	Log type	FROM data	TO data	Hole_ID data
Drillhole Desurvey	Interval logs	FROM (float)	TO float	Hole_ID (text)
Drillhole Desurvey	Point logs	DEPTH (float)	n/a	Hole_ID (text)
ioGAS live link	Interval logs	GAS_FROM (float)	GAS_TO (float)	Hole_ID (reference)

To transfer data to drillholes:

1. Right-click on a points object that has the required fields, as illustrated in the table above.
2. In the contextual menu, select **Transfer Data To Drillholes**.

All of the data residing on the points will be transferred to drillholes that have the same name as the required HOLE_ID field.

Add-on module: ioGAS Link

ioGAS Link is a paid add-on module dependent on Geoscience ANALYST Pro that dynamically links ioGAS and Geoscience ANALYST, allowing you to share features from both. Once linked, you can open any points object residing in Geoscience ANALYST Pro in ioGAS, and vice versa.

You can view ioGAS's powerful attribute settings in Geoscience ANALYST, and changes will be broadcast and updated in real time to dynamically display the data in 3D using Geoscience ANALYST's versatile viewing capabilities.

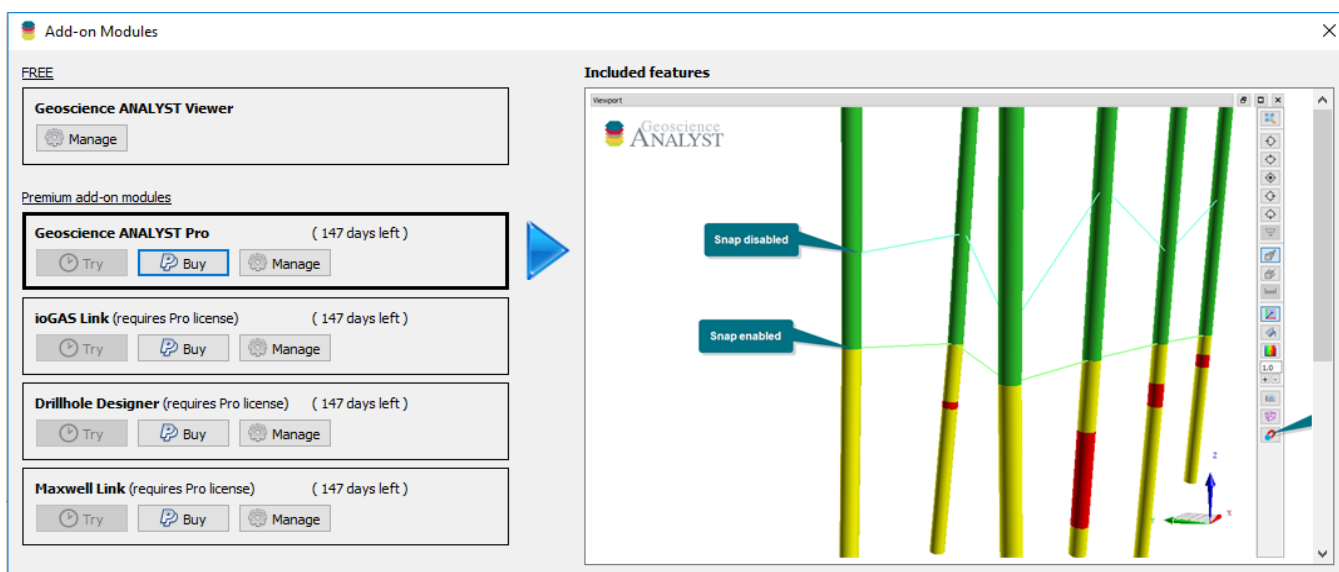
Note: The add-on module **does not include** the ioGAS application developed by the REFLEX GEOCHEMISTRY team. To buy or download a free trial version of ioGAS, or for information on ioGAS features, licence and compatibility with Geoscience ANALYST Pro, see [the website of REFLEX](#). If you already own an ioGAS licence, contact your REFLEX representative to activate the licensing feature required to enable the ioGAS - Geoscience ANALYST live link.

To activate your ioGAS Link licence:

1. In the Menu bar, open the **Add-on Modules** menu and click **Try/Buy/Activate Module(s)**.



2. In the *Add-on Modules* dialogue box, select the **Buy** button in the ioGAS Link box. You will be directed to the Mira Geoscience website to complete the transaction.



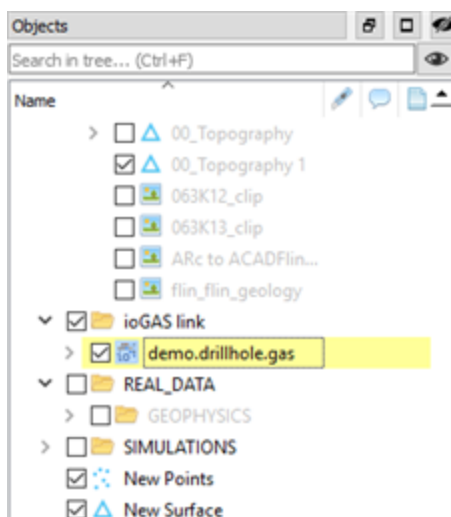
3. Retrieve your licence key that we emailed to you and press **Manage** to launch the registration wizard. (Follow the same procedure as the free viewer licence activation steps [described earlier](#) in this guide.)
4. Restart Geoscience ANALYST to access ioGAS Link.

To connect to ioGAS Link:

1. Launch ioGAS.
2. In Geoscience ANALYST, go to the **File** menu and click **Connect to ioGAS** to establish the live link connection.

You will see the message *Connected to ioGAS*, as well as the name of the ioGAS project in parentheses centred at the top of the Geoscience ANALYST Viewport.

When connected, an open file in ioGAS will automatically be broadcast to Geoscience ANALYST as a new ioGAS Points object, which you will see under a folder called **ioGAS link** in the Objects panel.

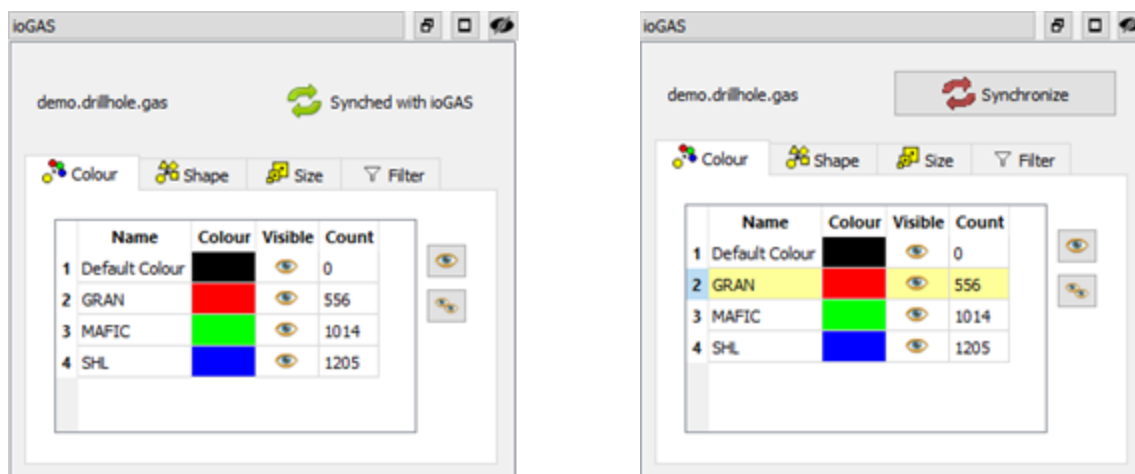


To view points objects in ioGAS:

1. In ioGAS, go to the **File** menu and click **Open Link Data**.
2. In the *Choose view from...* dialogue box, select an object from the drop-down menu.
3. Click **OK**.

By doing this, you will be able to view the linked points using ioGAS's powerful visualization and versatile attribute capabilities in the 3D Viewport, along with any other model components residing in the workspace.

Note: If you edit points attributes in ioGAS, Geoscience ANALYST will reflect the changes. However, if you create, delete, or edit ioGAS points objects in Geoscience ANALYST, the green **Synched with ioGAS** icon on the ioGAS panel will change to a red **Synchronize** button indicating that the two data sets are no longer matching. Press this button to re-sync the data between the two applications.



You can disconnect from ioGAS by closing either of the programs, or by clicking **Disconnect from ioGAS** in the Geoscience ANALYST **File** menu.

Renaming and reassigning data

To avoid possible conflicts with reserved names for geometrical fields, Geoscience ANALYST will automatically rename certain ioGAS points data names by adding a **GAS_** prefix. This includes *x, y, z, i, j, k, from, to* and *depth*.

Geoscience ANALYST assigns the following as floats:

- Numeric data (e.g., float and integer).
- Data tagged as special such as reserved names and aliases for 3D coordinates (e.g., north, east, lat, long, elevation).

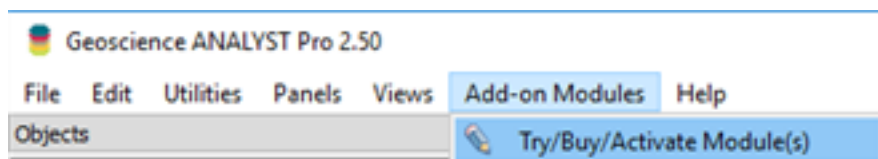
All other data such as text becomes reference data.

Add-on module: Maxwell Link

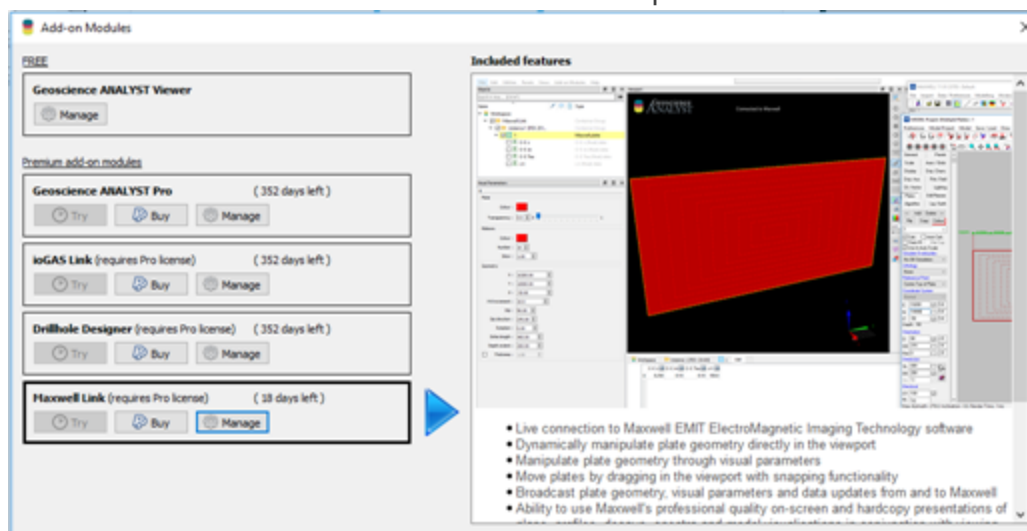
Maxwell Link is a paid add-on module dependent on Geoscience ANALYST Pro that dynamically links Maxwell EMIT and Geoscience ANALYST allowing you to harness the power of both. Once linked, you can broadcast plates within Maxwell to Geoscience ANALYST, adjust the geometry and parameters in Geoscience ANALYST, and broadcast the updated linked plate to Maxwell via a right-click contextual command on the linked plate or in the Object panel called *Broadcast to Maxwell*.

To activate your Maxwell Link licence:

1. In the Menu bar, open the **Add-on Modules** menu and click **Try/Buy/Activate Module(s)**.



2. In the *Add-on Modules* dialogue box, select the **Buy** button in the Maxwell Link box. You will be directed to the Mira Geoscience website to complete the transaction.



3. Retrieve your licence key that we emailed to you and press **Manage** to launch the registration wizard. (Follow the same procedure as the free viewer licence activation steps [described earlier](#) in this guide.)
4. Restart Geoscience ANALYST to access Maxwell Link.

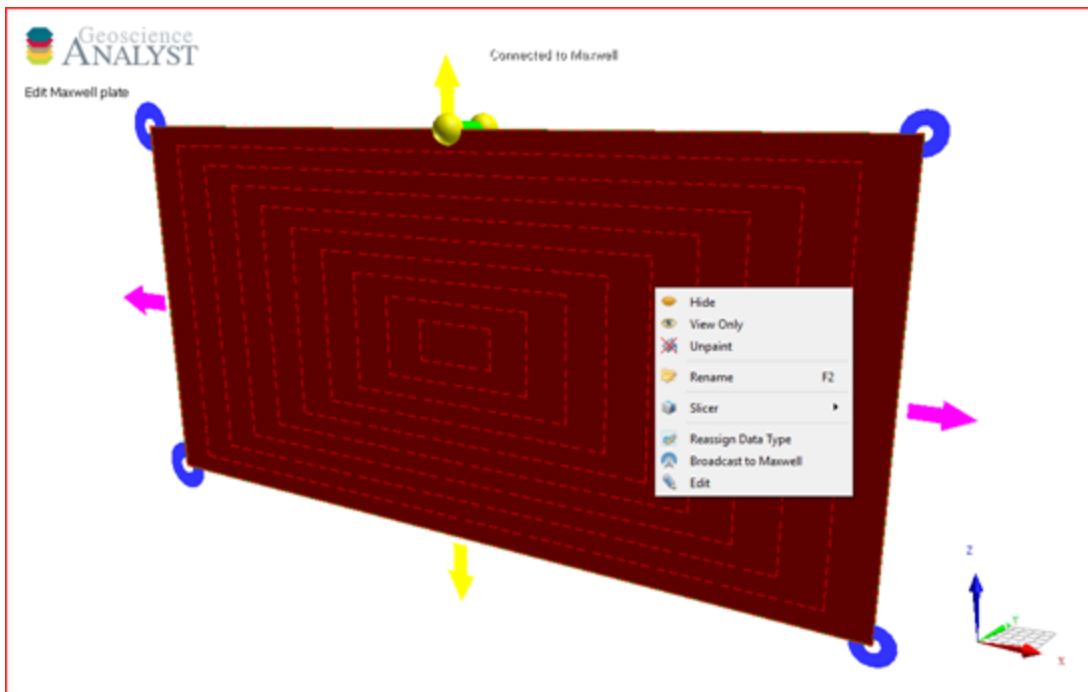
To connect to Maxwell Link, either:

1. Launch a new instance of Maxwell, or
2. Click **Connect** on the *Data/Preference/Manage Partners* dialogue box in Maxwell.

You will see the *Connected to Maxwell*, centred at the top of the Geoscience ANALYST Viewport.

To broadcast plates from Maxwell to Geoscience ANALYST:

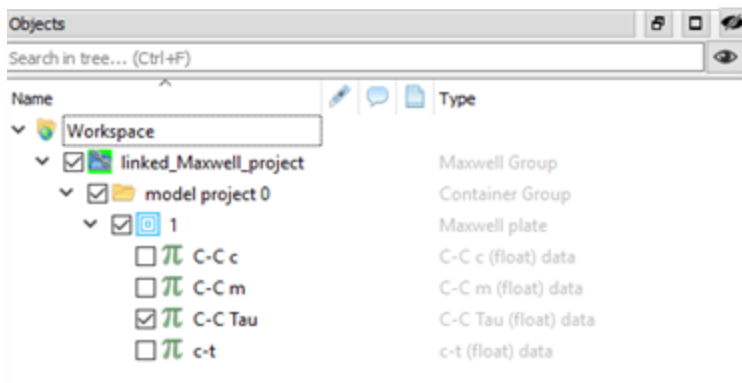
- Right-click in Maxwell's model viewer and select **Broadcast All Plates to Partners** or **Broadcast the Selected Plate to Partners**.



To view a Maxwell plate object in Geoscience ANALYST:

1. Open or create a new model project in Maxwell EMIT.
2. Right-click the Model project in Maxwell and in the contextual menu, click **Broadcast All plates to Partners**.
3. In Geoscience ANALYST click on the plate to display the object in the tree in the Object panel.

When broadcasting plates to Geoscience ANALYST from Maxwell, a new folder will be created nominated by a green linked icon to indicate the project is linked and named according to the Maxwell instance.



Note: Some manual plate changes in Maxwell will be automatically broadcast to Geoscience ANALYST. Other modifications using the interactive editor in Maxwell, for example, will require you to select *Broadcast changes to partners* from Maxwell in order for them to update in Geoscience ANALYST.

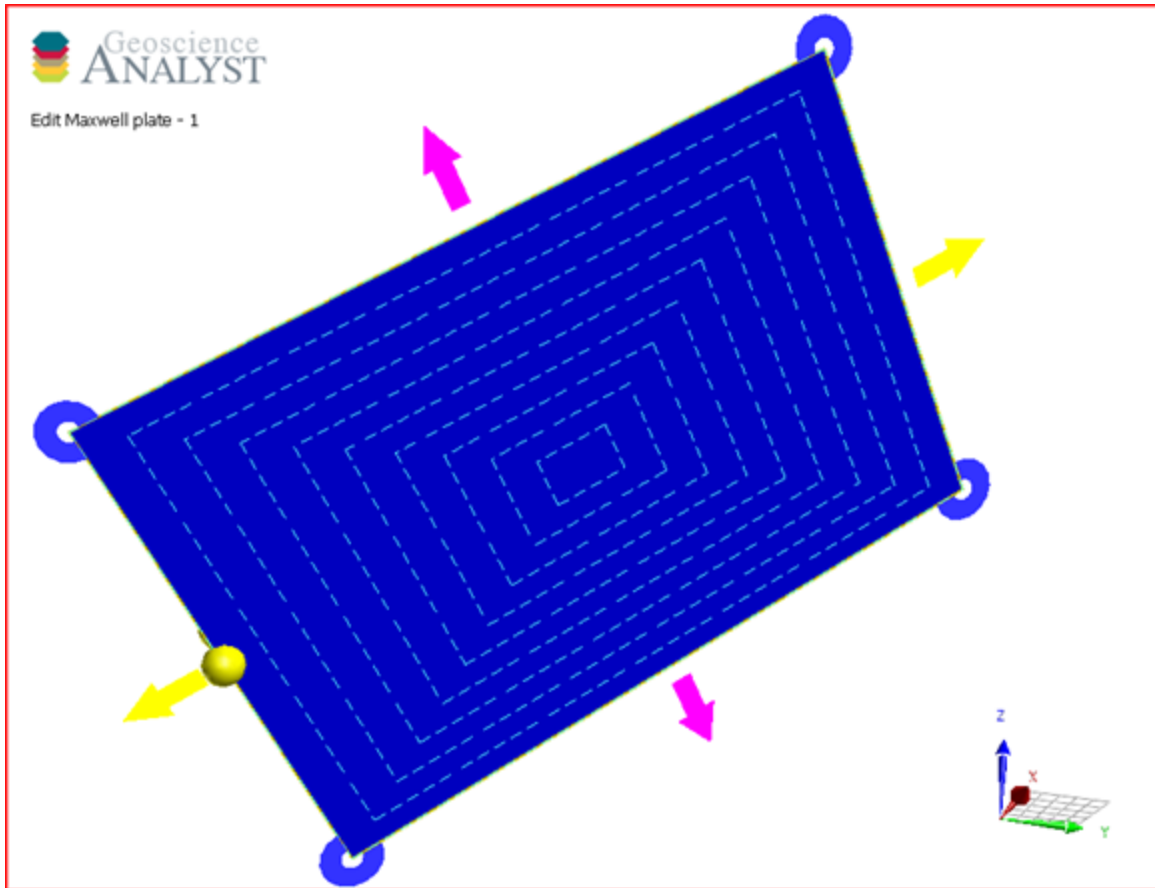
To disconnect from Maxwell, go to **File/Disconnect from Maxwell**. The folder and imported plates will remain in Geoscience ANALYST but the folder will no longer be green with a link icon. Instead, you will see a blue folder with a white Maxwell plate from each model project, within sub folders named according to the index number (e.g., model project 0, model project 1).

You can manually edit the cole-cole parameters and conductivity thickness data values through the Data Tables. You can modify the plate geometry and graphical settings through the visual parameter panel as well as interactively in the Viewport through *gizmos* attached to the plate as described here and presented in the Controls panel.

To edit Maxwell plates in the Viewport:

- Right-click on a plate's name in the object panel or on the plate object in the Viewport and select **Edit**, or press **E** and click on the plate in the Viewport.

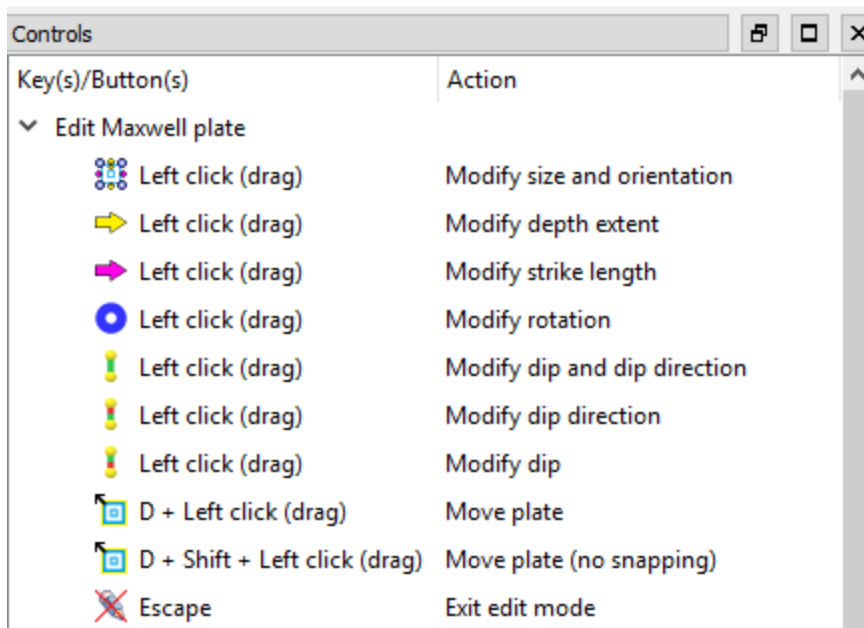
You will see a red perimeter around the Viewport camera, indicating it is in edit mode.













You can click on the yellow joystick handle to lock or unlock dip and dip direction. A red band below the yellow ball of the joystick indicates it is locked on that side.



The Controls panel contains details several actions available when editing Maxwell plates.



Key(s)/Button(s)	Action
▼ Edit Maxwell plate	
 Left click (drag)	Modify size and orientation
 Left click (drag)	Modify depth extent
 Left click (drag)	Modify strike length
 Left click (drag)	Modify rotation
 Left click (drag)	Modify dip and dip direction
 Left click (drag)	Modify dip direction
 Left click (drag)	Modify dip
 D + Left click (drag)	Move plate
 D + Shift + Left click (drag)	Move plate (no snapping)
 Escape	Exit edit mode

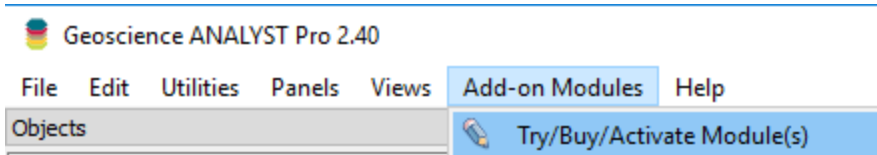
To exit edit mode, press **Esc**.

Add-on module: Drillhole Designer

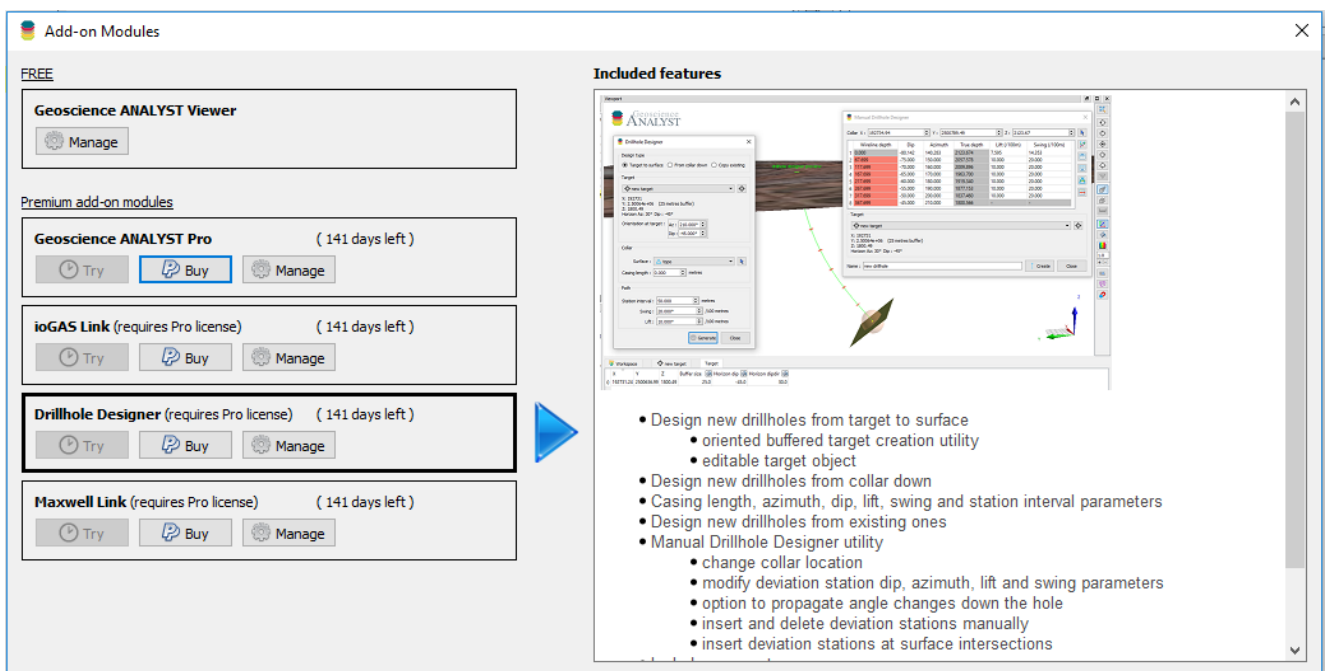
The Drillhole Designer is a paid add-on module to Geoscience ANALYST Pro that offers a dynamic, user friendly environment allowing you to quickly design new drillholes, whether they are simple straight holes from a collar location with specific lengths, to complex drillholes that lift and swing along the path.

To activate your Drillhole Designer licence:

1. In the Menu bar, open the **Add-on Modules** menu and click **Try/Buy/Activate Module(s)**.



2. In the *Add-on Modules* dialogue box, select the **Buy** button in the Drillhole Designer box. You will be directed to the Mira Geoscience website to complete the transaction.



3. Retrieve your licence key that we emailed to you and press **Manage** to launch the registration wizard. (Follow the same procedure as the free viewer licence activation steps [described earlier](#) in

this guide.)

4. Restart Geoscience ANALYST to access Drillhole Designer.

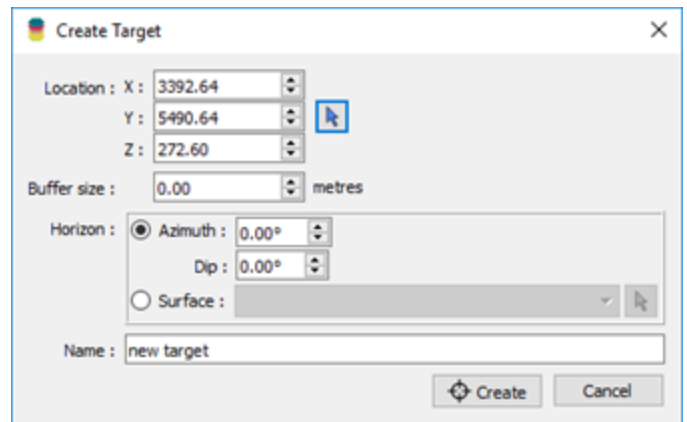
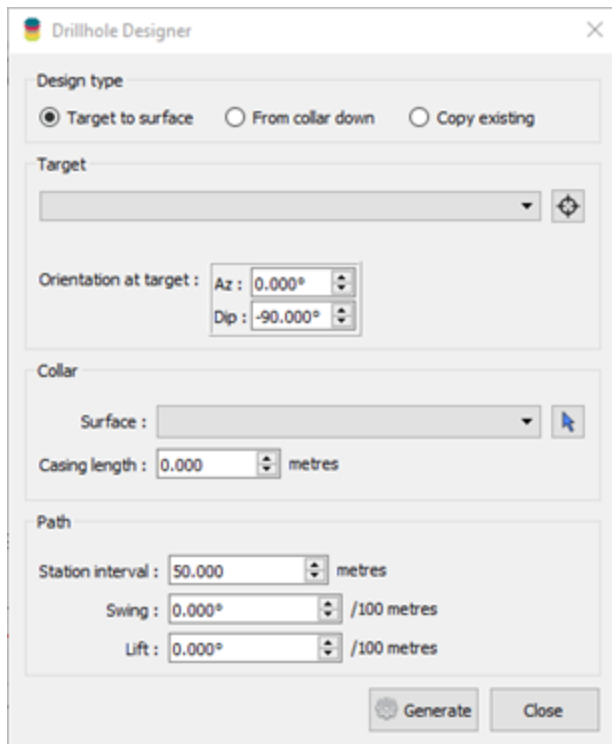
To open Drillhole Designer, go to the Utilities menu in Geoscience ANALYST Pro, and click **Drillhole Designer**.

In the Drillhole Designer application, you will see that there are three drillhole design options:

1. [Target to surface](#)
2. [From collar down](#)
3. [Copy existing](#)

Once created, the [Manual Drillhole Designer](#) launches to make further edits and refinements.

Target to surface




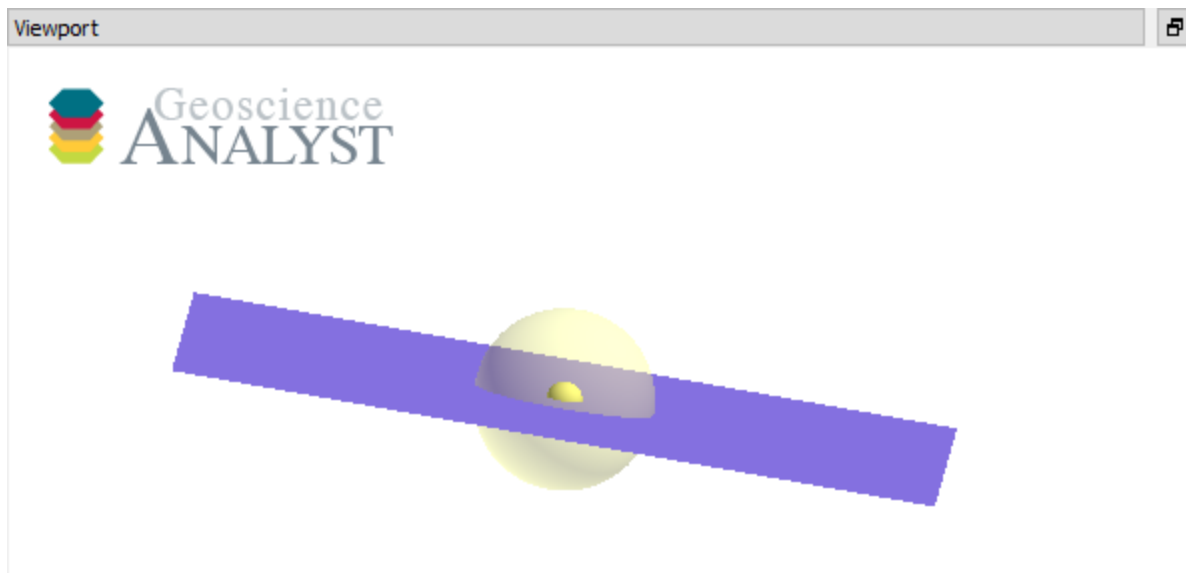
To create a target object (end of hole) using Target to surface:

1. Select the **Target to surface** button in the Drillhole Designer application.
2. Click on the **New target** button to launch the accompanying *Create Target* dialogue box.
3. In the *Create Target* dialogue box click the digitizing arrow. The Viewport will then be in edit mode.

4. Click the location in the Viewport where you want to place the drillhole target (or enter the x, y, z coordinates manually).
5. Set a *Buffer size*. (Optional)
6. Enter an Azimuth and Dip value of the target horizon, or click the **Surface** option and select an existing surface object either through the drop-down menu, or by using the digitizing arrow to click on the location in the Viewport.
7. Click **Create**.

In the Viewport you will see a new target object comprised of a node at the defined location, surrounded by a sphere indicating the set buffer size.

The Objects panel will contain an entry for the object, defined by the target icon .



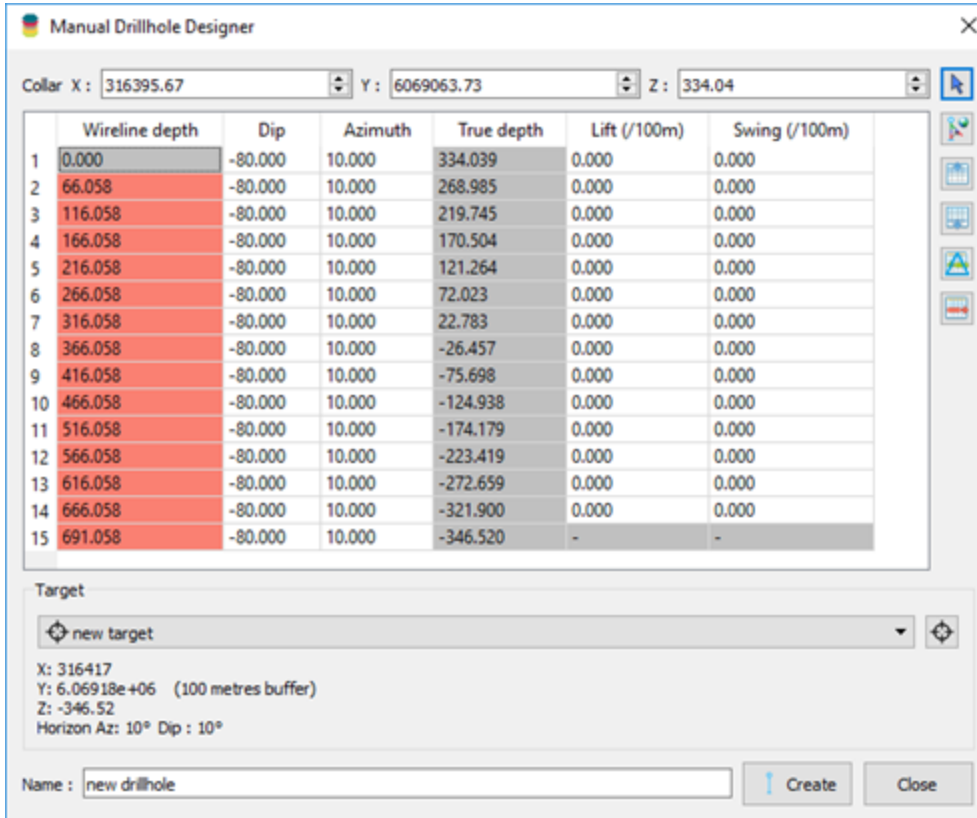
You can manually modify the target location, geometry, and buffer size values through the *Data Table*, which will automatically update the target geometry in the Viewport to allow you to visualize the modifications in real time. You can attach comments and files here as well.

To create a drillhole from target to surface:

1. In the *Collar* section of the *Target to surface* module of the Drillhole Designer, select a surface at which the collar will be projected onto, typically topography, using the drop-down menu, or by clicking on the surface in the Viewport with the digitizing arrow.
2. Select a casing length to generate a survey station at the selected depth. (Optional)

- Using *Station interval* In the *Path* section, create more deviation stations along the drillhole path by decreasing the value, while increasing the *Swing* and *Lift* angles to create a more deviated path.
- Click **Generate**.

Note: Having valid input parameters launches the Manual Drillhole Designer. If the drillhole path from the defined orientation at target, swing, and lift parameters would not intersect the collar surface, an error message will display in red in the console and the Manual Drillhole Designer will not launch.



Manual Drillhole Designer

Collar X : 316395.67 Y : 6069063.73 Z : 334.04

	Wireline depth	Dip	Azimuth	True depth	Lift (/100m)	Swing (/100m)
1	0.000	-80.000	10.000	334.039	0.000	0.000
2	66.058	-80.000	10.000	268.985	0.000	0.000
3	116.058	-80.000	10.000	219.745	0.000	0.000
4	166.058	-80.000	10.000	170.504	0.000	0.000
5	216.058	-80.000	10.000	121.264	0.000	0.000
6	266.058	-80.000	10.000	72.023	0.000	0.000
7	316.058	-80.000	10.000	22.783	0.000	0.000
8	366.058	-80.000	10.000	-26.457	0.000	0.000
9	416.058	-80.000	10.000	-75.698	0.000	0.000
10	466.058	-80.000	10.000	-124.938	0.000	0.000
11	516.058	-80.000	10.000	-174.179	0.000	0.000
12	566.058	-80.000	10.000	-223.419	0.000	0.000
13	616.058	-80.000	10.000	-272.659	0.000	0.000
14	666.058	-80.000	10.000	-321.900	0.000	0.000
15	691.058	-80.000	10.000	-346.520	-	-

Target

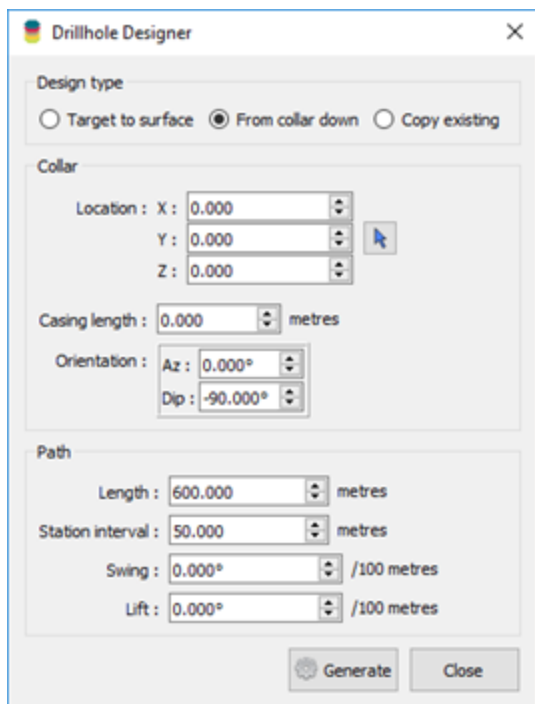
new target

X: 316417
Y: 6.06918e+06 (100 metres buffer)
Z: -346.52
Horizon Az: 10° Dip : 10°

Name : new drillhole

Create Close

From collar down



The screenshot shows the 'Drillhole Designer' application window. It has a title bar with a close button. The window is divided into three main sections: 'Design type', 'Collar', and 'Path'. In the 'Design type' section, there are three radio buttons: 'Target to surface' (unselected), 'From collar down' (selected), and 'Copy existing' (unselected). The 'Collar' section contains input fields for 'Location : X : 0.000', 'Y : 0.000', and 'Z : 0.000', each with a small arrow icon to its right. Below these is a 'Casing length : 0.000 metres' field. The 'Orientation' section has 'Az : 0.000°' and 'Dip : -90.000°' fields. The 'Path' section contains 'Length : 600.000 metres', 'Station interval : 50.000 metres', 'Swing : 0.000° /100 metres', and 'Lift : 0.000° /100 metres'. At the bottom right are 'Generate' and 'Close' buttons.

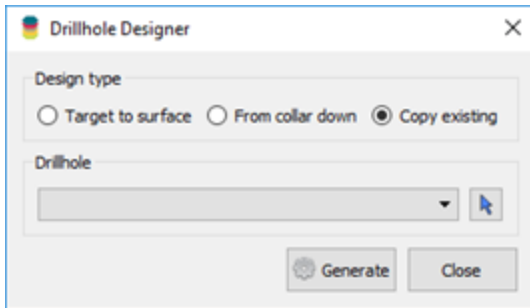
To create a drillhole from a collar down:

1. In the Drillhole Designer application, click **From collar down** in the *Design type* section.
2. Choose your desired drillhole location by either manually entering the *Location* values or by clicking on the arrow to digitize the location in the Viewport.
3. Set a starting orientation using the Azimuth and Dip.
4. Click **Generate**.

Optional features include:

- Modifying the station interval distance (decrease to generate more deviation stations).
- Entering a casing length.
- Specifying swing and lift angles per 100 units of drilling (metres or feet depending on the project units as defined on the workspace tab of the *Data Table*).

Copy existing



To copy an existing drillhole:

Method 1:

1. In the Drillhole Designer application, click **Copy existing** in the *Design type* section.
2. Select a drillhole from the drop-down menu, or click on an existing drillhole in the Viewport using the digitizer arrow.
3. Click **Generate** to launch the Manual Drillhole Designer to refine the path and location, if desired.

Method 2:

1. In the Objects panel or the Viewport, right-click an existing drillhole, then click **Manual Drillhole Designer** in the contextual menu.
2. From here, you can use either:
 - a. The digitizer arrow, by clicking on a drillhole you would like to copy, or
 - b. Type a name for your new drillhole in the *Name* text box, then click **Create**.

Note: When you copy using these methods, the copied drillhole will display in the exact location of the source of the copy until you use the Manual Drillhole Designer to define a new path and location.

Manual Drillhole Designer

Manual Drillhole Designer

Collar X : 316395.67 Y : 6069063.73 Z : 334.04

	Wireline depth	Dip	Azimuth	True depth	Lift (/100m)	Swing (/100m)
1	0.000	-80.000	10.000	334.039	0.000	0.000
2	66.058	-80.000	10.000	268.985	0.000	0.000
3	116.058	-80.000	10.000	219.745	0.000	0.000
4	166.058	-80.000	10.000	170.504	0.000	0.000
5	216.058	-80.000	10.000	121.264	0.000	0.000
6	266.058	-80.000	10.000	72.023	0.000	0.000
7	316.058	-80.000	10.000	22.783	0.000	0.000
8	366.058	-80.000	10.000	-26.457	0.000	0.000
9	416.058	-80.000	10.000	-75.698	0.000	0.000
10	466.058	-80.000	10.000	-124.938	0.000	0.000
11	516.058	-80.000	10.000	-174.179	0.000	0.000
12	566.058	-80.000	10.000	-223.419	0.000	0.000
13	616.058	-80.000	10.000	-272.659	0.000	0.000
14	666.058	-80.000	10.000	-321.900	0.000	0.000
15	691.058	-80.000	10.000	-346.520	-	-

Target

new target

X: 316417
Y: 6.06918e+06 (100 metres buffer)
Z: -346.52
Horizon Az: 10° Dip: 10°

Name : new drillhole

Create Close

The purpose of the Manual Drillhole Designer is to refine an existing drillhole's attributes.

The Manual Drillhole Designer allows you to:

- Edit a drillhole's location
- Manually insert new deviation stations at specific locations
- Delete stations
- Add stations at defined surface intersections
- Modify the strike and dip and / or lift and swing across certain lithological domains or structures
- Automatically propagate angle changes down a drillhole in real time when dip and azimuth changes are made
- Preview a newly-created drillhole

When you create a drillhole with the Manual Drillhole Designer, it will be located under the root Workspace folder named according to the name defined in the dialogue box.

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