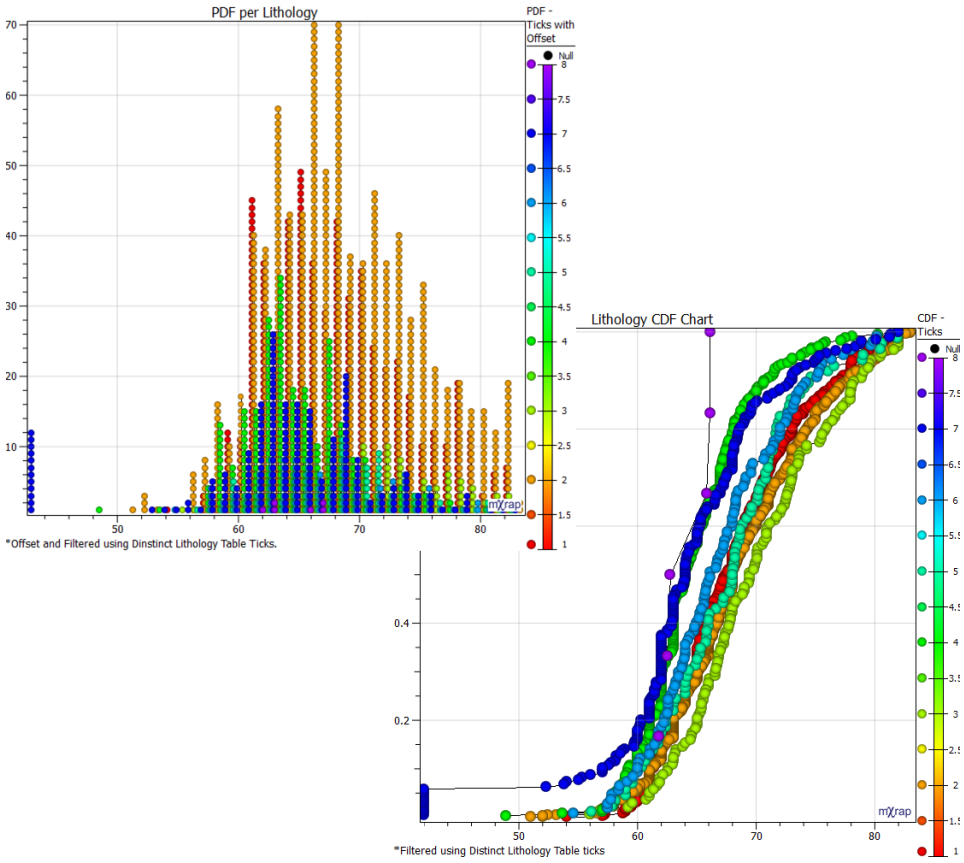
Rock Properties

App Creation Walkthrough



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Introduction

The purpose of this walkthrough is to illustrate to the user how an mXrap application can be built to analyse a dataset. The walkthrough gives an overview on the different tools which can be created in mXrap. This manual is set up to be a step-by-step guide for app building.

This walkthrough will be looking at an imported excel database (in the form of a .csv file) which contains values for Rock Mass Ratings (RMR) related to various geological lithologies. Once imported into mXrap, this database will then be manipulated using various tools in the Settings and Analysis window.

This application will enable the user to view CDF and PDF charts of RMR values for various lithologies. It will also illustrate how to build the frontend for the app.

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Structure of Walkthrough

The walkthrough follows a step-by-step structure. Each step shows how the particular tool is built in the Settings Window with a brief description of why the tool is being built. The process followed to visualise these built tools in the Analysis Window is then illustrated.

After introducing the data that the app will use and discussing the importance of understanding the content of the database, the walkthrough will introduce the Settings Window followed by a few Settings Tools and then the Analysis Window followed by an Analysis Tool. This will serve as an introduction to the basic method of tool creation used throughout the rest of the walkthrough.

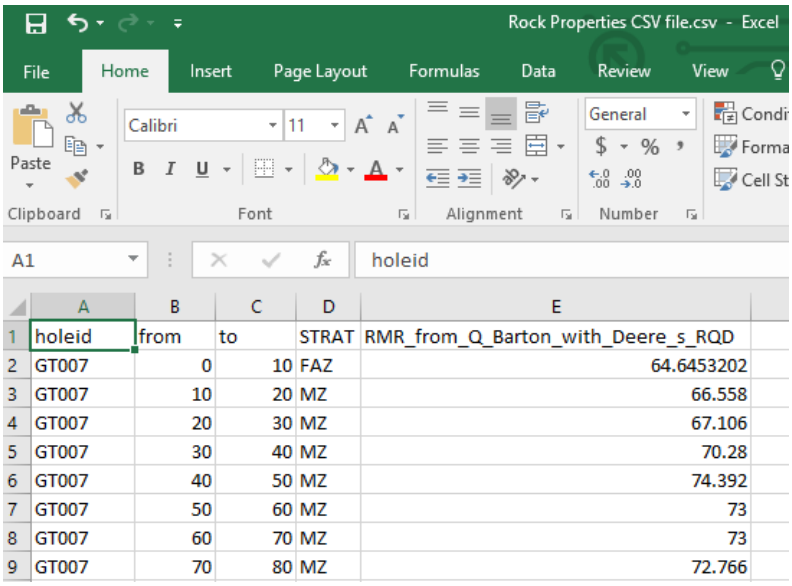
After building all of the necessary settings and analysis tools, we will introduce marker tools to colour the displayed data, as well as interface tools in which we will compile all of our work into an application.

Finally, the walkthrough will cover how to open the newly created app and set it up for future use.

Understanding the Data

Most commonly, the file type imported into mXrap will be in a .csv format (csv stands for comma-separated values). It is advised that the developer open the database in a program like Excel before building the app and to make sure that the context of the contents in the database are well understood.

In this case, we have a .csv file that contains four columns to represent rock quality per lithology. The data was obtained from borehole data from several boreholes, with an RMR calculated for each 10m section of borehole. The .csv is saved in the root folder under \#data\Rock Properties Example.



	A	B	C	D	E
1	holeid	from	to	STRAT	RMR_from_Q_Barton_with_Deere_s_RQD
2	GT007	0	10	FAZ	64.6453202
3	GT007	10	20	MZ	66.558
4	GT007	20	30	MZ	67.106
5	GT007	30	40	MZ	70.28
6	GT007	40	50	MZ	74.392
7	GT007	50	60	MZ	73
8	GT007	60	70	MZ	73
9	GT007	70	80	MZ	72.766

The columns represent the following

- holeid – Unique ID given to each borehole. There are several boreholes
- from – Start of the 10m section, measured in metres from surface in the negative z-direction
- to – End of the 10m section, measured in metres from surface in the negative z-direction
- STRAT – The dominant lithology type per borehole section
- RMR – Rock Mass Rating per depth

1. Importing the CSV file into mXrap

Introduction to the Settings Window

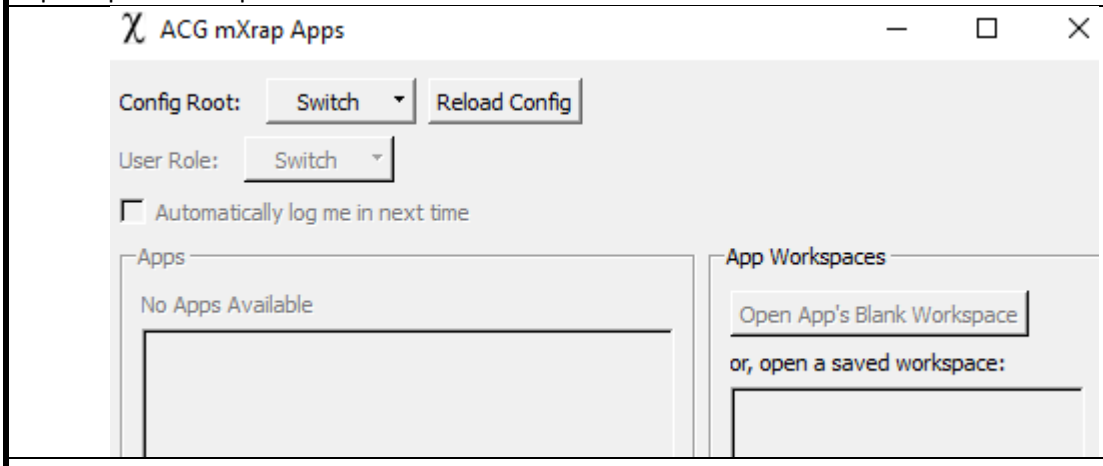
The Settings window is where the application tools are built. The right combination of created tools in the Settings window will form the backbone of the visual representations and calculations to be performed on the imported database.

The Settings Tools will be saved in the root folder under the directory:

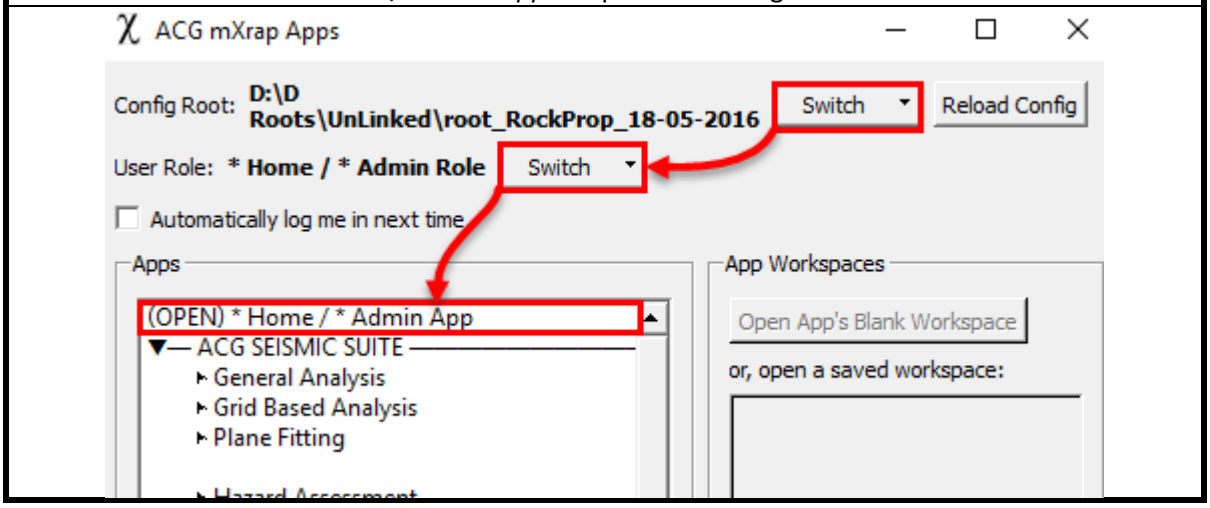
#Beta Modules/IGM Rock Property Statistics Visualisation

Each step in the Settings window will be saved numerically eg Step 1 – Read CSV

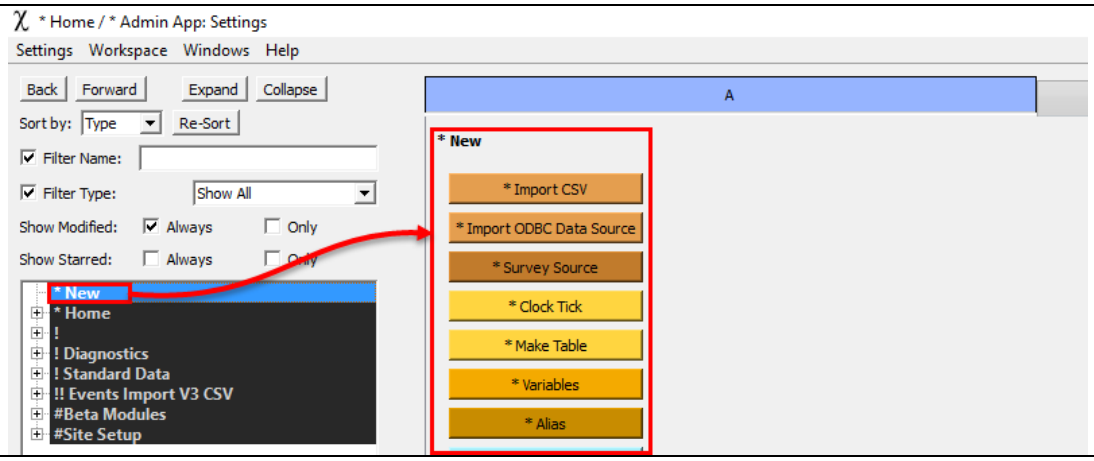
Open up the mXrap Launcher



In the mXrap Launcher
Left Click on the Config Root *Switch dropdown* and select the site root
Left Click on the User Role *Switch dropdown* and select the Home/Admin user role
Double left click on the **Home/*Admin app* to open the Settings window

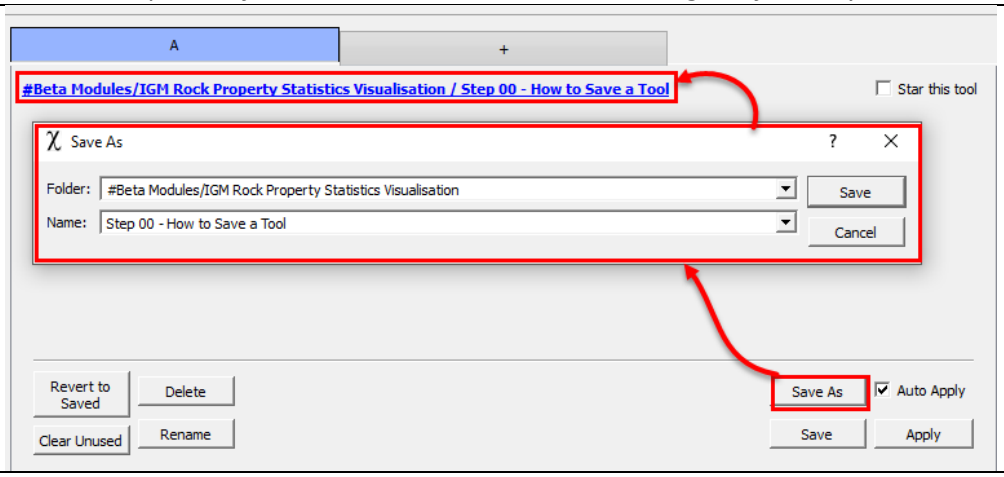


This is the Settings Window. Whenever new Settings Tools are created, the same process applies
Left click **New* in the tool tree to bring up the tools available for creation
Left click the tool to be created

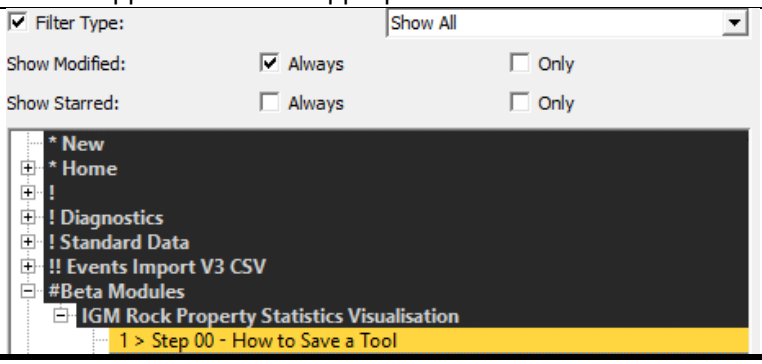


Once the tool is created, the first step is always to save the tool
It is useful to give the tool a short, descriptive name
In this example, the tools are given a Step number to make it easy for the reader to understand the flow of the process
Left click *Save As* in the bottom right corner of any tool
Choose an appropriate folder location in which to save the tool as well as a tool name

Note: For this example, the folder location and tool name will be given for every tool created



Once saved, the tool will appear under the appropriate folder in the tool tree

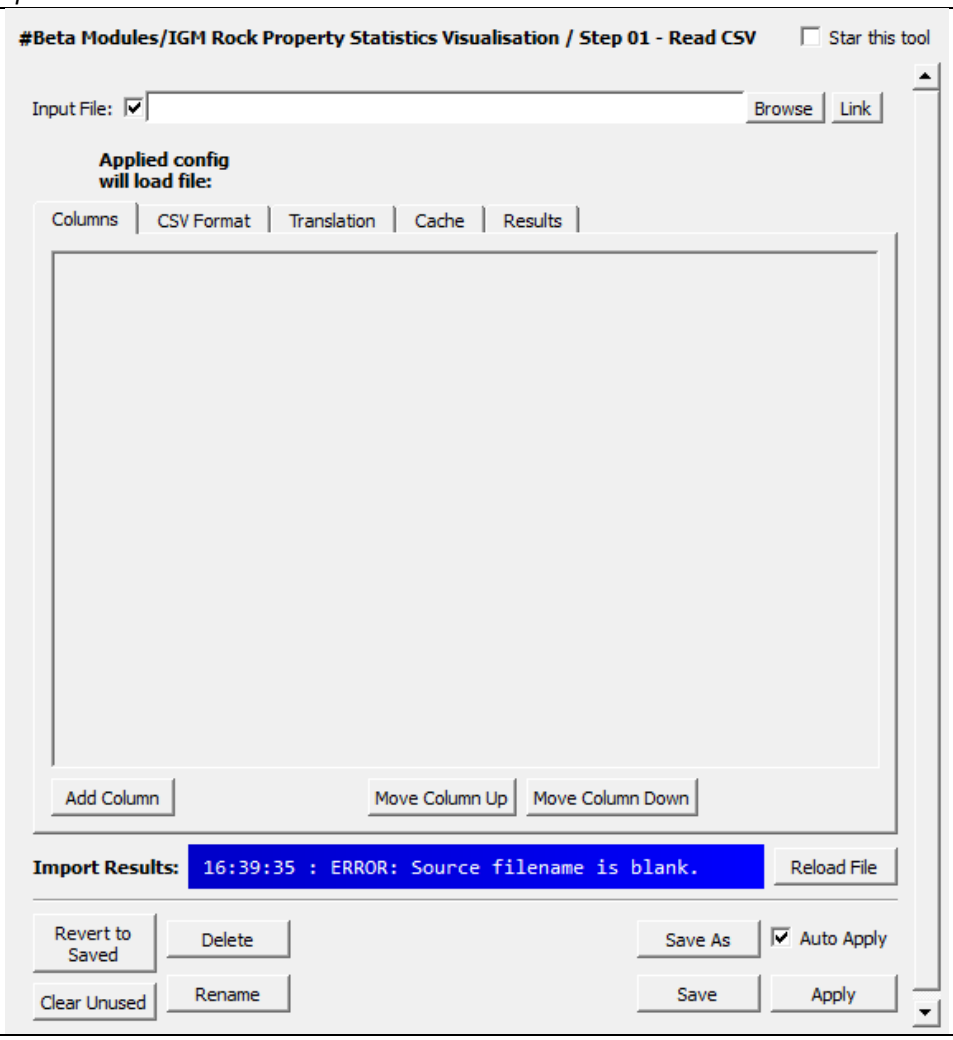


Settings Step 01– Creating the CSV tool and Importing a CSV into mXrap

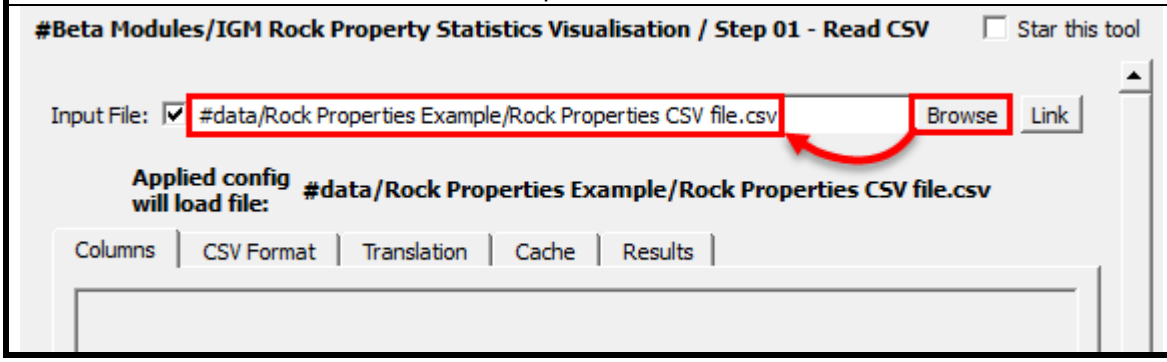
An Import CSV tool navigates to the directory where the CSV table is stored. These tables are normally stored in the site's mXrap root by the user.

Create and Save an Import CSV tool | * Import CSV

Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step 01 – Read CSV

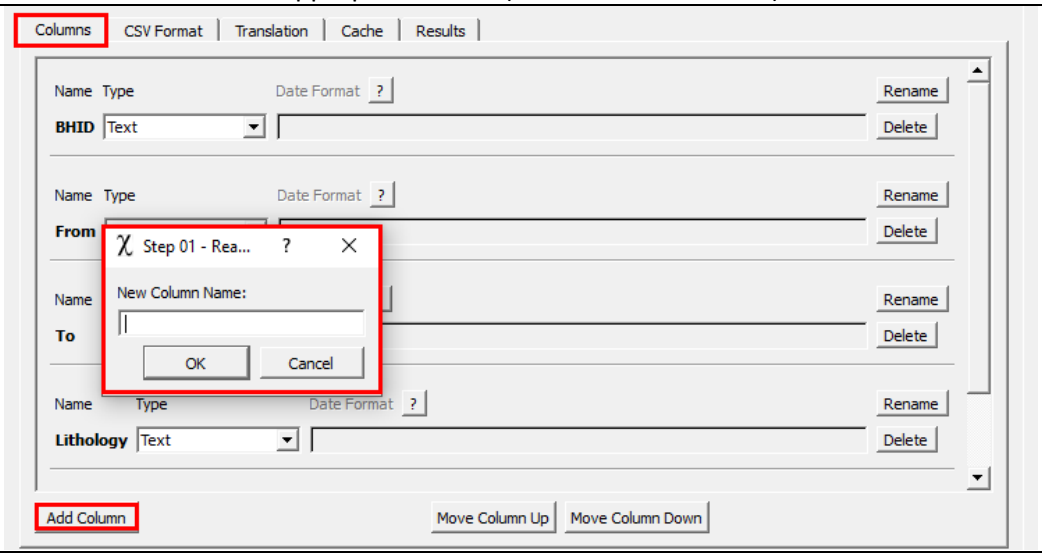


Left Click on the Input File *Browse* button
In the **Popup Window**, navigate to the Rock Properties CSV file location
Double Click on the file to add it in as the Input File



The columns will now be added in the same sequence as they appear in the CSV file
Left Click on the *Columns* tab to open it
For each column:

- **Left Click** on the *Add Column* button
- Give the column the appropriate name (as seen in the CSV file)

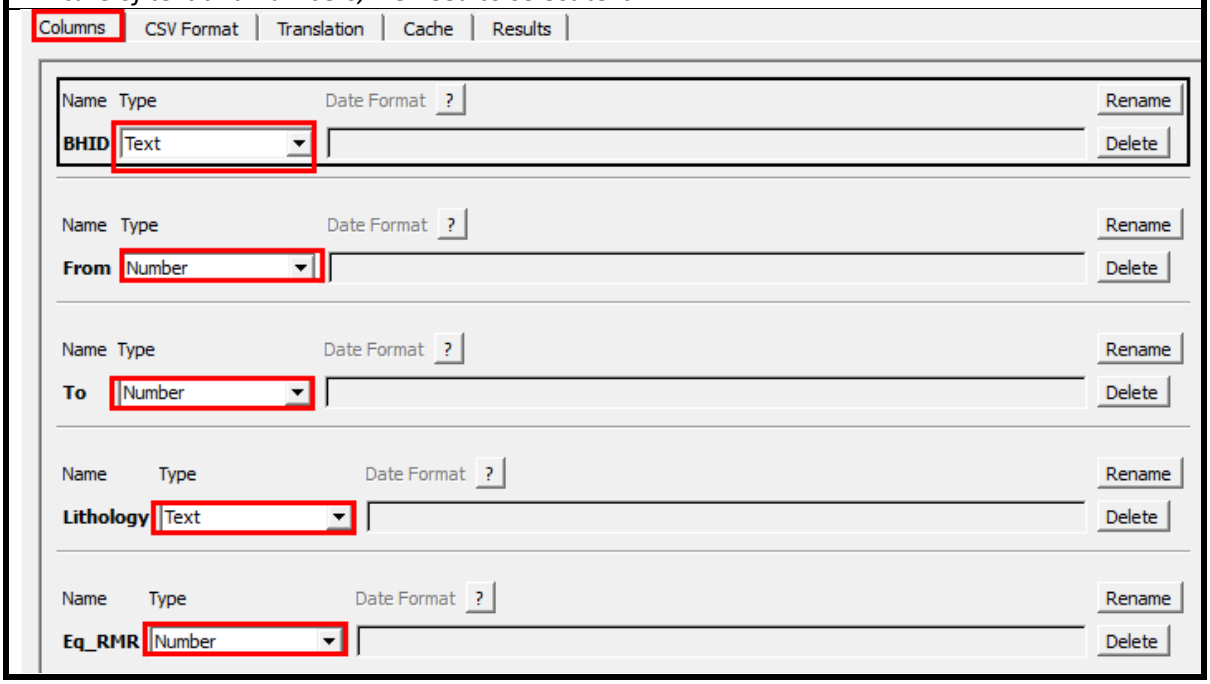


Once the columns have been added, their type needs to be correctly assigned
Left Click on the *Columns* tab to open it
For each column:

- **Left Click** on the *Type* dropdown
- In the dropdown, **Left Click** the appropriate input type

The following inputs are "Number" type: **From, To, Eq_RMR**
The following inputs are "Text" type: **BHID, Lithology**

Note: If an ID consists only of numbers, the ID type can be selected. In our case, since the ID's are a mixture of text and numbers, we need to select text.

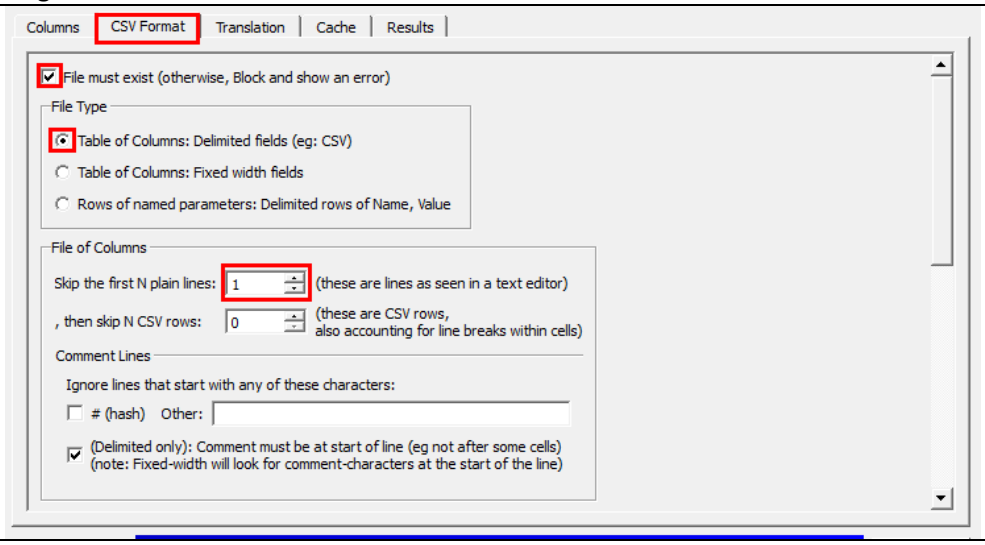


The CSV Format will now be entered
Left Click on the *CSV Format* tab to open it

Left Click on the *File Must Exist* check box
This means that the app will show an error if the file is not found in the selected location

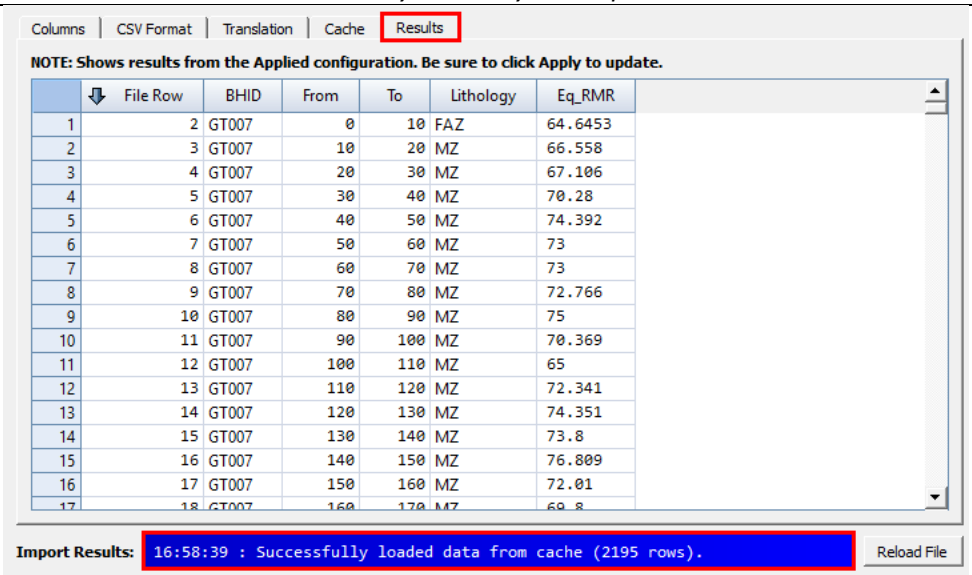
Under File Type, **Left Click** on the *Table of Columns: Delimited fields* toggle
This is appropriate as the input file is in fact a CSV

Under File of Columns, **Left Click** on the *Skip the first N plain lines* box and **change** it to 1
Since the CSV files contain headings, skipping the first line means mXrap won't attempt to read the headings as data



Left Click on the *Results* tab to view the imported file.
The Import Results **dialogue** will show any errors if the file could not be loaded as configured

Note: The File Row column is automatically added by the Import CSV tool



	File Row	BHID	From	To	Lithology	Eq_RMR
1	2	GT007	0	10	FAZ	64.6453
2	3	GT007	10	20	MZ	66.558
3	4	GT007	20	30	MZ	67.106
4	5	GT007	30	40	MZ	70.28
5	6	GT007	40	50	MZ	74.392
6	7	GT007	50	60	MZ	73
7	8	GT007	60	70	MZ	73
8	9	GT007	70	80	MZ	72.766
9	10	GT007	80	90	MZ	75
10	11	GT007	90	100	MZ	70.369
11	12	GT007	100	110	MZ	65
12	13	GT007	110	120	MZ	72.341
13	14	GT007	120	130	MZ	74.351
14	15	GT007	130	140	MZ	73.8
15	16	GT007	140	150	MZ	76.809
16	17	GT007	150	160	MZ	72.01
17	18	GT007	160	170	MZ	69.8

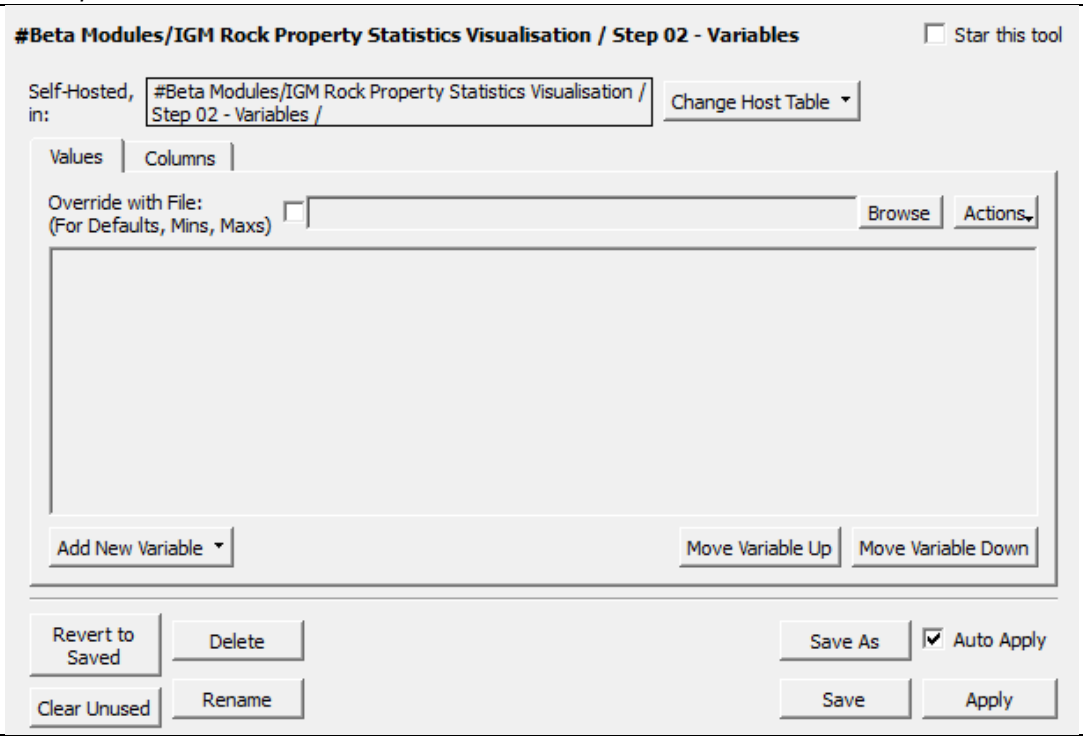
Save the Tool

Settings Step 02 – Variables tool for importing .csv's

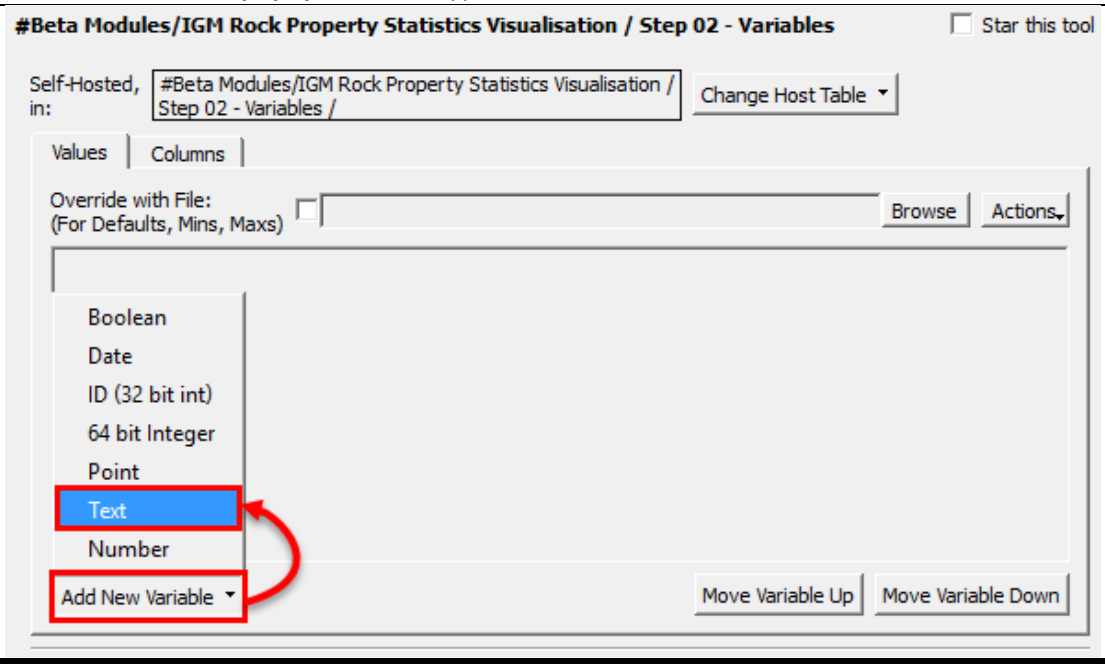
The following variables tool allows the user to choose which csv to import into the application. Note that the databases need to maintain the same format to be uploaded successfully.

Create and Save a new *Variables tool | * Variables

Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step 02 – Variables



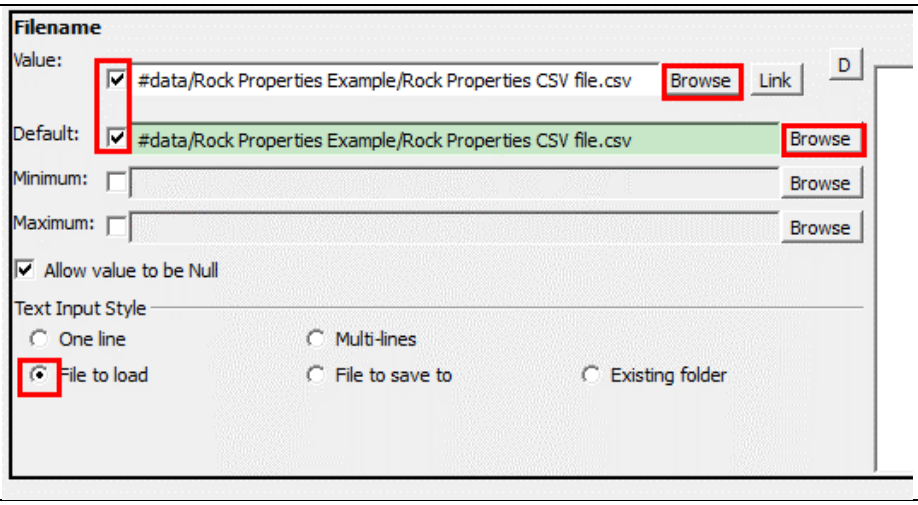
Left Click on the *Values* tab to open it
Left Click on the *Add New Variable* dropdown
In the *New Text Name* **popup window**, type in "Filename"



In the Filename variable, **Left Click** the *File to load* toggle
This allows the values above to be set to a file location
Left click on the *Value* and *Default* checkboxes to select them

For the *Value* and *Default* fields
Left click on the *Browse* buttons
In the **Popup Window**, navigate to the Rock Properties CSV file location
Double Click on the file to add it in as the Value and Default

Note: This variable will be editable by a user in the application. To avoid the user accidentally losing the file location, the default is set to easily navigate the user back to the original input file location.

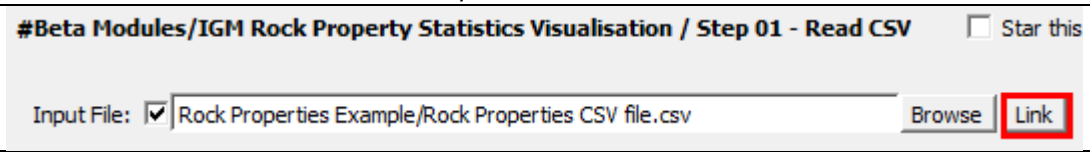


Save the Tool

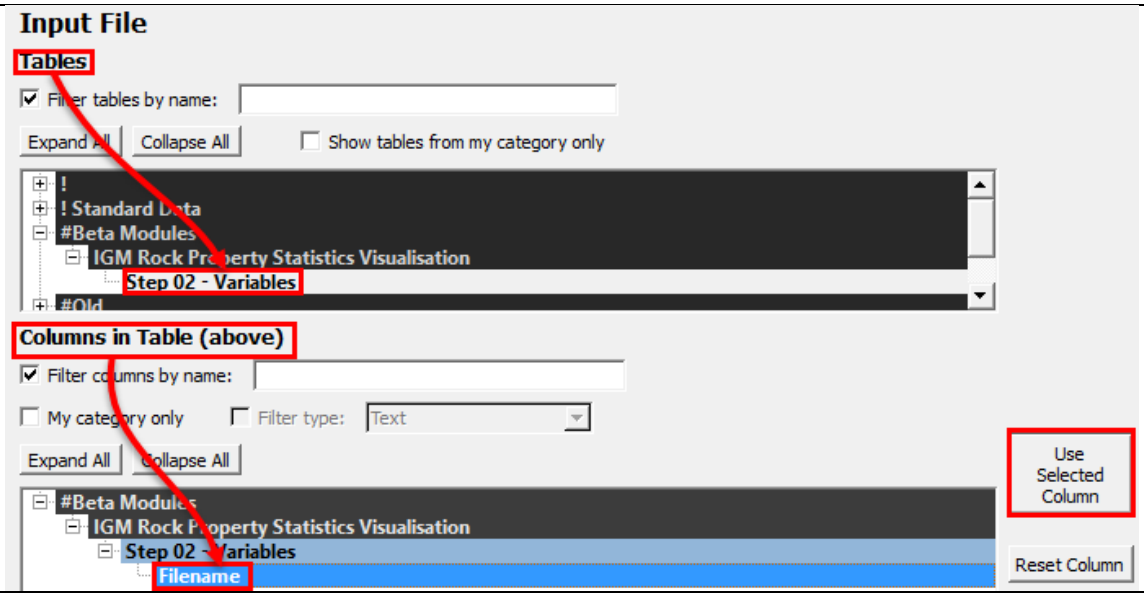
Settings Step 01 Continued – Linking the Filename variable into the Import CSV

Open the Read CSV tool created earlier | 1 > Step 01 - Read CSV

Left click on the *Link* button next to the *Input File* box



In the **popup window**, the Inputs now need to be selected
Under the *Tables* section, **Left Click** on the *Step 02 – Variables* table
Now, under the *Columns in Table* section, **Left Click** on the *Filename* column
Left Click on the *Use Selected Column* button to link the variable in



The variable should now be linked in as follows

Save the Tool

Introduction to Analysis Window

The Analysis Window is where the data that's been imported and manipulated in the Settings Window is displayed in the form of Charts, Table Views and 3D Views. These are also the visual elements that will be incorporated in to the frontend of the app.

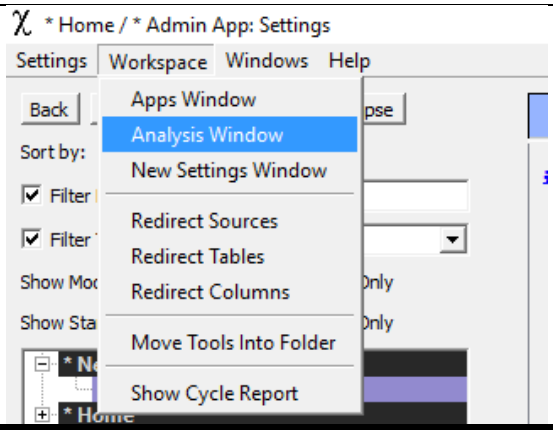
The Analysis Tools will be saved in the root folder under the directory:

#Beta Modules/IGM Rock Property Statistics Visualisation

Each step in the Analysis window will be saved alphabetically eg Step A – Full Dataset Tableview

In the Settings window menu
Left Click on the *Workspace* dropdown menu
Left Click on *Analysis Window*

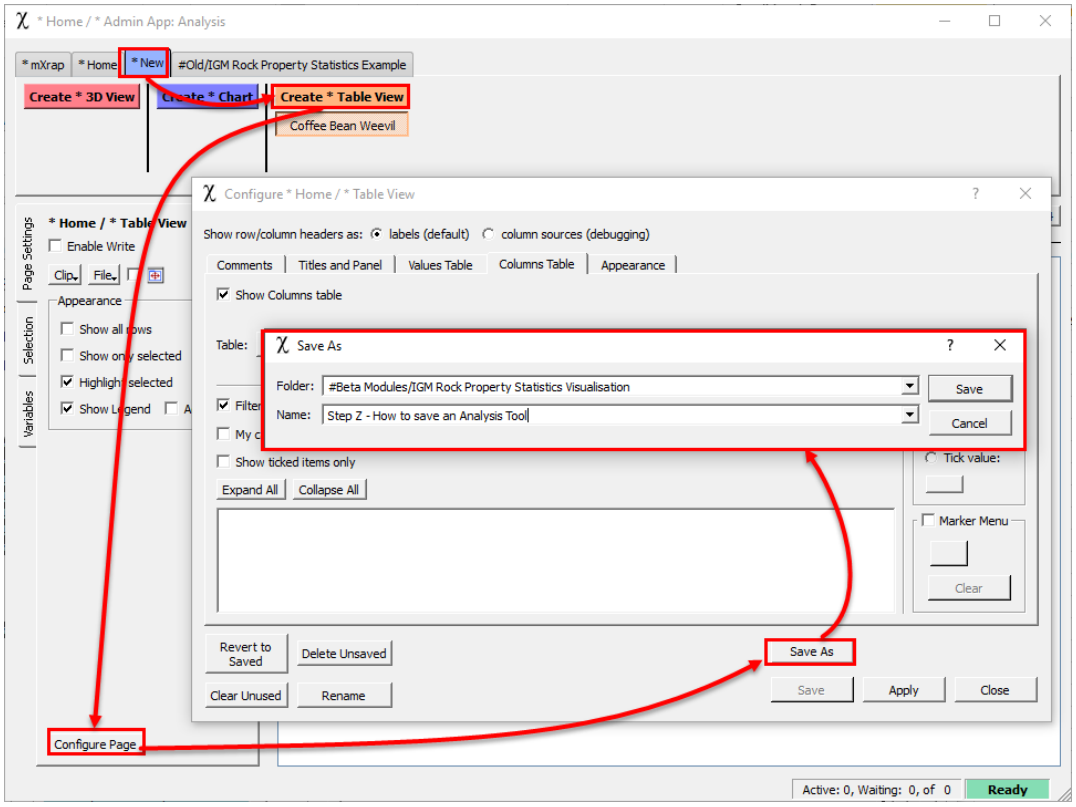
Note: This will open the Analysis window in which Table Views, Charts and 3D Views can be created.



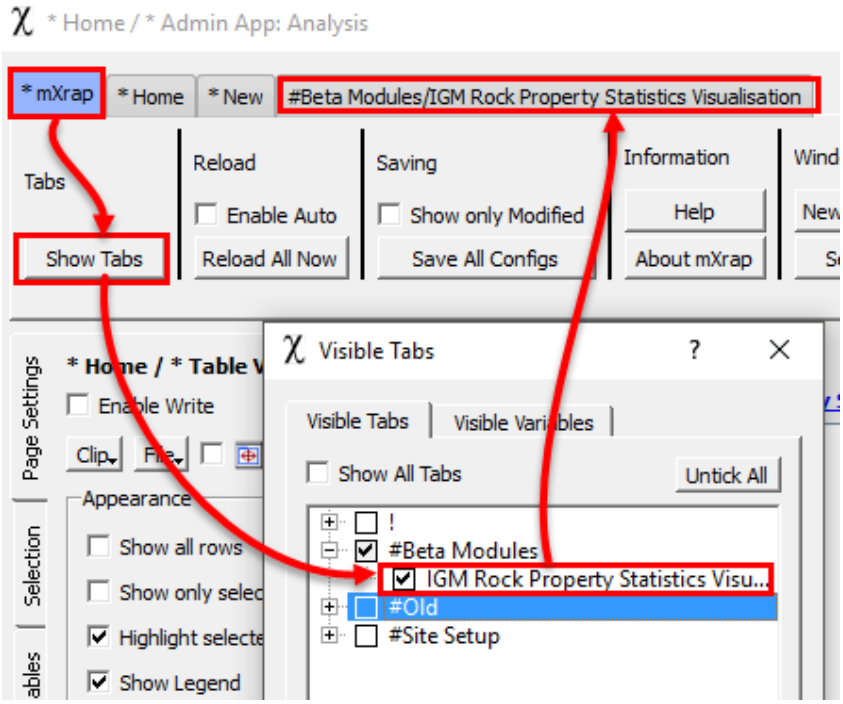
To create a new Chart/Table View/3D View:
Left click **New* and choose the tool to create
Left click the *Configure Page* button at the bottom left of the screen

In the *Configure Page* **popup**
Left click on the *Save As* button
In the *Folder* **textbox**, navigate to the same directory used for the Settings Window tools
In the *Name* **textbox,** give the Analysis tool an appropriate name

Note: For this example, the folder location and tool name will be given for every tool created



To view the Saved tools created in Analysis View
Left click on the **mXrap* button
Left click on the *Show Tabs* button
In the *Visible Tabs* popup, navigate to and **tick** the folder in which the tools are saved
This will open a new tab showing all the created tools



Analysis Step A – Creating a Table View for the Imported CSV

Create and Saved a new *Table View	**Create * Table View**

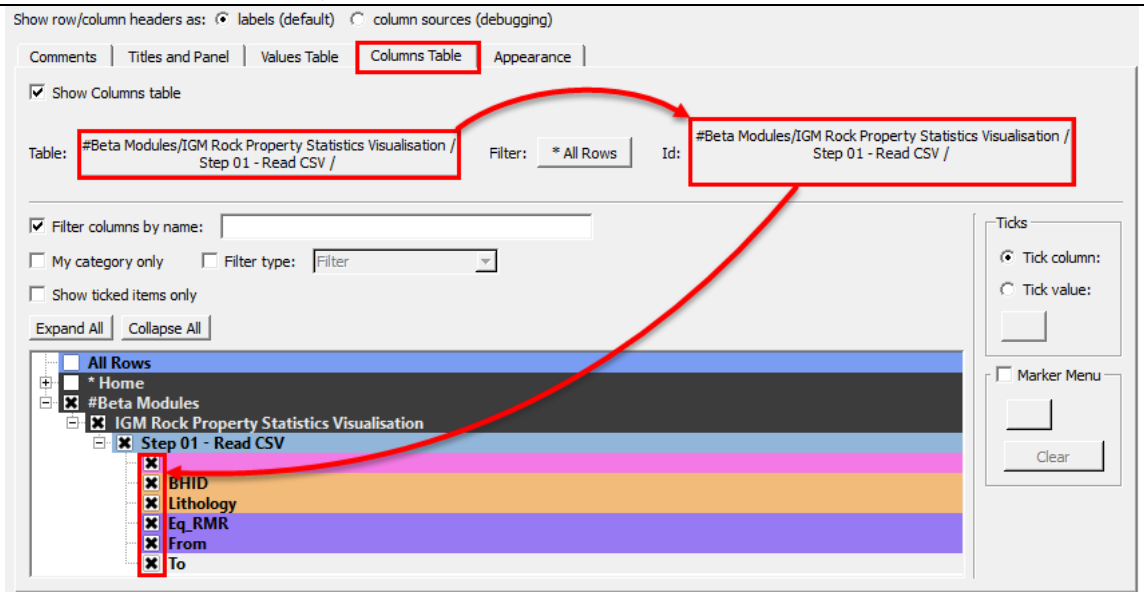
Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*

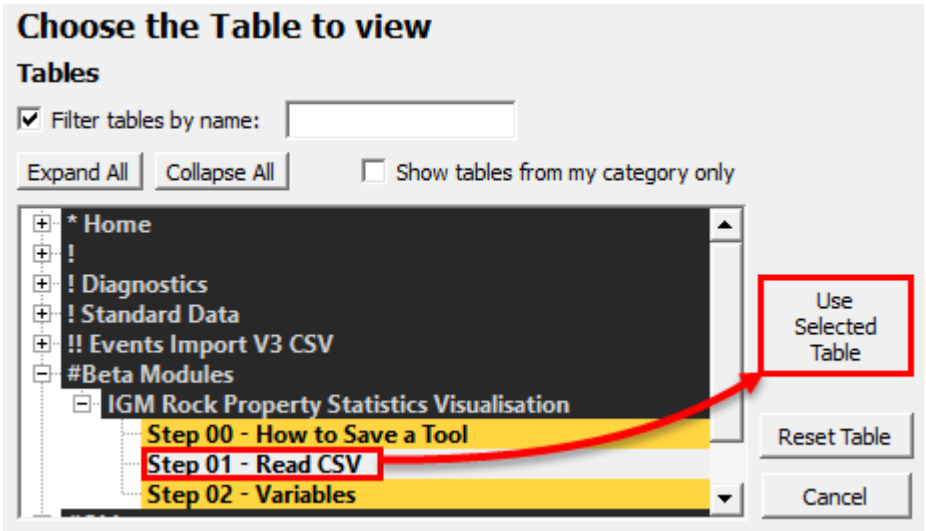
Name: Step A – Full Dataset Tableview

Left click on the *Configure Page* button

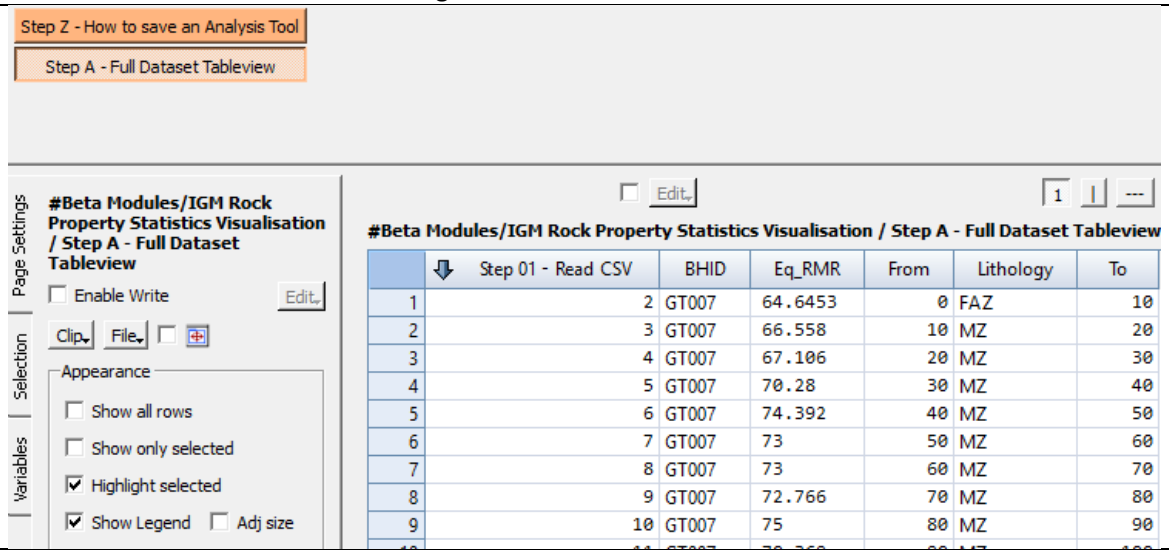
In the *Configure page* **popup**:

- **Left click** on the *Columns Table* tab
- **Left click** on the *Table* button
  - In the *Choose the Table to View* **popup,** navigate to the Read CSV Table
- **Left click** on the *Filter* button
  - In the *Set the default Filter* **popup,** navigate to *All Rows
- **Left click** on the *ID* button
  - In the *Set ID* **popup,** set the ID to Read CSV
- In the *Columns Tree*, **tick** all the columns under the CSV table





The Tableview should look something like this

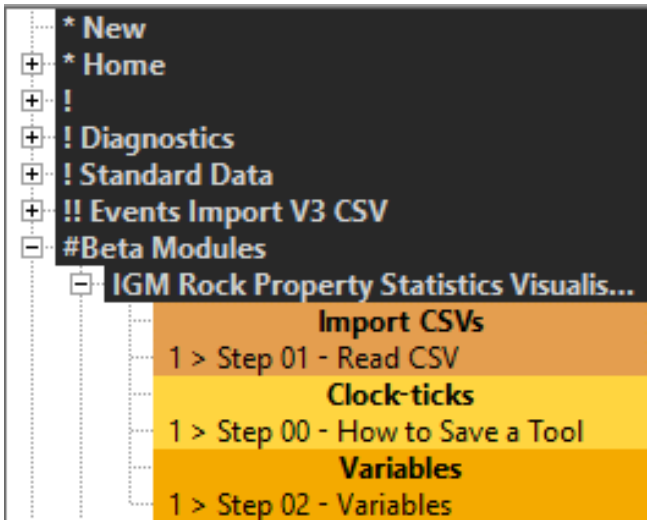


	Step 01 - Read CSV	BHID	Eq_RMR	From	Lithology	To
1	2	GT007	64.6453	0	FAZ	10
2	3	GT007	66.558	10	MZ	20
3	4	GT007	67.106	20	MZ	30
4	5	GT007	70.28	30	MZ	40
5	6	GT007	74.392	40	MZ	50
6	7	GT007	73	50	MZ	60
7	8	GT007	73	60	MZ	70
8	9	GT007	72.766	70	MZ	80
9	10	GT007	75	80	MZ	90

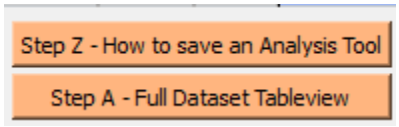
Left Click the Configure Page button and Save the Tool

Application Progress (Section 1)

The tool tree in the Settings Window should now look as follows. Following the naming convention will make it easier to follow the walkthrough steps.



The file has been imported and a variable created to enable the user of the app to change the input file from within the application. The file can also be viewed in the Analysis Window through a tableview.



In the next section, a Distinct Table will be created which will show each distinct lithology type contained within the database.

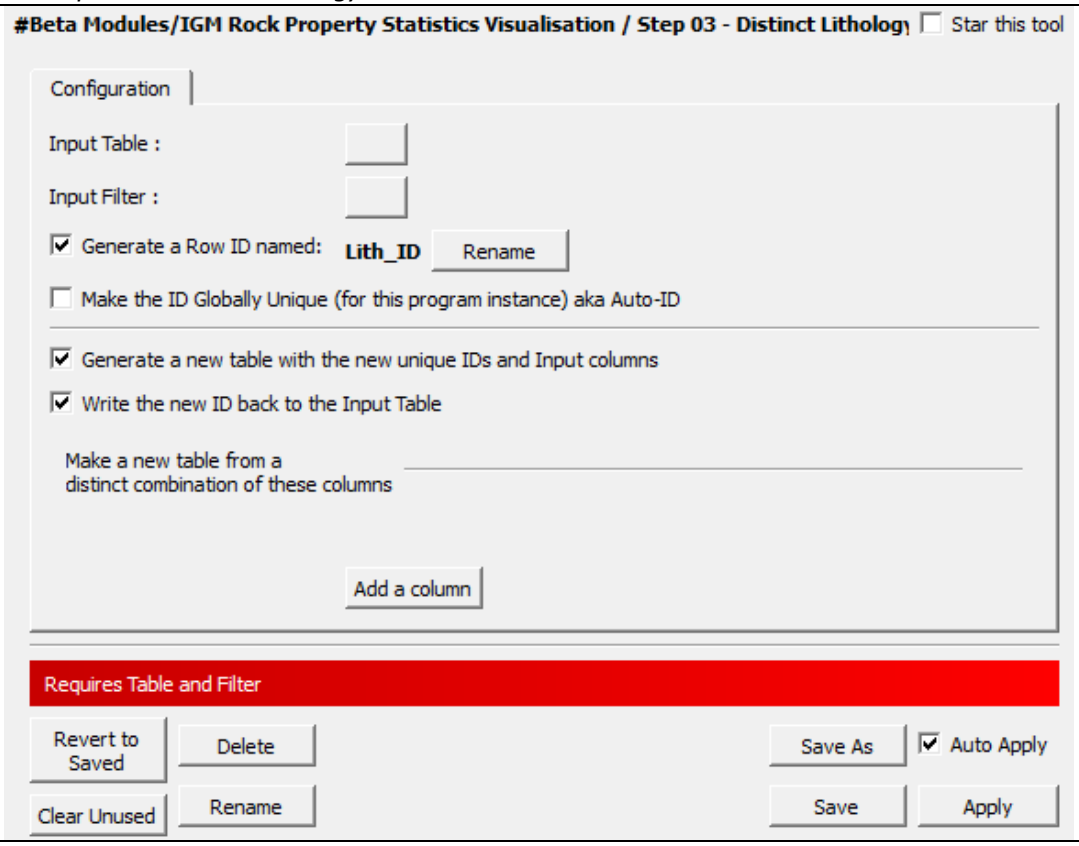
2. Creating a Distinct Table for the imported Geological Lithologies

Settings Step 03 – Creating a Distinct Table for Lithology

Using the values for Lithology in the imported csv file a Distinct Table, independent of the imported CSV table, is created to show all the unique lithologies from the original table.

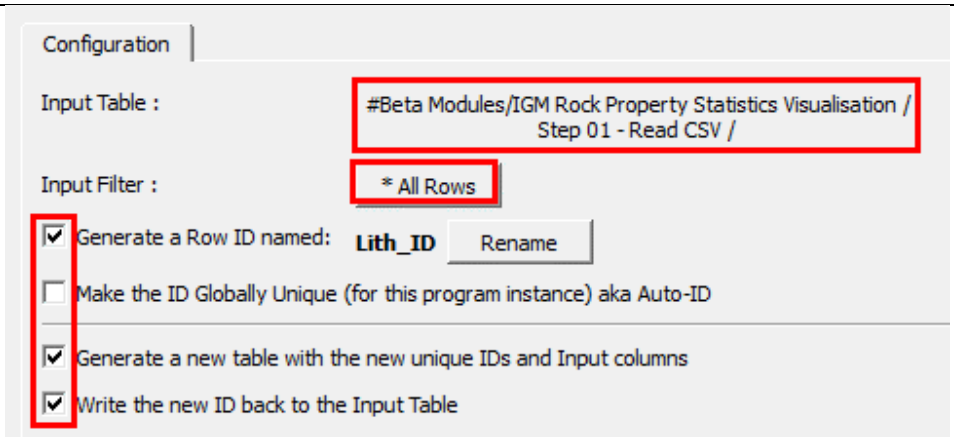
Create and Save a new *Distinct Table tool | * Distinct Table

Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step 03 – Distinct Lithology Table

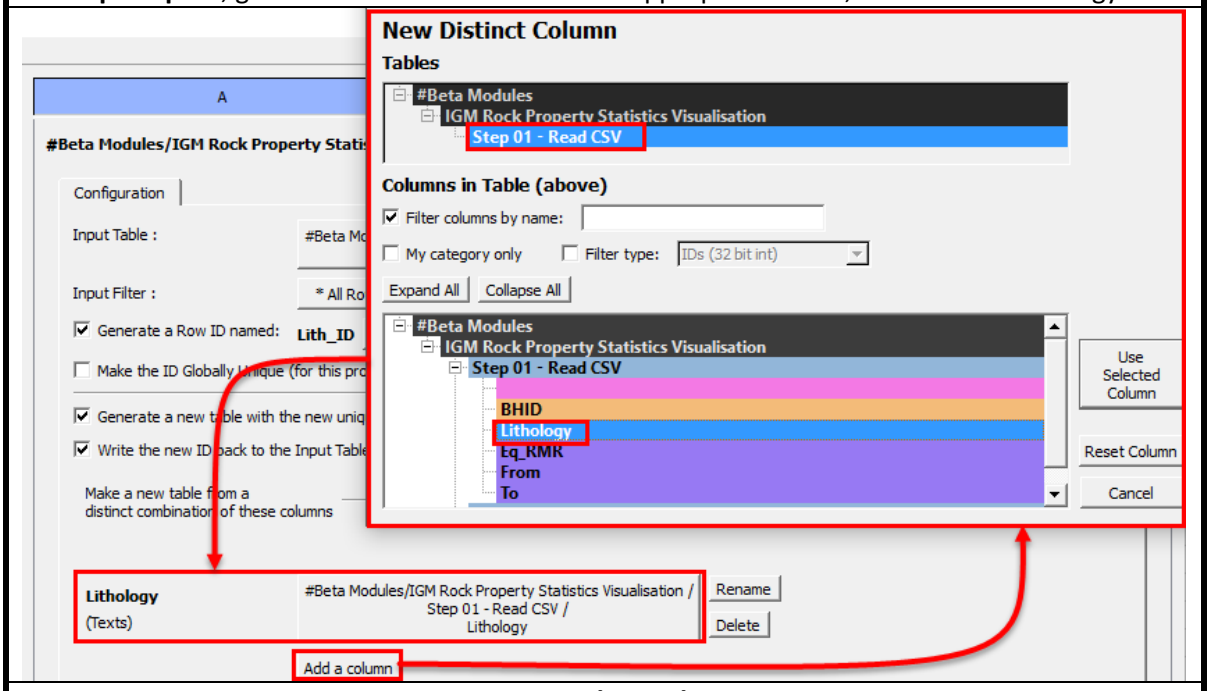


Left click on the *Input Table* button and in the *Table* **popup,** select the Read CSV table
Left click on the *Input Filter* button and in the *Filter* **popup,** select the *All Rows column

Tick the *Generate a Row ID named* button
Tick the *Write the new ID back to the Input Table* button



Left Click on the *Add a column* button
In the *New Distinct Column* **popup,** navigate to the Lithology column of the Read CSV table
When **prompted**, give the New Distinct Column an appropriate name, in this case “Lithology”



Save the Tool

Analysis Step B – Viewing the Distinct Table for Lithologies

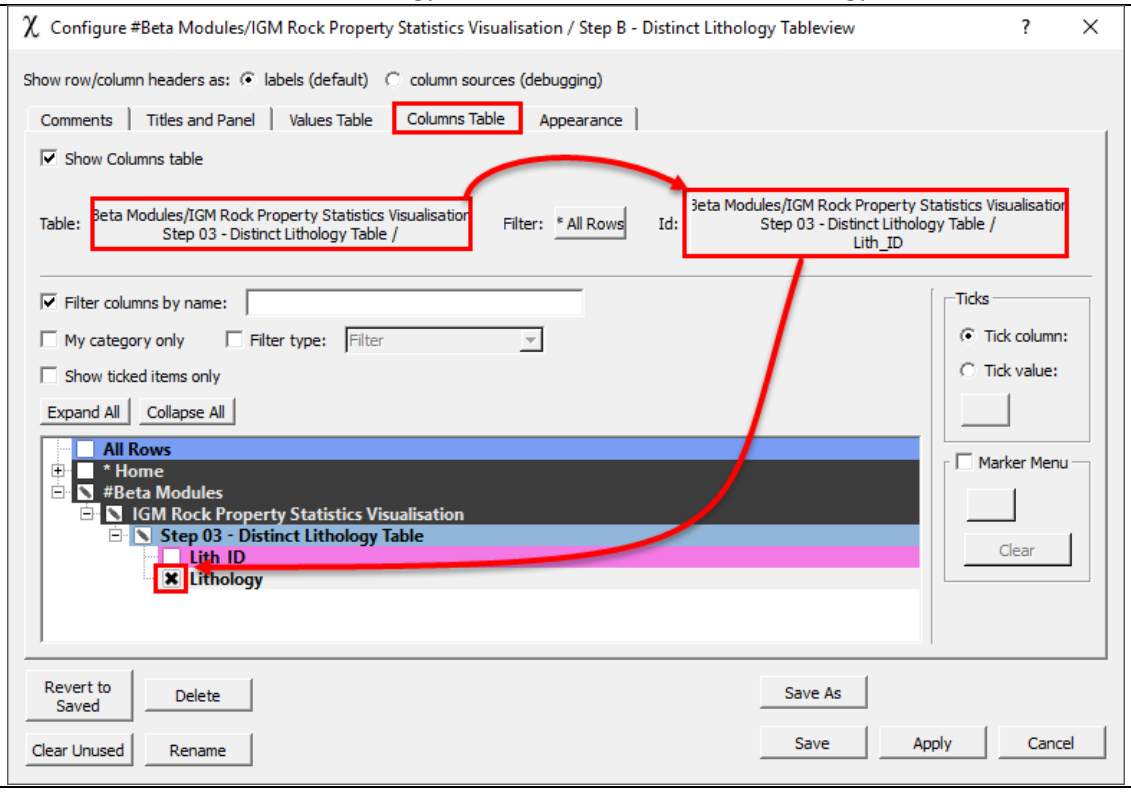
Create and Save a new *Table View | **Create * Table View**

Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step B – Distinct Lithology Tableview

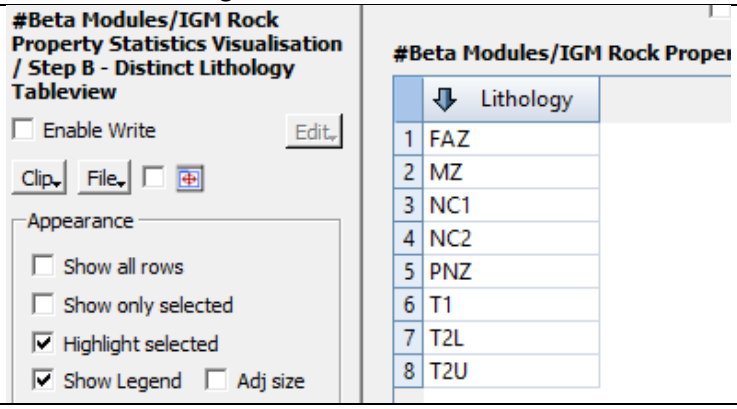
Left click on the *Configure Page* button
In the *Configure page* **popup**:

- **Left click** on the *Columns Table* tab
- **Left click** on the *Table* button
  - In the *Choose the Table to View* **popup,** navigate to the Distinct Lithology Table
- **Left click** on the *Filter* button
  - In the *Set the default Filter* **popup,** navigate to *All Rows
- **Left click** on the *ID* button
  - In the *Set ID* **popup,** set the ID to Lith_ID

In the *Columns Tree*, **tick** the Lithology column under the Distinct Lithology Table



The Tableview should look something like this



Left Click the Configure Page button and Save the Tool

Settings Step 04 – Variables tool enabling tick boxes for the Distinct Table

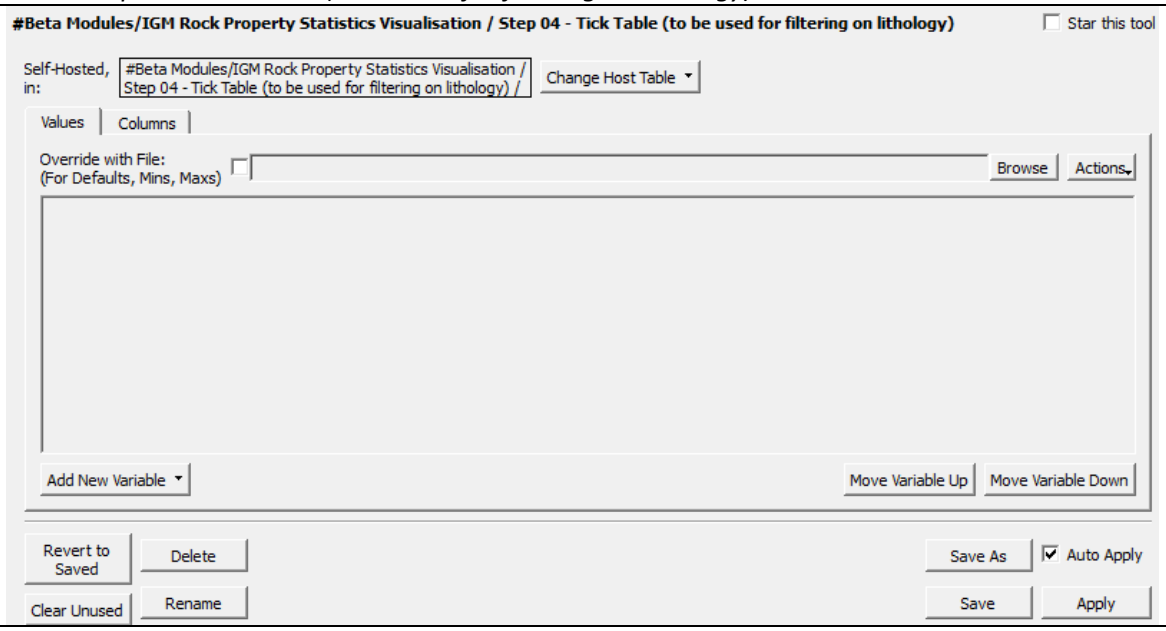
This variable will allow the user to tick and untick which lithology to be visualised.

Create and Save a new *Variables tool

* Variables

Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*

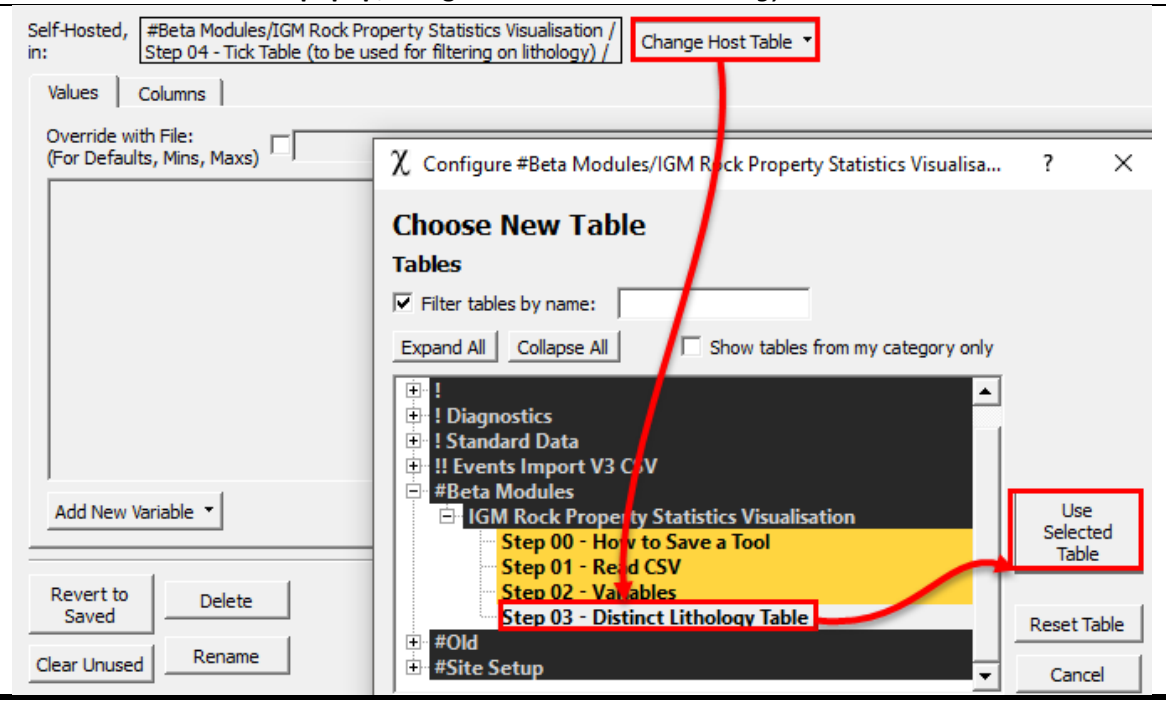
Name: Step 04 – Tick Table (to be used for filtering on lithology)



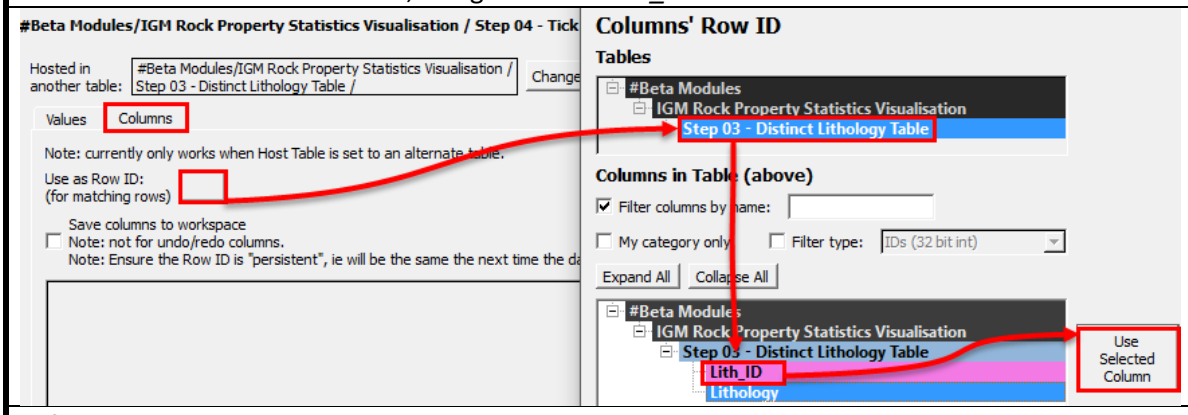
Left click on the *Change Host Table* **dropdown,** and **left click** on the *Host in another table* button

When **prompted** if all other tools should be redirected, **left click** on the *Yes* button

In the *Choose New Table* **popup,** navigate to the *Distinct Lithology Table*

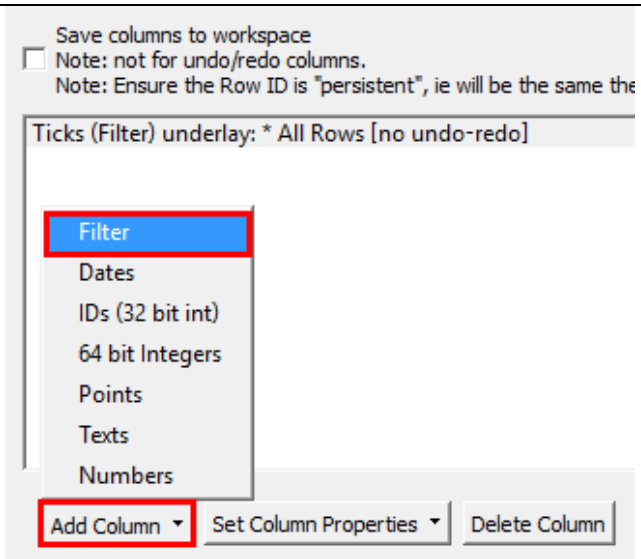


Left click on the *Columns* tab
Left click on the *Use as Row ID* button
Under the *Tables* tree, navigate to the *Distinct Lithology Table* created in Step 3
Under the *Columns in Table* tree, navigate to the *Lith_ID* column



Left click on the *Add Column* button
In the **dropdown, left click** on *Filter*
When **prompted** for a filter name, name the filter "Ticks"
Right click on the newly created filter

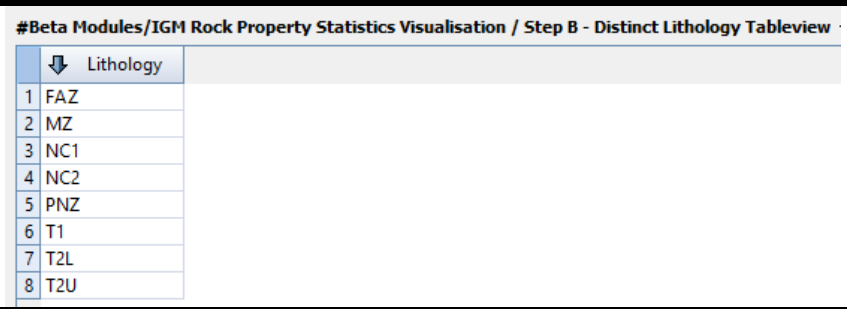
- **Left click** *Select Underlay Column*
- In the *Underlay for Ticks* **popup,** under the *Tables tree*, navigate to the *Distinct Table*
- In the *Underlay for Ticks* **popup,** under the *Columns tree*, select "All Rows" at the top of the tree



Save the Tool

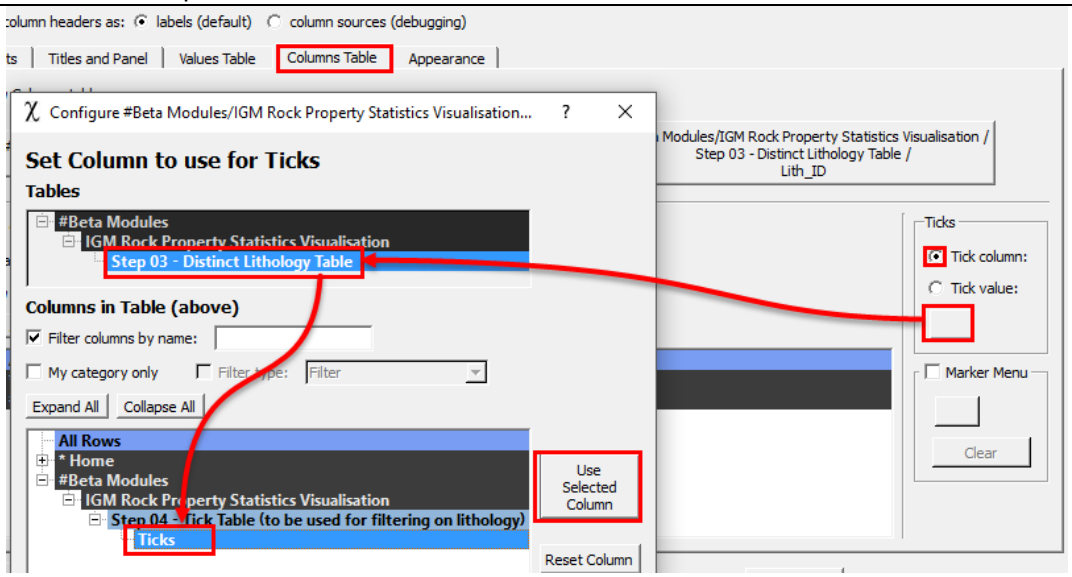
Analysis Step B Continued – Adding Ticks Variable to the Distinct Lithology Table

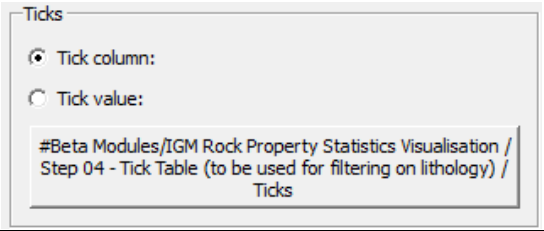
Open the Distinct Lithology Tableview | Step B - Distinct Lithology Tableview



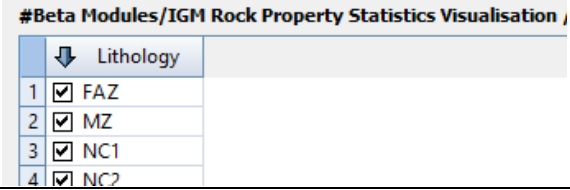
Left click on the *Configure Page* button
In the *Configure page* **popup**:

- **Left click** on the *Columns Table* tab
- **Left click** on the *Tick column* button to toggle it
- **Left click** on the *Ticks* button
  - In the *Set Column to use for Ticks* **popup,** navigate to the *Ticks* column created in Step 4





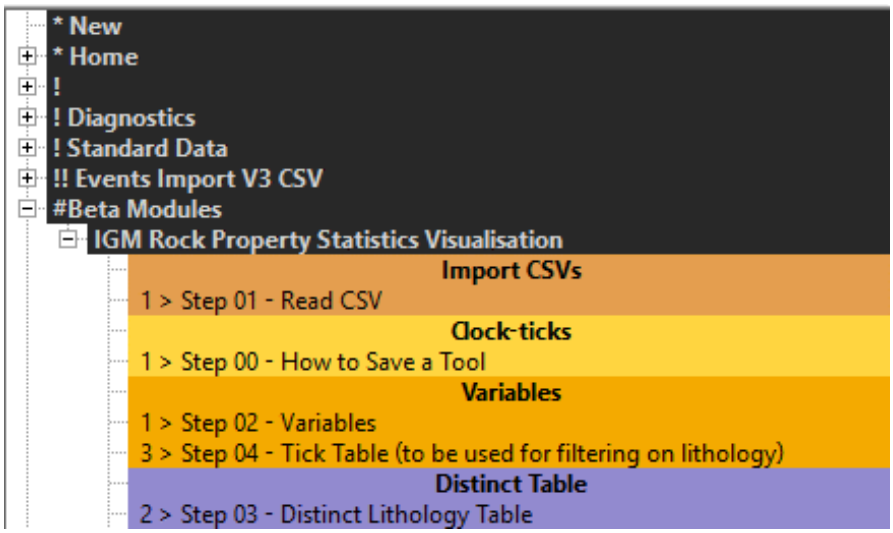
The Tableview should look something like this



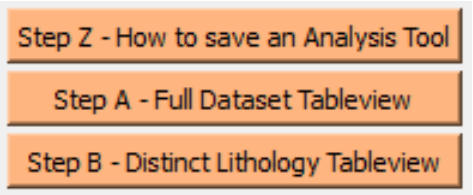
Left Click the Configure Page button and Save the Tool

Application Progress (Section 2)

The tool tree in the Settings Window should now look as follows. Following the naming convention will make it easier to follow the walkthrough steps.



A distinct table has now been created to show the types of lithology contained in the database. A ticks filter column has also been added. These changes are reflected in a newly created tableview.



In the next section, a table map will be used to map the values for the ticks column in the distinct table over to the CSV table.

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3. Linking the two tables using a Table Map

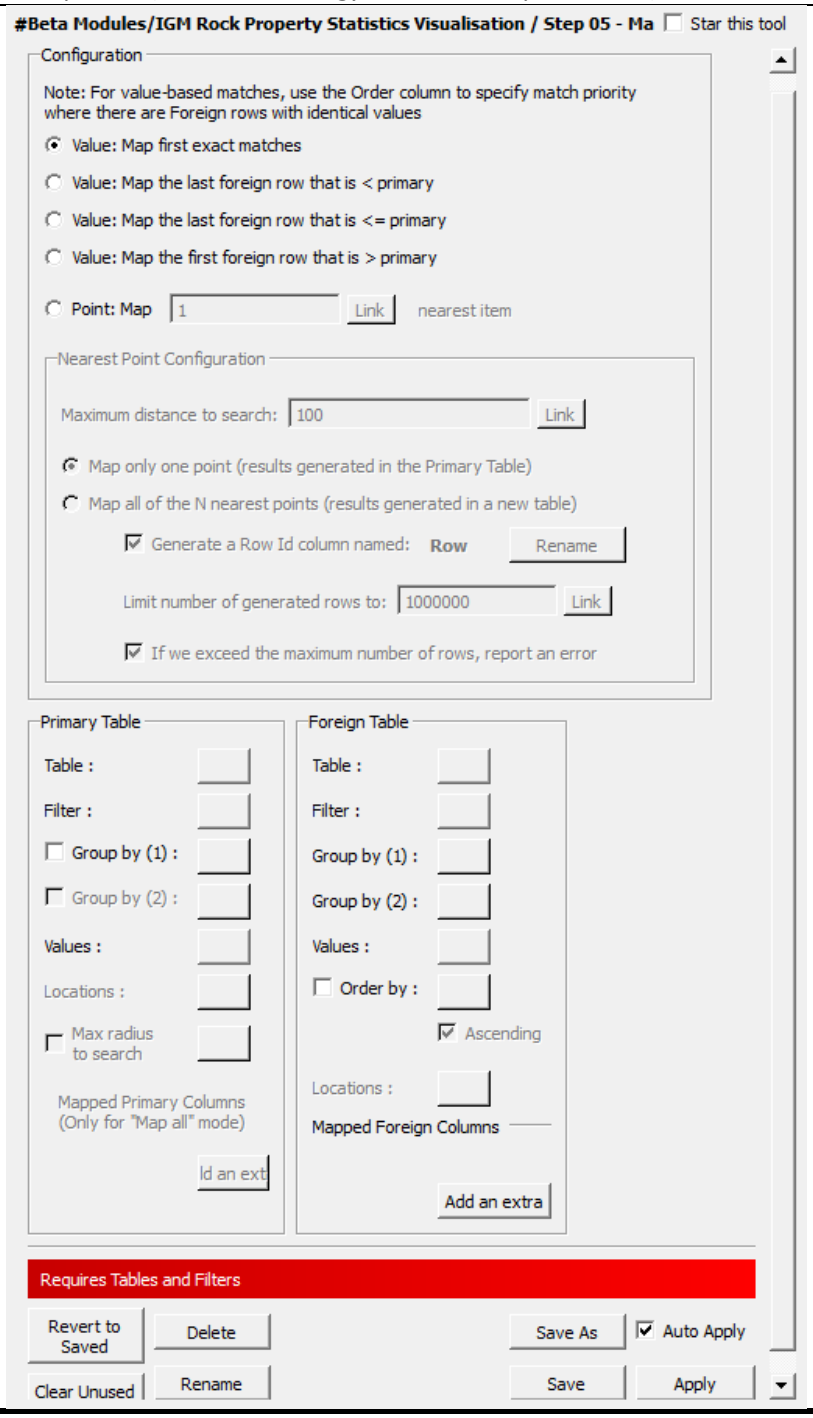
Settings Step 05 – Creating a Table Map from the CSV table to the Distinct Lith table

The aim of a table map is to compare selected columns in two tables (In this case, the csv table and the distinct Lithology table) and to perform an action once a comparative condition is met. In this case we're assigning the ticks from the Distinct Lithology Table to the original CSV table.

Create and Save a new *Table Map tool | * Table Map

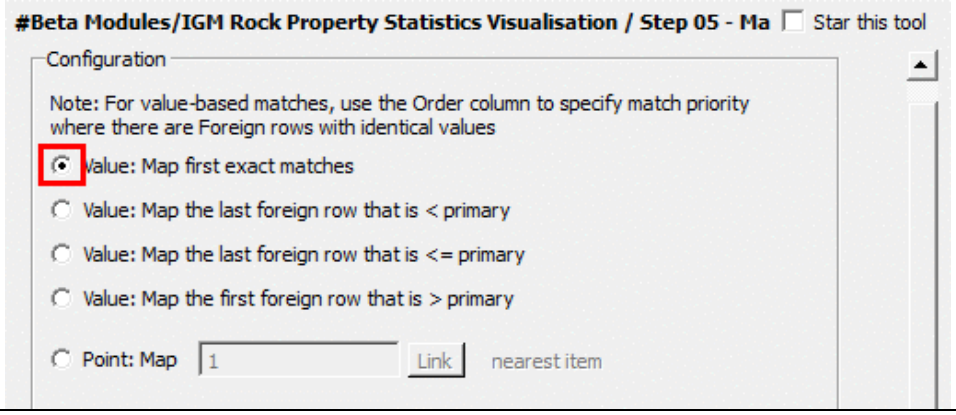
Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*

Name: Step 05 – Map Ticks (Distinct Lithology table to Complete table)



Left click to Toggle the *Map first exact matches* value

Note: The aim is to map the lithologies of the CSV table (Step 1) to the distinct table (Step 3), mapping only the first exact matches, adding a column for the Ticks filter created in Step 4.

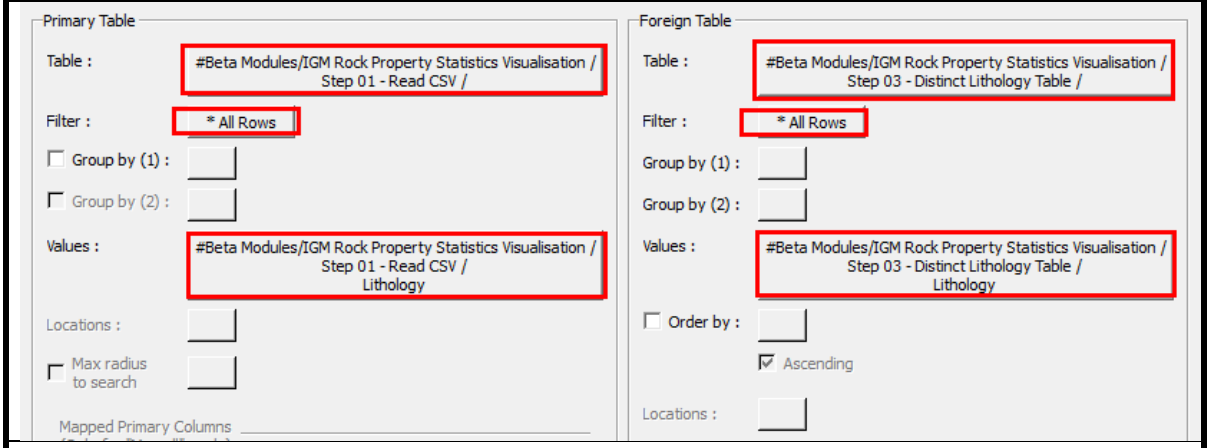


In the *Primary Table* section

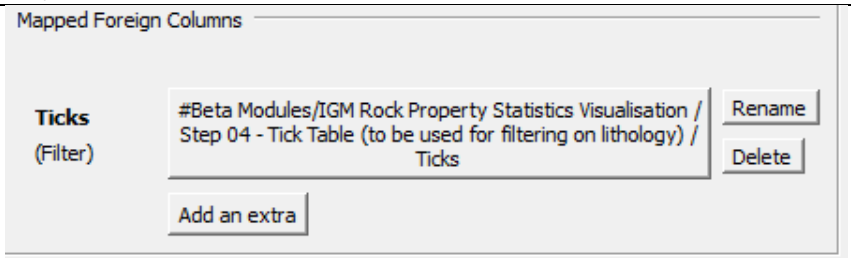
- **Left click** the *Table* button, in the *Primary Table* **popup** navigate to the *Read CSV* table
- **Left click** the *Filter* button, in the *Primary Filter* **popup** navigate to **All Rows*
- **Left click** the *Values* button, in the *Primary Values* **popup** navigate to *Lithology*

In the *Foreign Table* section

- **Left click** the *Table* button, in the *Foreign Table* **popup** navigate to the *Distinct Lithology* table
- **Left click** the *Filter* button, in the *Foreign Filter* **popup** navigate to **All Rows*
- **Left click** the *Values* button, in the *Foreign Values* **popup** navigate to *Lithology*



In the *Mapped Foreign Columns* section
Left click on the *Add an extra* button
In the *New Foreign Extra* **popup,** navigate to the *Ticks* column created in Step 04
When **prompted**, name the extra "Ticks"



Save the Tool

Analysis Step C – Creating a Table View showing which Lithologies are "Ticked"

Create and Save a new *Table View | **Create * Table View**

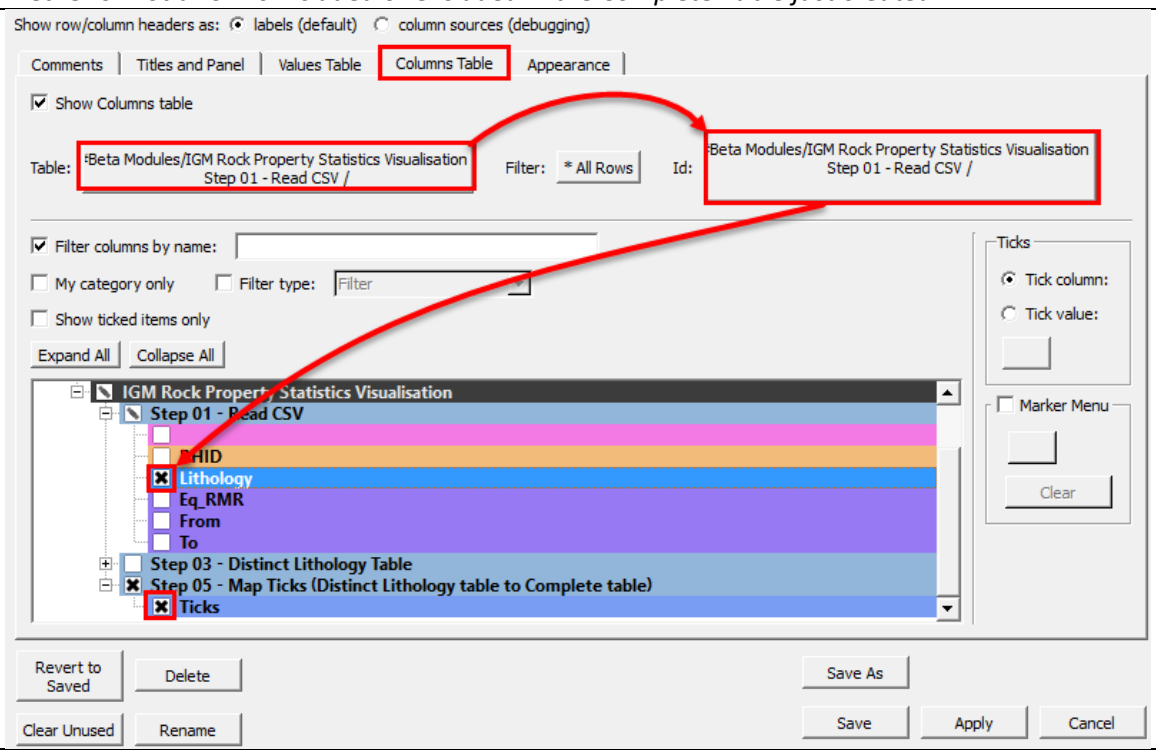
Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step C – Complete Table with Ticks Tableview

Left click on the *Configure Page* button
In the *Configure page* **popup**:

- **Left click** on the *Columns Table* tab
- **Left click** on the *Table* button
  - In the *Choose the Table to View* **popup,** navigate to the Read CSV table
- **Left click** on the *Filter* button
  - In the *Set the default Filter* **popup,** navigate to *All Rows
- **Left click** on the *ID* button
  - In the *Set ID* **popup,** set the ID to Read CSV

In the *Columns Tree*, **tick** the Lithology column under Read CSV and the Ticks column under Map Ticks

Note: Ticking and unticking the various lithologies in the Distinct Lithology table will now show whether or not a row is included or excluded in the Complete Table just created.



The Tableview should look something like this

#Beta Modules/IGM Rock Property Statistics Visualisation / Step C - Complete Table (ticks filtered) Tableview

	Lithology	Ticks
1	FAZ	Included
2	FAZ	Included
3	FAZ	Included
4	FAZ	Included
5	FAZ	Included
6	FAZ	Included

Note: Changing the ticks column in the Distinct Lithology Table will now indicate whether or not a Lithology is included or not in the new table. The use of this will become apparent later on in the walkthrough. Effectively this will allow the user to toggle wich lithologies are of interest.

#Beta Modules/IGM Rock Property Statistics Visualisation / Step B - Distinct Lithology Tableview

	Lithology
1	☐ FAZ
2	☑ MZ
3	☑ NC1
4	☑ NC2
5	☑ PNZ
6	☑ T1
7	☑ T2L
8	☑ T2U

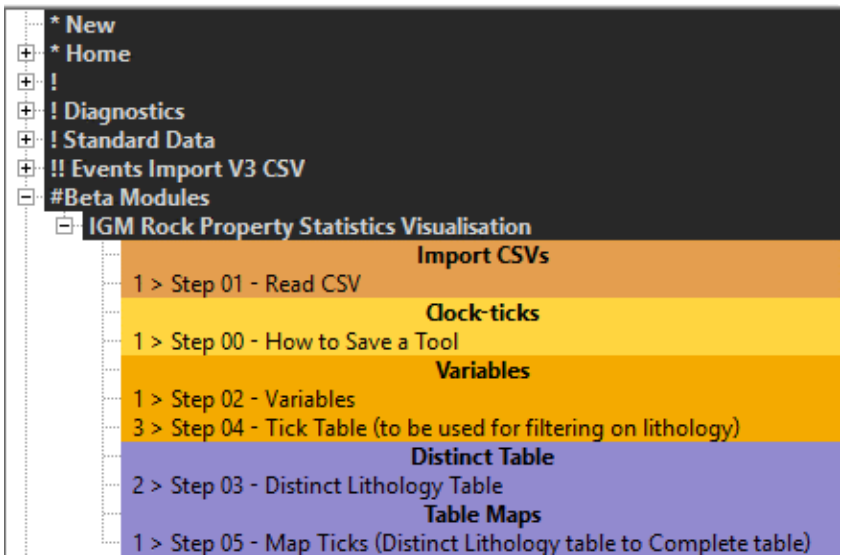
#Beta Modules/IGM Rock Property Statistics Visualisation / Step C - Complete Table (ticks filtered) Tableview

	Lithology	Ticks
558	FAZ	
559	FAZ	
560	FAZ	
561	FAZ	
562	FAZ	
563	FAZ	
564	MZ	Included
565	MZ	Included
566	MZ	Included
567	MZ	Included
568	MZ	Included

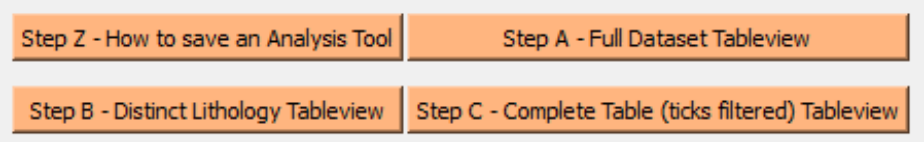
Left Click the Configure Page button and Save the Tool

Application Progress (Section 3)

The tool tree in the Settings Window should now look as follows. Following the naming convention will make it easier to follow the walkthrough steps.



The ticks variable has now been mapped over to from the Distinct Lithology Table to the Read CSV table using a table map. The influence of this has been demonstrated in a newly created tableview. It can be seen that changing the ticks in the Distinct Lithology Tableview changes the Ticks column values in the Complete Table (ticks filtered) Tableview.



In the next section, basic row calculations and accumulations will be used to create a CDF chart for the Lithologies.

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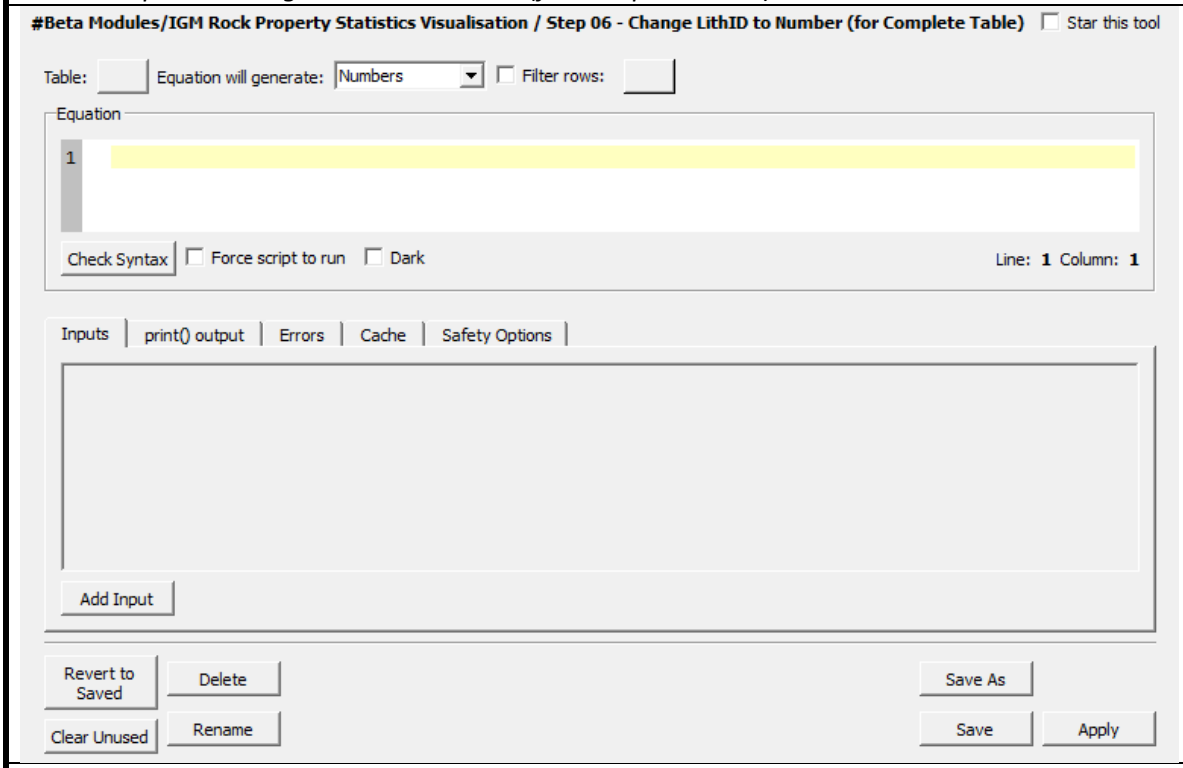
4. Creating a CDF table and chart for the Lithologies

Settings Step 06 – Row calculations to return the LithID as a number for CSV table

This row calculation simply gives a unique ID for each of the Lithologies in the CSV table. This is done so we can order the CSV table using the numbers in the unique ID column.

Create and Save a new *Row Calculations tool | *Row Calculation

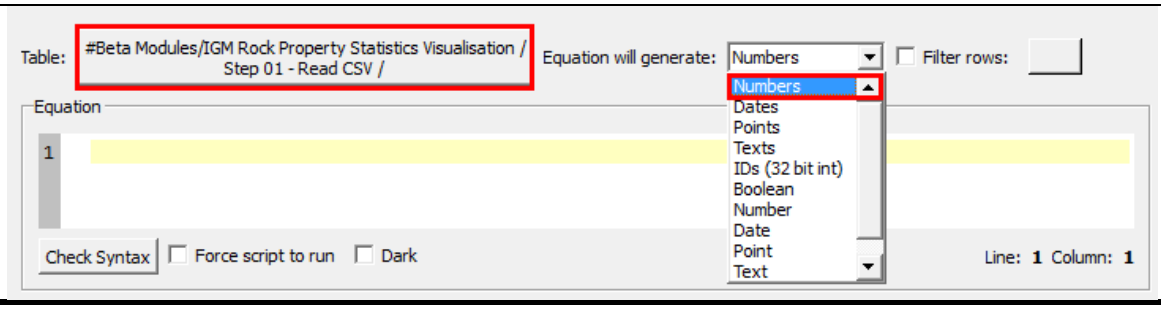
Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step 06 – Change LithID to Number (for Complete Table)



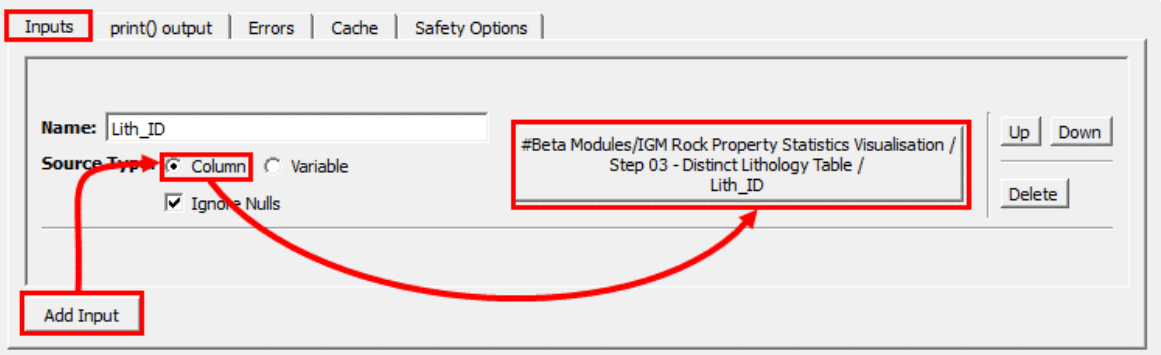
Left click on the *Table* button
In the *Table* **popup,** navigate to the Read CSV table

In the *Equation will generate* **dropdown,** select *Numbers*

Note: If the equation is set to generate a Number instead of Numbers, it will only generate a single value. In this case, the desired outcome is the conversion of each Lith_ID as a number instead of an ID.

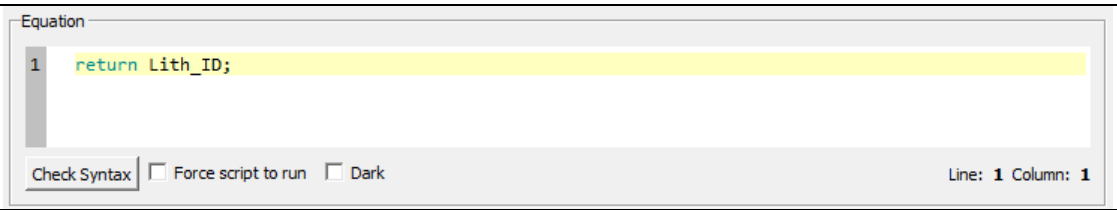


Left click on the *Inputs* tab to open it
Left click on the *Add Input* button
Left click on the *Column* toggle to select it
Left click on the *Source* button, in the *Choose Column for* **popup,** navigate to the Lith_ID
Type in the *Name* of the input as "Lith_ID"

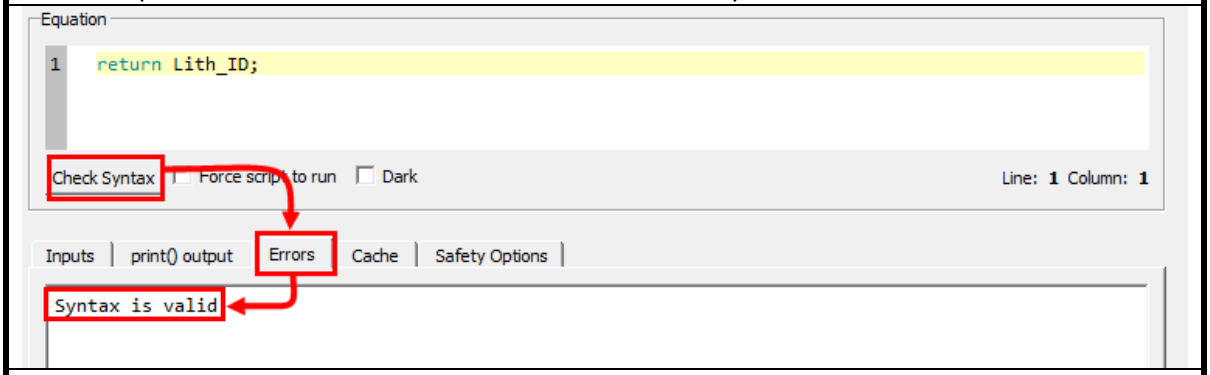


In the *Equation* box, **type** the following code:
Return Lith_ID;

Note: Recall the Input Name set earlier was Lith_ID. What this calculation does, is call up the Lith_ID column for each row of the Read CSV table. The input is read in as an ID, and then returned as a number.



To check that the Syntax of the code is correct, **left click** the *Check Syntax* button
This will open the *Errors* tab and show whether or not the Syntax is valid



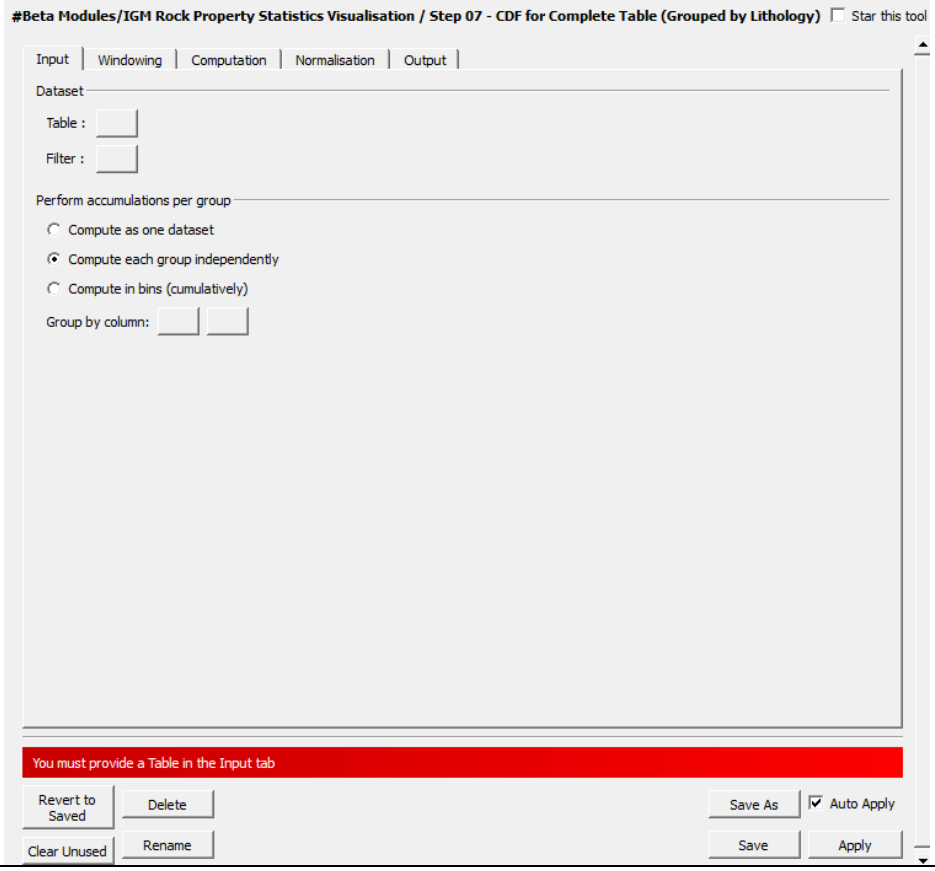
Save the Tool

Settings Step 07 – Using an Accumulation tool to create a CDF table sorted per lithology

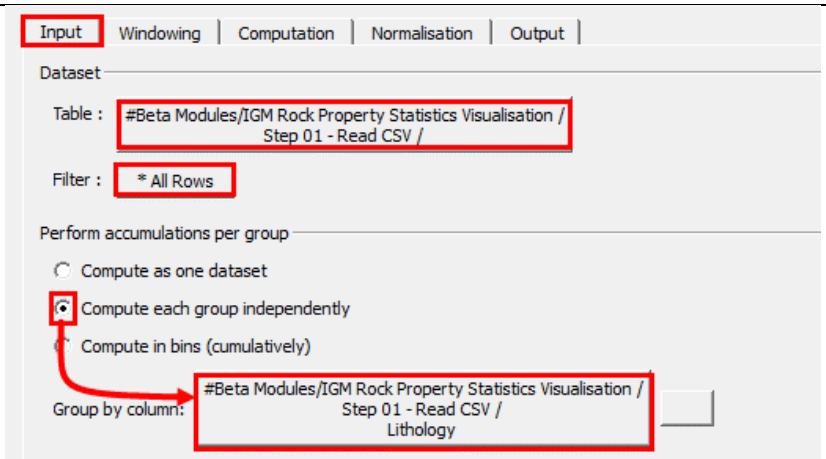
This accumulation will count the RMR values for each lithology.

Create and Save a new *Accumulation tool	* Accumulation

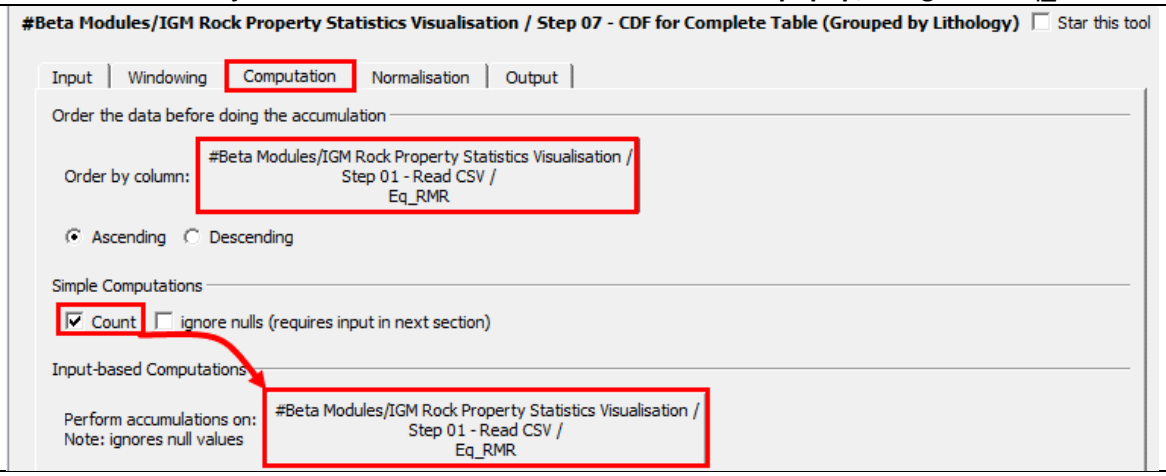
Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step 07 – CDF for Complete Table (Grouped by Lithology)



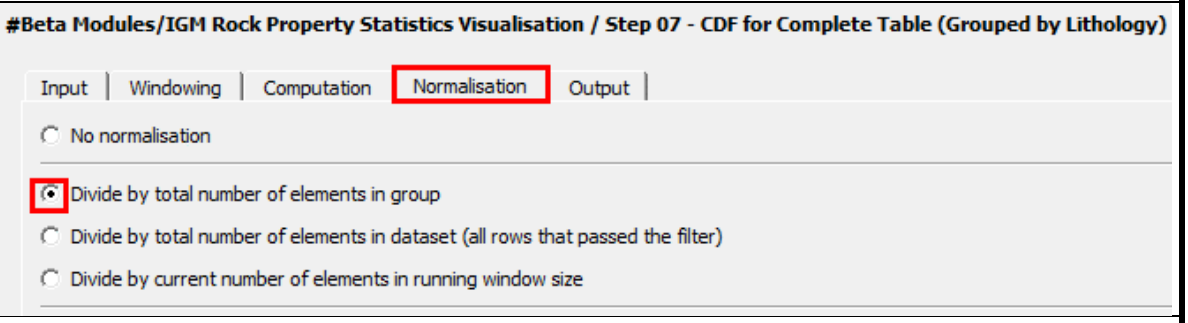
Left click on the *Input* tab to open it
Left click on the *Table* button. In the *Table* **popup**, navigate to the Read CSV table
Left click on the *Filter* button. In the *Filter* **popup,** navigate to *All Rows
Left click to toggle the *Compute each group independently* value
Left click on the *Group by column* button. In the *Group first by Column* **popup,** navigate to the Lithology column



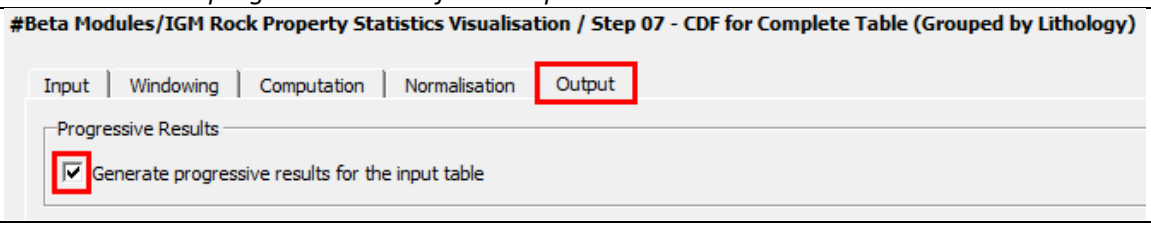
Left click on the *Computation* tab to open it
Left click on the *Order by column* button. In the *Order by column* **popup**, navigate to the Eq_RMR column
Tick the *Count* box under the *Simple Computations* section
Left click on the *Perform Accumulations On* button. In the *Values* **popup,** navigate to Eq_RMR



Left click on the *Normalisation* tab to open it
Left click on the *Divide by total number of elements in group* option to **toggle** it



Left click on the *Output* tab to open it
Tick the *Generate progressive results for the input table* box



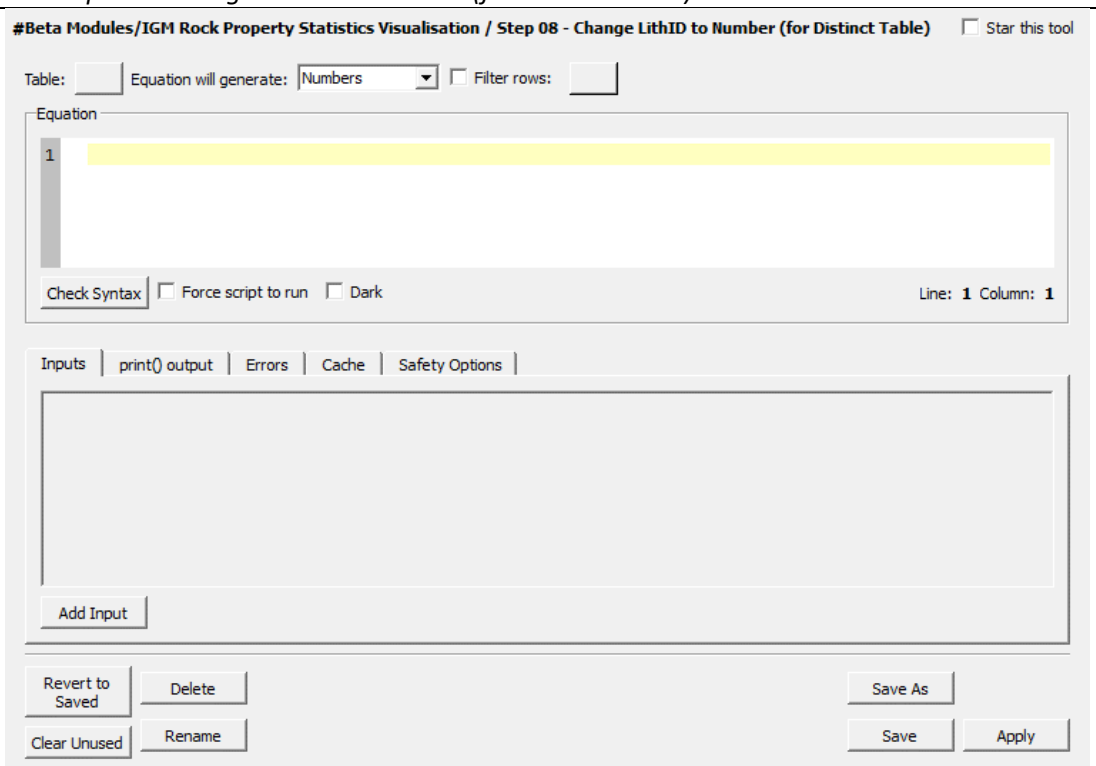
Save the Tool

Settings Step 08 – Row calculations to return LithID as a number for Distinct Lith table

Similarly, to the previously built Row Calculation, this Row Calculation will give an ID to each lithology however this time in the Distinct Lithology Table.

Create and Save a new *Row Calculations tool | * Row Calculation

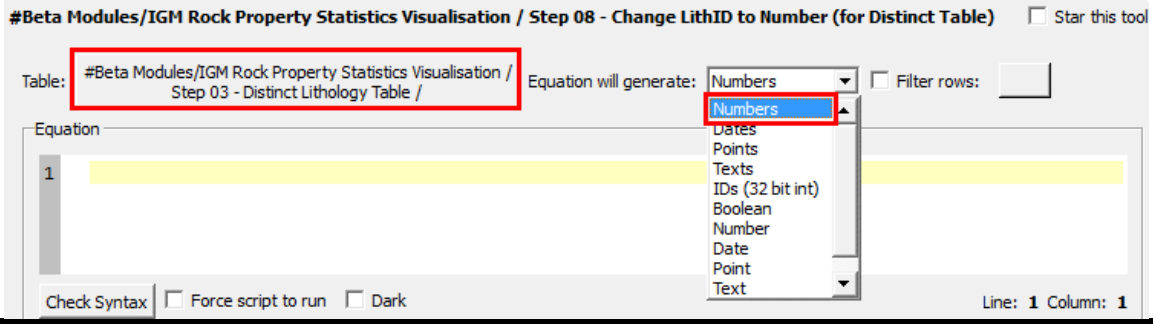
Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step 08 – Change LithID to Number (for Distinct Table)



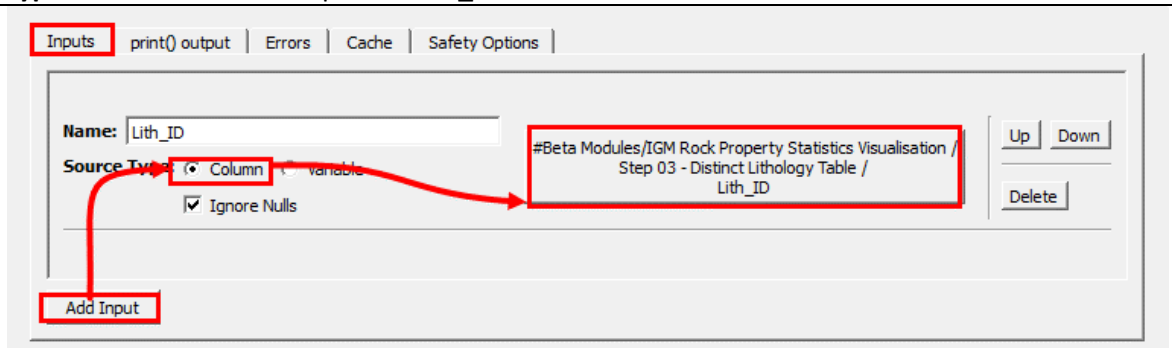
Left click on the *Table* button
In the *Table* **popup,** navigate to the Distinct Lithology Table

In the *Equation will generate* **dropdown,** select *Numbers*

Note: If the equation is set to generate a Number instead of Numbers, it will only generate a single value.

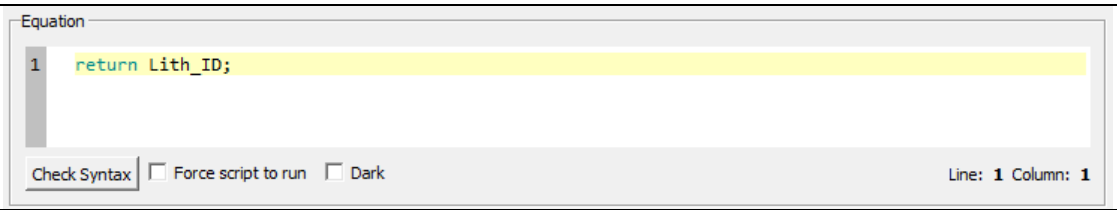


Left click on the *Inputs* tab to open it
Left click on the *Add Input* button
Left click on the *Column* toggle to select it
Left click on the *Source* button, in the *Choose Column for* **popup,** navigate to the Lith_ID
Type in the *Name* of the input as "Lith_ID"

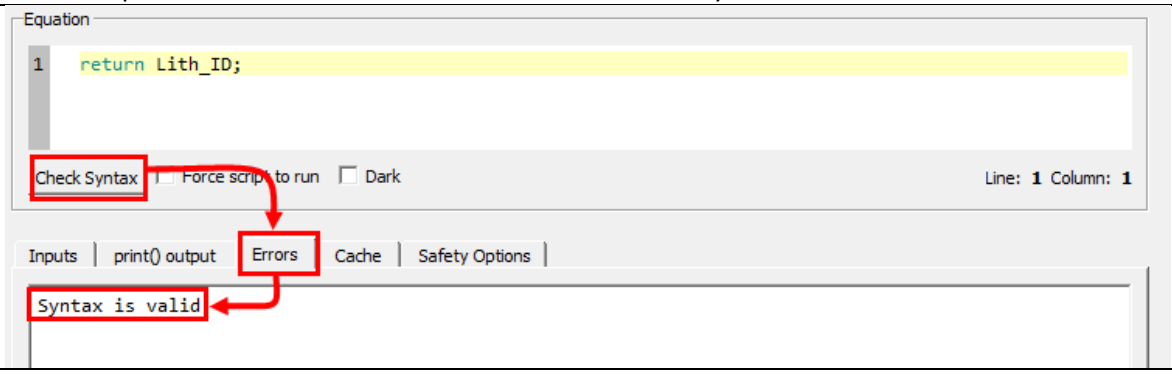


In the *Equation* box, **type** the following code:
Return Lith_ID;

Note: Recall the Input Name set earlier was Lith_ID. What this calculation does, is call up the Lith_ID column for each row of the Read CSV table. The input is read in as an ID, and then returned as a number.



To check that the Syntax of the code is correct, **left click** the *Check Syntax* button
This will open the *Errors* tab and show whether or not the Syntax is valid



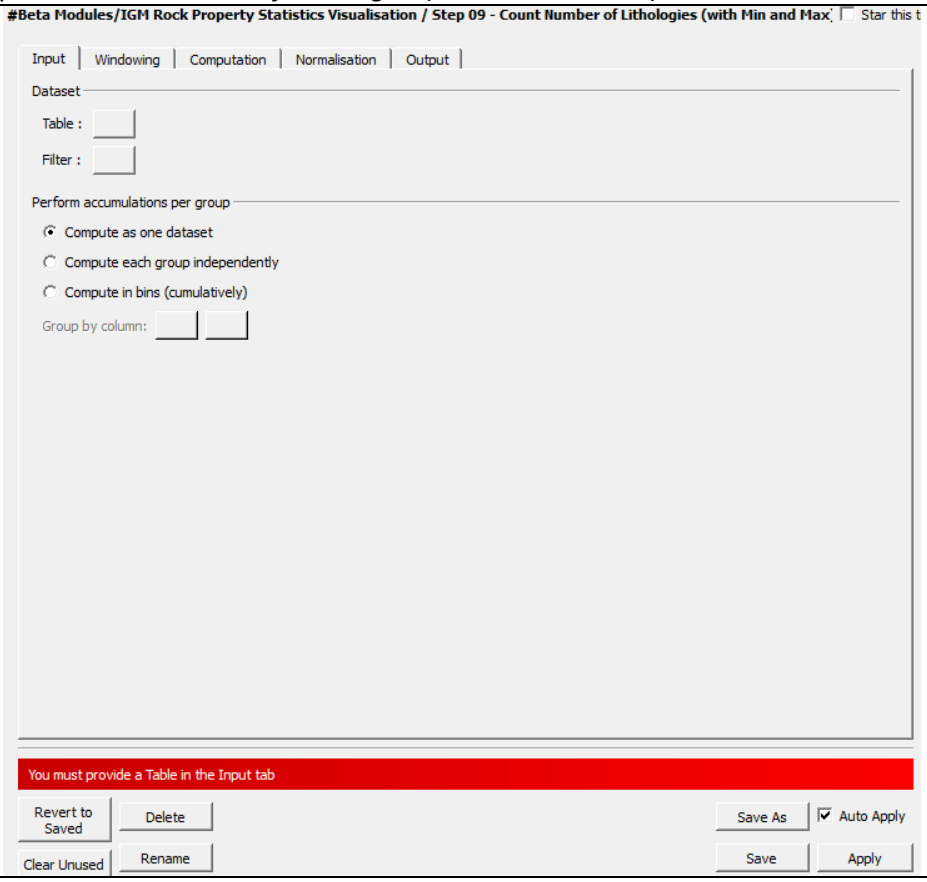
Save the Tool

Settings Step 09 – Accumulations tool to Number the Lithologies in the Distinct Table

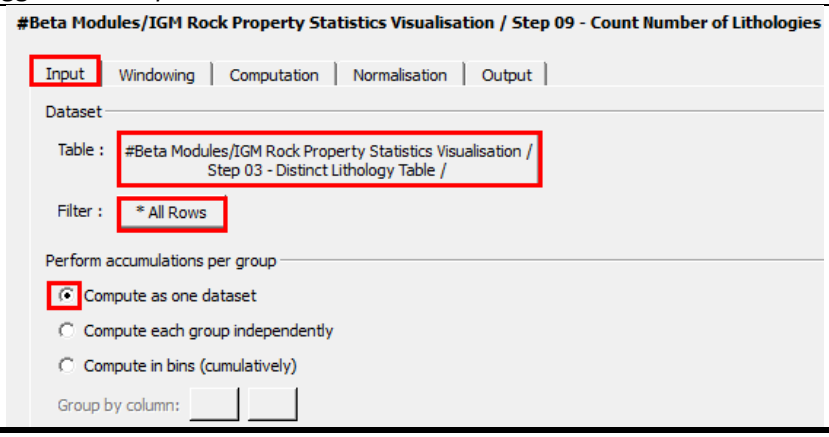
This accumulation counts the number of entries under each lithology.

Create and Save a new *Accumulation tool	* Accumulation

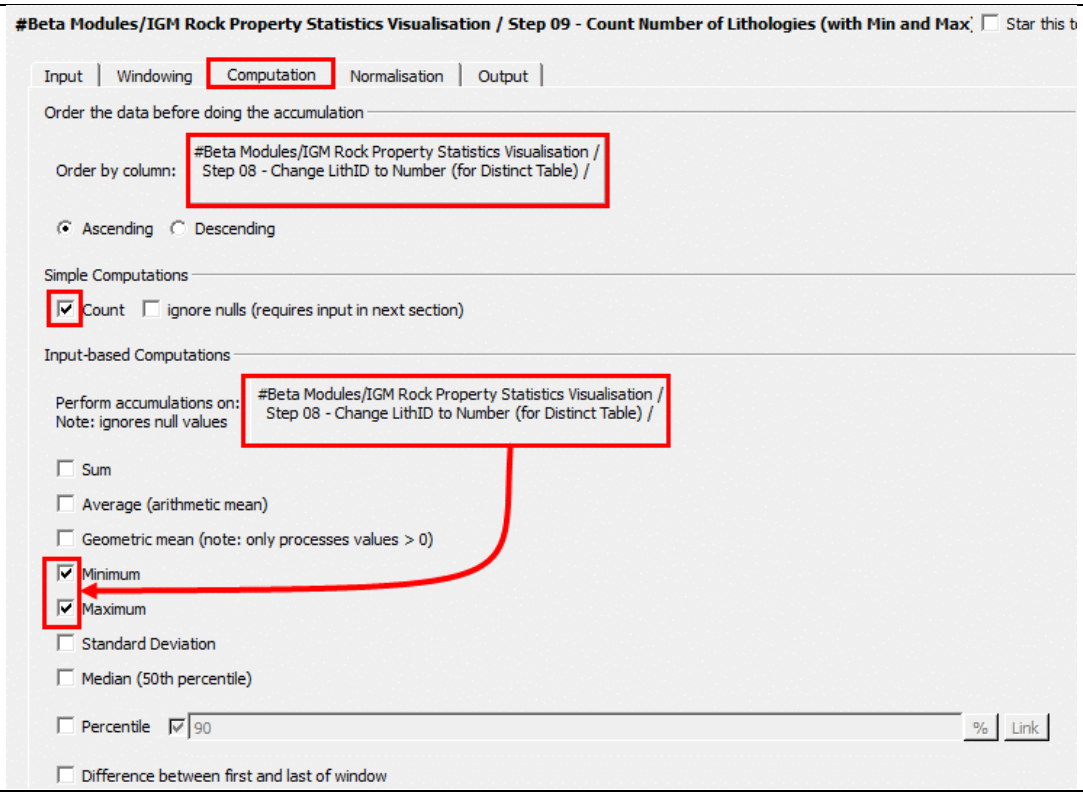
Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step 09 – Count Number of Lithologies (with Min and Max)



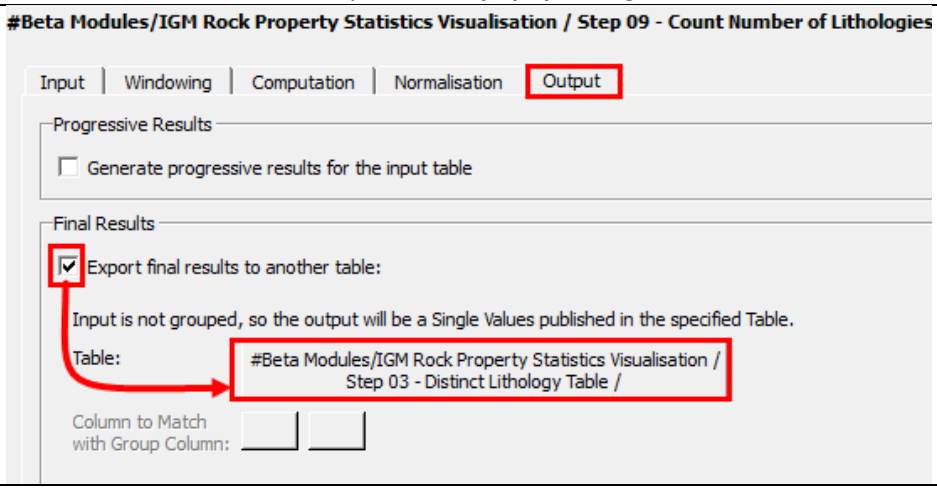
Left click on the *Input* tab to open it
Left click on the *Table* button. In the *Table* **popup**, navigate to the Distinct Lithology table
Left click on the *Filter* button. In the *Filter* **popup,** navigate to *All Rows
Left click to toggle the *Compute as one dataset* value



Left click on the *Computation* tab to open it
Left click on the *Order by column* button. In the *Order by column* **popup**, navigate to the Change LithID to Number row calculation output column from Step 08
Tick the *Count* box under the *Simple Computations* section
Left click on the *Perform Accumulations On* button. In the *Values* **popup,** navigate again to the output from the row calculation in Step 08 (LithID to Number)
Tick the *Minimum* and *Maximum* boxes



Left click on the *Output* tab to open it
Tick the *Export final results to another table* box
Left click on the *Table* button, in the *Export Table* **popup,** navigate to the Distinct Lithology Table



Save the Tool

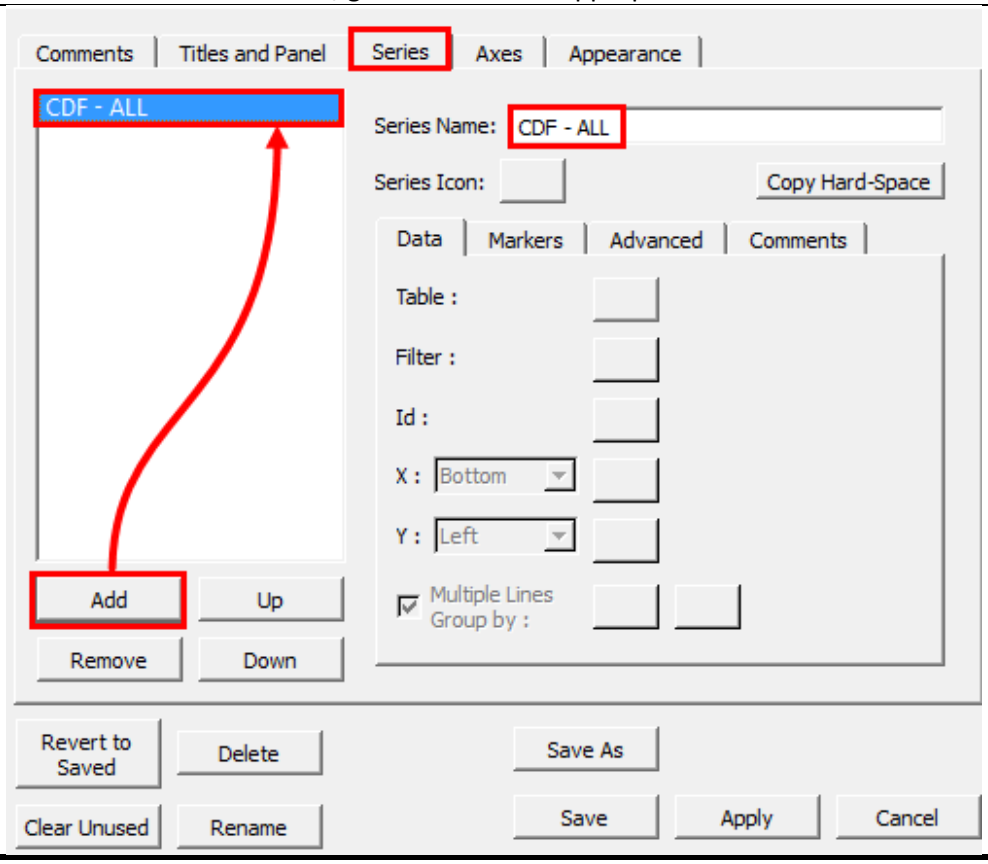
Analysis Step D – Creating a CDF chart for All Lithologies

Create and Save a new *Chart	Create * Chart

Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step D – CDF per Lithology Chart

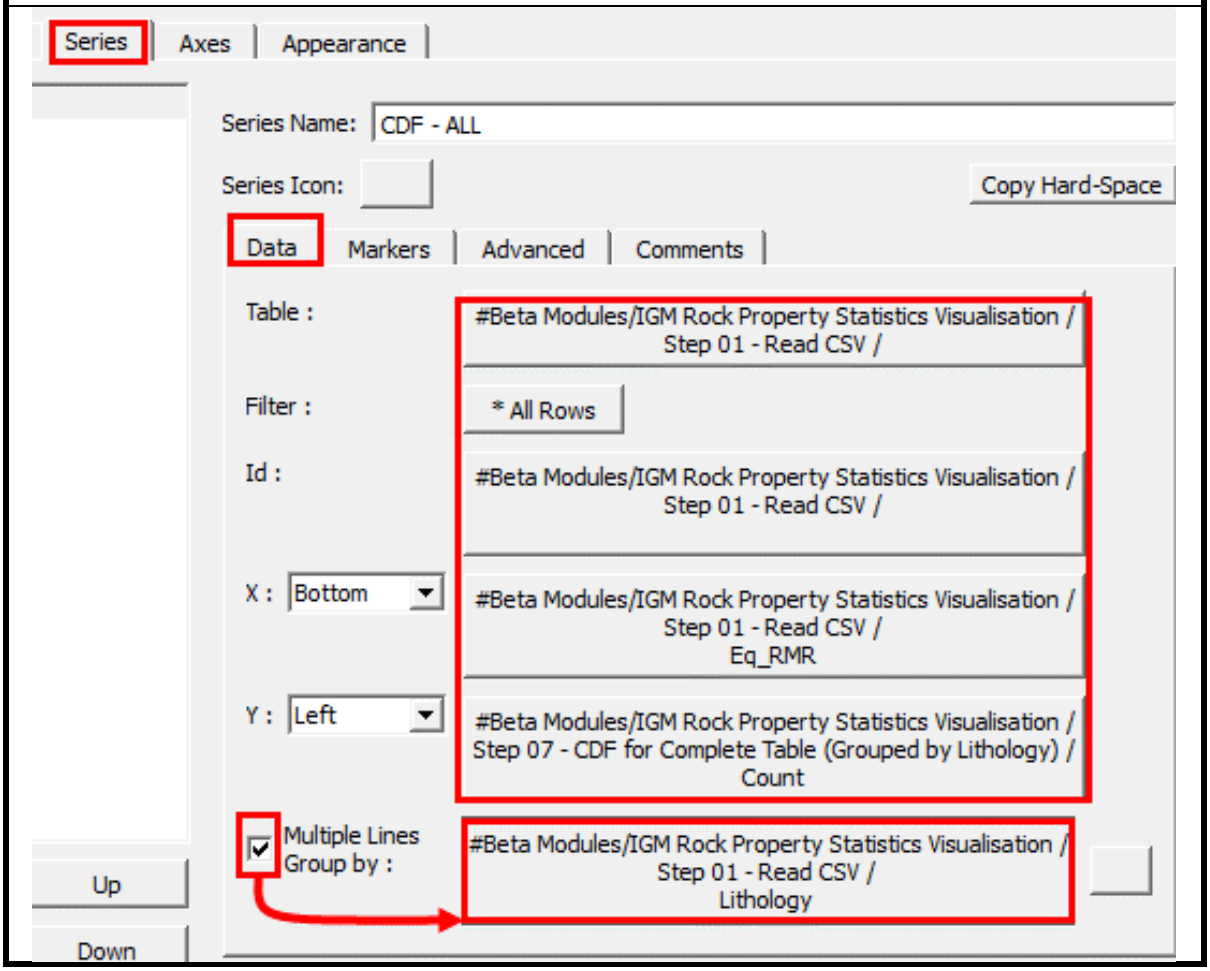
Left click on the *Configure Page* button
In the *Configure page* **popup**:

- **Left click** on the *Series* tab
- **Left click** on the *Add* button
- In the *Series Name* text box**,** give the series an appropriate name

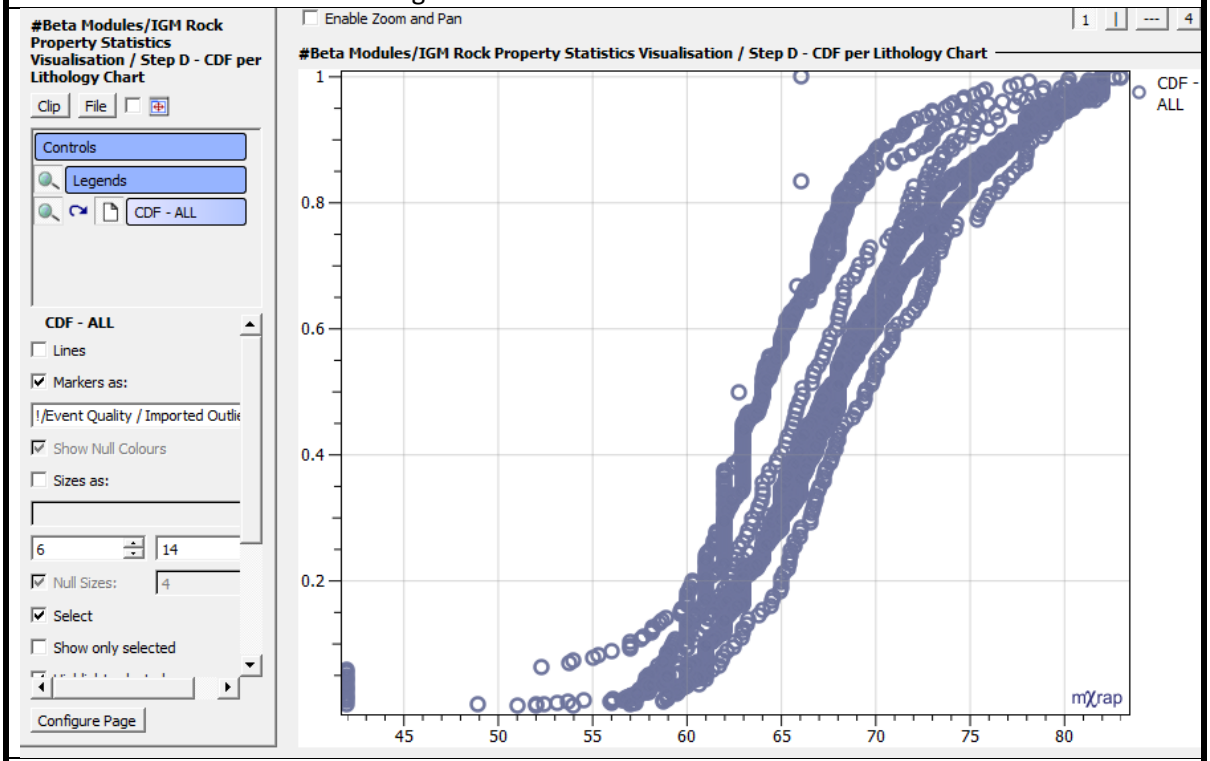


Left click on the *Data* tab to open it

- **Left click** on the *Table* button
  - In the *Table* **popup,** navigate to the Read CSV table
- **Left click** on the *Filter* button
  - In the *Filter* **popup,** navigate to *All Rows
- **Left click** on the *ID* button
  - In the *Set ID* **popup,** set the ID to Read CSV
- **Left click** on the *X* button
  - In the *X* **popup,** set the X-Values to the Eq-RMR for the Read CSV table
- **Left click** on the *Y* button
  - In the *Y* **popup,** set the Y-Values to the Count for CDF for accumulation created in step 07
- **Tick** the *Multiple Lines Group By* box
- **Left click** on the *Multiple Lines Group By* button
  - In the *Group (1)* **popup,** set the Group to the Lithology under the Read CSV

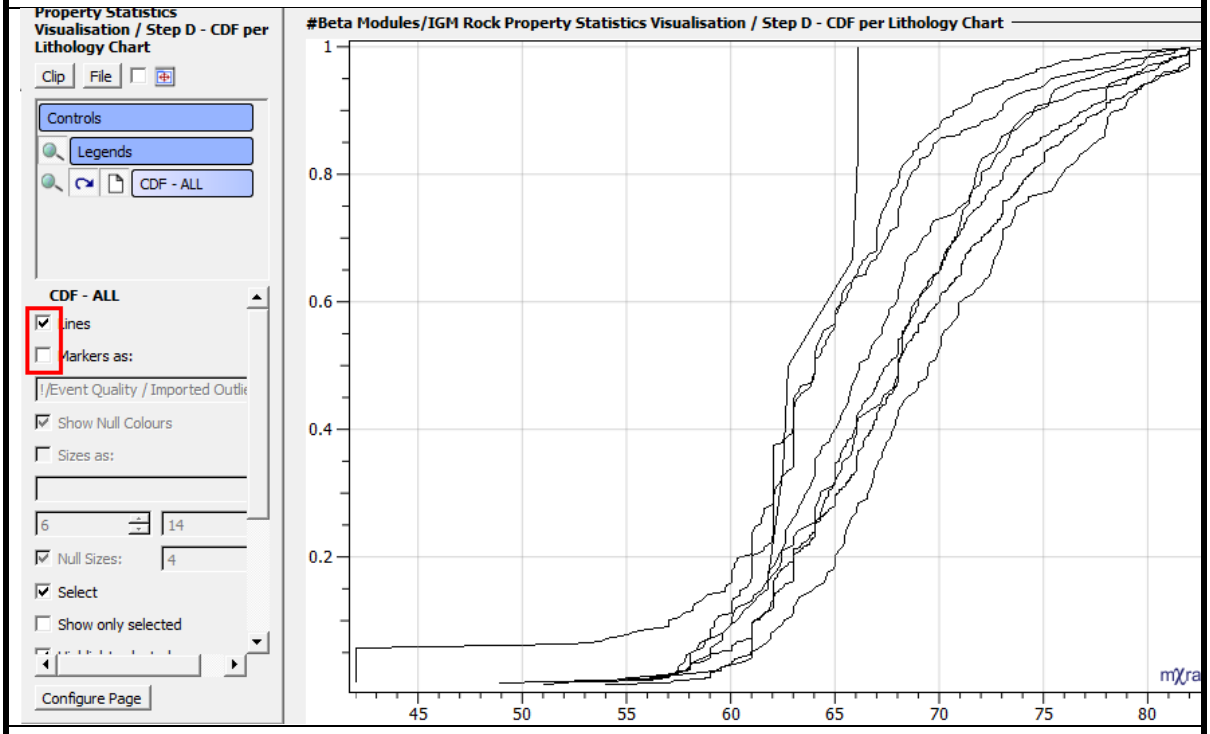


The Charts should look something like this



Tick the *Lines* box to show the distribution as lines and **untick** the *Marker as* box to remove the marker dots

The Chart will now look like this



Left Click the Configure Page button and Save the Tool

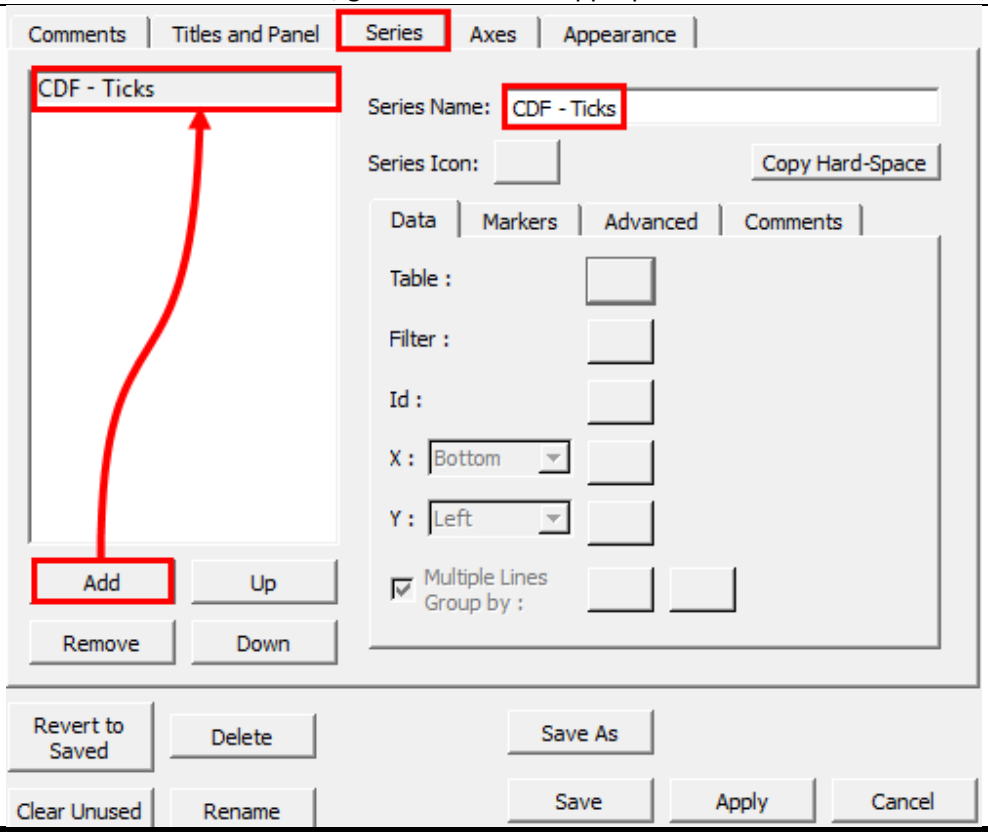
Analysis Step E – Creating a CDF chart for the Ticked Lithologies

Create and Save a new *Chart	Create * Chart

Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step E – CDF per Lithology (ticks filtered) Chart

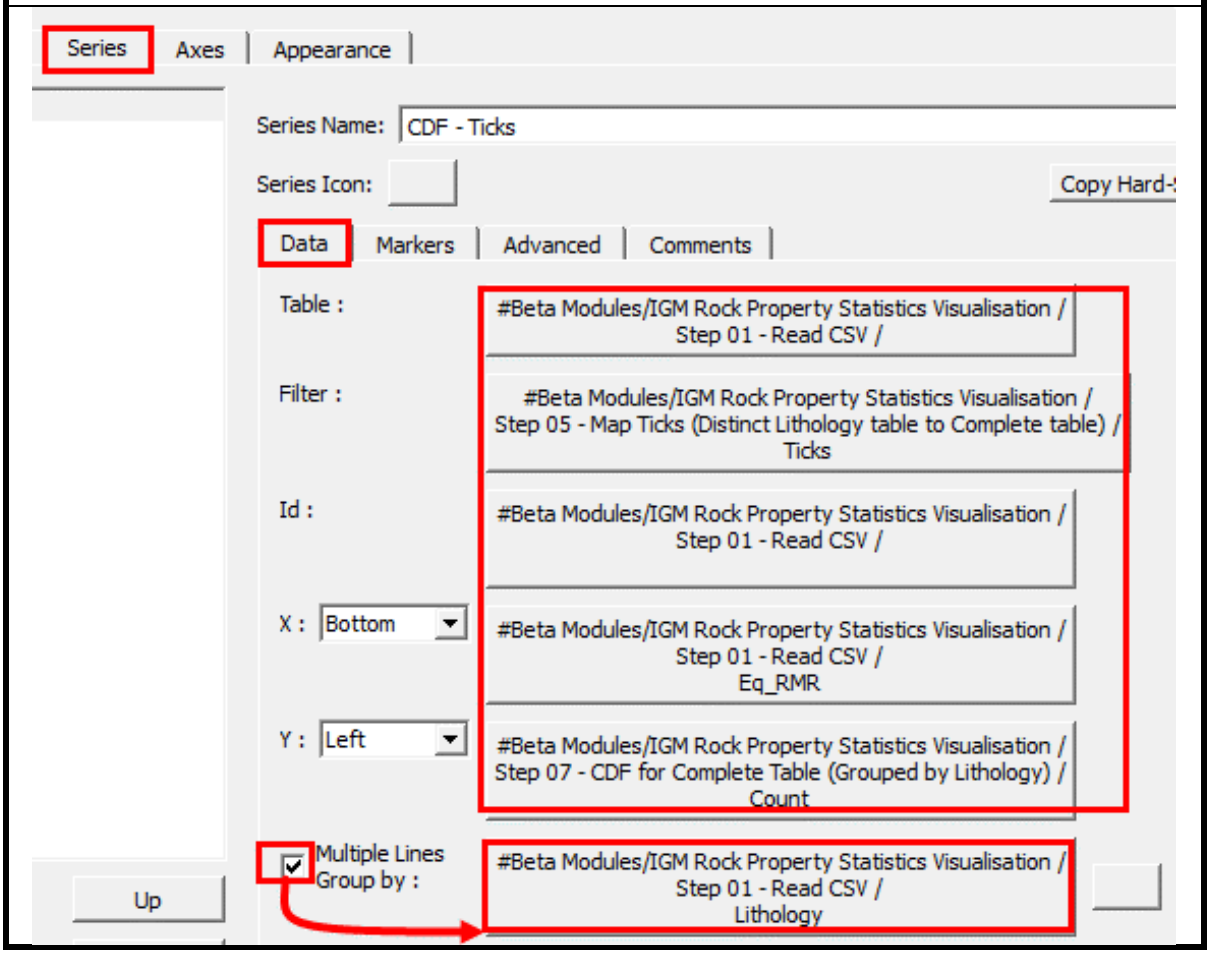
Left click on the *Configure Page* button
In the *Configure page* **popup**:

- **Left click** on the *Series* tab
- **Left click** on the *Add* button
- In the *Series Name* text box**,** give the series an appropriate name



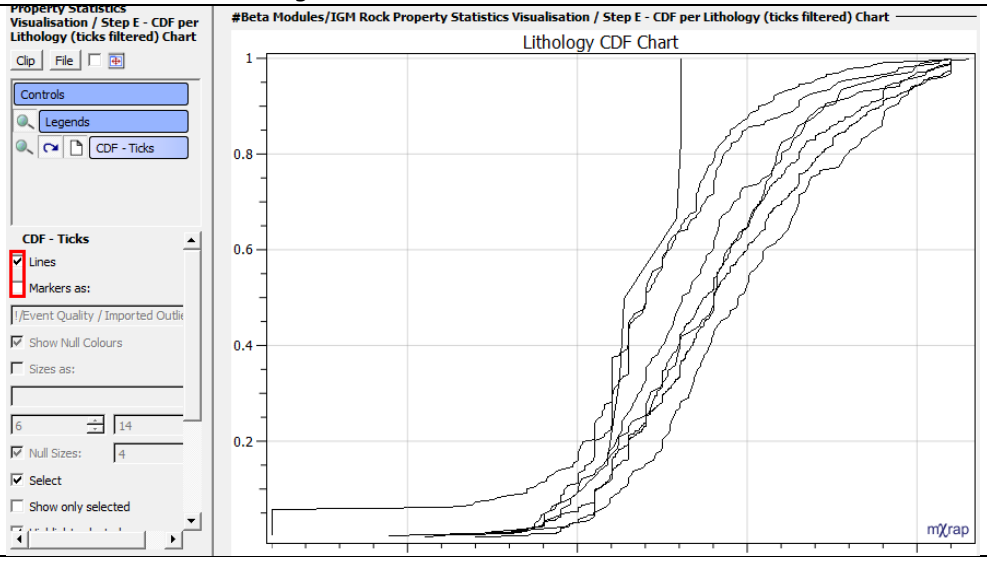
Left click on the *Data* tab to open it

- **Left click** on the *Table* button
  - In the *Table* **popup,** navigate to the Read CSV table
- **Left click** on the *Filter* button
  - In the *Filter* **popup,** navigate to Ticks filter under the table map created in Step 05
- **Left click** on the *ID* button
  - In the *Set ID* **popup,** set the ID to Read CSV
- **Left click** on the *X* button
  - In the *X* **popup,** set the X-Values to the Eq-RMR for the Read CSV table
- **Left click** on the *Y* button
  - In the *Y* **popup,** set the Y-Values to the Count for CDF for accumulation created in step 07
- **Tick** the *Multiple Lines Group By* box
- **Left click** on the *Multiple Lines Group By* button
  - In the *Group (1)* **popup,** set the Group to the Lithology under the Read CSV

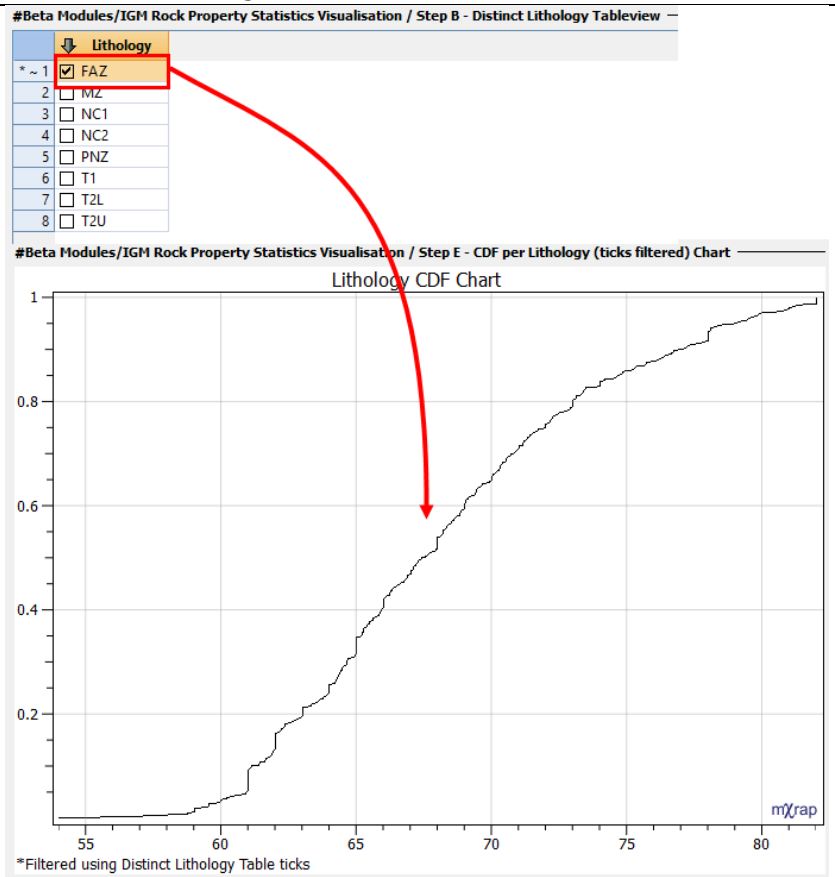


As before, **tick** the *Lines* box and **untick** the *Marker as* box to get the distribution in line form
The chart will look like this

*Note: The Titles and Panel tab and the Axes tab in the Configure Page **popup** can be used to give the chart a title as well as naming the axes.*



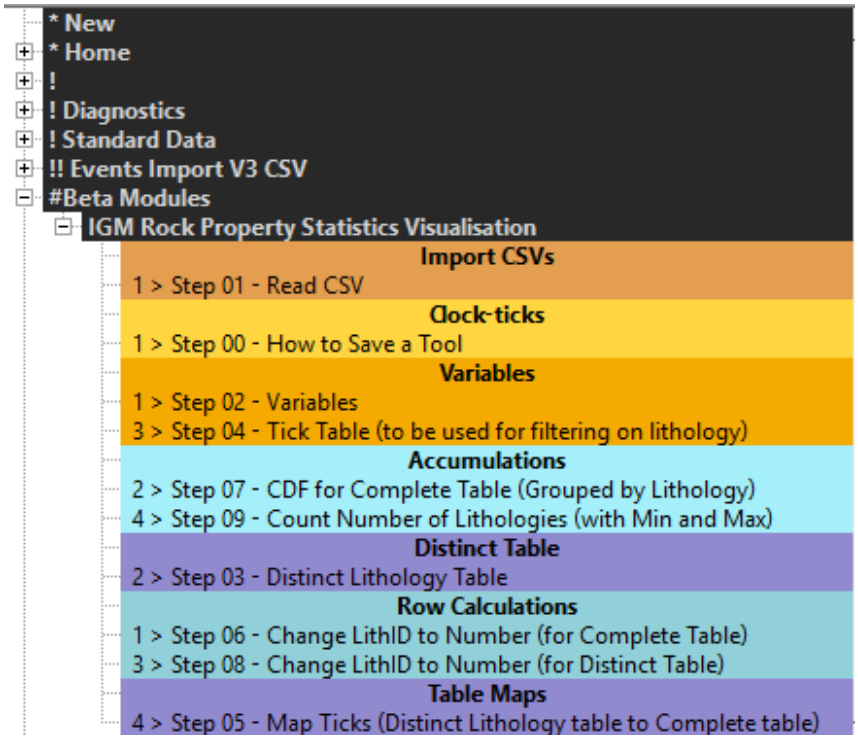
Note: Ticking the Lithologies in the Distinct Lithology Table will now change which of the Lithologies are shown in the Chart. Later, Markers will be added to allow easier differentiation of which lines represent which lithologies



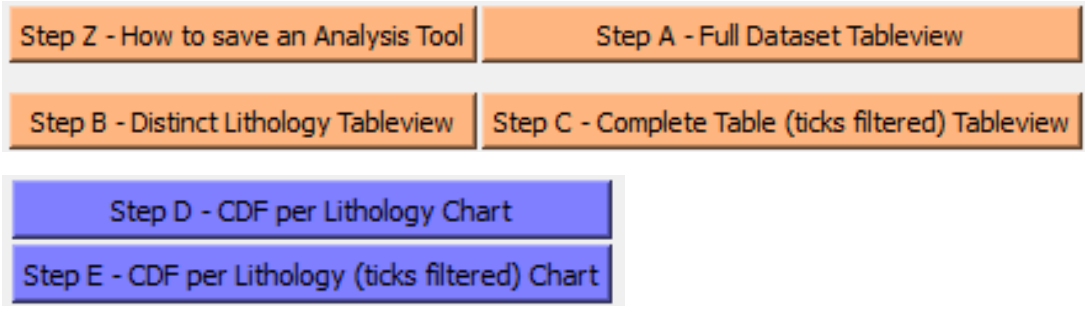
Left Click the Configure Page button and Save the Tool

Application Progress (Section 4)

The tool tree in the Settings Window should now look as follows. Following the naming convention will make it easier to follow the walkthrough steps.



A CDF plot for the Lithologies has been drawn using a combination of row calculations and accumulations. Two new charts have been created, one of which has the added functionality of being filtered by the ticks column in the Distinct Lithology Table.



In the next section, key statistical values for each lithology will be determined and displayed in a tableview.

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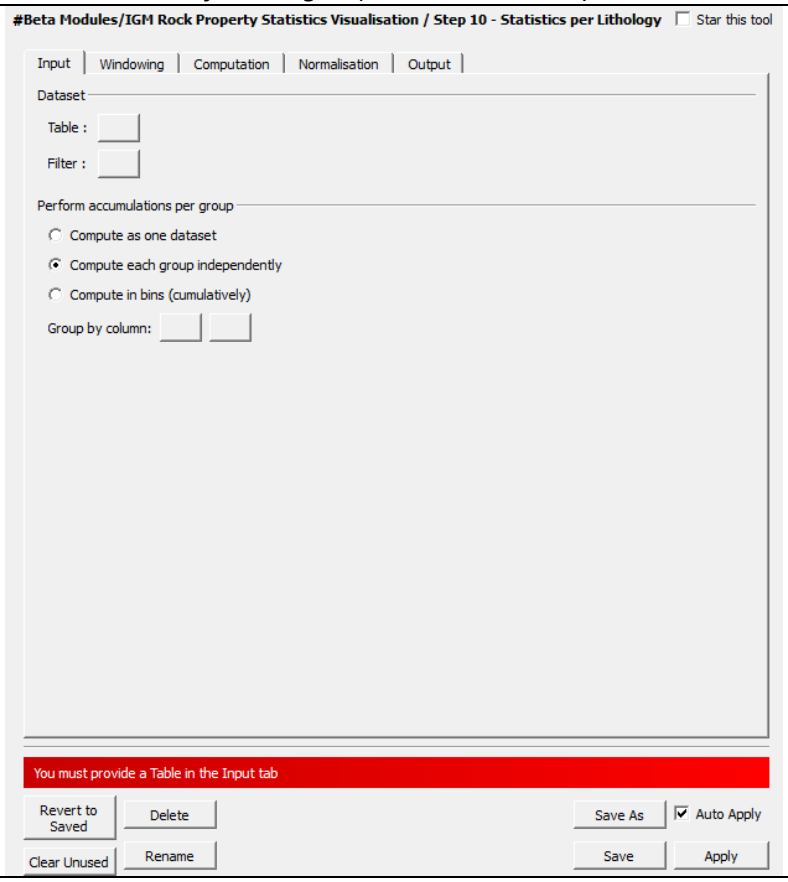
5. Calculating the Statistics per Lithology

Settings Step 10 – Accumulating the statistics for each lithology

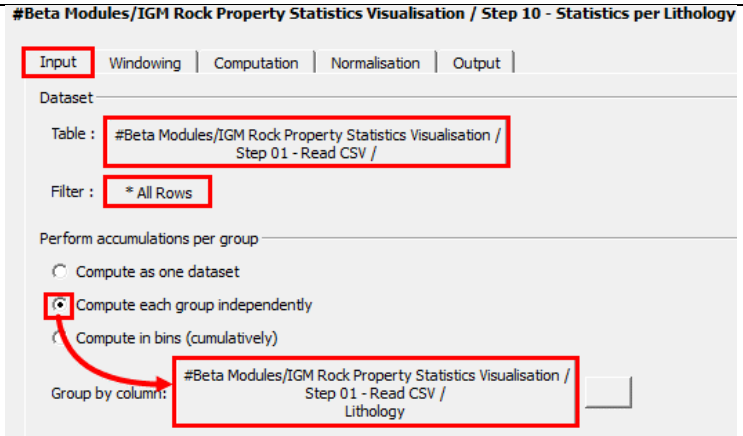
The following accumulation determines key statistics for each of the lithologies.

Create and Save a new *Accumulation tool	* Accumulation

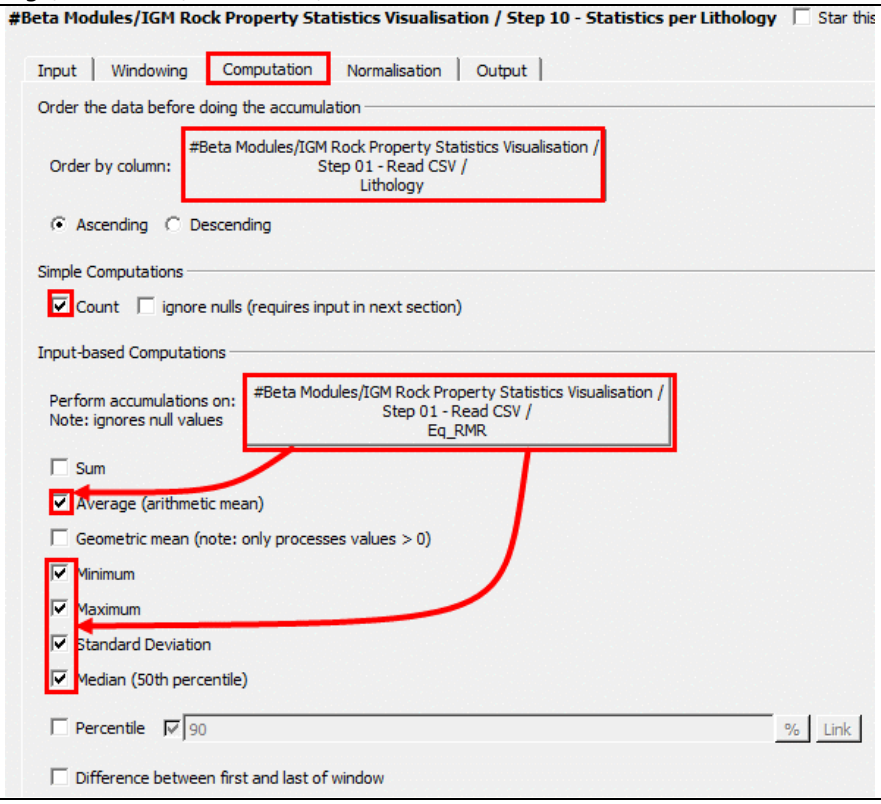
Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step 10 – Count Number of Lithologies (with Min and Max)



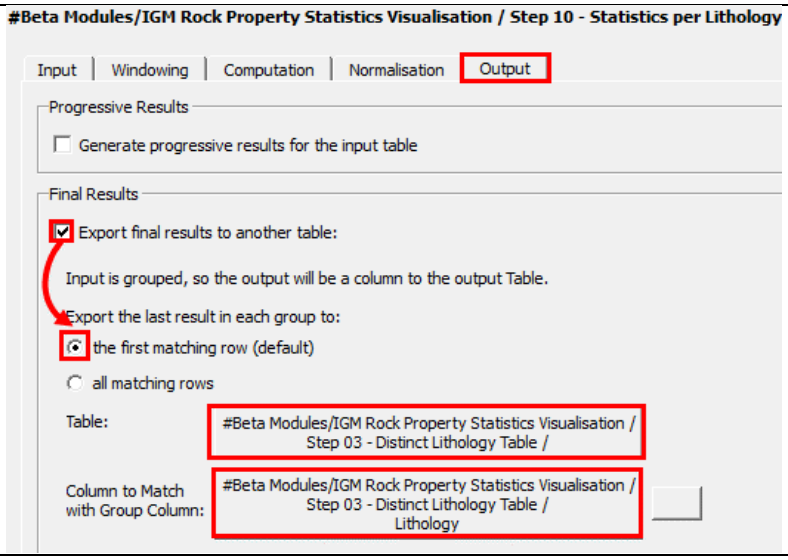
Left click on the *Input* tab to open it
Left click on the *Table* button. In the *Table* **popup**, navigate to the Read CSV table
Left click on the *Filter* button. In the *Filter* **popup,** navigate to *All Rows
Left click to toggle the *Compute each group independently* value
Left click on the *Group by column* button. In the *Group first by Column* **popup,** navigate to the Lithology column



Left click on the *Computation* tab to open it
Left click on the *Order by column* button. In the *Order by column* **popup**, navigate to Lithology
Tick the *Count* box under the *Simple Computations* section
Left click on the *Perform Accumulations On* button. In the *Values* **popup,** navigate to Eq_RMR
Tick the *Average, Minimum, Maximum, Standard Deviation* and *Median* boxes



Left click on the *Output* tab to open it
Tick the *Export final results to another table* box
Left click on the *Table* button, in the *Export Table* **popup,** navigate to the Distinct Lithology Table
Left click on the *Column to Match* button, in the *Export Group* **popup,** navigate to the Lithology column



Save the Tool

Analysis Step F – Creating a Table View for the Statistics per Lithology

Create and Save a new *Table View	**Create * Table View**

Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*

Name: Step F – Statistics per Lithology Tableview

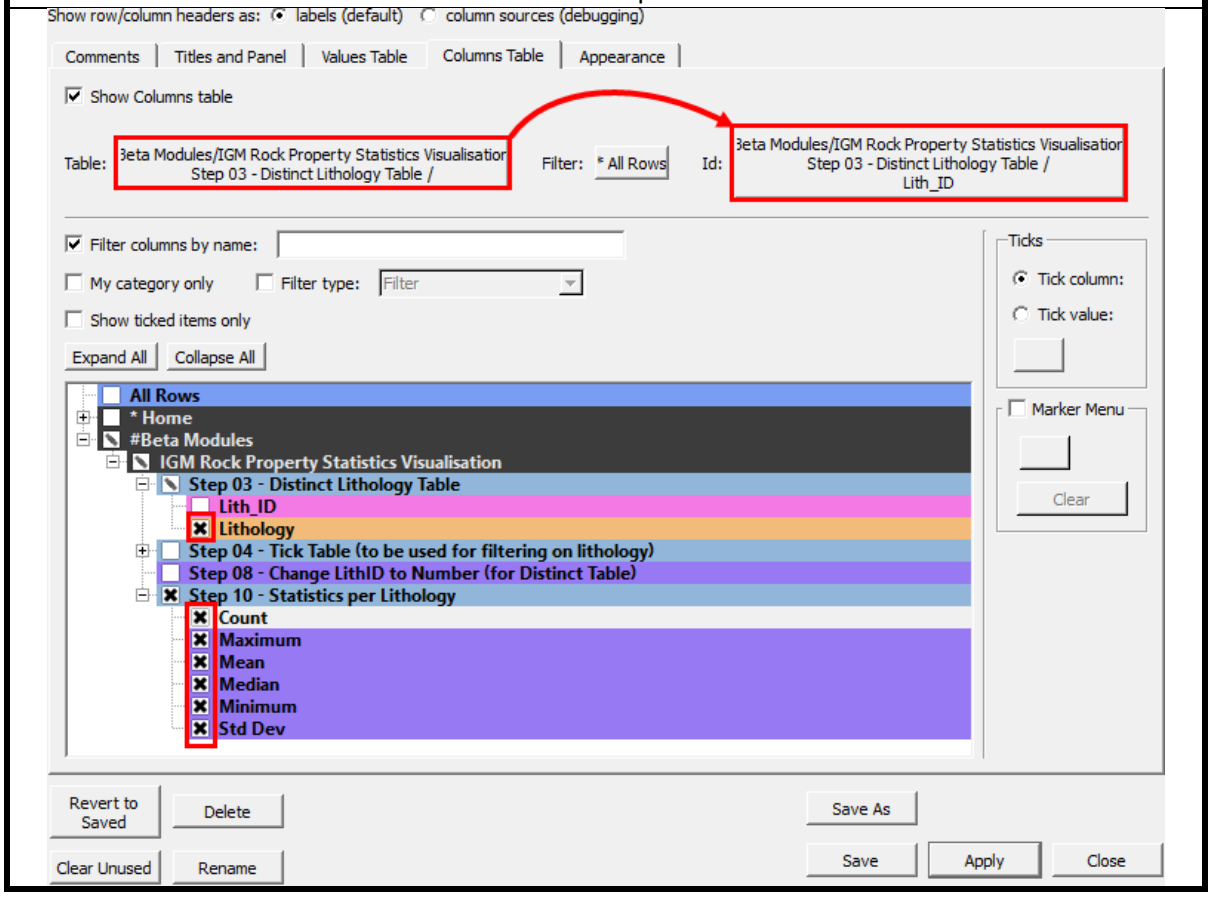
Left click on the *Configure Page* button

In the *Configure page* **popup**:

- **Left click** on the *Columns Table* tab
- **Left click** on the *Table* button
  - In the *Choose the Table to View* **popup,** navigate to the Distinct Lithology Table
- **Left click** on the *Filter* button
  - In the *Set the default Filter* **popup,** navigate to *All Rows
- **Left click** on the *ID* button
  - In the *Set ID* **popup,** set the ID to Lith_ID

In the *Columns Tree*

- **Tick** the Lithology column under the Distinct Lithology Table
- **Tick** all the Statistics columns created in Step 10



The Tableview should look something like this

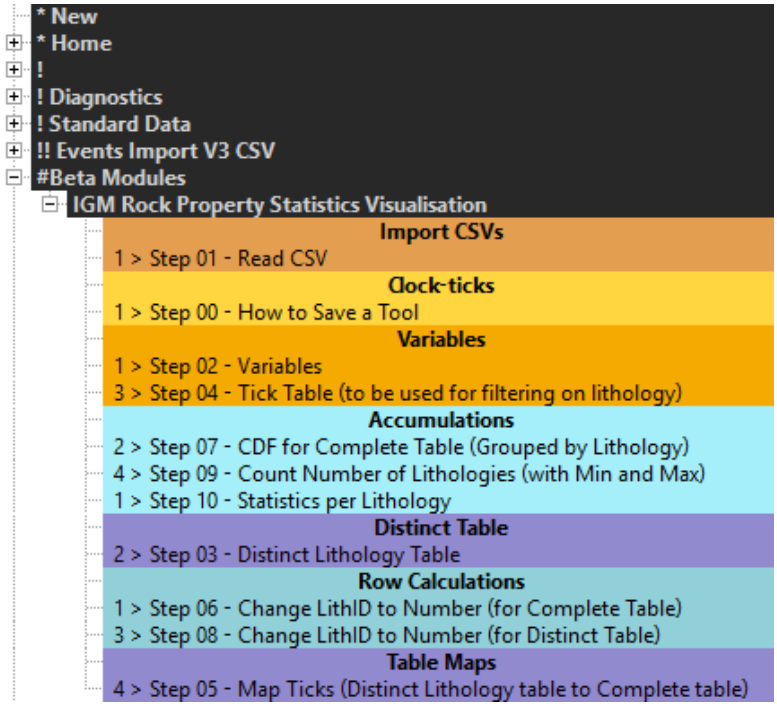
#Beta Modules/IGM Rock Property Statistics Visualisation / Step F - Statistics per Lithology Tableview

	Lithology	Count	Maximum	Mean	Median	Minimum	Std Dev
* 1	FAZ	563	82	68.1929	67.4157	54	5.6621
2	MZ	850	83	68.7896	68	51.015	6.20261
3	NC1	137	82	70.0948	69.465	55.93	5.94919
4	NC2	6	66.091	64.1683	64.285	61.769	1.85303
5	PNZ	205	82	63.9555	64	42	7.64134
6	T1	241	82	64.8233	64	48.903	4.65614
7	T2L	86	82	67.857	68.038	56.113	5.71468
8	T2U	107	82	66.9825	66.14	54.566	5.64195

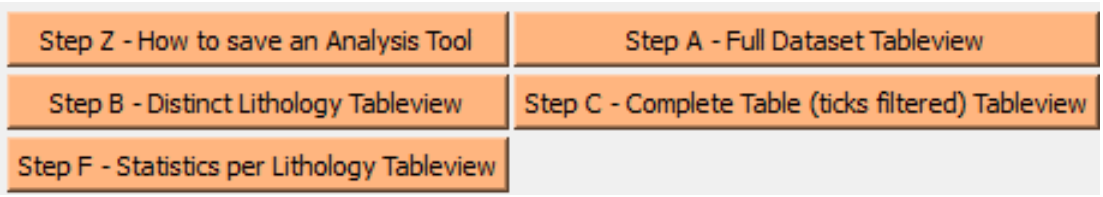
Left Click the Configure Page button and Save the Tool

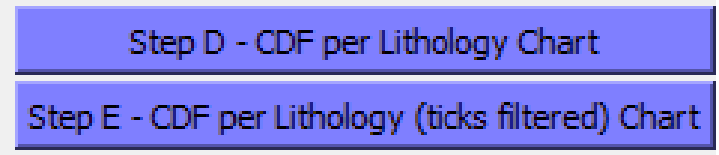
Application Progress (Section 5)

The tool tree in the Settings Window should now look as follows. Following the naming convention will make it easier to follow the walkthrough steps.



Key statistical values for each lithology has been determined using an accumulation tool. The statistical values for each lithology can be seen in a newly created Statistics per Lithology Tableview





In the next section, a PDF distribution for each lithology will be obtained and displayed by means of charts.

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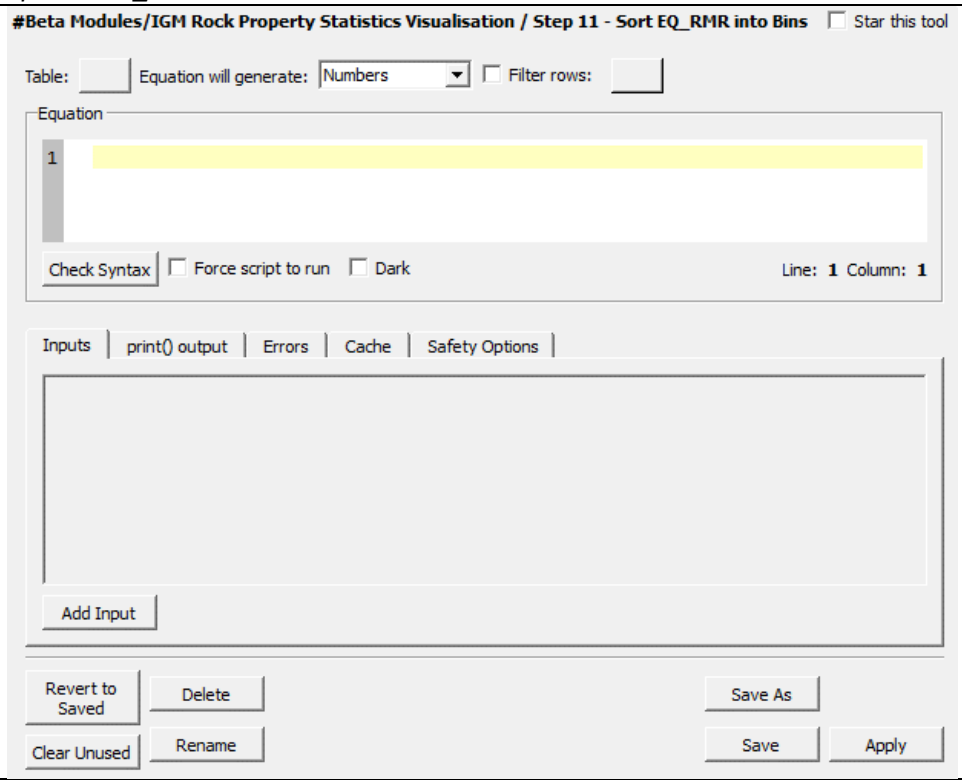
6. Creating PDF charts for the Lithologies

Settings Step 11 – Creating a Row Calculation to sort RMR data into bins

The goal of this Row Calculation is to sort the RMR values into bins. Each bin is characterised by the lithology it represents and therefore contains RMR values that particular lithology only.

Create and Save a new *Row Calculations tool | *Row Calculation

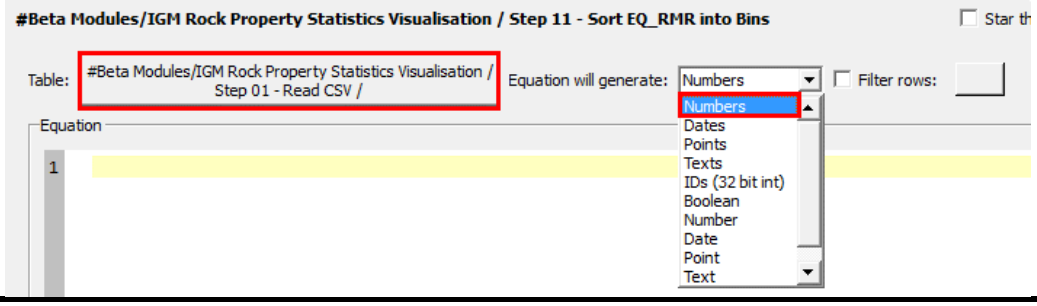
Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step 11 – EQ_RMR Bins



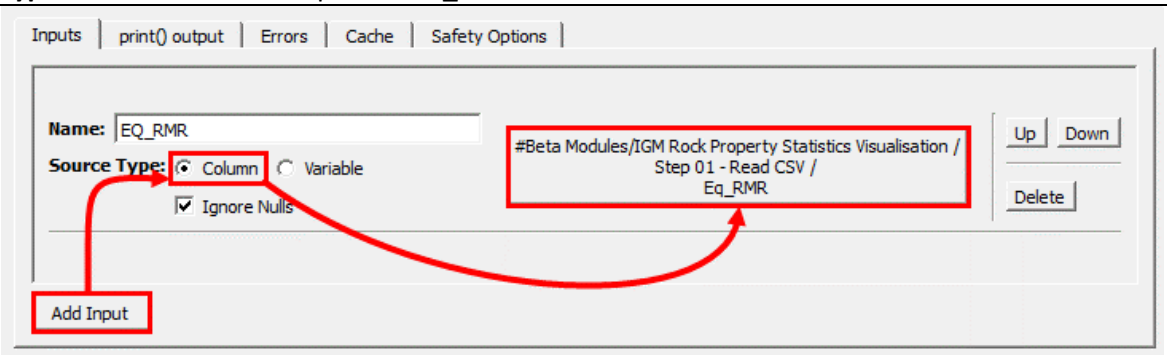
Left click on the *Table* button
In the *Table* **popup,** navigate to the Read CSV table

In the *Equation will generate* **dropdown,** select *Numbers*

Note: If the equation is set to generate a Number instead of Numbers, it will only generate a single value.

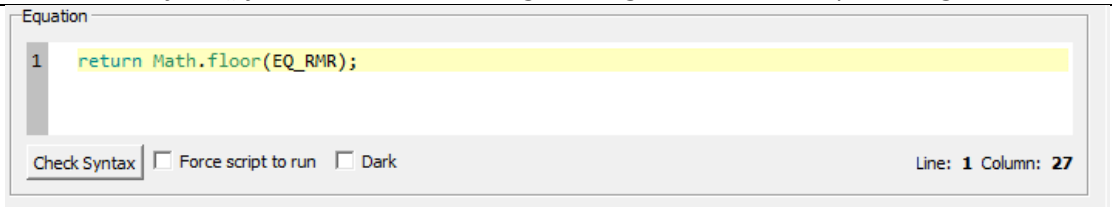


Left click on the *Inputs* tab to open it
Left click on the *Add Input* button
Left click on the *Column* toggle to select it
Left click on the *Source* button, in the *Choose Column for* **popup,** navigate to the Eq_RMR
Type in the *Name* of the input as "EQ_RMR"

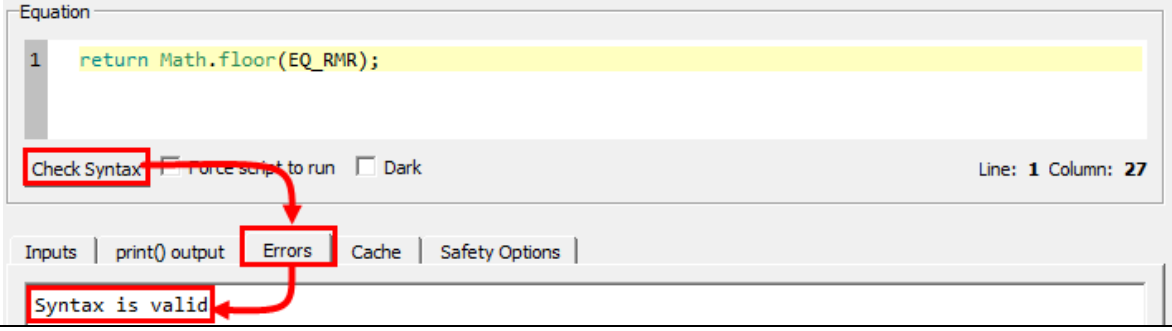


In the *Equation* box, **type** the following code:
Return Math.floor(EQ_RMR);

Note: The Math.floor() function returns the largest integer less than or equal to a given number.



To check that the Syntax of the code is correct, **left click** the *Check Syntax* button
This will open the *Errors* tab and show whether or not the Syntax is valid



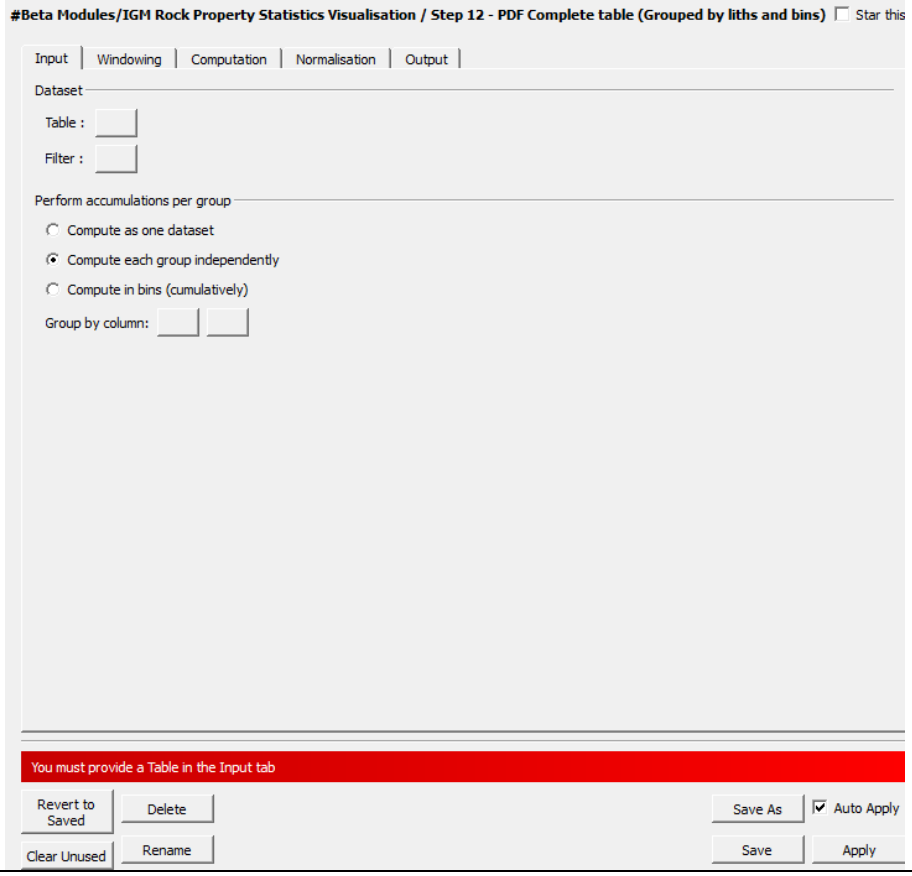
Save the Tool

Settings Step 12 – Accumulations tool created for the PDF of the RMR values

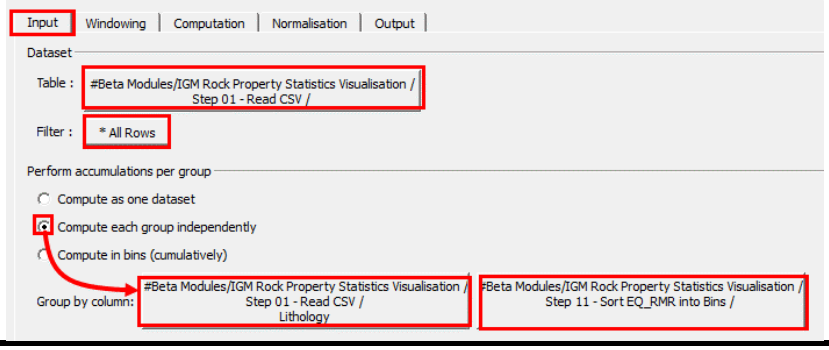
This accumulation will count the values for RMR grouping the values by bins as well.

Create and Save a new *Accumulation tool	* Accumulation

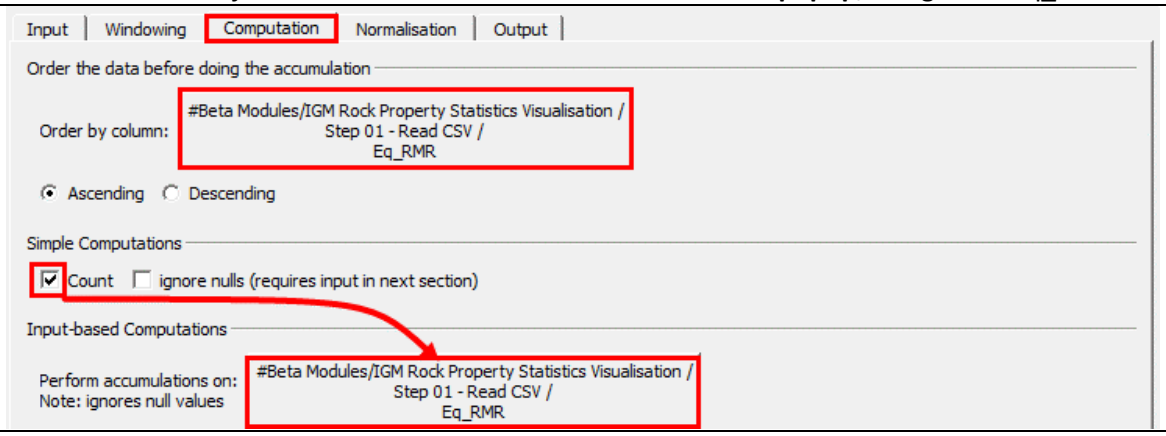
Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step 12 – PDF Complete table (Grouped by liths and bins)



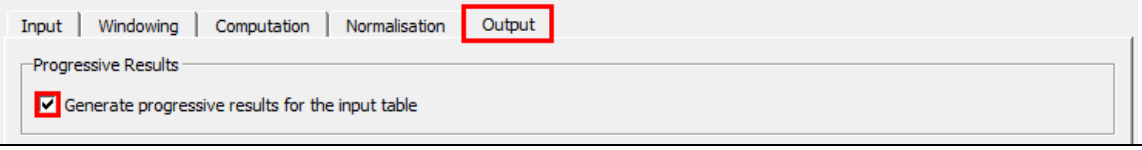
Left click on the *Input* tab to open it
Left click on the *Table* button. In the *Table* **popup**, navigate to the Read CSV table
Left click on the *Filter* button. In the *Filter* **popup,** navigate to *All Rows
Left click to toggle the *Compute each group independently* value
Left click on the *Group by column* button. In the *Group first by Column* **popup,** navigate to the Lithology column
Left click on the other *Group by column* button. In the *Group second by Column* **popup,** Sort EQ_RMR into Bins row calculation output from Step 11



Left click on the *Computation* tab to open it
Left click on the *Order by column* button. In the *Order by column* **popup**, navigate to the Eq_RMR column
Tick the *Count* box under the *Simple Computations* section
Left click on the *Perform Accumulations On* button. In the *Values* **popup,** navigate to Eq_RMR



Left click on the *Output* tab to open it
Tick the *Generate progressive results for the input table* box



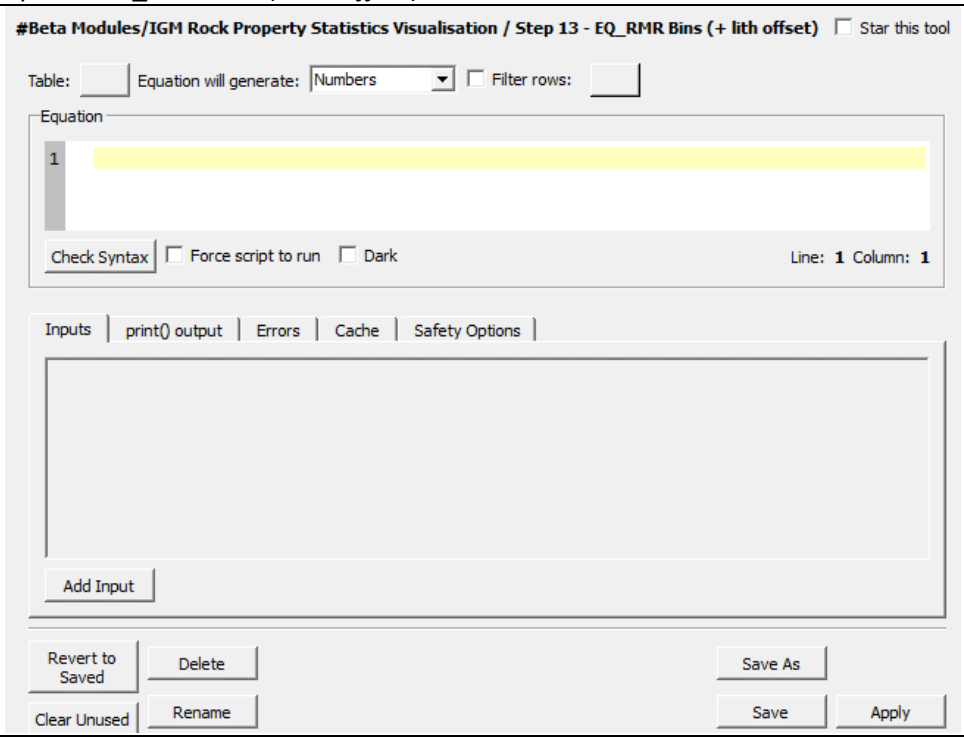
Save the Tool

Settings Step 13 – Creating an offset for the PDF chart using Row Calculations

This row calculation will offset the bars on the PDF chart which will increase the ease of visualisation.

Create and Save a new *Row Calculations tool	*Row Calculation

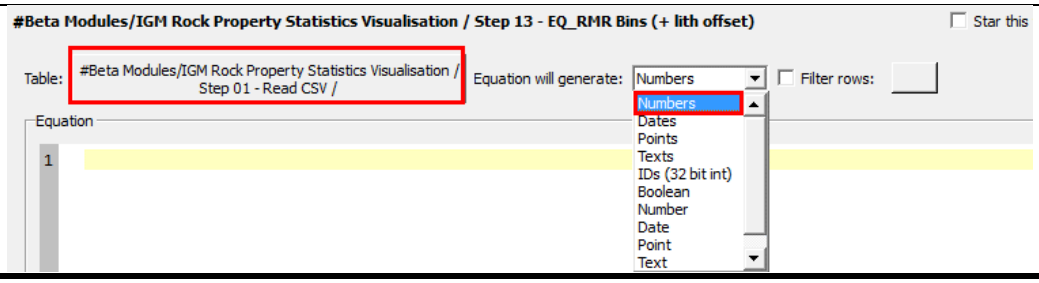
Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step 13 – EQ_RMR Bins (+ lith offset)



Left click on the *Table* button
In the *Table* **popup,** navigate to the Read CSV table

In the *Equation will generate* **dropdown,** select *Numbers*

Note: If the equation is set to generate a Number instead of Numbers, it will only generate a single value.



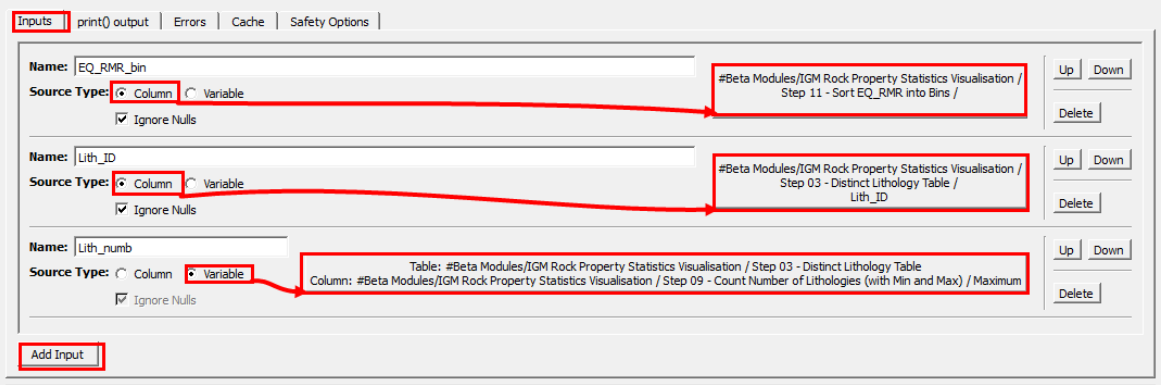
Left click on the *Inputs* tab to open it
Left click on the *Add Input* button
Left click on the *Column* toggle to select it
Left click on the *Source* button, in the *Choose Column for* **popup,** navigate to the the Sort EQ_RMR into Bins output from the Step 11 Row Calculation output
Type in the *Name* of the input as "EQ_RMR_bin"

Left click on the *Inputs* tab to open it
Left click on the *Add Input* button
Left click on the *Column* toggle to select it
Left click on the *Source* button, in the *Choose Column for* **popup,** navigate to the Lith_ID
Type in the *Name* of the input as "Lith_ID"

Left click on the *Inputs* tab to open it
Left click on the *Add Input* button
Left click on the *Variable* toggle to select it
Left click on the *Source* button, in the *Choose Variable for* **popup**

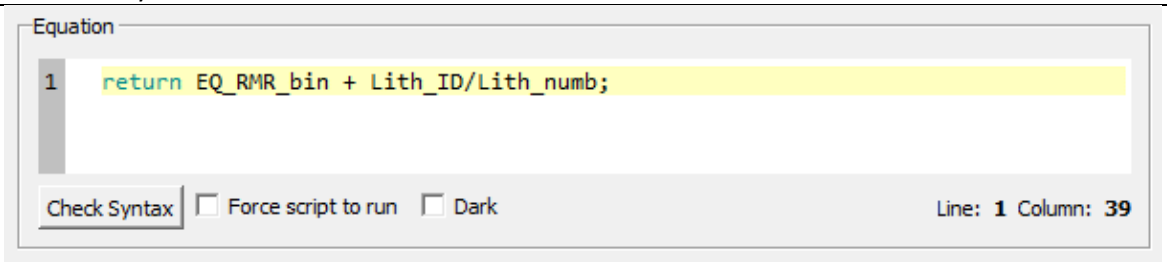
- Under the *Table* section, navigate to the Distinct Lithology Table
- Under the *Columns in Table* section, navigate to the Maximum obtained from the Step 09 accumulation

Type in the *Name* of the input as "Lith_numb"



In the *Equation* box, **type** the following code:
return EQ_RMR_bin + Lith_ID/Lith_numb;

Check the syntax



Save the Tool

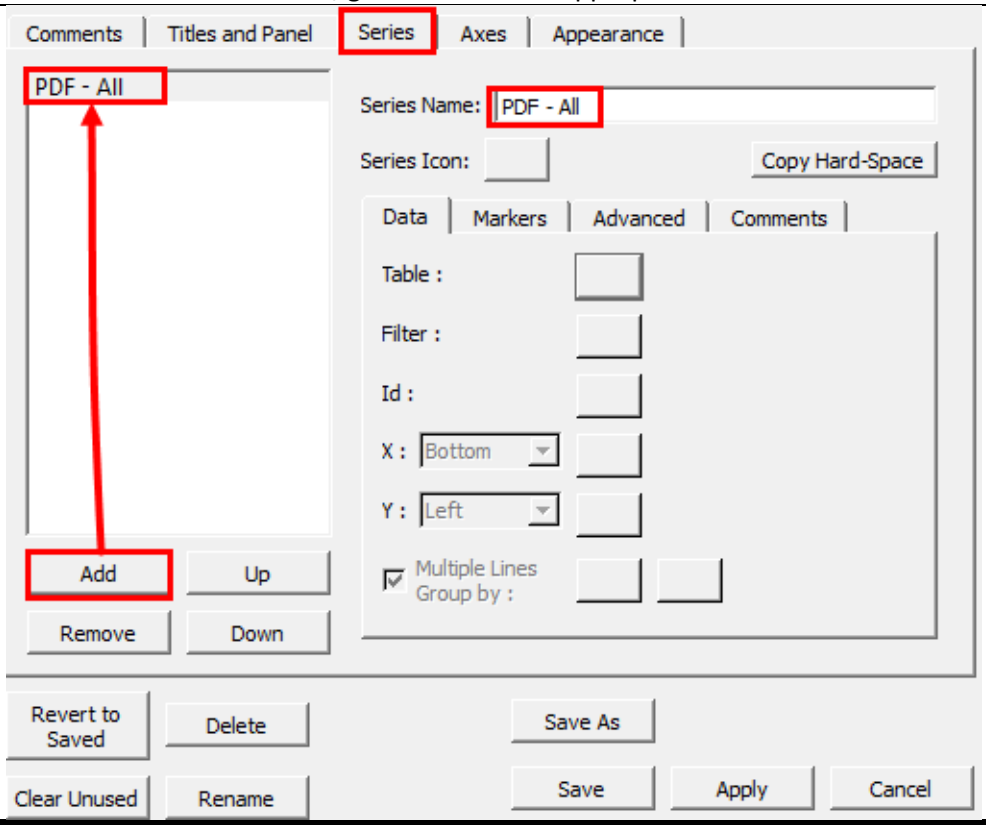
Analysis Step G – Creating a PDF Chart of all Lithologies

Create and Save a new *Chart	Create * Chart

Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step G – PDF per Lithology Chart

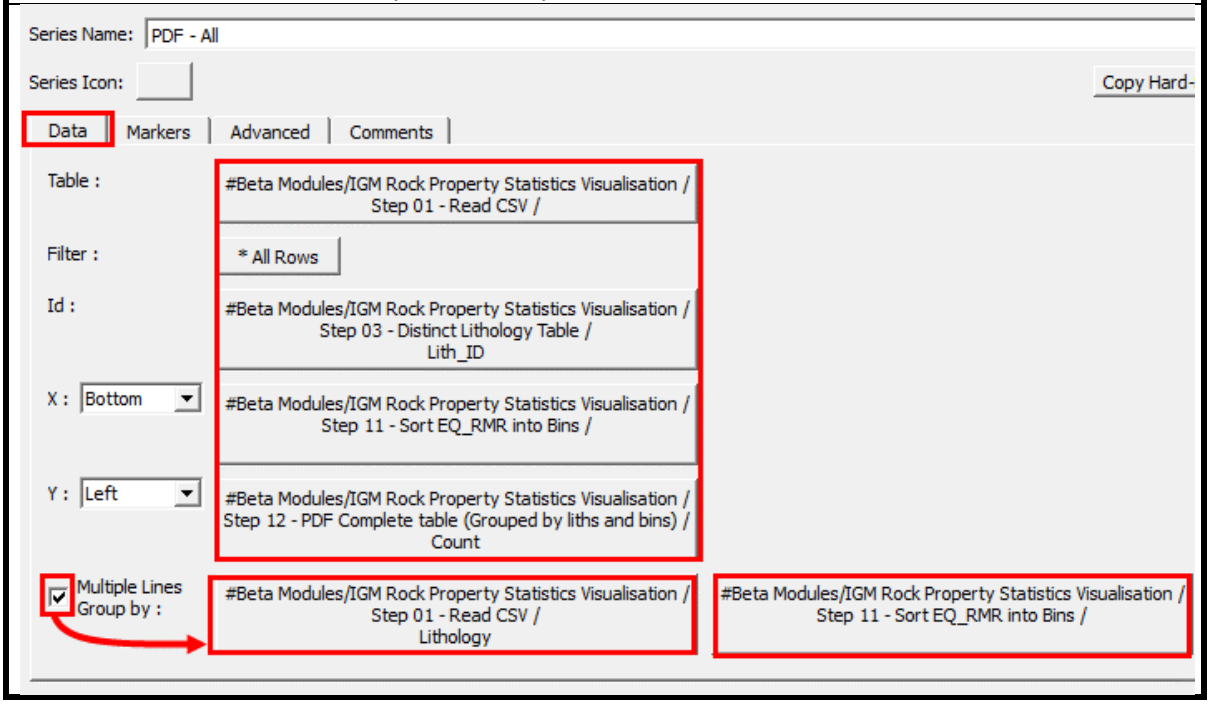
As before, **left click** on the *Configure Page* button
In the *Configure page* **popup**:

- **Left click** on the *Series* tab
- **Left click** on the *Add* button
- In the *Series Name* text box**,** give the series an appropriate name

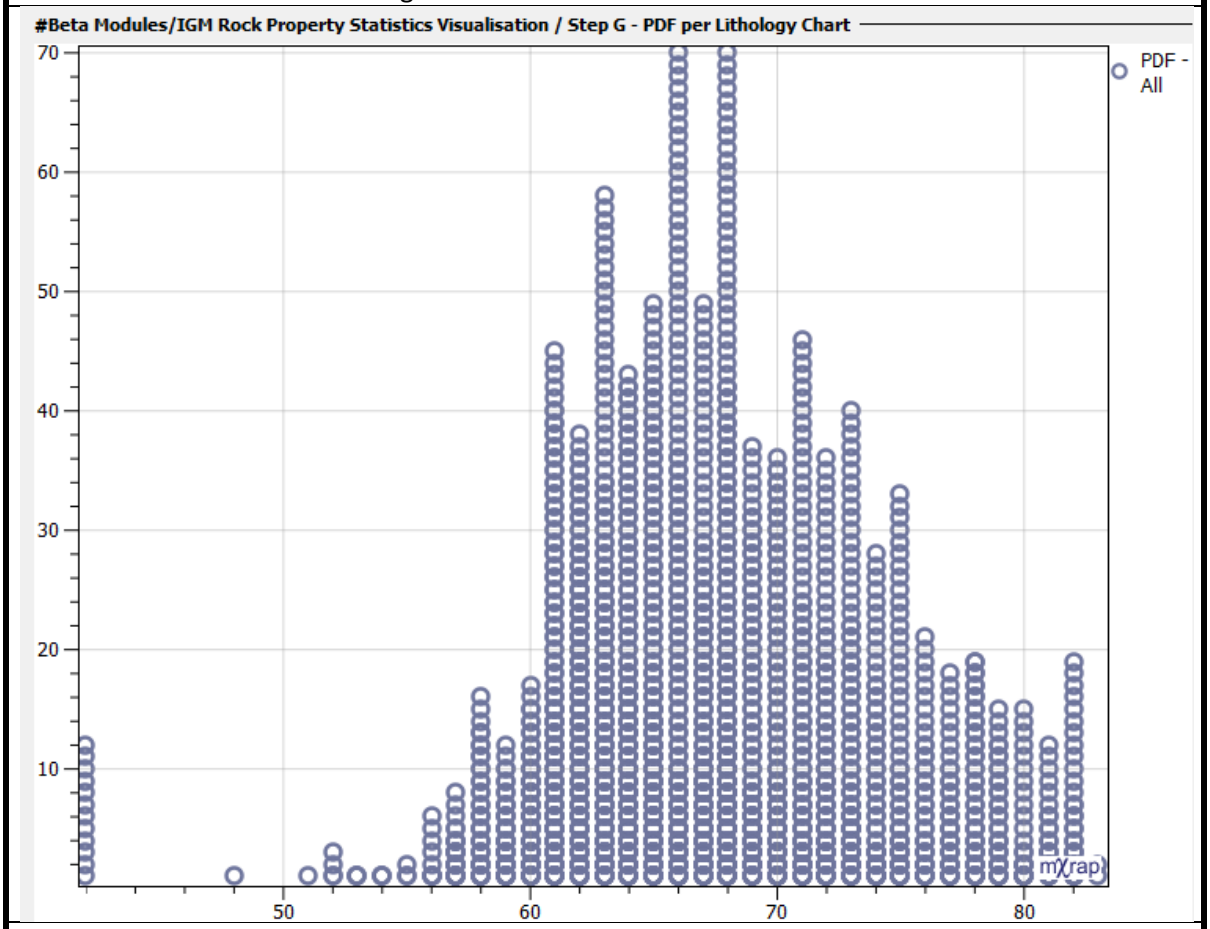


Left click on the *Data* tab to open it

- **Left click** on the *Table* button
  - In the *Table* **popup,** navigate to the Read CSV table
- **Left click** on the *Filter* button
  - In the *Filter* **popup,** navigate to *All Rows
- **Left click** on the *ID* button
  - In the *Set ID* **popup,** set the ID to Lith_ID
- **Left click** on the *X* button
  - In the *X* **popup,** set the X-Values to the Sort EQ_RMR into Bins Row Calculation output from step 11
- **Left click** on the *Y* button
  - In the *Y* **popup,** set the Y-Values to the Count for the PDF Complete table accumulation created in step 12
- **Tick** the *Multiple Lines Group By* box
- **Left click** on the *Multiple Lines Group By* button
  - In the *Group (1)* **popup,** set the Group to the Lithology under the Read CSV
  - In the *Group (2)* **popup,** set the Group to the Sort EQ_RMR into Bins Row Calculation output from step 11



The Chart should look something like this



Left Click the Configure Page button and Save the Tool

Analysis Step H – Creating a PDF Chart for the Ticked Lithologies

Create and Save a new *Chart | Create * Chart

Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step H – PDF per Lithology (ticks filtered) Chart

As before, **left click** on the *Configure Page* button
In the *Configure page* **popup**:

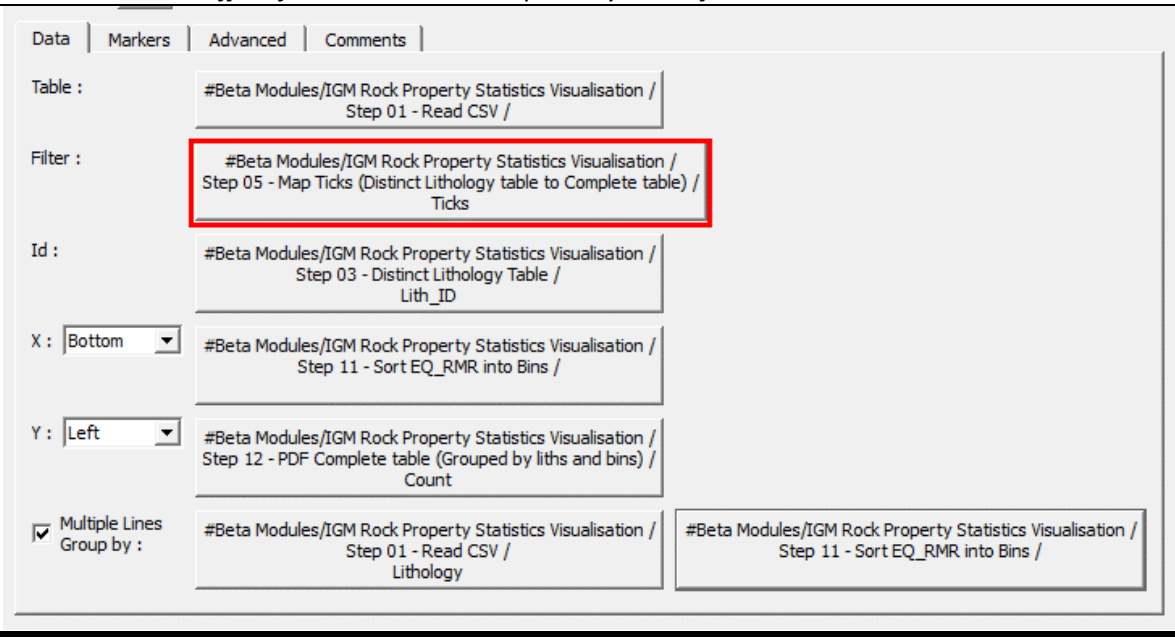
- **Left click** on the *Series* tab
- **Left click** on the *Add* button
- In the *Series Name* text box**,** give the series an appropriate name

Series Name: PDF - Ticks

Left click on the *Data* tab to open it

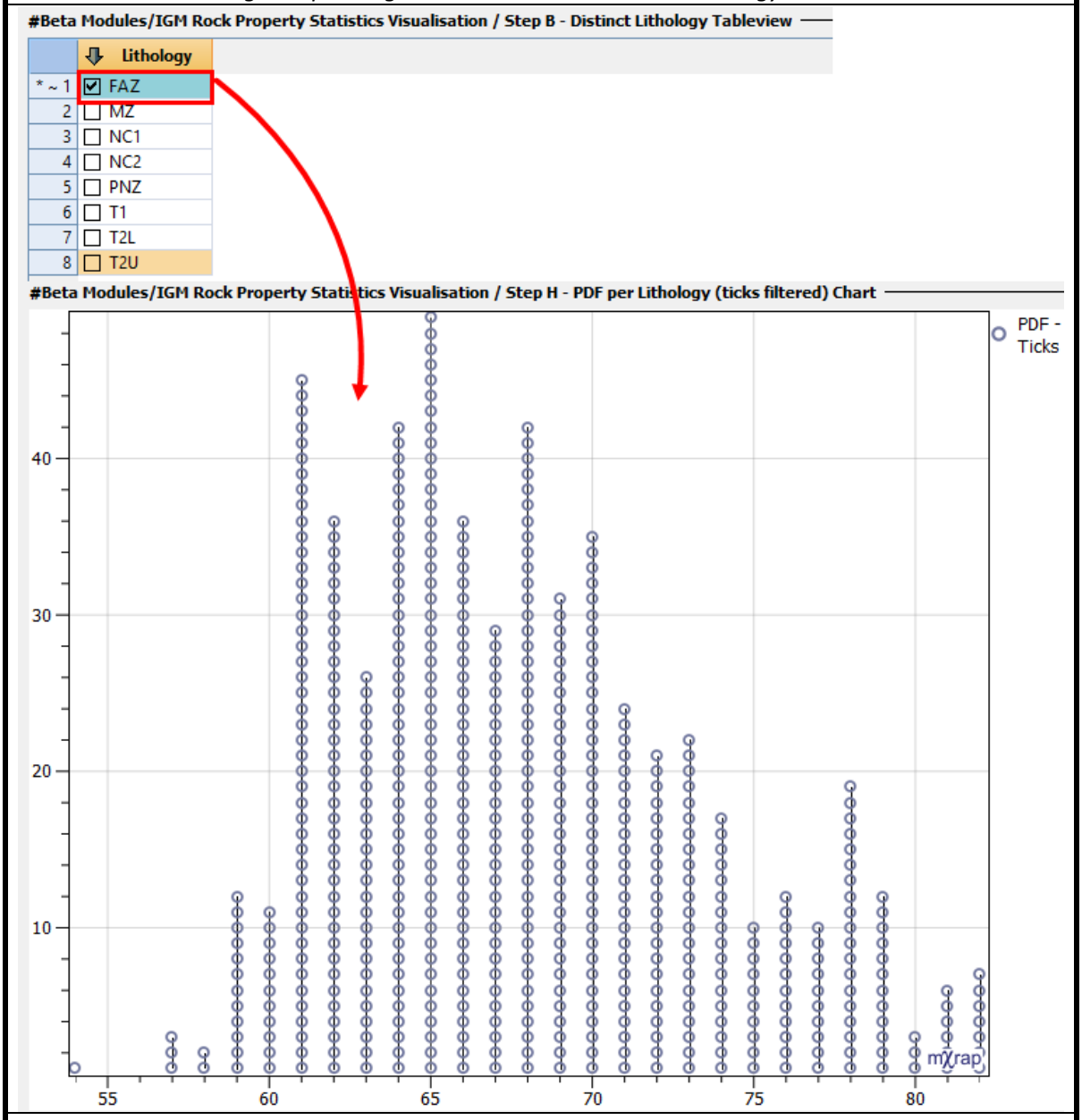
- **Left click** on the *Table* button
  - In the *Table* **popup,** navigate to the Read CSV table
- **Left click** on the *Filter* button
  - In the *Filter* **popup,** navigate to Ticks filter under the table map created in Step 05
- **Left click** on the *ID* button
  - In the *Set ID* **popup,** set the ID to Lith_ID
- **Left click** on the *X* button
  - In the *X* **popup,** set the X-Values to the Sort EQ_RMR into Bins Row Calculation output from step 11
- **Left click** on the *Y* button
  - In the *Y* **popup,** set the Y-Values to the Count for the PDF Complete table accumulation created in step 12
- **Tick** the *Multiple Lines Group By* box
- **Left click** on the *Multiple Lines Group By* button
  - In the *Group (1)* **popup,** set the Group to the Lithology under the Read CSV
  - In the *Group (2)* **popup,** set the Group to the Sort EQ_RMR into Bins Row Calculation output from step 11

Note: This chart differs from the chart in Step G only in the filter it uses.



The Chart should look something like this.

Note: This chart changes depending on the ticks in the Distinct Lithology Table



Left Click the Configure Page button and Save the Tool

Analysis Step I – Creating a PDF Chart for the Lithologies (Including an Offset)

Create and Save a new *Chart | Create * Chart

Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step I – PDF per Lithology (ticks + offset) Chart

As before, **left click** on the *Configure Page* button
In the *Configure page* **popup**:

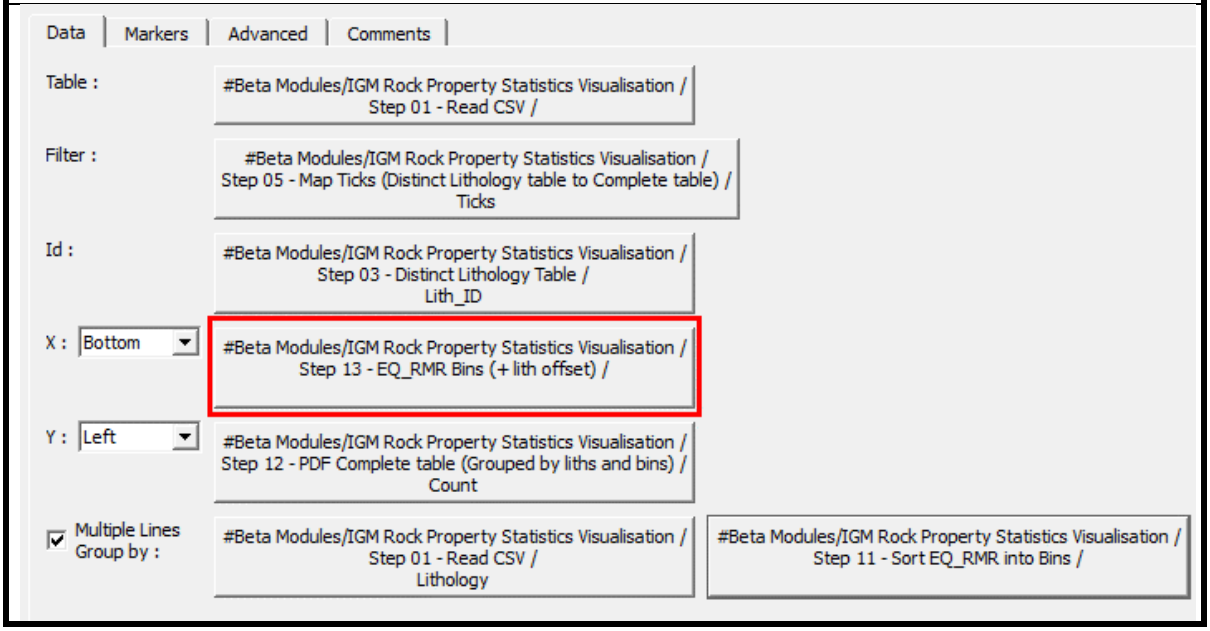
- **Left click** on the *Series* tab
- **Left click** on the *Add* button
- In the *Series Name* text box**,** give the series an appropriate name

Series Name: PDF - Ticks with Offset

Left click on the *Data* tab to open it

- **Left click** on the *Table* button
  - In the *Table* **popup,** navigate to the Read CSV table
- **Left click** on the *Filter* button
  - In the *Filter* **popup,** navigate to Ticks filter under the table map created in Step 05
- **Left click** on the *ID* button
  - In the *Set ID* **popup,** set the ID to Lith_ID
- **Left click** on the *X* button
  - In the *X* **popup,** set the X-Values to the EQ_RMR Bins (+ lith offset) row calculation output from Step 13
- **Left click** on the *Y* button
  - In the *Y* **popup,** set the Y-Values to the Count for the PDF Complete table accumulation created in step 12
- **Tick** the *Multiple Lines Group By* box
- **Left click** on the *Multiple Lines Group By* button
  - In the *Group (1)* **popup,** set the Group to the Lithology under the Read CSV
  - In the *Group (2)* **popup,** set the Group to the Sort EQ_RMR into Bins Row Calculation output from step 11

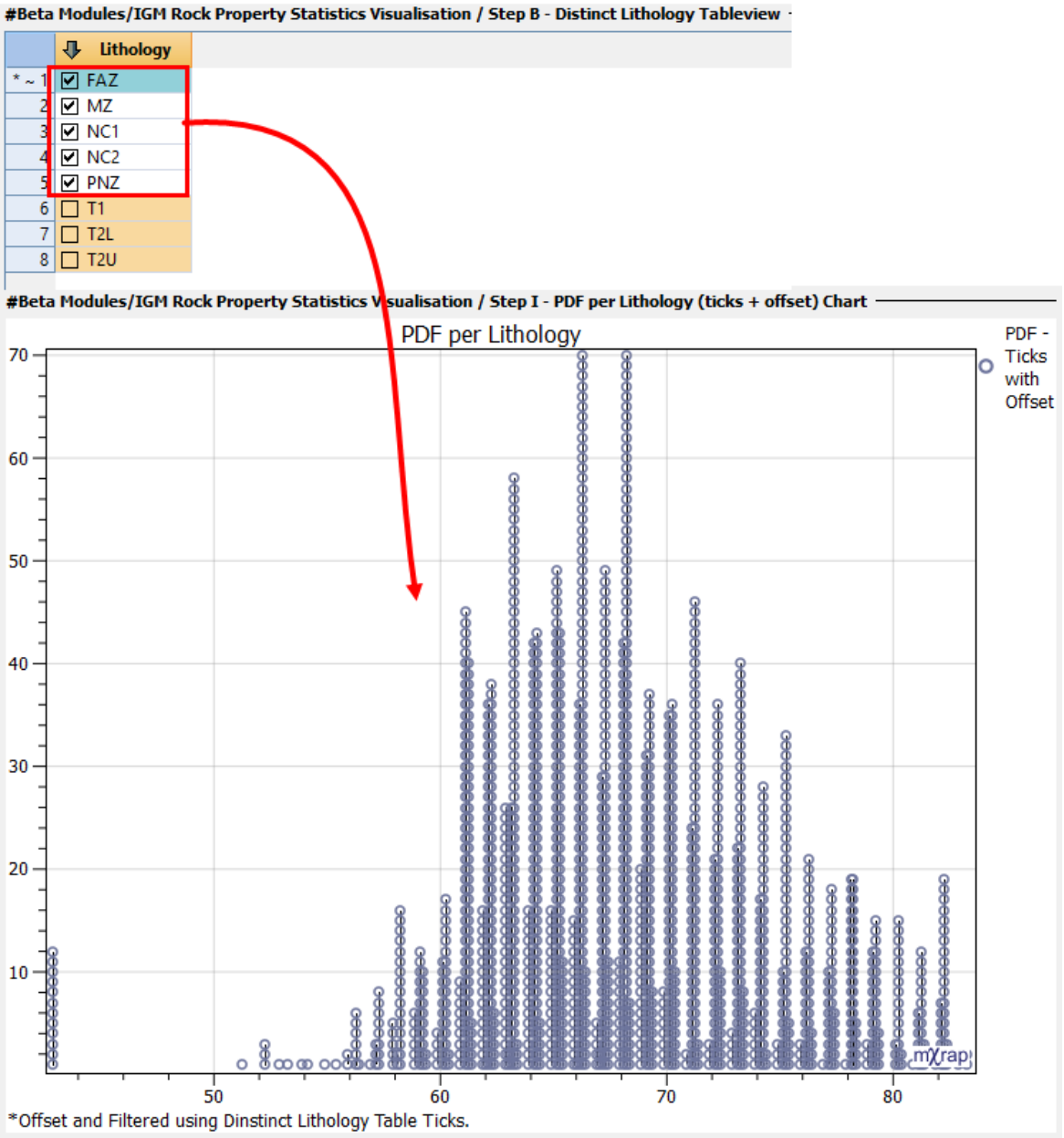
Note: This chart differs from the chart in Step H only in the X-Axis values it uses.



The Chart should look something like this.

Note: This chart changes depending on the ticks in the Distinct Lithology Table

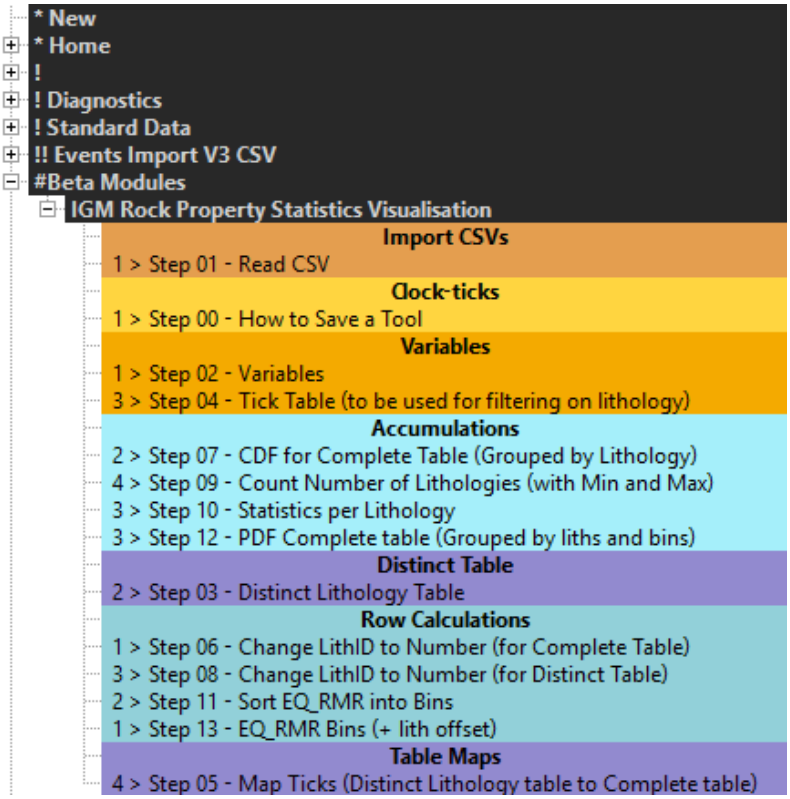
Note: The lithologies are slightly offset from each other. Once marker styles are applied (later in the walkthrough) the purpose of this offset will become particularly apparent.



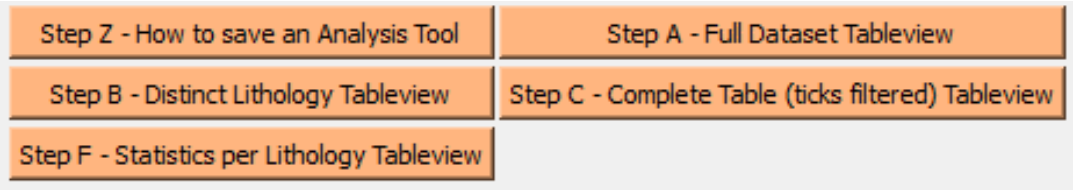
Left Click the Configure Page button and Save the Tool

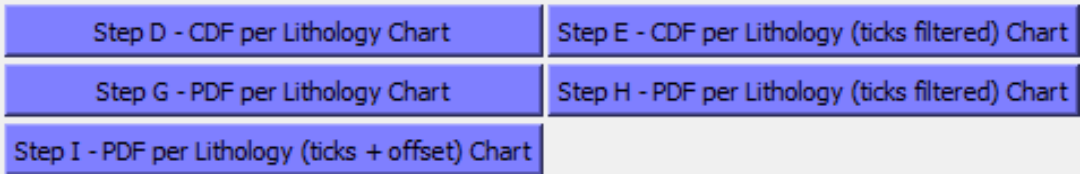
Application Progress (Section 6)

The tool tree in the Settings Window should now look as follows. Following the naming convention will make it easier to follow the walkthrough steps.



A PDF function has been created using a combination of a row calculation and an accumulation. This PDF is displayed using various charts, with the last of three charts filtered using the ticks from the Distinct Lithologies Table. The lithologies on the chart are also offset (using a row calculation) to make it easier to view the data for each lithology





In the next section, Marker Styles will be created. These Marker Styles will be applied to the charts and tables that will be included in the final application.

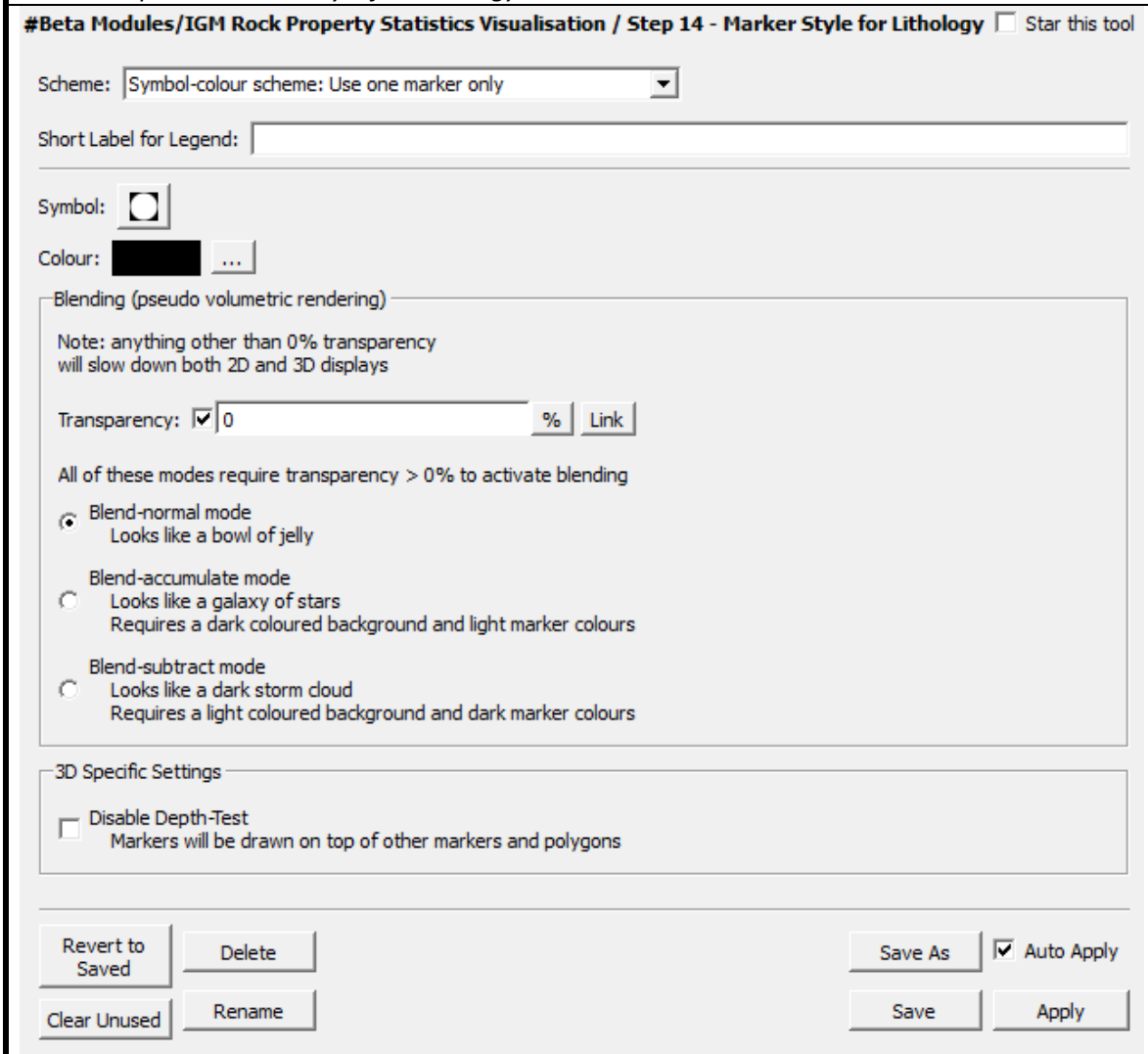
7. Markers

Settings Step 14 – Marker Style created for each lithology

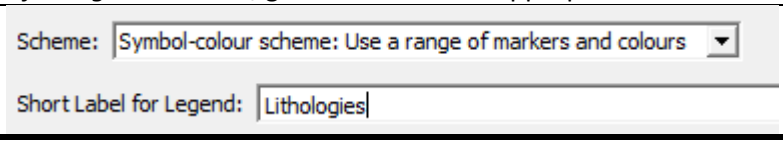
Marker style tools are used in the Analysis Window and determine the marker colours and shapes used to visualise the data.

Create and Save a new *Marker Style tool | *Marker Style

Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*
Name: Step 14 – Marker Style for Lithology



Left click on the *Scheme* **dropdown** and set the scheme to Symbol-colour scheme: Use a range of markers and colours
In the *Short Label for Legend* **textbox,** give the marker an appropriate name such as "Lithologies"



Left click on the *Basics* tab to open it
Left click on the *Input* button, in the *Choose Marker Input* **popup**

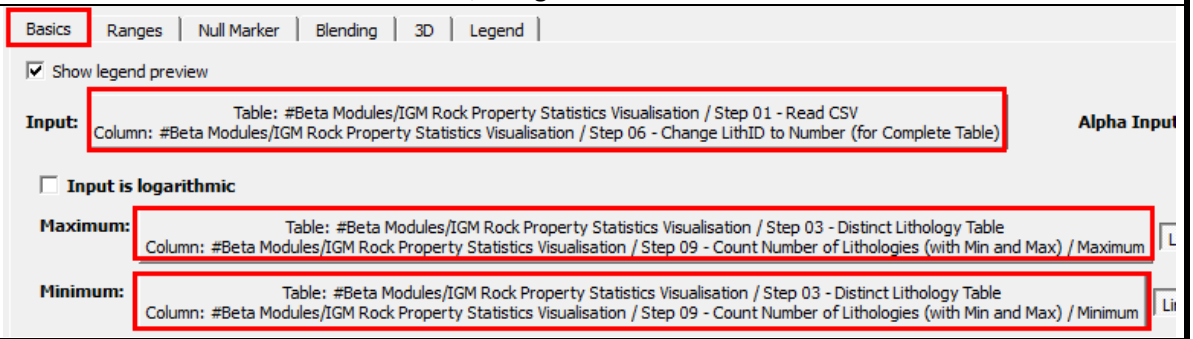
- In the *Tables* section, navigate to the CSV table
- In the *Columns in Table* section, add in the Change LithID to Number row calculation output from Step 06

Left click on the *Maximum* button, in the *Fixed Maximum* **popup**

- In the *Tables* section, navigate to the Distinct Lithology Table
- In the *Columns in Table* section, navigate to the Maximum

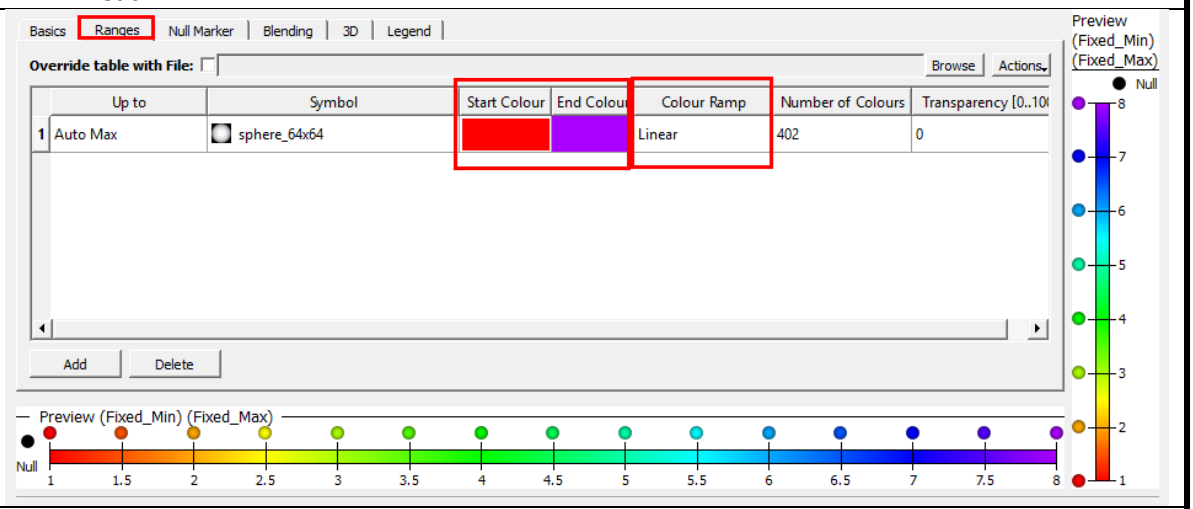
Left click on the *Minimum* button, in the *Fixed Minimum* **popup**

- In the *Tables* section, navigate to the Distinct Lithology Table
- In the *Columns in Table* section, navigate to the Minimum



Left click on the *Ranges* tab to open it

- **Double left click** on the *Colour Ramp* and select Linear
- **Double left click** on the *Start Colour* and *End Colour* and choose an appropriate colour for each



Save the Tool

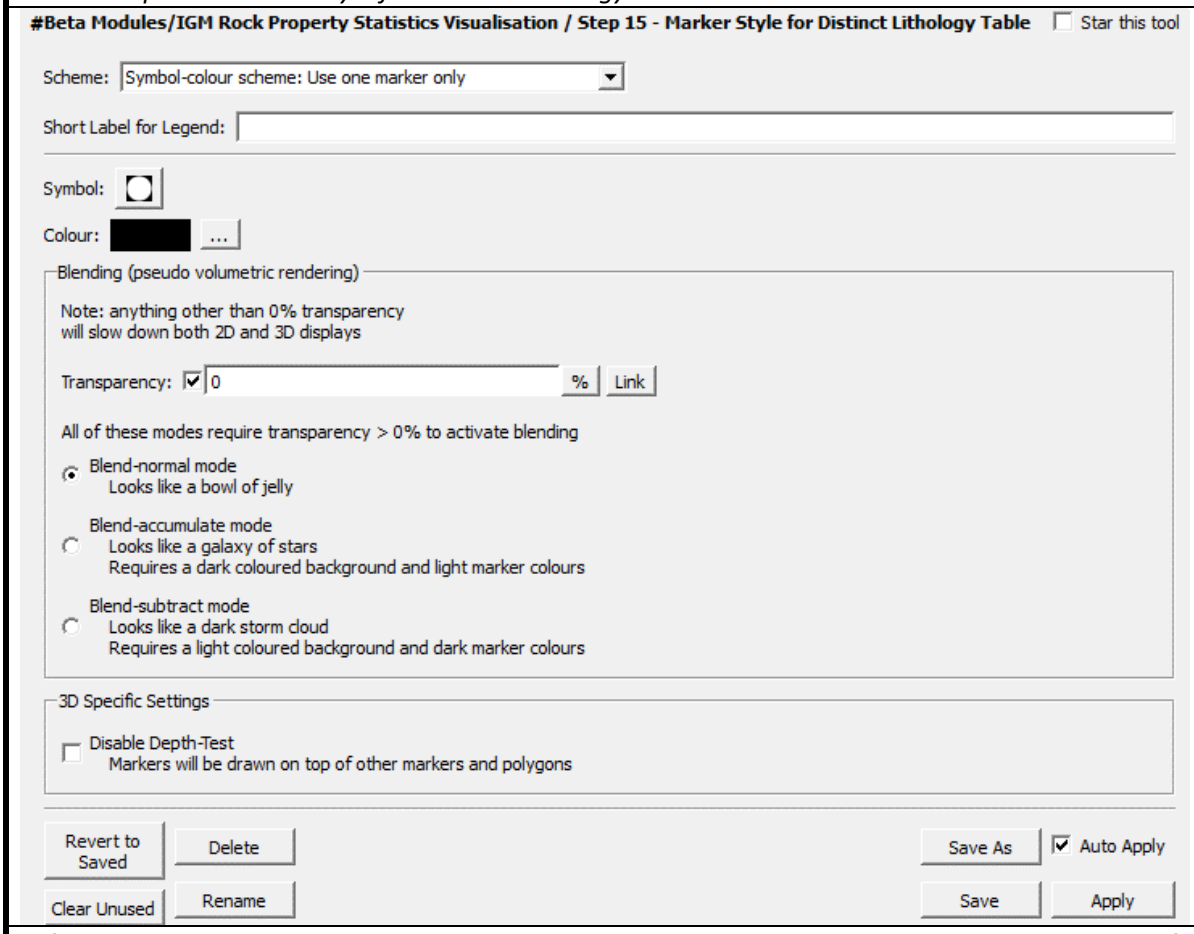
Settings Step 15 – Creating a new Marker Style for the Distinct Lithology Table

This marker style will give a unique colour to each of the lithologies.

Create and Save a new *Marker Style tool | * Marker Style

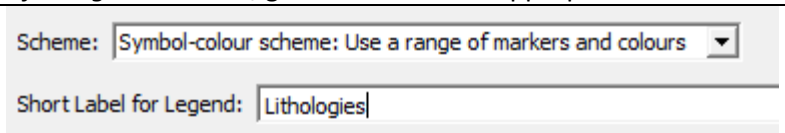
Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation*

Name: Step 15 – Marker Style for Distinct Lithology Table



Left click on the *Scheme* **dropdown** and set the scheme to Symbol-colour scheme: Use a range of markers and colours

In the *Short Label for Legend* **textbox,** give the marker an appropriate name such as "Lithologies"



Left click on the *Basics* tab to open it
Left click on the *Input* button, in the *Choose Marker Input* **popup**

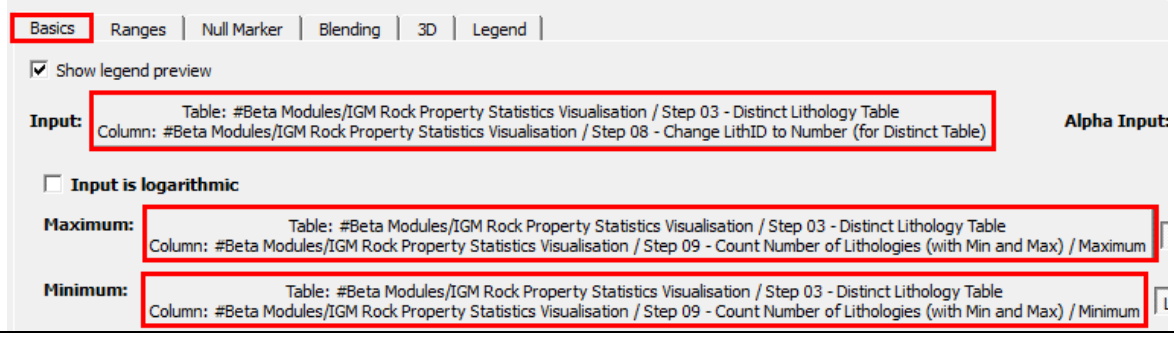
- In the *Tables* section, navigate to the Distinct Lithology Table
- In the *Columns in Table* section, add in the Change LithID to Number row calculation output from Step 08

Left click on the *Maximum* button, in the *Fixed Maximum* **popup**

- In the *Tables* section, navigate to the Distinct Lithology Table
- In the *Columns in Table* section, navigate to the Maximum

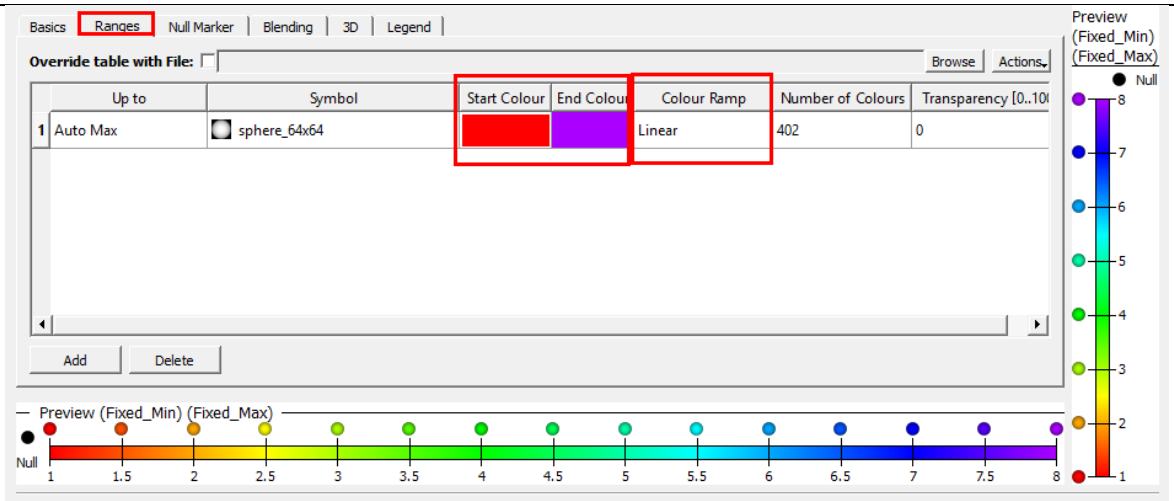
Left click on the *Minimum* button, in the *Fixed Minimum* **popup**

- In the *Tables* section, navigate to the Distinct Lithology Table
- In the *Columns in Table* section, navigate to the Minimum



Left click on the *Ranges* tab to open it

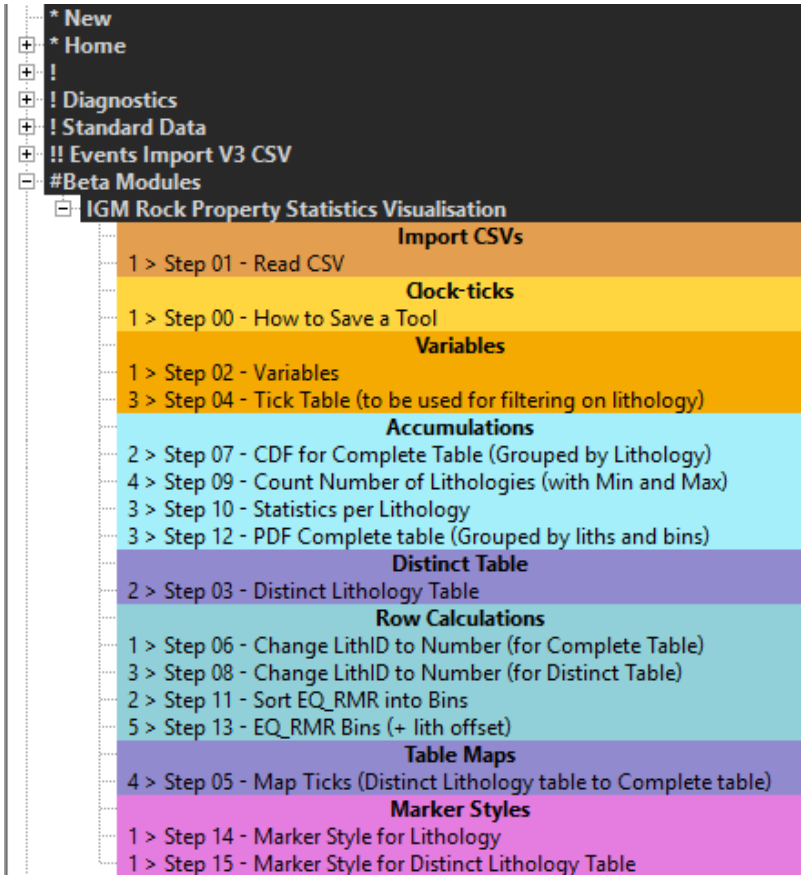
- **Double left click** on the *Colour Ramp* and select Linear
- **Double left click** on the *Start Colour* and *End Colour* and choose an appropriate colour for each



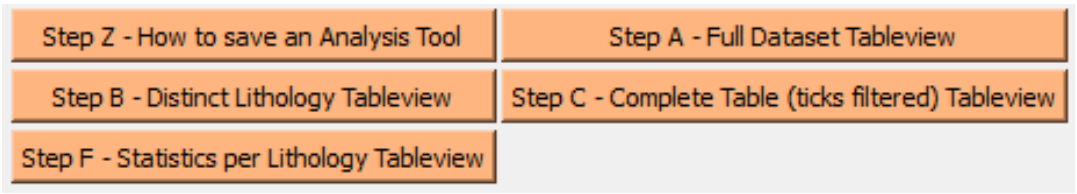
Save the Tool

Application Progress (Section 7)

The tool tree in the Settings Window should now look as follows. Following the naming convention will make it easier to follow the walkthrough steps.



Markers have now been created. These will be added in to the relevant charts and tables after the interface tools have been completed.



In the next section, the application interface tools will be created.

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8. Interface

Interface submenu

The interface is a set of tools created for the purpose of building the frontend of the app. To differentiate from the tools previously created in the Settings Window, it is advised to save the tools created for the interface under a new submenu (named @interface in this case)

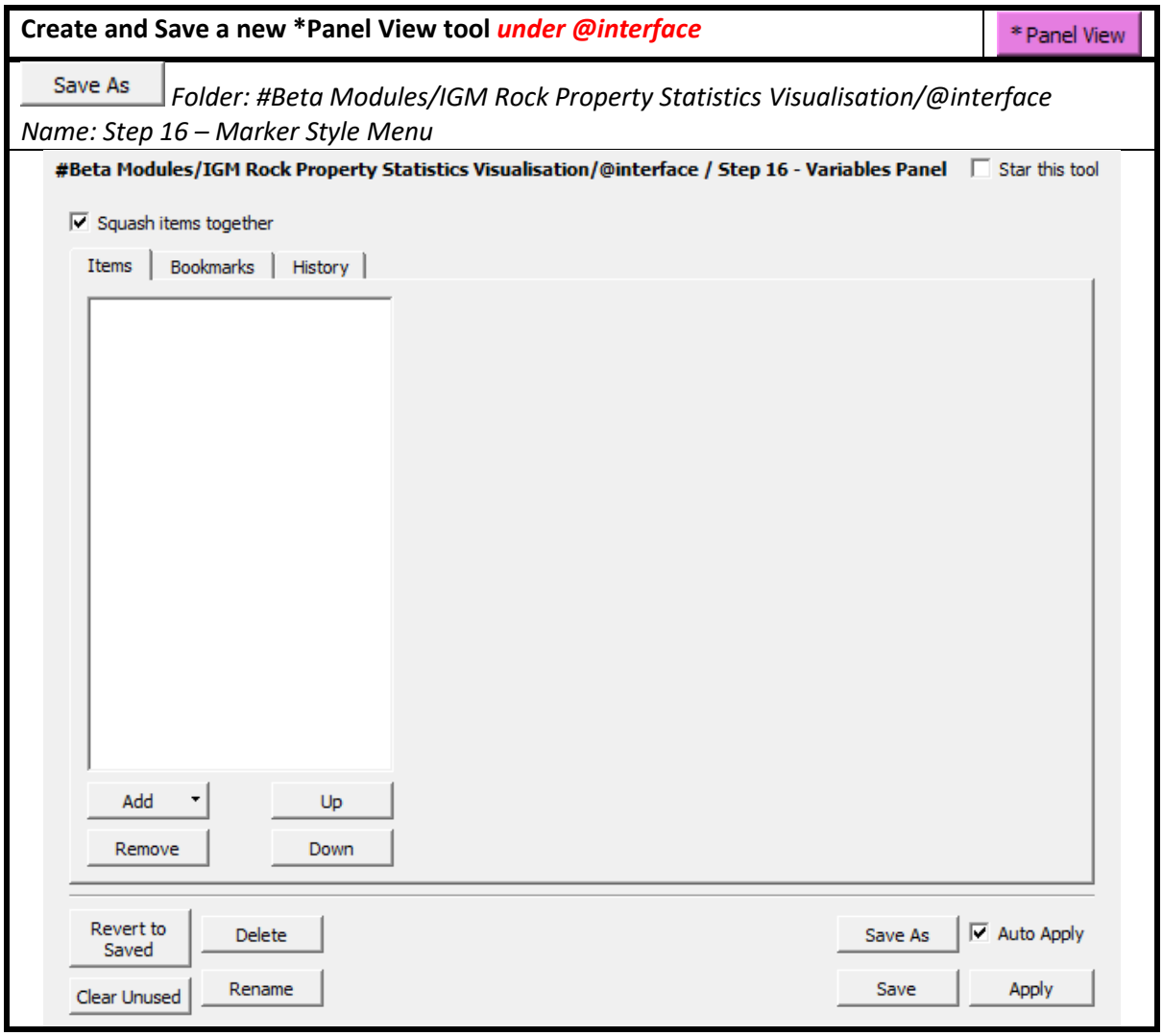
The Analysis Tools will be saved in the root folder under the directory:

#Beta Modules/IGM Rock Property Statistics Visualisation Example/@interface

Each interface step (Settings window) will be saved Numerically eg Step 16 – Marker Style Menu

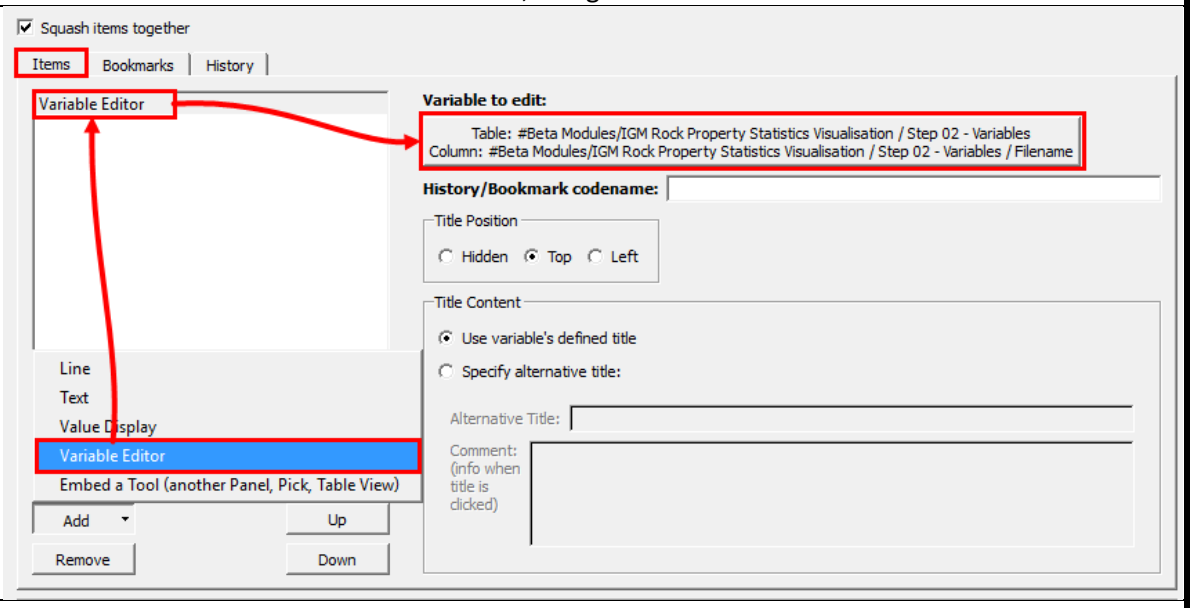
Settings Step 16 – Creating a Variables Panel for the App

Variables panels are created for the user of the app to change a set of predefined parameters. In this case, this variables panel will be set up to allow the user to change the input CSV file within the app instead of necessitating the use of the Settings Window.



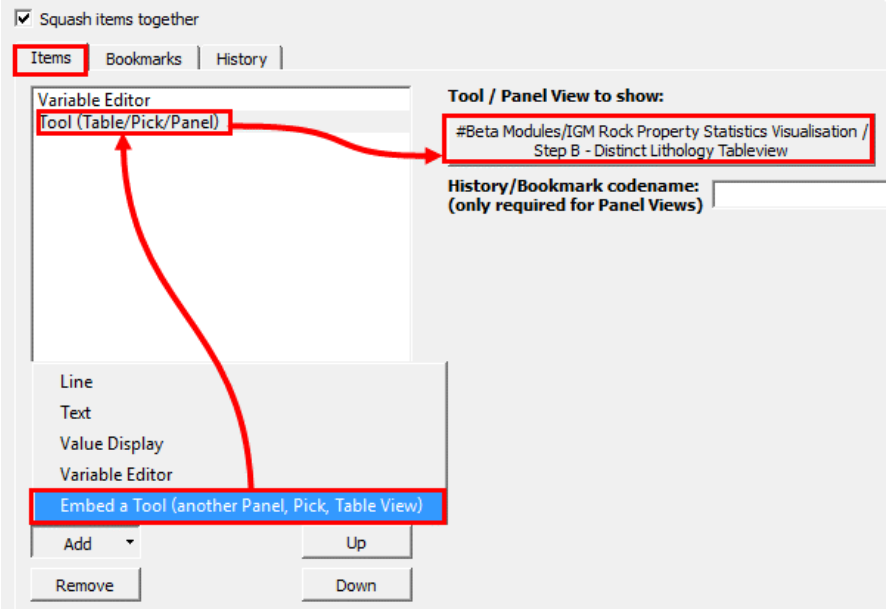
Left click on the *Items* tab to open it
Left click on the *Add* **dropdown** and add a Variable Editor
Left click on the *Variable Editor* item
Left click on the *Variable to edit* button
In the *Choose Variable* **popup**

- Under the *Tables* section, navigate to the Variable table created in Step 02
- Under the *Columns in Table* section, navigate to the Filename variable column



Left click on the *Items* tab to open it
Left click on the *Add* **dropdown** and add a Embed a tool (another Panel, Pick, Table View)
Left click on the *Tool (Table/Pick/Panel)* item
Left click on the *Tool/Panel View to show* button
In the *Tool/Panel View to show* **dropdown list,** navigate to the Distinct Lithology Tableview created in Step B using the following route

- **Table Views >> #Beta Modules >> IGM Rock Property Statistics Visualisation >> Step B – Distinct Lithology Tableview**



Save the Tool

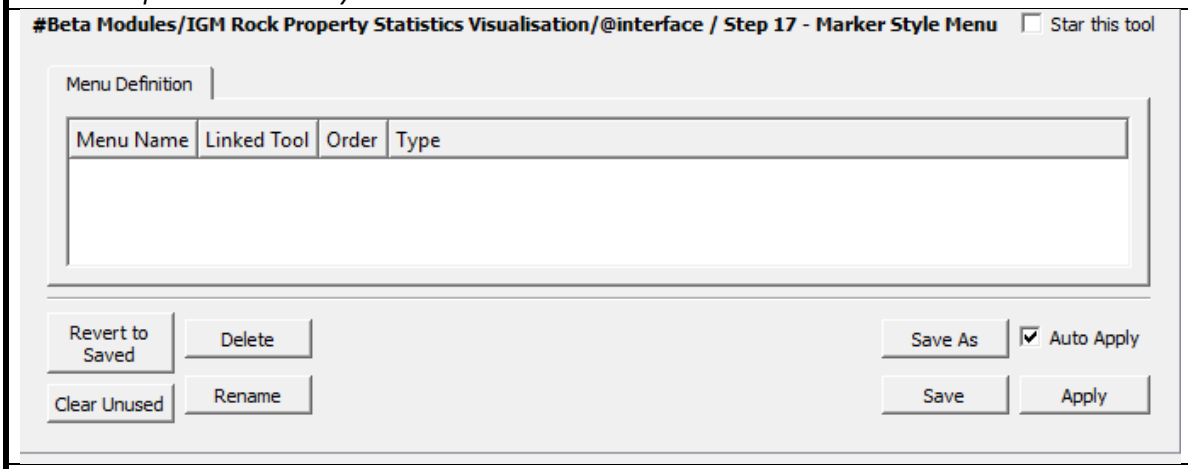
Settings Step 17 – Creating a Menu Definition for the Marker Styles

Menus contain items that have been created in the Settings and Analysis Windows. In this case, the Menu Definition will contain all of the marker styles that have been created. This menu will later be added in to the analysis tools that will be used in the app.

Create and Save a new *New Menu Definition tool *under @interface*

Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation/@interface*

Name: Step 17 – Marker Style Menu



Right click in the Menu Definition window
Left click *Add New Tool*
In the **dropdown list,** navigate to the Marker Style created in Step 14 using the following route

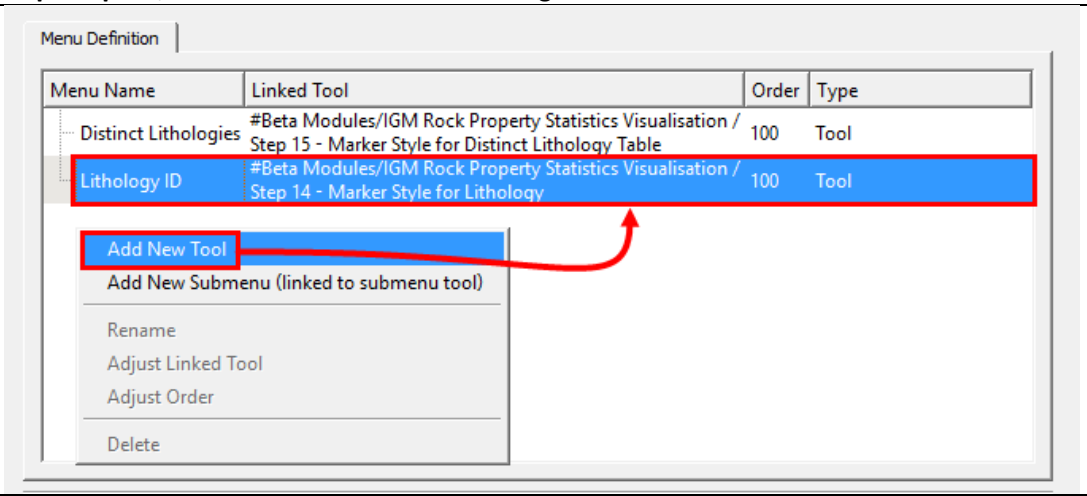
- **Marker Styles >> #Beta Modules >> IGM Rock Property Statistics Visualisation >> Step 14 – Maker Style for Lithology**

When **prompted,** name the tool "Lithology ID"

Right click in the Menu Definition window
Left click *Add New Tool*
In the **dropdown list,** navigate to the Marker Style created in Step 15 using the following route

- **Marker Styles >> #Beta Modules >> IGM Rock Property Statistics Visualisation >> Step 15 – Maker Style for Distinct Lithology Table**

When **prompted**, name the tool "Distinct Lithologies"



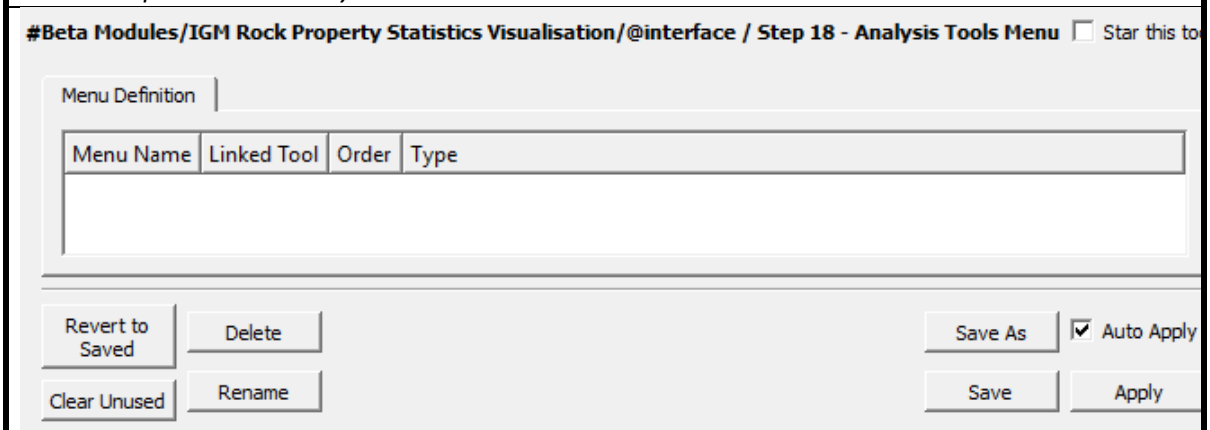
Save the Tool

Settings Step 18 – Creating a Menu Definition for the Analysis Tools created

This menu definition contains all of the analysis tools to be displayed in the app as well as any controls that need to be included into the app.

Create and Save a new *New Menu Definition tool *under @interface*

Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation/@interface*
Name: Step 18 – Marker Style Menu



Right click in the Menu Definition window
Left click *Add New Tool*
In the **dropdown list,** navigate to the CDF chart created in Step E using the following route

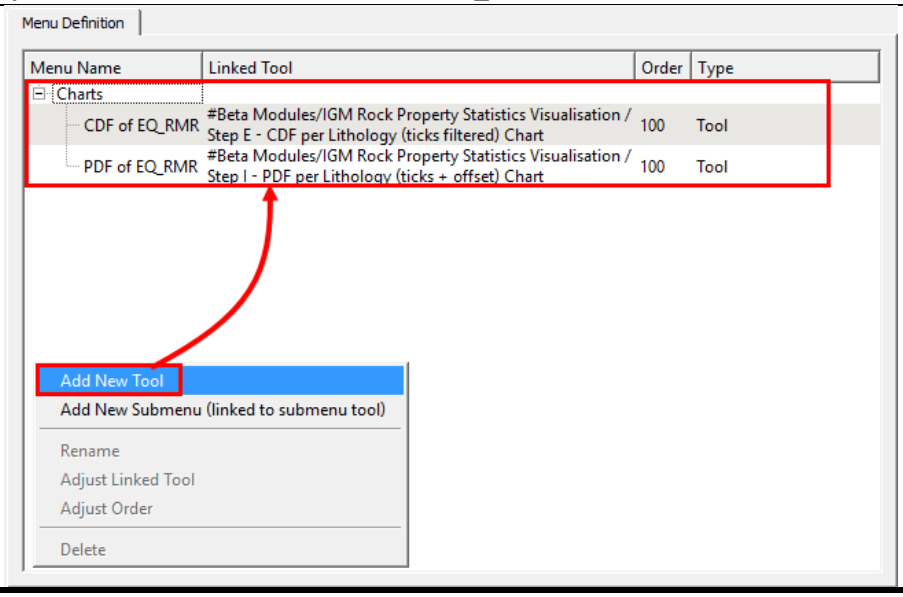
- **Charts >> #Beta Modules >> IGM Rock Property Statistics Visualisation >> Step E – CDF per Lithology (ticks filtered) Chart**

When **prompted,** name the tool "Charts/CDF of EQ_RMR"

Right click in the Menu Definition window
Left click *Add New Tool*
In the **dropdown list,** navigate to the PDF chart created in Step I using the following route

- **Charts >> #Beta Modules >> IGM Rock Property Statistics Visualisation >> Step I – PDF per Lithology (ticks + offset) Chart**

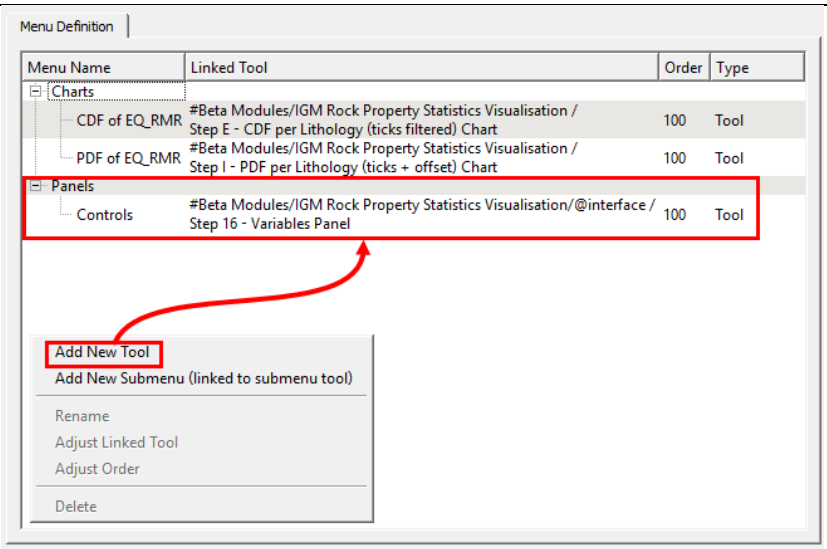
When **prompted**, name the tool "Charts/PDF of EQ_RMR"



Right click in the Menu Definition window
Left click *Add New Tool*
In the **dropdown list,** navigate to the Panel View created in Step 16 using the following route

- **Panel Views >> #Beta Modules >> IGM Rock Property Statistics Visualisation >> Step 16 – Variables Panel**

When **prompted,** name the tool "Panels/Controls"



Right click in the Menu Definition window
Left click *Add New Tool*
In the **dropdown list,** navigate to the Table created in Step F using the following route

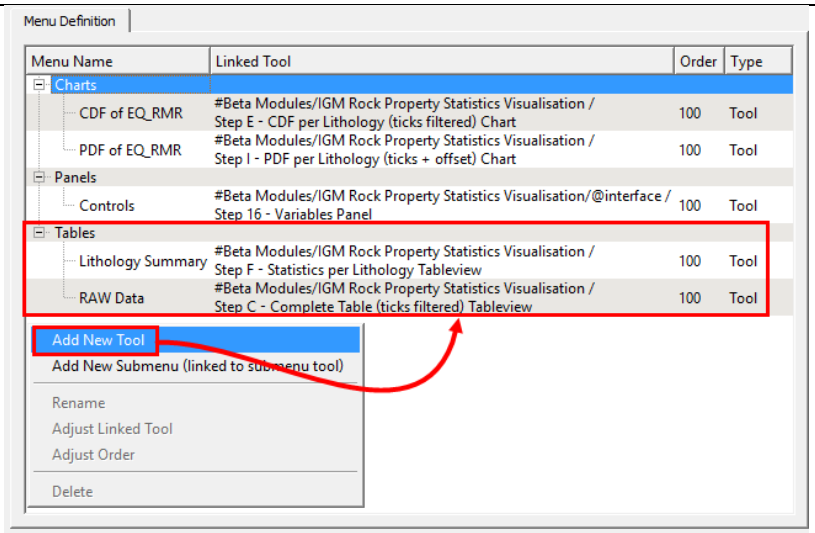
- **Table Views>> #Beta Modules >> IGM Rock Property Statistics Visualisation >> Step F – Statistics per Lithology Tableview**

When **prompted,** name the tool "Tables/Lithology Summary"

Right click in the Menu Definition window
Left click *Add New Tool*
In the **dropdown list,** navigate to the Table created in Step C using the following route

- **Table Views>> #Beta Modules >> IGM Rock Property Statistics Visualisation >> Step C – Complete Table (ticks filtered) Tableview**

When **prompted,** name the tool "Tables/RAW Data"

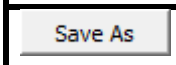


Save the Tool

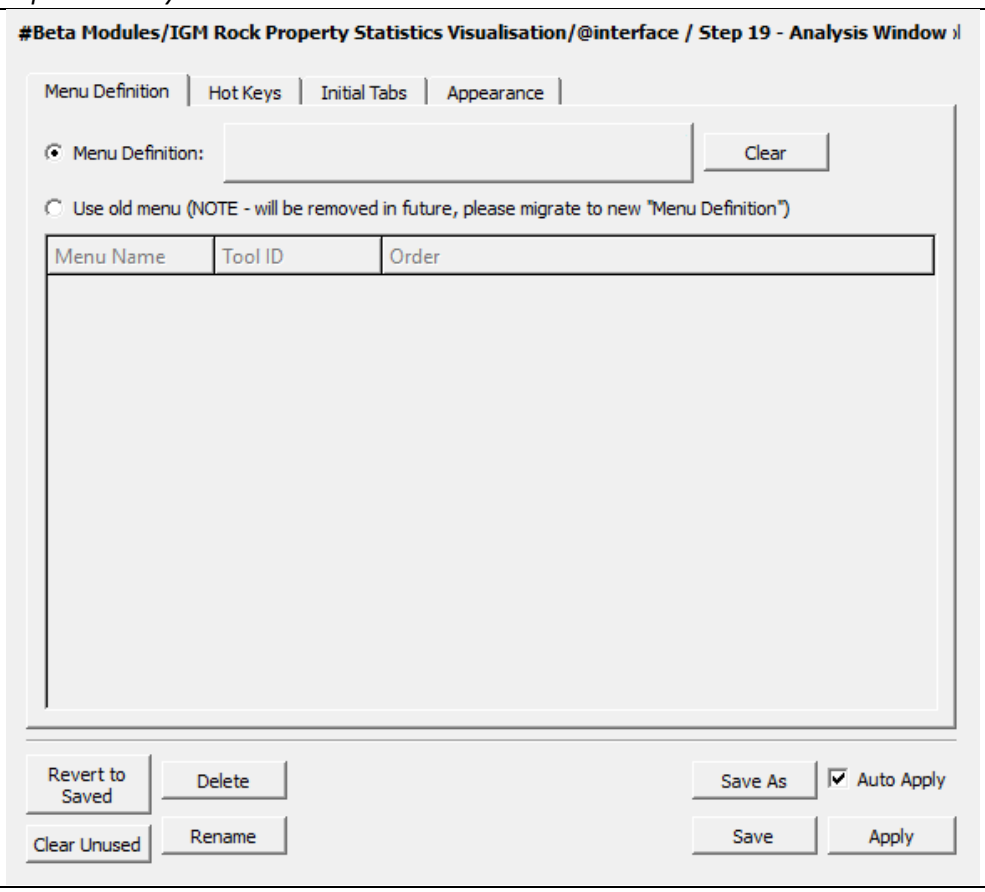
Settings Step 19 – Creating a Window Definition

Each app requires at least one window, but can have many windows. This allows for each window to be focussed on a specific task. Separation of tools into appropriate windows helps to avoid unnecessary clutter.

Create and Save a new *Window Definition tool *under @interface*

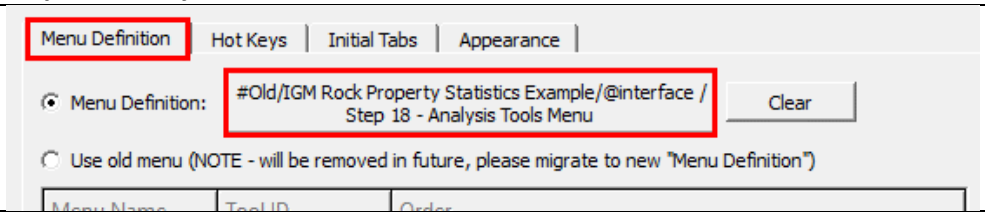


Folder: #Beta Modules/IGM Rock Property Statistics Visualisation/@interface
Name: Step 19 – Analysis Window



Left click on the *Menu Definitions* tab to open it
Left click on the *Menu Definition* button and navigate to the Menu Definition created in Step 18 using the following route

- **Menu Definitions >> #Beta Modules >> IGM Rock Property Statistics Visualisation >> Step 18 – Analysis Tools Menu**



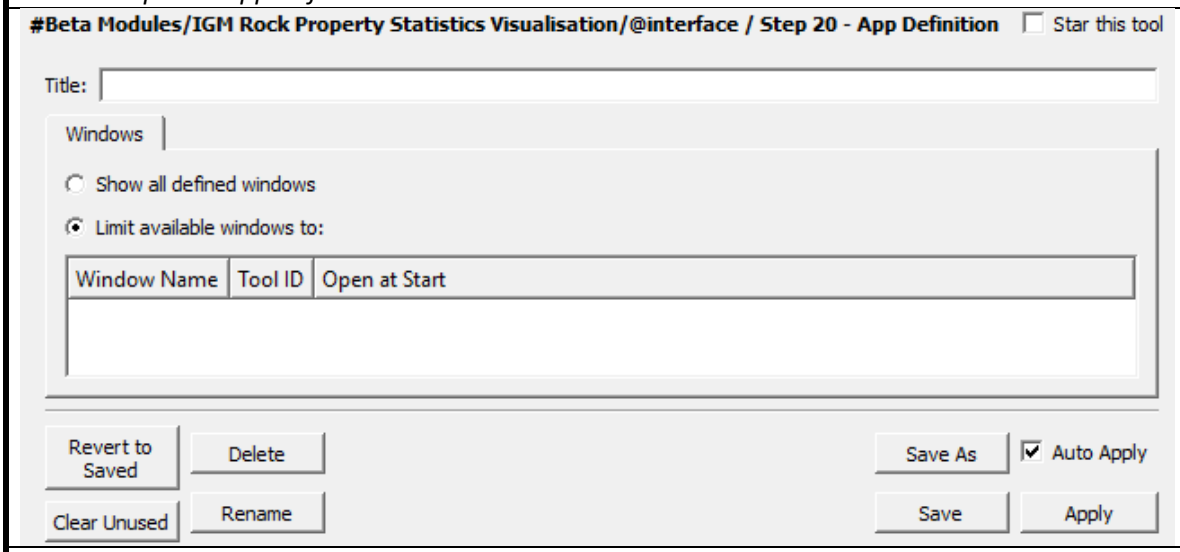
Save the Tool

Settings Step 20 – Creating an App definition to complete the App build process

Finally, the app definition simply contains all of the windows that should be included into the application.

Create and Save a new *App Definition tool *under @interface* | * App Definition

Save As *Folder: #Beta Modules/IGM Rock Property Statistics Visualisation/@interface*
Name: Step 20 – App Definition



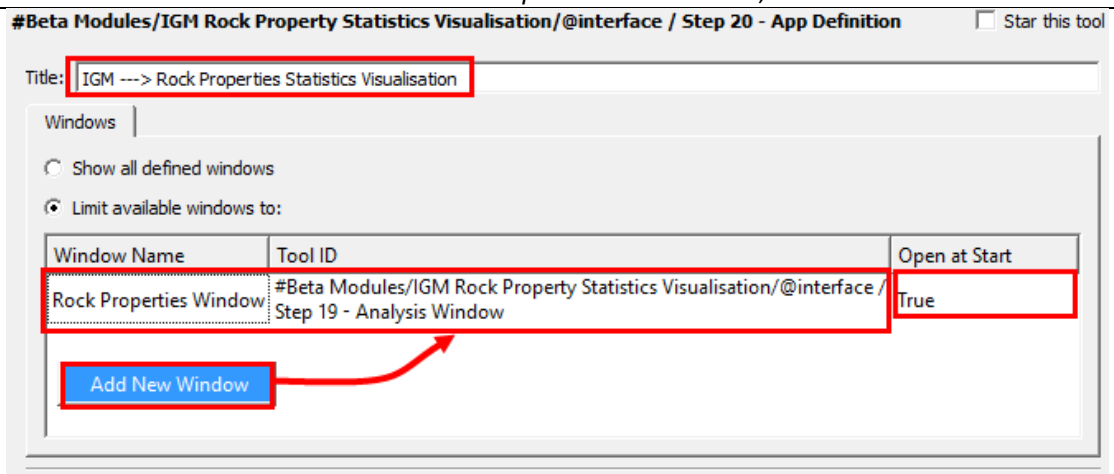
In the *Title* **textbox,** enter an appropriate app name. For this walkthrough, the name is:
"IGM ---> Rock Properties Statistics Visualisation"

Right click in the Menu Definition window
Left click *Add New Window*
In the **dropdown list,** navigate to the Window Definition created in Step 19 using the following route

- **Window Definitions >> #Beta Modules >> IGM Rock Property Statistics Visualisation >> Step 19 – Analysis Window**

When **prompted,** name the tool "Rock Properties Window"

Double left click on the Window Definitions *Open at Start* column, and set it to *True*

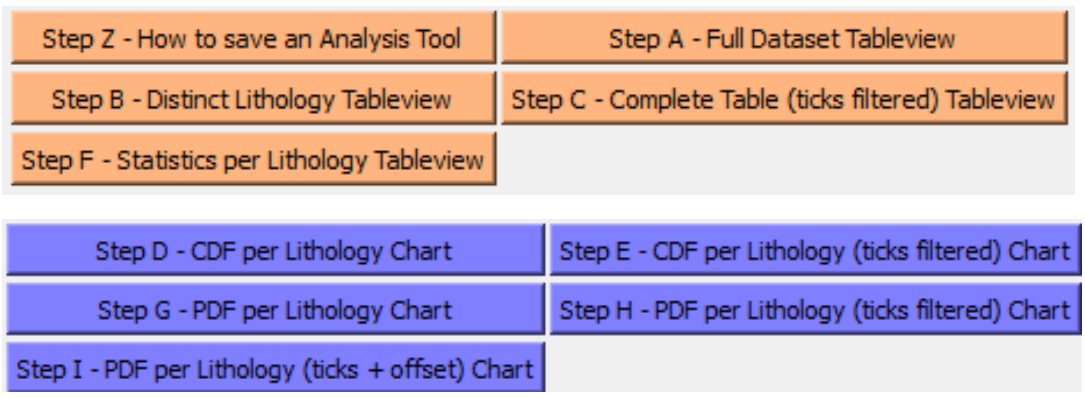


Save the Tool

Application Progress (Section 8)

The tool tree in the Settings Window should now look as follows. Following the naming convention will make it easier to follow the walkthrough steps.

The interface is now complete.



In the next section, the marker styles will be applied to the application charts and tables.

9. Applying LithoID Markers

Analysis Step C Continued – Adding Markers to Complete Ticks Table

Open the Complete Table with Ticks Tableview | Step C - Complete Table (ticks filtered) Tableview

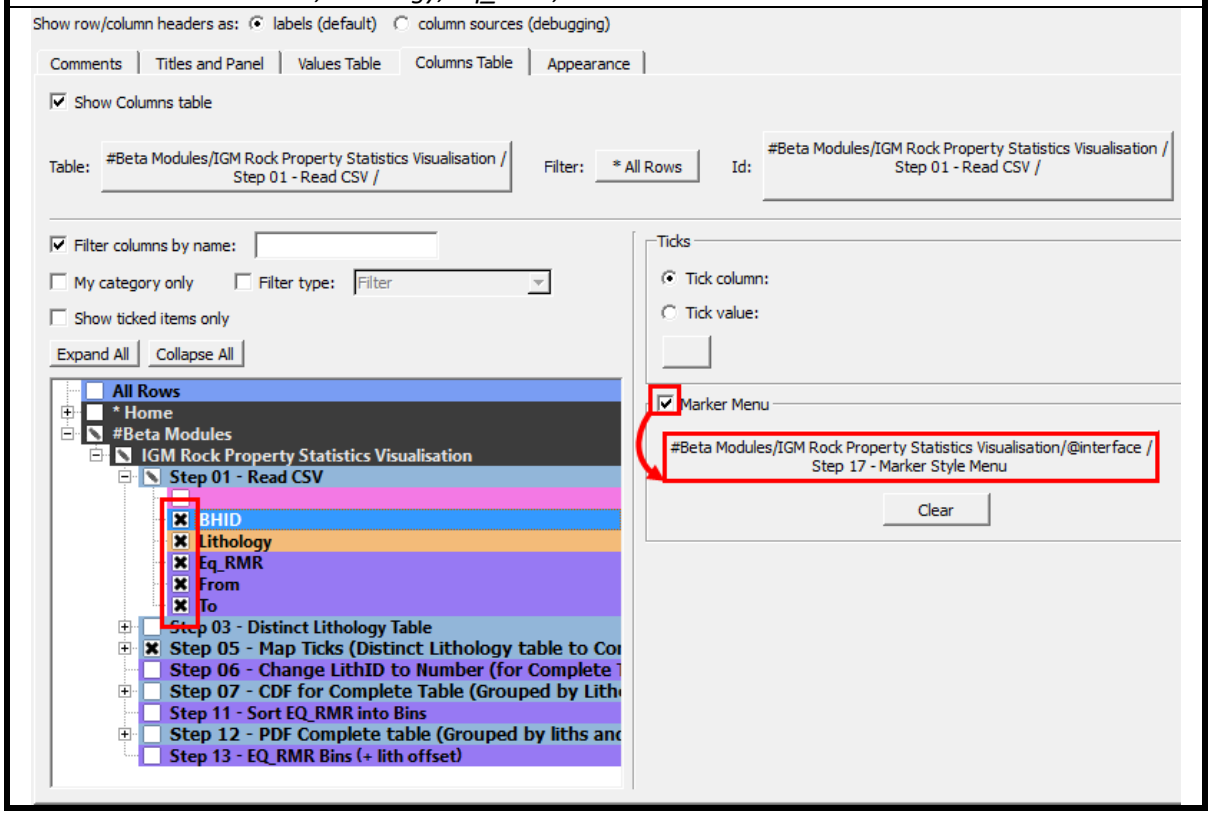
#Beta Modules/IGM Rock Property Statistics Visualisation / Step C - Complete Table (ticks filtered) Tableview

	Ticks	Lithology
432	Included	FAZ
433	Included	FAZ
434	Included	FAZ
435	Included	FAZ
436	Included	FAZ
437	Included	FAZ

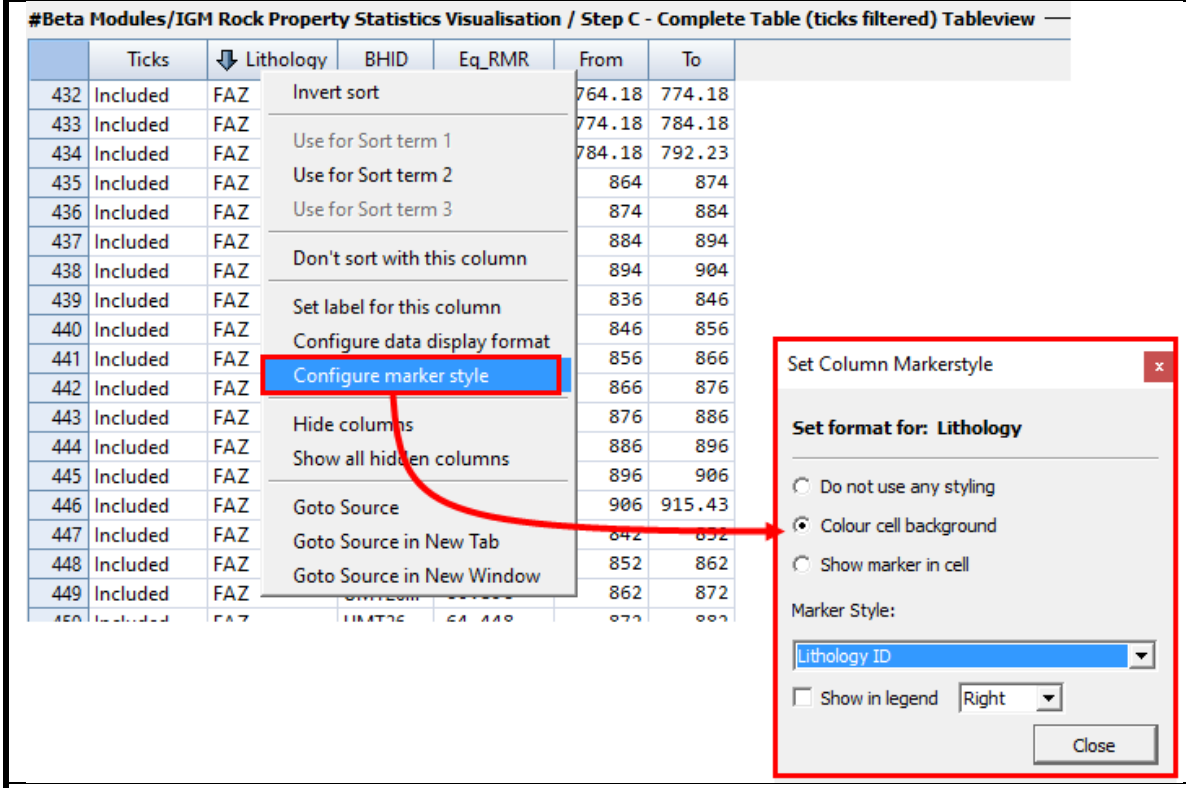
Left click on the *Configure Page* button

In the *Configure page* **popup**:

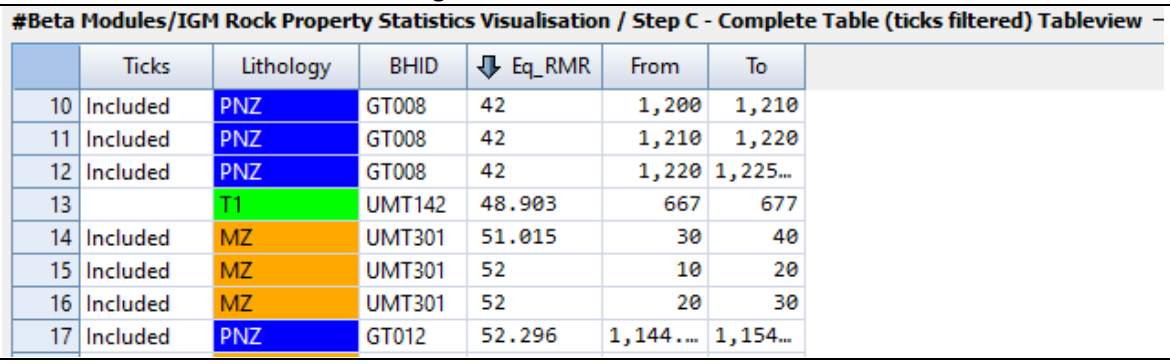
- **Tick** the *Marker Menu* box
- In the *Marker Menu* **dropdown,** navigate to the Marker Menu created in Step 17 using the following route
  - **Menu Definitions >> #Beta Modules >> IGM Rock Property Statistics Visualisation >> Step 17 – Marker Style Menu**
- **Tick** on the *BHID, Lithology, Eq_RMR, From* and *To* columns to show them in the table.



Right click on the *Lithology* column heading and then **left click** on *Configure marker style*



The table should now look something like this



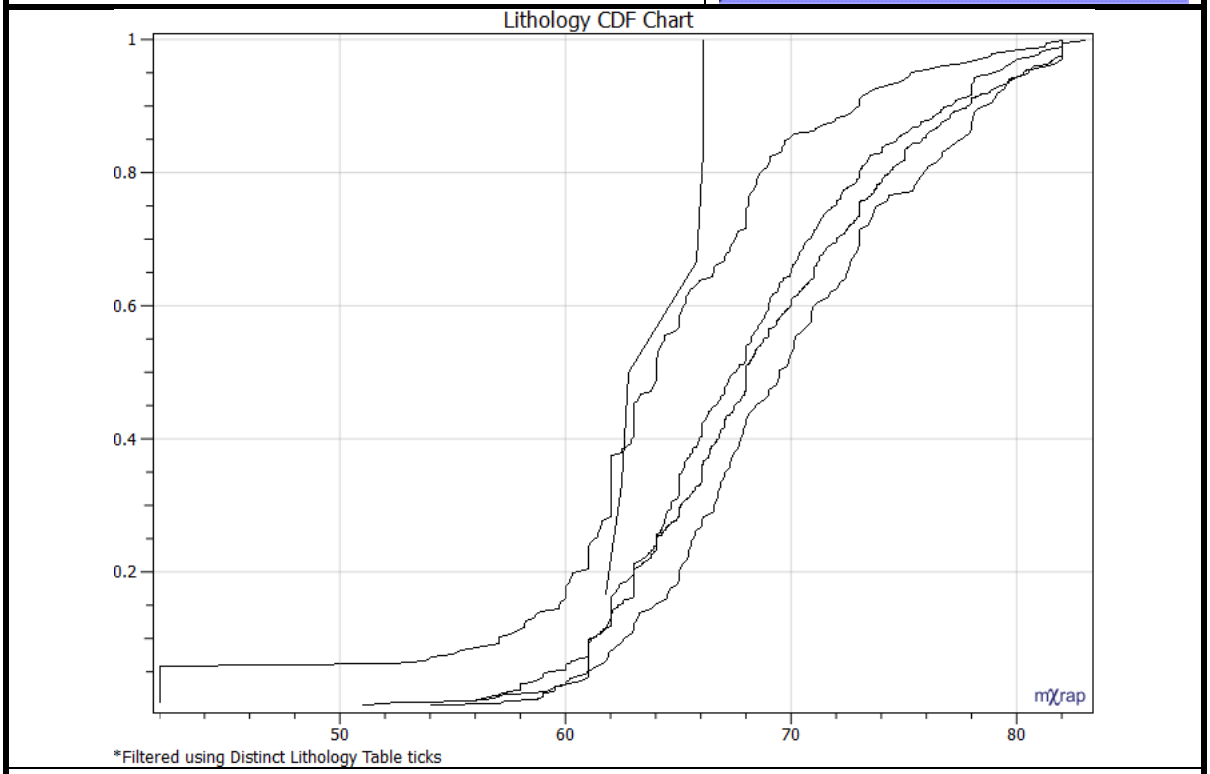
	Ticks	Lithology	BHID	Eq_RMR	From	To
10	Included	PNZ	GT008	42	1,200	1,210
11	Included	PNZ	GT008	42	1,210	1,220
12	Included	PNZ	GT008	42	1,220	1,225…
13		T1	UMT142	48.903	667	677
14	Included	MZ	UMT301	51.015	30	40
15	Included	MZ	UMT301	52	10	20
16	Included	MZ	UMT301	52	20	30
17	Included	PNZ	GT012	52.296	1,144.…	1,154…

Left Click the Configure Page button and Save the Tool

Analysis Step E Continued – Adding Markers to CDF Chart

Open the CDF per Lithology (ticks filtered) Chart

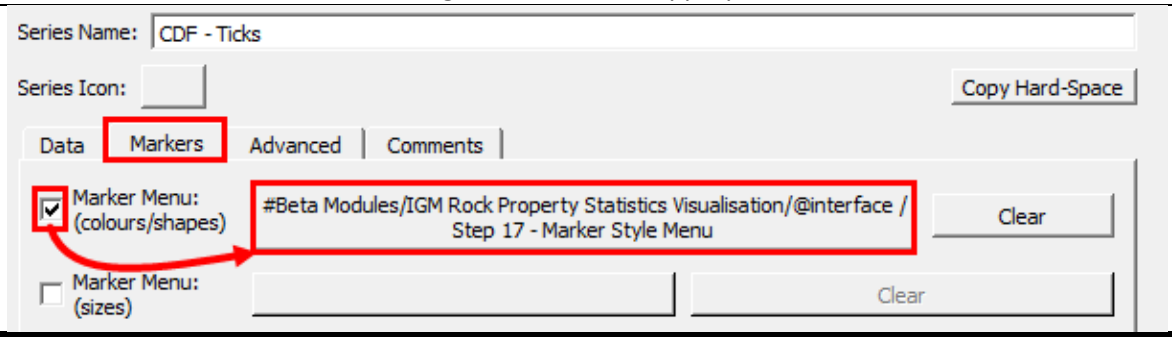
Step F - CDF per Lithology (ticks filtered) Chart



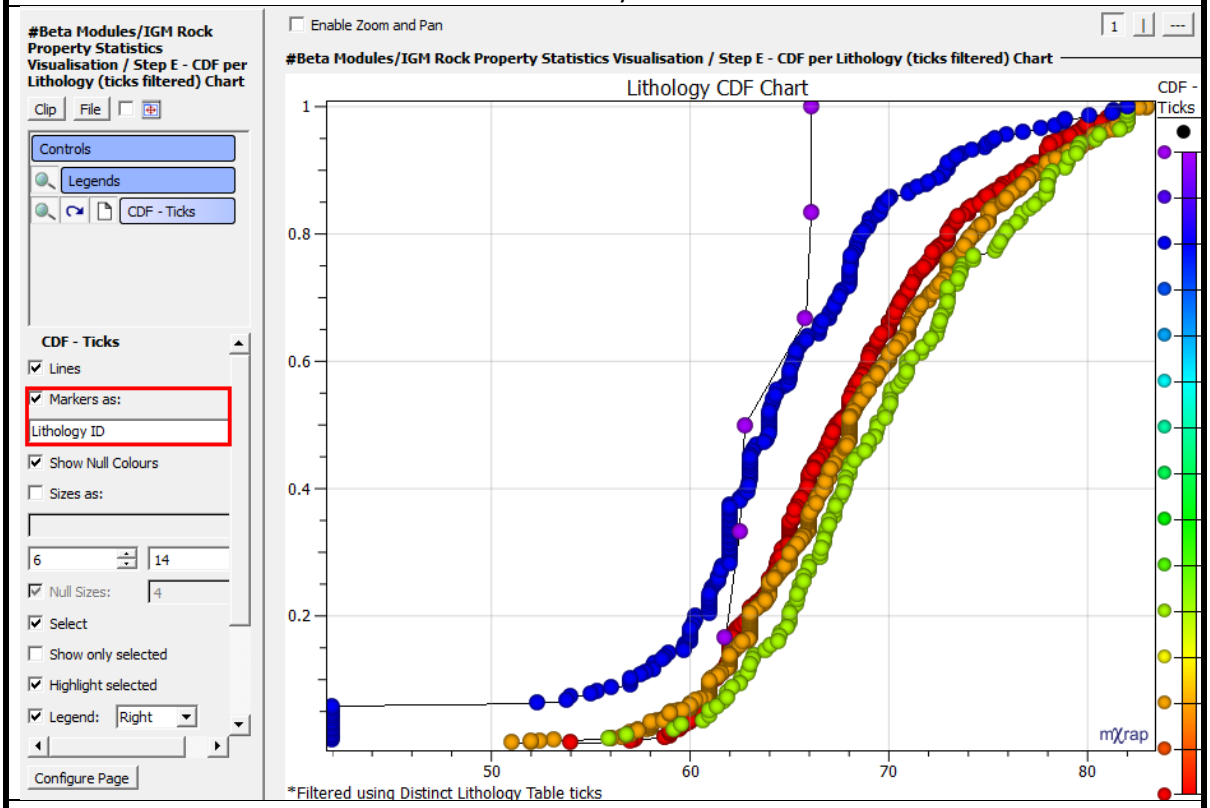
As before, **left click** on the *Configure Page* button

In the *Configure page* **popup**:

- **Left click** on the *Series* tab
- In the *Series* tab, **left click** on the *Markers* tab
- **Tick** the *Marker Menu (colours/shapes)*
- **Left click** on the *Marker Menu* button
- In the **dropdown**, navigate to the Marker Styles menu definition using the following route
  - **Menu Definitions >> #Beta Modules >> IGM Rock Property Statistics Visualisation >> Step 17 – Marker Style Menu**
- In the *Series Name* text box**,** give the series an appropriate name



Tick the *Marker As* box to view the new Marker Style

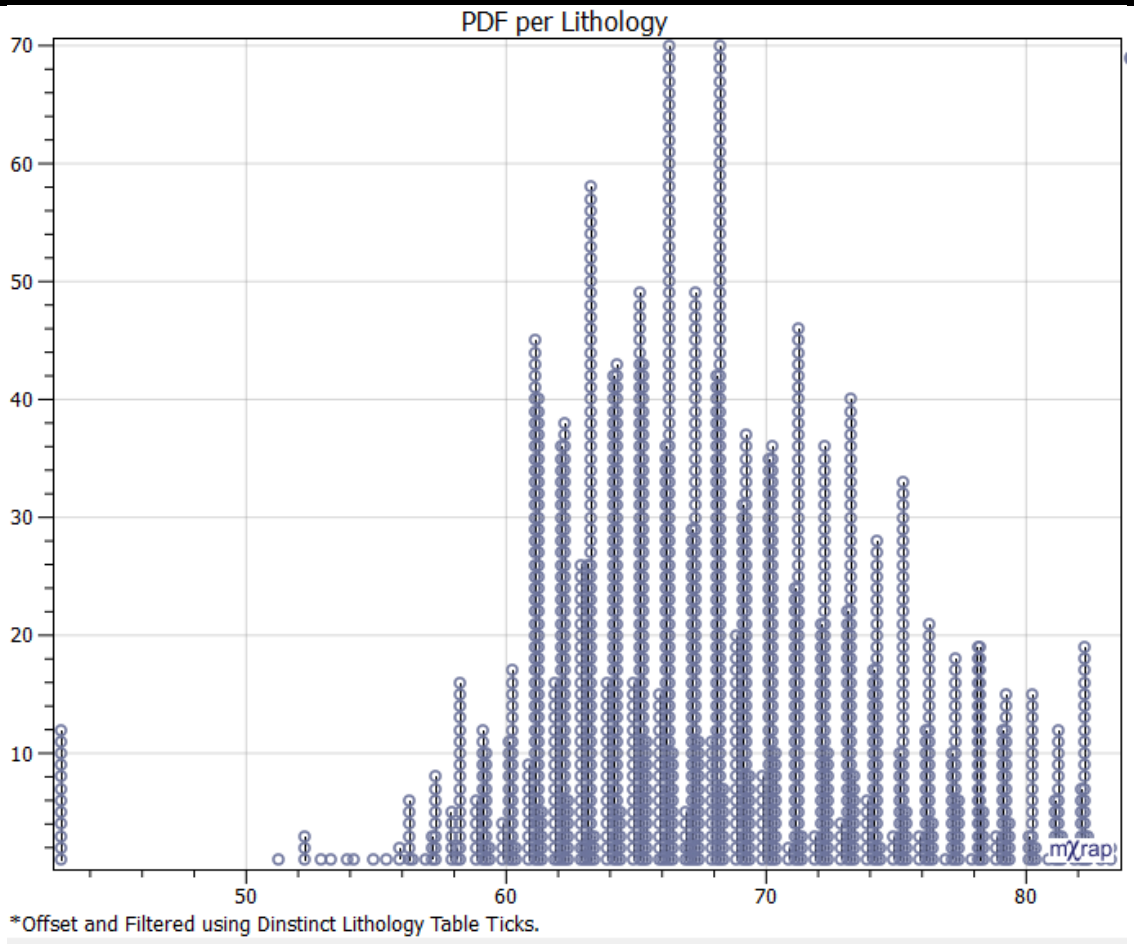


Left Click the Configure Page button and Save the Tool

Analysis Step I Continued – Adding Markers to PDF Chart

Open the PDF per Lithology (ticks + offset) Chart

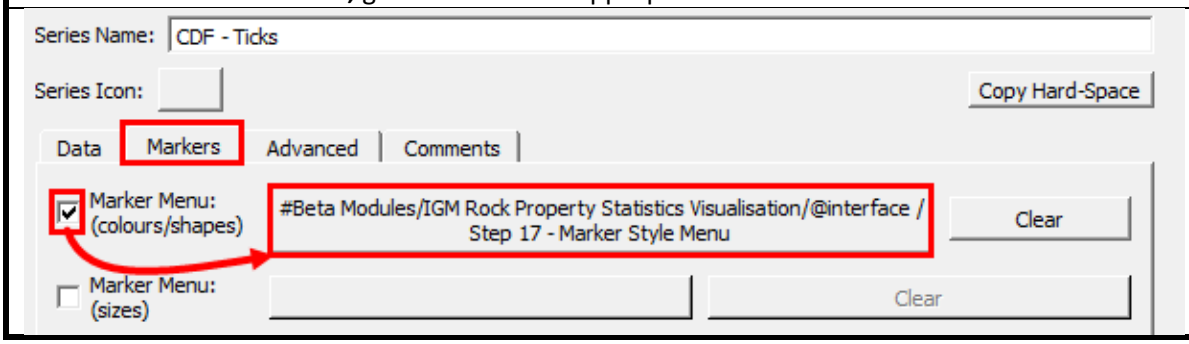
Step I - PDF per Lithology (ticks + offset) Chart



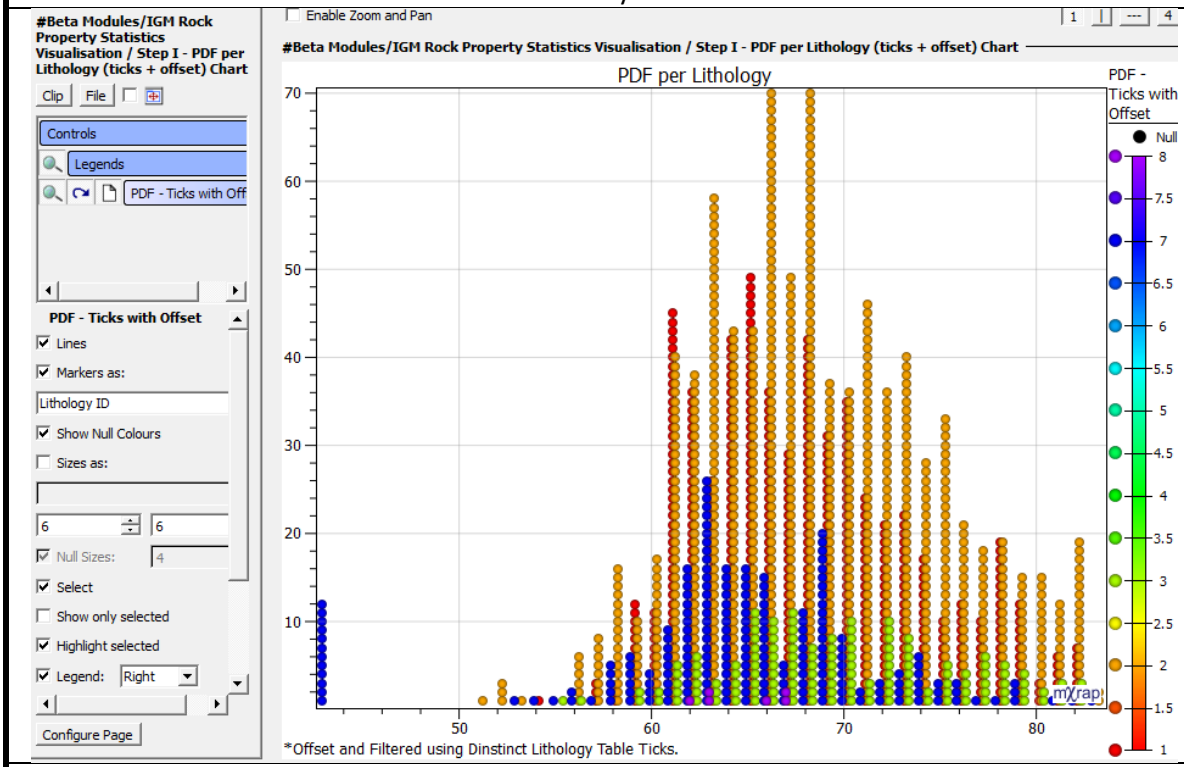
As before, **left click** on the *Configure Page* button
In the *Configure page* **popup**:

- **Left click** on the *Series* tab
- In the *Series* tab, **left click** on the *Markers* tab
- **Tick** the *Marker Menu (colours/shapes)*
- **Left click** on the *Marker Menu* button
- In the **dropdown**, navigate to the Marker Styles menu definition using the following route
  - **Menu Definitions >> #Beta Modules >> IGM Rock Property Statistics Visualisation >> Step 17 – Marker Style Menu**

In the *Series Name* text box**,** give the series an appropriate name



Tick the *Marker As* box to view the new Marker Style

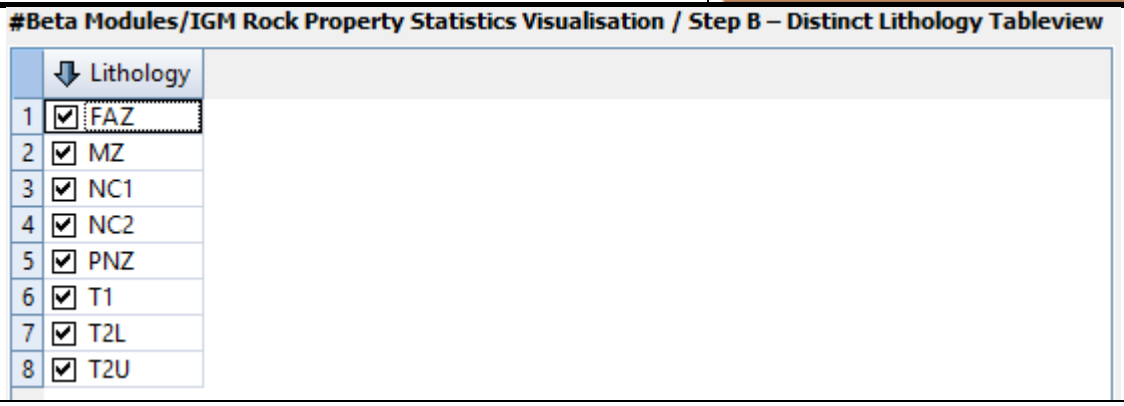


Left Click the Configure Page button and Save the Tool

10. Applying Distinct Table Markers

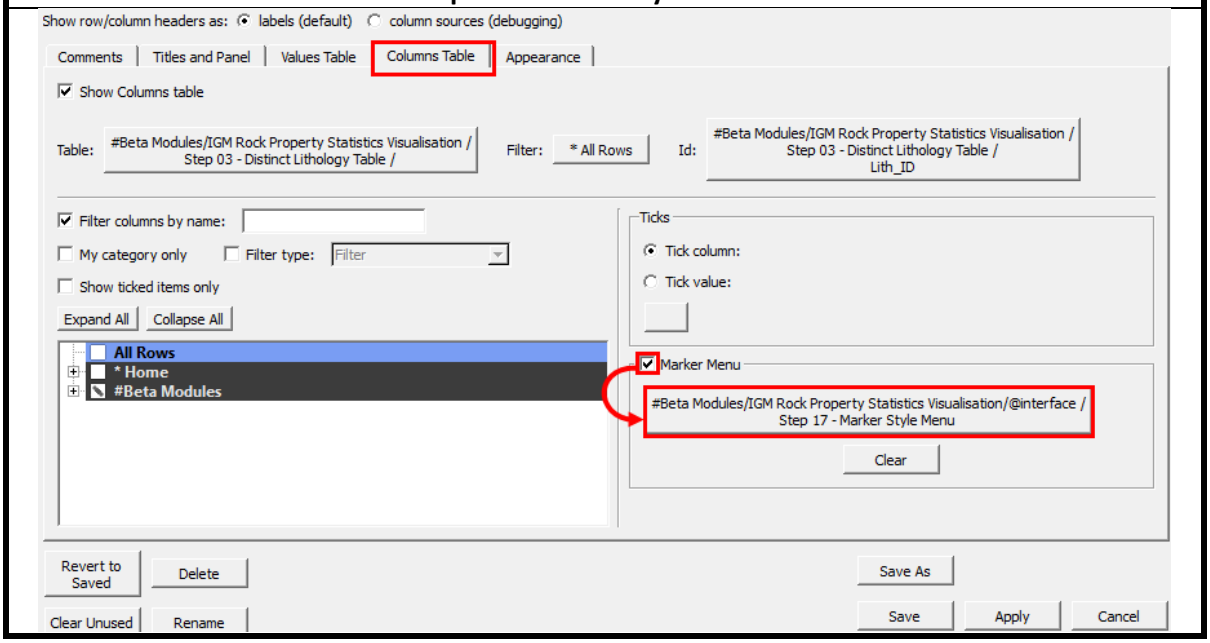
Analysis Step B Continued – Adding Markers to Distinct Lithology Table

Open the Distinct Lithology Tableview | Step B – Distinct Lithology Tableview

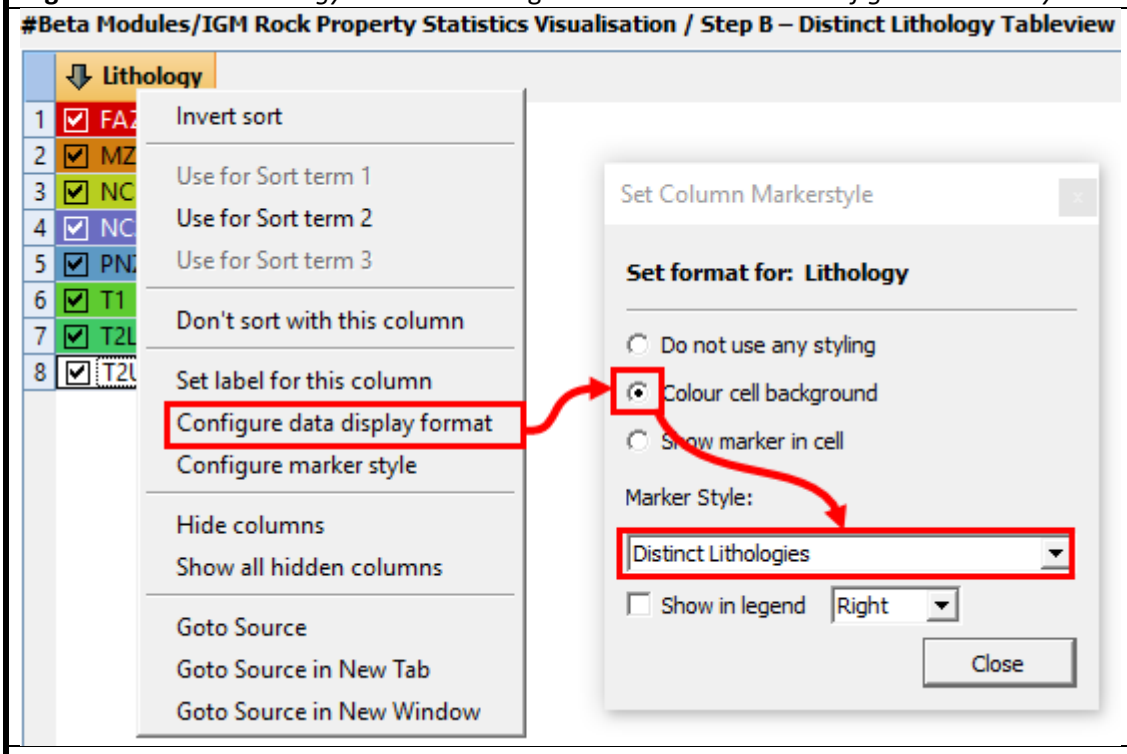


Left click on the *Configure Page* button
In the *Configure page* **popup**:

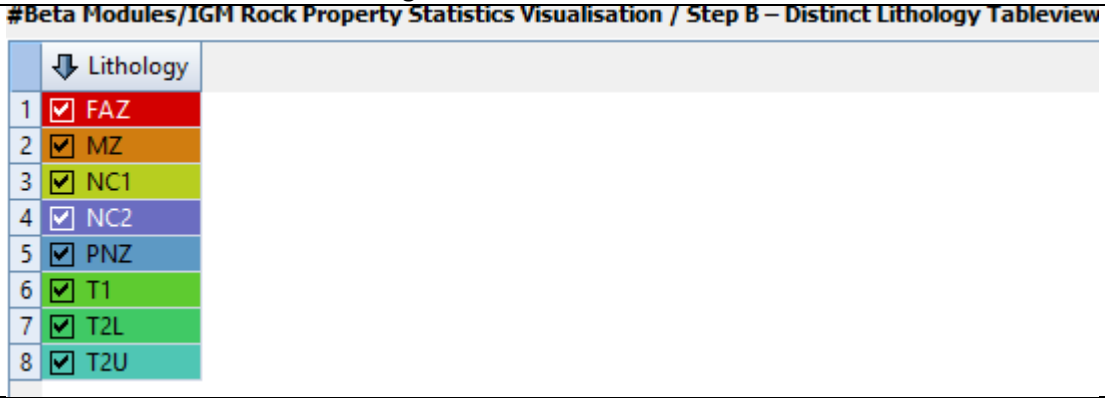
- **Tick** the *Marker Menu* box
- In the *Marker Menu* **dropdown,** navigate to the Marker Menu created in Step 17 using the following route
    - **Menu Definitions >> #Beta Modules >> IGM Rock Property Statistics Visualisation >> Step 17 – Marker Style Menu**



Right click on the *Lithology* column heading and then **left click** on *Configure marker style*



The table should now look something like this



Left Click the Configure Page button and Save the Tool

Analysis Step F Continued – Adding Markers to Statistics per Lithology Tableview

Open the Statistics per Lithology Tableview

Step F - Statistics per Lithology Tableview

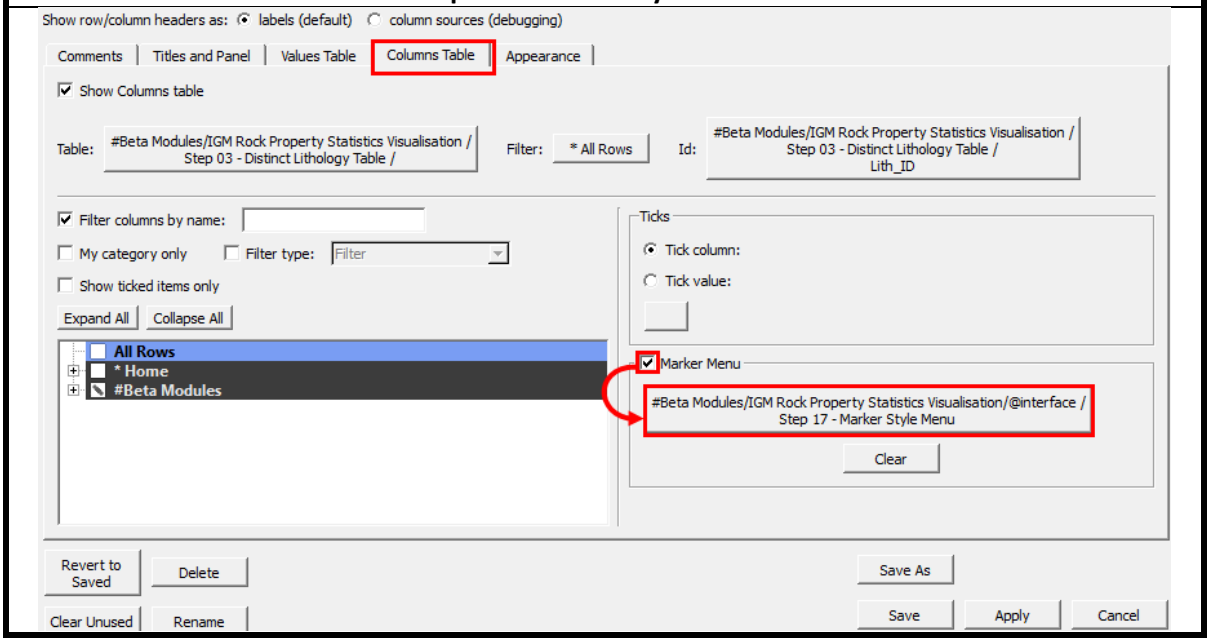
#Beta Modules/IGM Rock Property Statistics Visualisation / Step F - Statistics per Lithology Tableview

	Lithology	Count	Maximum	Mean	Median	Minimum	Std Dev
* 1	FAZ	563	82	68.1929	67.4157	54	5.6621
2	MZ	850	83	68.7896	68	51.015	6.20261
3	NC1	137	82	70.0948	69.465	55.93	5.94919
4	NC2	6	66.091	64.1683	64.285	61.769	1.85303
5	PNZ	205	82	63.9555	64	42	7.64134
6	T1	241	82	64.8233	64	48.903	4.65614
7	T2L	86	82	67.857	68.038	56.113	5.71468
8	T2U	107	82	66.9825	66.14	54.566	5.64195

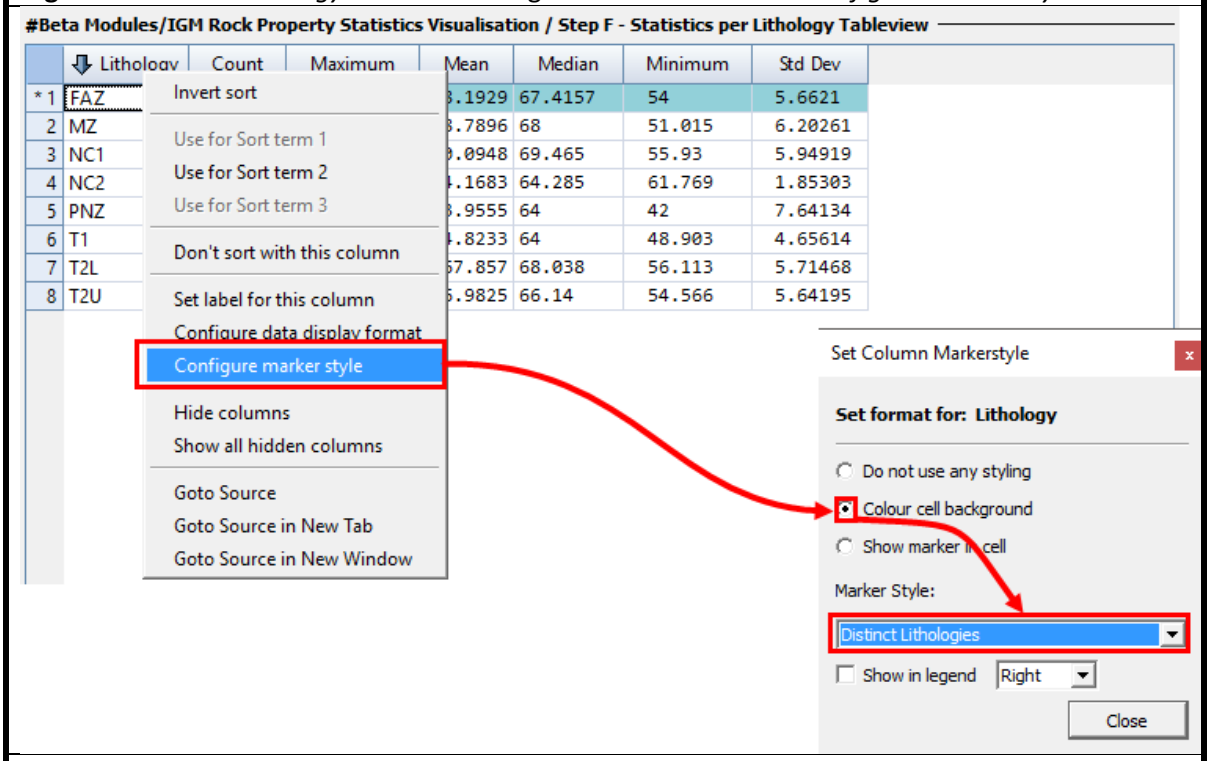
Left click on the *Configure Page* button

In the *Configure page* **popup**:

- **Tick** the *Marker Menu* box
- In the *Marker Menu* **dropdown,** navigate to the Marker Menu created in Step 17 using the following route
  - **Menu Definitions >> #Beta Modules >> IGM Rock Property Statistics Visualisation >> Step 17 – Marker Style Menu**



Right click on the *Lithology* column heading and then **left click** on *Configure marker style*



The table should now look something like this

#Beta Modules/IGM Rock Property Statistics Visualisation / Step F - Statistics per Lithology Tableview

	Lithology	Count	Maximum	Mean	Median	Minimum	Std Dev
* 1	FAZ	563	82	68.1929	67.4157	54	5.6621
2	MZ	850	83	68.7896	68	51.015	6.20261
3	NC1	137	82	70.0948	69.465	55.93	5.94919
4	NC2	6	66.091	64.1683	64.285	61.769	1.85303
5	PNZ	205	82	63.9555	64	42	7.64134
6	T1	241	82	64.8233	64	48.903	4.65614
7	T2L	86	82	67.857	68.038	56.113	5.71468
8	T2U	107	82	66.9825	66.14	54.566	5.64195

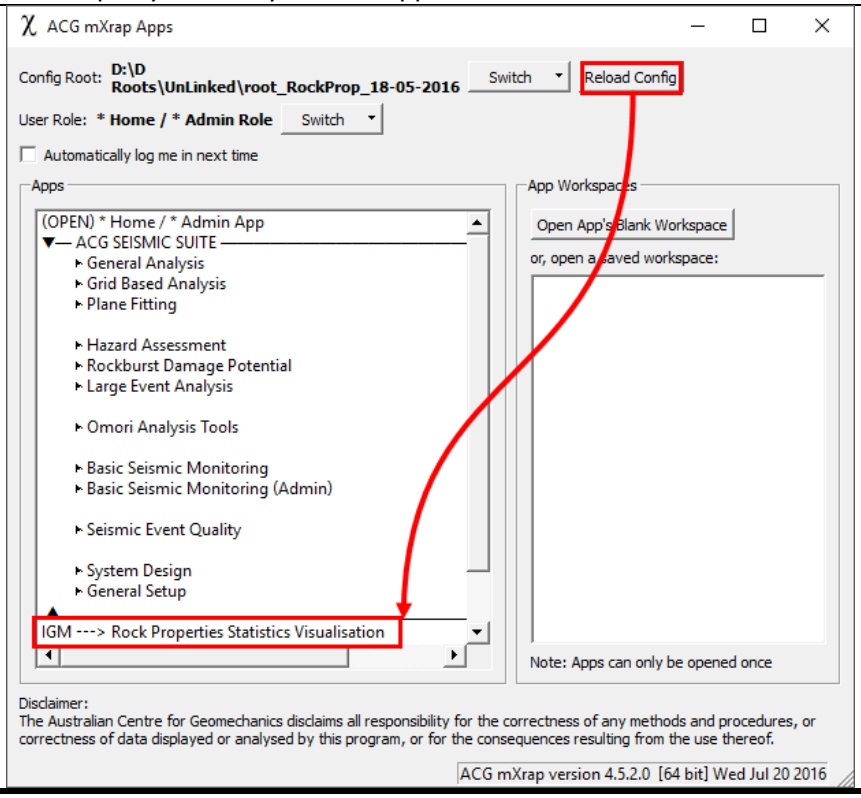
Left Click the Configure Page button and Save the Tool

11. Application

Launching your App

Once the app has been built, it should appear in the mXrap launcher.

In the Launcher, **left click** Reload Config to refresh the Launcher
The app should now appear under the correct root under the Home/Admin Role
Double left click to open your newly created app



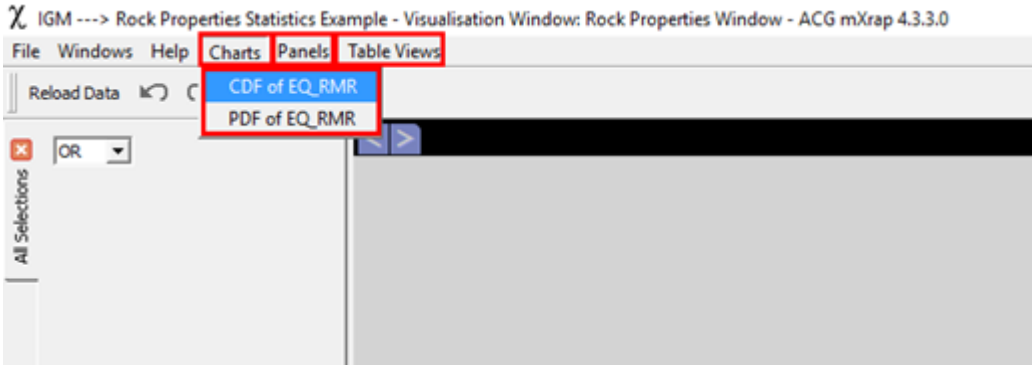
Selecting what you want to see in your App

The user can open the various charts and table views in tabs within the app workspace. The panels created can also be opened and should display to the left of the workspace.

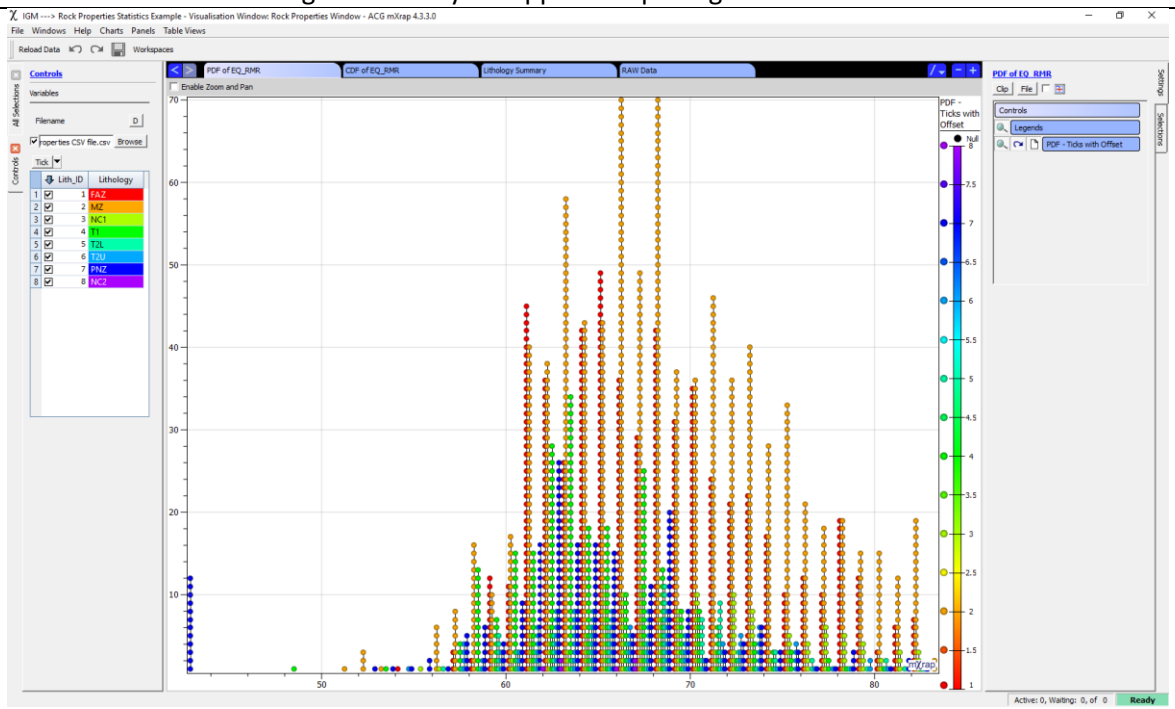
The charts, table views and variables panels created under the @interface will now be accessible in your app

In the App **menu**

- Charts – Select the charts you want to view
- Panels – Select the panels you want to view
- Table views – Select the table views you want to view



You should see something like this in your app after opening a few tools

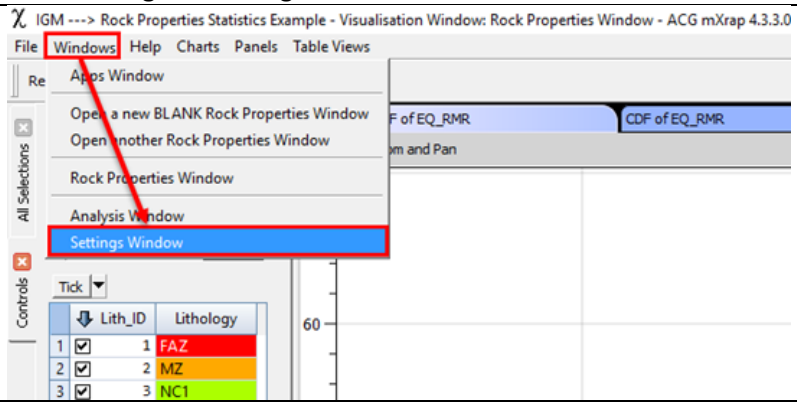


Saving the opened tabs so they appear every time the app is opened

The tabs opened by the user can be saved, allowing for the blank workspace to be configured as required.

In the App Menu:

- Click Windows and go to Settings Window



In the Settings Window:
Open the *Analysis Window Menu Definition* tool created in Step 19
Left click the *Initial Tabs* tab to open it
Tick the "Enable initial tabs capture".

Now go back to the App window. In the App Menu:
Left click File and then click Capture Initial Tabs

Go back to the Settings Window with the tool created in Step 19 still open. Save the tool.

Your app will now open the same tabs that you've just saved every time you open the app.