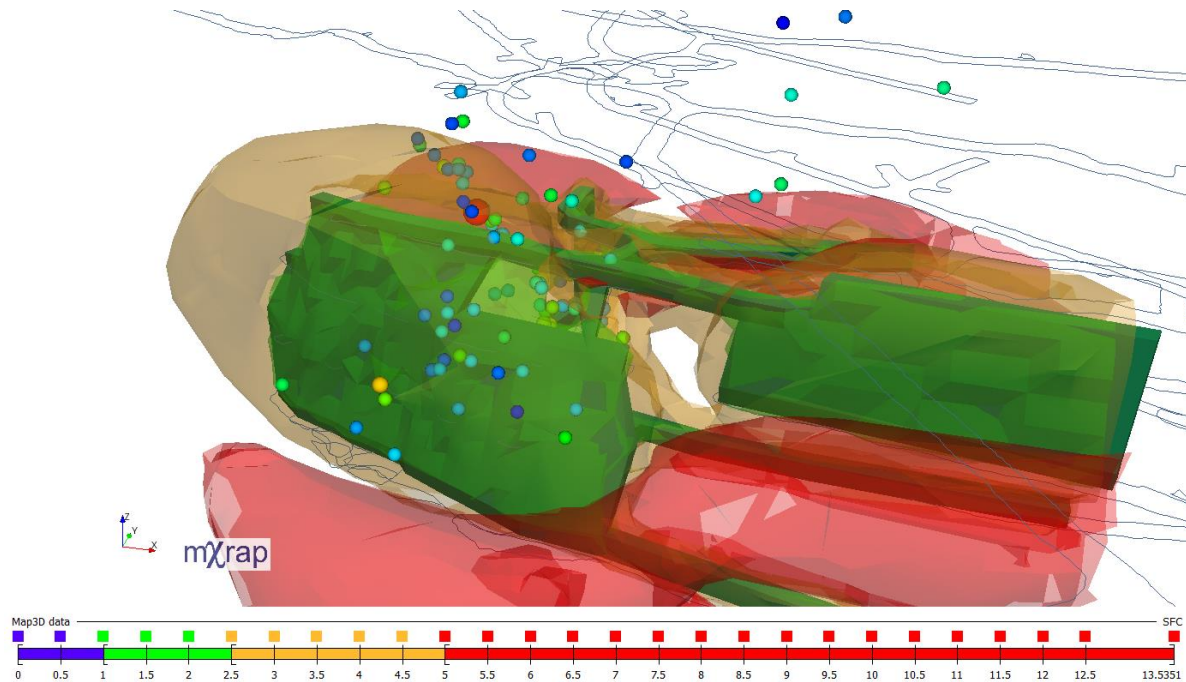


Advanced mXrap Training

Basic Map3d Module Creation

This basic module will create the tools required to visualise 'blast by blast' map3D results and the induced seismicity. Map3D results are also used to chart the stress condition at the source of the induced seismic events.



The outcomes for this exercise are to become familiar with:

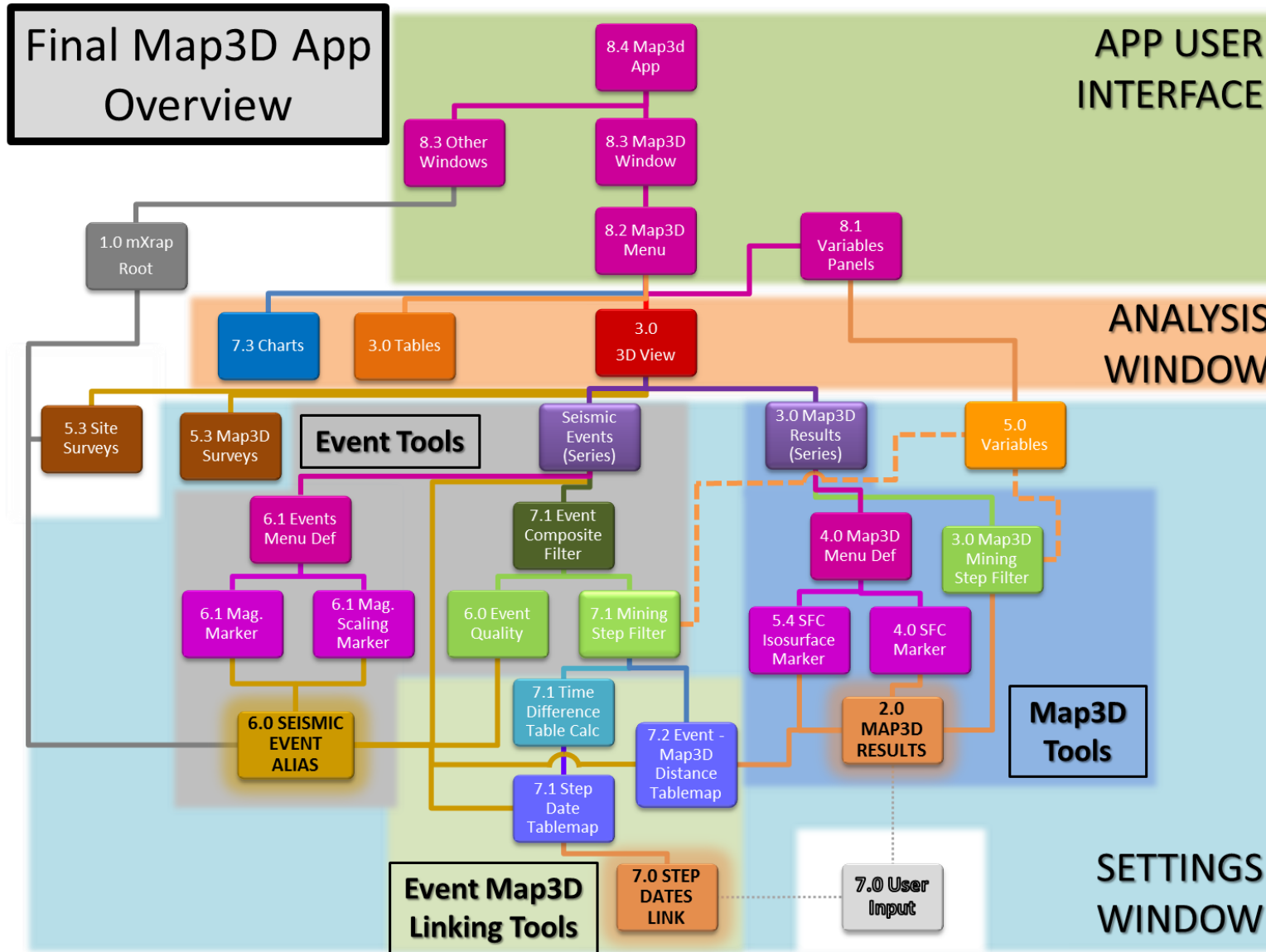
- CSV imports
- Variables
- Range Filters and Composite Filters
- Marker styles/Menu Definitions
- 3D View, Chart View, Table View
- Aliases
- Table Calculations (*simple*)
- Table Maps
- Surveys
- Inference: App Definitions, Panel Views, Window Definitions

Extension exercises are provided to reinforce and further develop skills established during the basic module creation.

Support Email: support@mxrap.com

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1 Getting Started

First things first, we need to setting up the root for module creation

Windows Explorer	
C:/mXrap/Advanced Training/root_Tasmania_Advanced	Place the required data in the root folder #Tasmania Map3D → root_Tasmania_Advanced Contains: Step by Step <i>.inps</i> (for Surveys) Total Mine <i>.str</i> (for Surveys) Results <i>.txt</i> Step Dates <i>.txt</i>
mXrap software → Configure Root	Configure the root for development C:/mXrap/Advanced Training/root_Tasmania_Advanced
mXrap software → User Role	Configure your role i.e. *Home /*Admin App
mXrap software → Apps	Get started by opening *Home /*Admin App. This will open a Settings Window
Menu: Workspace → Analysis Window	This will open an Analysis Window TIP: Put the Analysis & Settings Windows on different Monitors
3D View	Click on the centre of the 3D view to get the focus. Press “R” on keyboard to Reset the view.

2 Import Map3D Results

Import of Map3D results

Settings Window → *New → *Import CSV * Import CSV

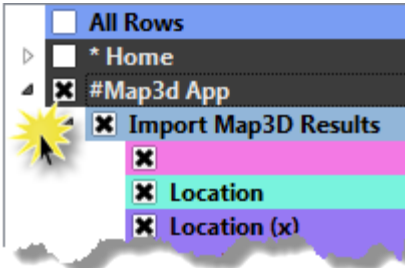
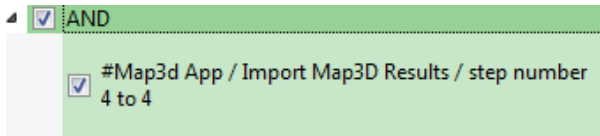
*New/Import CSV	Start by saving this tool. Save As: Folder: #Map3d App Name: <i>Import Map3D Results</i> <div style="float: right; border: 1px solid #ccc; padding: 5px; margin-top: 5px;"> <input type="button" value="Save As"/> <input checked="" type="checkbox"/> Auto Apply <input type="button" value="Save"/> <input type="button" value="Apply"/> </div>
#Map3d App → Import Map3D Results	For the Input File: Browse to the <i>Results.txt</i>
#Map3d App → Import Map3D Results → CSV Format	Configure the format of this file: Ignore Rows that start with * and Multiple Space Delimited <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px; width: fit-content;"> Delimited Field Configuration Field Separators <input type="checkbox"/> Tab <input type="checkbox"/> Semicolon <input type="checkbox"/> Comma <input checked="" type="checkbox"/> Space Other: <input style="width: 50px;" type="text"/> <input checked="" type="checkbox"/> Treat consecutive delimiters as one <input checked="" type="checkbox"/> Skip blank cells at the start of the row (eg for handling a space-separated file with extra spaces at the start of each row) </div> Ignore lines that start with any of these characters: <input checked="" type="checkbox"/> # (hash) Other: *
#Map3d App → Import Map3D Results → Columns	Add the required columns: Name (<i>type</i>). Location (<i>3 columns of X,Y,Z</i>) S1 (<i>Number</i>) S2 (<i>Number</i>) S3 (<i>Number</i>) Sfc (<i>Number</i>) Step Number (<i>Number</i>)
#Map3d App → Import Map3D Results → Results	Check this import is doing what you think it should be! Open the Results tab for a preview. TIP: This is important. If the info doesn't come in correctly it will cause headaches when it is used 'downstream'

```


1 * Mining step 1
2 * Point format: x,y,z s1 s2 s3 sfc step#
3 3015.000000 4480.000000 985.000000 126. 1
4 3015.000000 4475.000000 985.000000 126. 1
5 3015.000000 4480.000000 980.000000 126. 1
6 3015.000000 4475.000000 980.000000 126. 1
7 3015.000000 4480.000000 975.000000 126. 1
8 3015.000000 4475.000000 975.000000 126. 1
9 3015.000000 4480.000000 970.000000 126. 1
10 3015.000000 4475.000000 970.000000 126. 1
11 3015.000000 4480.000000 965.000000 127. 1
            
```

3 Viewing Map3D Results

Creating a table and 3D View of modelling results

Analysis Window → *New → *Table View Create * Table View	
Page Settings (Panel) → Configure Page → Columns Table	Open table configuration and fill in the fields Table: #Map3d App / Import Map3D Results / Filter: *All Rows ID: #Map3d App/ Import Map3D Results / Select the columns for display:  Save As: Folder: #Map3D App, Name: Map3D Results Table
<p>Problem!!! We can see from this table view that there are quite a few rows (500k+). So let us have a think about what we what in 3D view...</p> <p>We wish to view the grid of each step independently of the previous/following step. Ultimately, we need to limit this table to have a subset of data to plot in 3D... back to the Settings Window!</p>	
Settings Window → *New → *Range Filter * Range Filter	
*New/Import CSV	Save As: Folder: #Map3d App Name: Mining Step Range Filter
#Map3d App → Mining Step Range Filter	Configure this tool: Table: #Map3d App / Import Map3D Results / Columns: Step number. HINT: 'Drag and Drop' From the bottom window onto the top '[] AND' Green bar. Configure Row: Double click this new row to 'open' it. Tick on the boxes, and lets limit the data to step number 4 by setting limits '4 to 4'. (We will revisit This!) Save! 
OK that should do the trick... back to the Analysis Window	

Analysis Window → *New → *3D View

Create * 3D View 

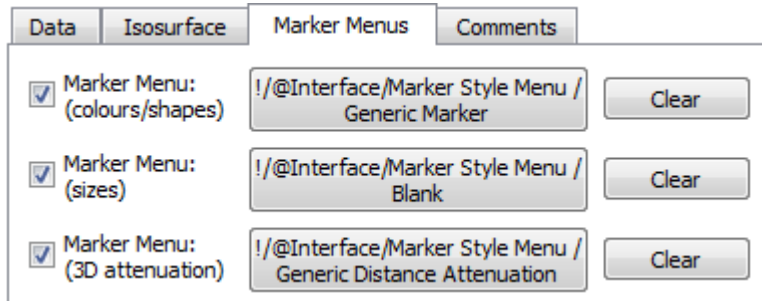
Page Settings (Panel) →
Configure Page →
3D View → Series

Open 3D View configuration page, click *Add*, then *Points*, and fill in the fields:

- Series Name:** Map3D Grid
- Icon:** dot
- Table:** #Map3d App / Import Map3D Results /
- Filter:** #Map3d App / Mining Step Range Filter (*Just made this!*)
- ID:** #Map3d App/ Import Map3D Results /
- Location:** #Map3d App/ Import Map3D Results / Location
- Save As:** Folder: #Map3D App, Name: 3D View

Page Settings (Panel) →
Configure Page →
3D View → Marker Menu

Let's set up a basic marker menu from what already exists... just so we can see *something*. We will be revisiting this...

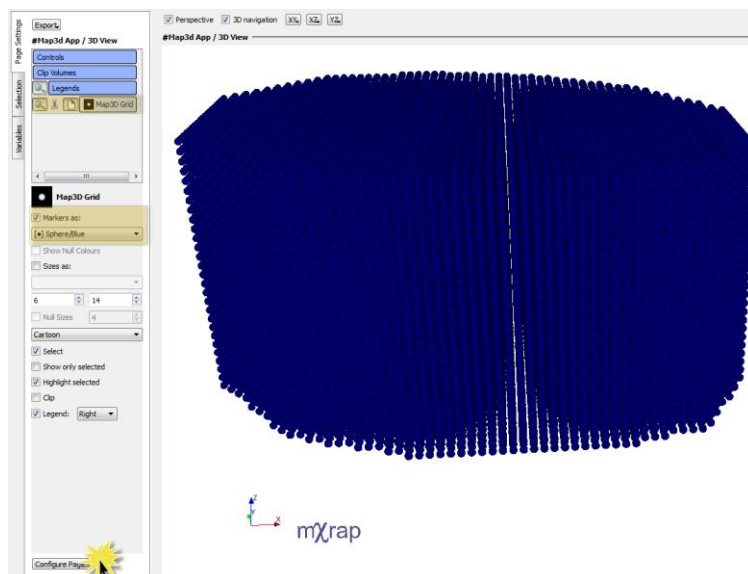
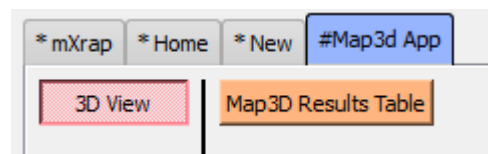


Can't see anything? Make sure your markers are on, Click on the 3d viewer, and press R (zoom to extents)

Problem!!! Where did our new views get to, I can't see them on the top tab of the analysis window...?!

Head to: *mXrap → Tabs → Show Tabs → Visible Tabs → Tick the #Map3D App.

This shows a tab with ALL the views saved in this app. We will have to do this for our variables when we make them later.



4 Map3D Data and Marker Styles

In the last step, we set up 'Page Settings (Panel) → Configure Page → 3D View → Marker Menu'... Now we will make our own menu containing the only the existing basic markers we wish to see, and a few we have made. Let's set up some basic marker styles for this table.

Settings Window → *New → *Menu Definitions * New Menu Definition

*New / *Window Definition	Save As: Folder: #Map3d App, Name: Marker Style Menu																				
#Map3d App → Marker Style Menu	<p>Click right on the window space → Add new tool/Marker Style!/Black Ring</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 5px;"> <thead> <tr> <th style="width: 30%;">Menu Name</th> <th style="width: 30%;">Linked Tool</th> <th style="width: 10%;">Order</th> <th style="width: 30%;">Type</th> </tr> </thead> <tbody> <tr> <td>Menu</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Black - Ring</td> <td>!/ Black - Ring</td> <td>100</td> <td>Tool</td> </tr> </tbody> </table> <p>Rename the 'Menu/Black - Ring' to 'Black - Ring' (Double click on menu)</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 5px;"> <thead> <tr> <th style="width: 30%;">Menu Name</th> <th style="width: 30%;">Linked Tool</th> <th style="width: 10%;">Order</th> <th style="width: 30%;">Type</th> </tr> </thead> <tbody> <tr> <td>Black - Ring</td> <td>!/ Black - Ring</td> <td>100</td> <td>Tool</td> </tr> </tbody> </table> <p>Save</p>	Menu Name	Linked Tool	Order	Type	Menu				Black - Ring	!/ Black - Ring	100	Tool	Menu Name	Linked Tool	Order	Type	Black - Ring	!/ Black - Ring	100	Tool
Menu Name	Linked Tool	Order	Type																		
Menu																					
Black - Ring	!/ Black - Ring	100	Tool																		
Menu Name	Linked Tool	Order	Type																		
Black - Ring	!/ Black - Ring	100	Tool																		
Analysis Window → Page Settings (Panel) → Configure Page → 3D View → Marker Menu	<p>Let's go back to the Analysis window and put this menu into the configuration.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 5px;"> <thead> <tr> <th style="width: 25%;">Data</th> <th style="width: 25%;">Isosurface</th> <th style="width: 25%;">Marker Menus</th> <th style="width: 25%;">Comments</th> </tr> </thead> <tbody> <tr> <td><input checked="" type="checkbox"/> Marker Menu: (colours/shapes)</td> <td></td> <td>#Map3d App / Marker Style Menu</td> <td>Clear</td> </tr> <tr> <td><input checked="" type="checkbox"/> Marker Menu: (sizes)</td> <td></td> <td>!/@Interface/Marker Style Menu / Blank</td> <td>Clear</td> </tr> <tr> <td><input checked="" type="checkbox"/> Marker Menu: (3D attenuation)</td> <td></td> <td>!/@Interface/Marker Style Menu / Generic Distance Attenuation</td> <td>Clear</td> </tr> </tbody> </table> <p>Save</p> <p>We will now have our own (boring old plain) limited markers</p> <p><input checked="" type="checkbox"/> Markers as: Black - Ring</p>	Data	Isosurface	Marker Menus	Comments	<input checked="" type="checkbox"/> Marker Menu: (colours/shapes)		#Map3d App / Marker Style Menu	Clear	<input checked="" type="checkbox"/> Marker Menu: (sizes)		!/@Interface/Marker Style Menu / Blank	Clear	<input checked="" type="checkbox"/> Marker Menu: (3D attenuation)		!/@Interface/Marker Style Menu / Generic Distance Attenuation	Clear				
Data	Isosurface	Marker Menus	Comments																		
<input checked="" type="checkbox"/> Marker Menu: (colours/shapes)		#Map3d App / Marker Style Menu	Clear																		
<input checked="" type="checkbox"/> Marker Menu: (sizes)		!/@Interface/Marker Style Menu / Blank	Clear																		
<input checked="" type="checkbox"/> Marker Menu: (3D attenuation)		!/@Interface/Marker Style Menu / Generic Distance Attenuation	Clear																		
<p>Problem!!! Black rings don't tell us anything... let's make some of our own maker styles for Map3D columns. Back to the Settings Window!</p>																					

Settings Window → *New → *Marker Style

*New / *Marker Style	Save As: Folder: #Map3d App, Name: SFC												
#Map3d App → SFC	Configure this marker style to plot colours based on the SFC column in the Map3D table. Scheme: Symbol-colour Scheme Short Label: SFC Basics → Input: Table: Import Map3D Results, Column: SFC Basics → Ranges: Max:10, Min 0 Ranges → Auto Max → Symbol: Sphere Ranges → Auto Max → Colour Ramp: Linear Ranges → Auto Max → Start Colour: Red(ish) Ranges → Auto Max → End Colour: Blue(ish) Check the Preview! Save												
#Map3d App → Marker Style Menu	Add this new marker to your Marker Style Menu Click right on the window space → Add new tool/Marker Style/#Map3D App/SFC Name: SFC <div style="border: 1px solid gray; padding: 5px; margin: 5px 0;"> Menu Definition </div> <table border="1" style="width: 100%; border-collapse: collapse; margin: 5px 0;"> <thead> <tr> <th style="text-align: left;">Menu Name</th> <th style="text-align: left;">Linked Tool</th> <th style="text-align: left;">Order</th> <th style="text-align: left;">Type</th> </tr> </thead> <tbody> <tr> <td>Black - Ring</td> <td>! / Black - Ring</td> <td>100</td> <td>Tool</td> </tr> <tr style="background-color: #e0e0e0;"> <td>SFC</td> <td>#Map3d App / SFC</td> <td>100</td> <td>Tool</td> </tr> </tbody> </table> Save	Menu Name	Linked Tool	Order	Type	Black - Ring	! / Black - Ring	100	Tool	SFC	#Map3d App / SFC	100	Tool
Menu Name	Linked Tool	Order	Type										
Black - Ring	! / Black - Ring	100	Tool										
SFC	#Map3d App / SFC	100	Tool										
Analysis Window → #Map3D → 3D View													
Page Settings (Panel) → Markers As → SFC	Try Viewing your new marker 'SFC'												


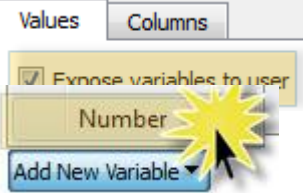
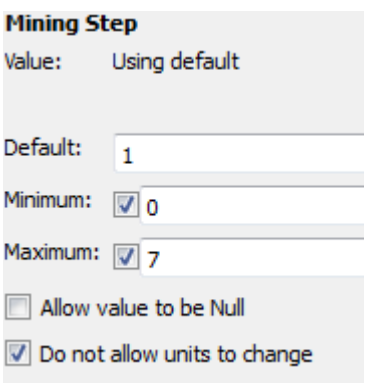
5 Refining the 3D view

So we have our results in there and are getting somewhere with the makers but it is hard to audit these results because we can't see inside the blob of points, can't adjust mining steps, and there are no site surveys.

Let's do some work to configure this 3D view further to enable:

- Filtering based on mining step
- Clipping
- Surveys
- Isosurfaces + Transparency

5.1 Setting up a variable for mining steps

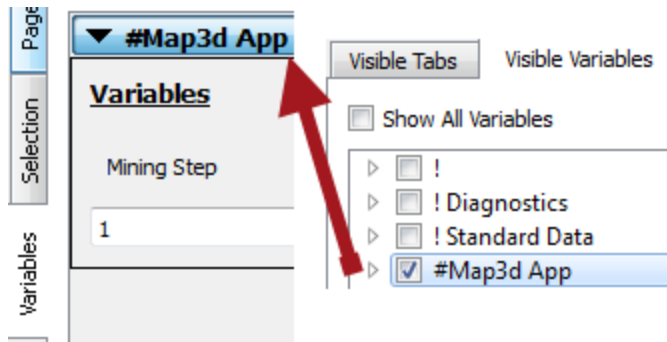
Settings Window → *New → *Variables 	
*New / *Window Definition	Save As: Folder: #Map3d App Name: Variables
#Map3d App → Variables	Expose the variables to user by checking the tick box. Add New Variable: Name: Mining Step 
#Map3d App → Variables → Mining Step (Number Variable)	Configure to variable (number) as shown. Default: 1 Min/max: 0 and 7 (Corresponds to the mining steps) Do NOT allow this number to be null Do NOT allow the units to change Save 
#Map3d App → Mining Step Range Filter	Configure Row: Double click this new row to 'open' it. Configure the 'link' buttons for the upper and lower limits. Variable: #Map3d App/Variables/Mining Step Click on the '[]AND' Green bar to close Save

Analysis Window →#Map3D →3D View

Problem!!! Variables (Panel) →Nothing here!!! Remember how we had to expose the 'views' in the module... we have to do the same for variables

Head to: *mXrap → Tabs → Show Tabs → Visible Variables → Tick the #Map3D App

This shows a tab with ALL the variables saved in this app.



Problem!!!

Adjusting this variable doesn't show much change at the extents... Let's "clip" though the middle and see what's happening.

5.2 Configuring Clipping Volumes

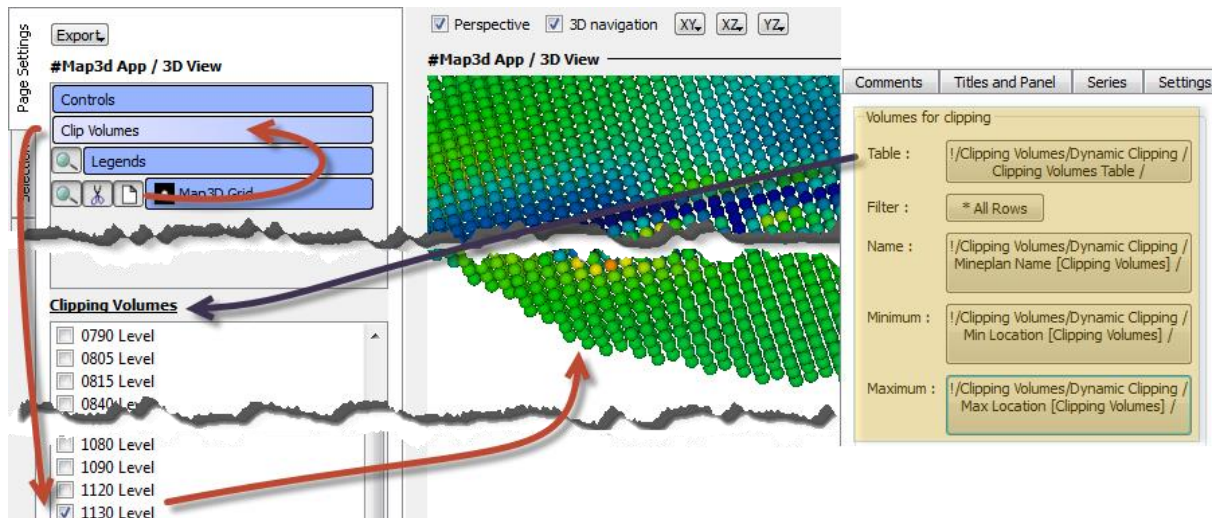
Analysis Window →#Map3D →3D View

Page Settings (Panel) →
Configure Page →
Clipping Volumes

Configure the clipping volumes using the table already set up for the site.
Table: !/Clipping Volumes/Dynamic Clipping/Clipping Volumes Table /
Filter: !/Clipping Volumes/Dynamic Clipping/Clipping Volumes Table /*All Row
Name: !/Clipping Volumes/Dynamic Clipping/Clipping Volumes Table /Mineplan Name
Minimum: !/Clipping Volumes/Dynamic Clipping/Clipping Volumes Table /Max Location [Clipping Volumes]
Maximum: !/Clipping Volumes/Dynamic Clipping/Clipping Volumes Table /Max Location [Clipping Volumes]
Save

Explanation: This table we just put into the configuration contains all the predefined volumes, which is shown in the Clipping Volumes Table (Blue Arrow).

Reminder: To clip, tick on the scissors, click on Clip Volumes, Select the level (or levels), View! (red arrows)



5.3 Configuring Surveys

Analysis Window → #Map3D → 3D View

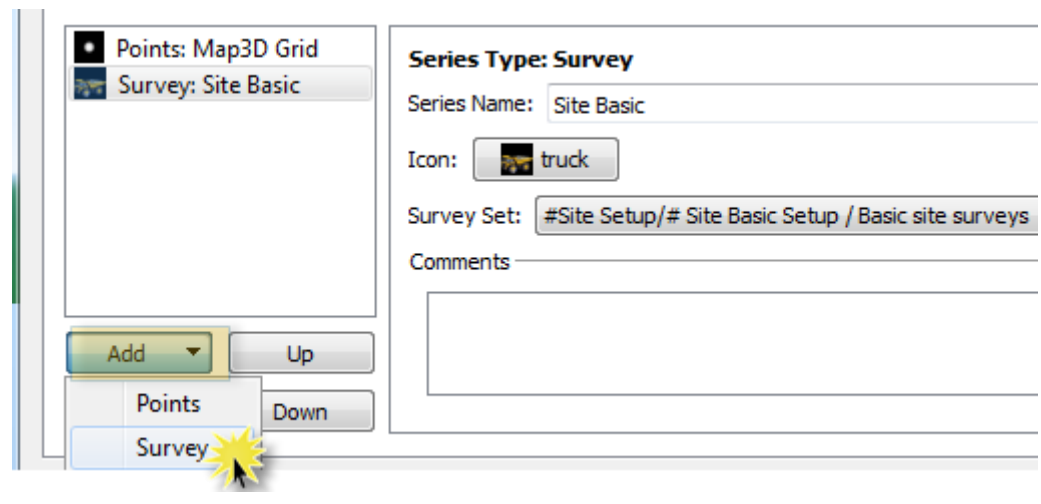
Page Settings
(Panel) →
Configure Page →
Series

Add and configure a new Survey Series


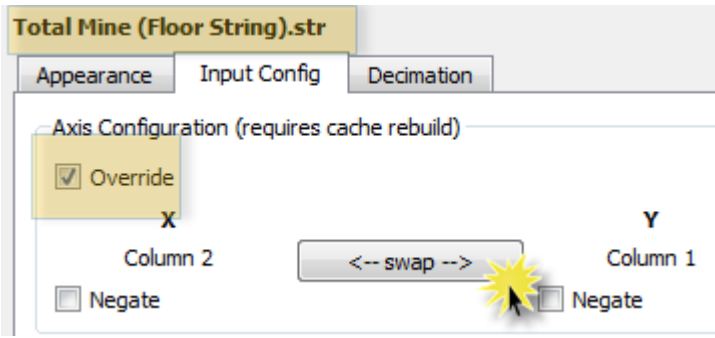
Series Name: Site Basic

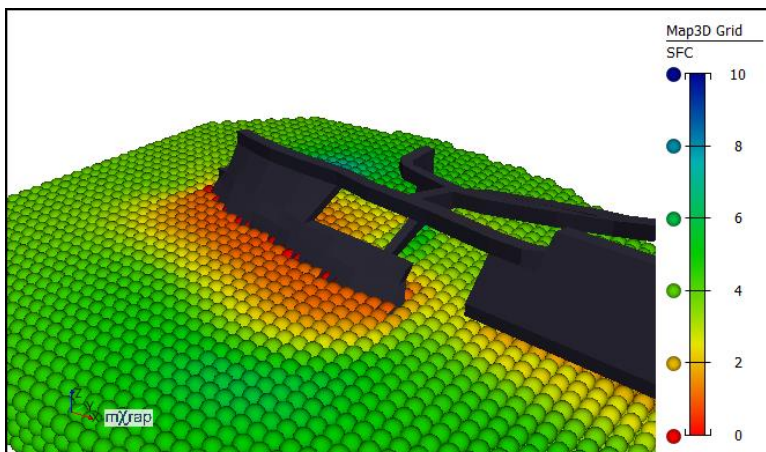
Icon: Truck (My fav. for surveys)

Survey Set: #Site Setup/#Site Basic Setup / Basic site surveys



We now have access to all the site surveys in this view. Good for geology and things not in the map3D data folder, however, we don't have the exact mining sets. Let's bring those in too. Back to the **Settings Window!**

Settings Window → *New → *Survey Source 	
*New / *Survey Source	<p>Save As:</p> <p>Folder: #Map3d App</p> <p>Name: Map3D App Surveys</p>
#Map3d App → Map3D App Surveys	<p>Configure this tool. You can play around with the colours and transparency; however, I will just cover the basics here.</p> <p>Base Folder: #Tasmania Map3D</p> <p>Total Mine (Floor String).str - This will need the coordinates flipped due to the file type. Click on this row and head to input config:</p> <div data-bbox="542 660 1260 996">  </div> <p>Rebuild Cache for All: Click!</p> <p>Save</p>
Analysis Window → #Map3D → 3D View	
<p>Page Settings (Panel) →</p> <p>Configure Page → Series</p>	<p>Add and configure this new survey set to the 3D View</p> <p>Series Name: Map3D</p> <p>Icon: Truck (My fav. for surveys)</p> <p>Survey Set: #Map 3D App / Map3D App Surveys</p> <p>SAVE</p> <p>Try visualising surveys and clipping the grid. Change the steps!</p>



5.4 Isosurfaces + Transparency

3D view is looking better... but the grid is still a bit hard to see through... so let's render some isosurfaces instead.

Settings Window → *New → *Marker Style

***New / *Marker Style** **Save As:** Folder: #Map3d App, Name: SFC (Iso)

Problem!!! I'm lazy.
Let's just duplicate the one we already made using 'Save As' and modify the duplicate.
Name: *SFC (Iso)*

#Map3d App → Variables → SFC (Iso)

Configure to variable (number) as shown.

Scheme: Symbol-colour Scheme

Short Label: SFC (Iso) *CHANGED*

Basics → Input: Table: Import Map3D Results, Column: SFC

Basics → Ranges: Max:10, Min 0

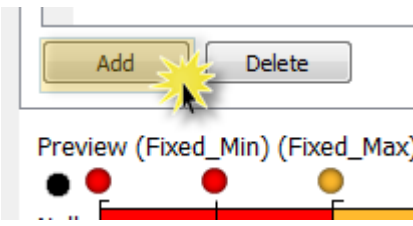
Ranges → Auto Max → Symbol: Sphere

Ranges → Auto Max → Colour Ramp: None *CHANGED*

Ranges → Auto Max → Start Colour: Blue *CHANGED*

Ranges → Auto Max → End Colour: NONE *CHANGED*

So we have to add some rows to give the marker style discrete boundaries.



Configure these new rows (See Screen Shot)

Save

	Up to	Symbol	Start Colour	End Colour	Colour Ramp	Number of Colours	Transparency [0..100]
1	Auto Max	sphere_64x64		(No ramp)	None	(No ramp)	80
2	5	sphere_64x64		(No ramp)	None	(No ramp)	60
3	2.5	sphere_64x64		(No ramp)	None	(No ramp)	40
4	1	sphere_64x64		(No ramp)	None	(No ramp)	0

#Map3d App → Variables → SFC (Iso)

#Map3d App → Marker Style Menu

Add this marker style to the Marker Style Menu, same as the previous markers but here's a **HINT**:

Menu Definition			
Menu Name	Linked Tool	Order	Type
Black - Ring	!/ Black - Ring	100	Tool
SFC	#Map3d App / SFC	100	Tool
SFC (ISO)	#Map3d App / SFC (ISO)	100	Tool

Analysis Window → #Map3D → 3D View

Page Settings
(Panel) →
Configure Page →
Series

Duplicate the “Map3D Grid” Series
Ctrl + Shift + Click and Drag the series name and drop it below on the list.
You can use the ‘up’ and ‘down’ to adjust the order of series.

Rename the Series Name:

Map3D Iso

Change the Icon: bullseye2ring
(looks a bit like surfaces)

Open the Isosurface tab for this
new series

Show an Isosurface instead:

Enable

Assumed Grid Space: 5

Series Type: Points

Series Name: Map3D ISO

Icon: bullseye2ring

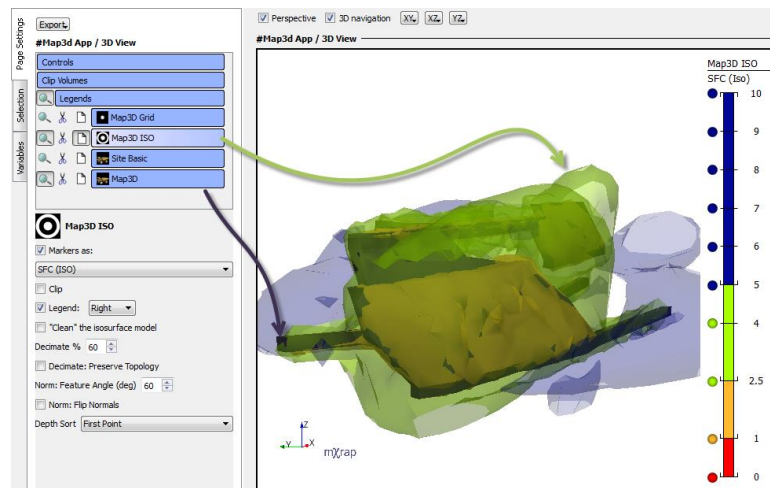
Data Isosurface Marker Menu Comments

Show an Isosurface instead

Assumed
Grid Spacing for
Isosurface

5

Results:



6 Seismic Events

We now wish to visualise the seismic responses to each mining step. Let's plot the Seismic Data.

Settings Window → *New → *Alias
* Alias

*New / *Alias	<p>Save As:</p> <p>Folder: #Map3d App</p> <p>Name: Seismic Events</p>																		
#Map3d App → Seismic Events	<p>Configure this tool. You can play around with the colours and transparency; however, I will just cover the basics here.</p> <p>Source Table: !/Data Tables / Events /</p> <p>Add new Alias → Add many columns at once: !/ Data Tables/id, date, location, localMagnitude</p> <p>Also: add !/ Event Quality / Quality Events</p> <div style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <p>Host Table: #Map3d App / Seismic Events / Source Table: !/Data Tables / Events /</p> <p>Column and Value Aliases</p> <p><input type="checkbox"/> Show hints</p> <p>Add New Alias ▼</p> <table border="1" style="width: 100%; border-collapse: collapse; font-size: small;"> <thead> <tr> <th>Alias Name</th> <th>Type</th> <th>Source Column</th> </tr> </thead> <tbody> <tr> <td>date</td> <td>Dates</td> <td>!/Data Tables / Events / date</td> </tr> <tr> <td>id</td> <td>IDs (32 bit int)</td> <td>!/Data Tables / Events / id</td> </tr> <tr> <td>localMagnitude</td> <td>Numbers</td> <td>!/Data Tables / Events / localMagnitude</td> </tr> <tr> <td>location</td> <td>Points</td> <td>!/Data Tables / Events / location</td> </tr> <tr style="background-color: #e6f2ff;"> <td>Quality Events</td> <td>Filter</td> <td>!/Event Quality / Quality Events</td> </tr> </tbody> </table> </div> <p>Save</p> <p>Explanation: We could just use columns from !/Data Tables / Events / directly, however, we will see every column for this table and have to deal with long path names.</p>	Alias Name	Type	Source Column	date	Dates	!/Data Tables / Events / date	id	IDs (32 bit int)	!/Data Tables / Events / id	localMagnitude	Numbers	!/Data Tables / Events / localMagnitude	location	Points	!/Data Tables / Events / location	Quality Events	Filter	!/Event Quality / Quality Events
Alias Name	Type	Source Column																	
date	Dates	!/Data Tables / Events / date																	
id	IDs (32 bit int)	!/Data Tables / Events / id																	
localMagnitude	Numbers	!/Data Tables / Events / localMagnitude																	
location	Points	!/Data Tables / Events / location																	
Quality Events	Filter	!/Event Quality / Quality Events																	

Analysis Window → #Map3D → 3D View

Page Settings
(Panel) →
Configure Page →
3D View → Series

Open 3D View configuration page, click *Add*, then *Points*, and fill in the fields:

Series Name: Seismic Events
Icon: Sphere
Table: #Map3d App / Seismic Events /
Filter: #Map3d App / Seismic Events / Quality Events
ID: #Map3d App / Seismic Events / id
Location: #Map3d App / Seismic Events / Location
Save

Data	Isosurface	Mark
Table :	#Map3d App / Seismic Events /	
Filter :	#Map3d App / Seismic Events / Quality Events	
Id :	#Map3d App / Seismic Events / id	
Location :	#Map3d App / Seismic Events / location	

Problem!!!

Marker Styles: There are no Marker Styles for the Events Table set up. If we didn't use an Alias we would have access to those used in the rest of mXrap, however, because the Alias is in practice a new table, these need to be set up.

Filters: We passed though the quality filter so we don't have to recreate those filters, however, we are seeing all events... not just those which happened after the step (blast) was taken.

Let's tackle the marker styles first then move onto the Filters.

6.1 Marker Styles

This is the same as the marker styles for the Map3D grid so: ILL GIVE YOU A BREIF OVERVIEW... However, that is it!

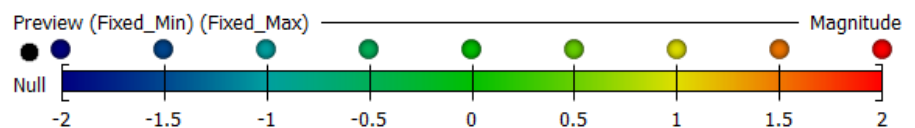
Settings Window → *New → *Marker


*Marker Style  Style

*New / *Marker Style


Save As: Folder: #Map3d App, Name: Magnitude

Hints – Column: localMagnitude, Max: 2, Min -2 Auto Max, Sphere, Blue to Red Linear Colour Ramp.



Settings Window → *New → *Marker Style * Marker Style 

*New / *Marker Style	<p>Save As:</p> <p>Folder: #Map3d App,</p> <p>Name: Magnitude [Scale]</p> <p>We HAVE NOT made one of these before. This lets us make large values look larger and small values look smaller in the 3d view.</p> <p>Scheme: Size scheme: Scale based on a value</p> <p>Input: #Map3d App / Seismic Events / localMagnitude</p> <p>Input Minimum: -1</p> <p>Input Maximum: 1</p> <p>Scheme: <input type="text" value="Size scheme: Scale based on a value"/></p> <p>Short Label for Legend: <input type="text"/></p> <p>Scale the size of the markers (note: only supports Number columns for an in</p> <p>Input: <input type="text" value="Table: #Map3d App / Seismic Events
Column: #Map3d App / Seismic Events / localMagnitude"/></p> <p>Input Minimum: <input checked="" type="checkbox"/> -1 <input type="button" value="Link"/></p> <p>Input Maximum: <input checked="" type="checkbox"/> 1 <input type="button" value="Link"/></p>
----------------------	---

Settings Window → *New → *Menu Definitions * New Menu Definition 

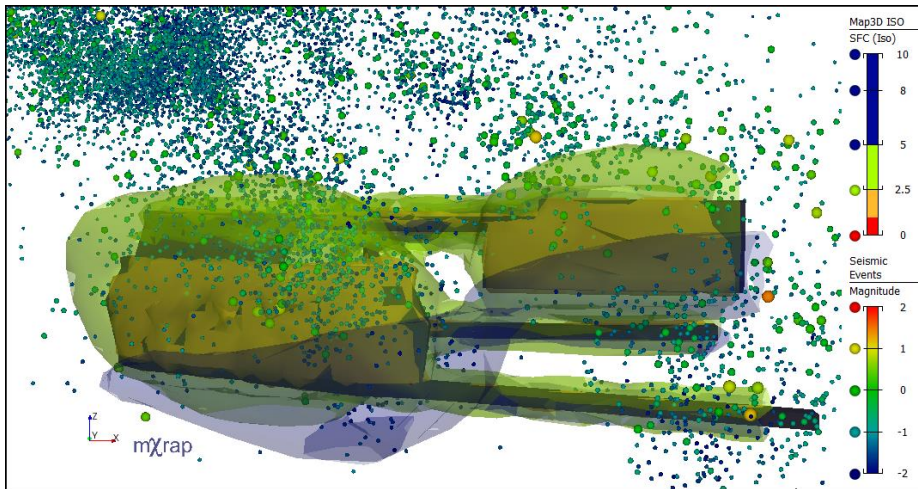
*New / *Window Definition	<p>Save As:</p> <p>Folder: #Map3d App,</p> <p>Name: <i>Marker Style Menu [Events]</i></p>																
#Map3d App → Marker Style Menu [Events]	<p>Add:</p> <p>Simple 'Black ring' or something similar</p> <p>Magnitude (<i>just created</i>)</p> <p>Magnitude [Scale] (<i>just created</i>)</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th>Menu Name</th> <th>Linked Tool</th> <th>Order</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>Black - Ring</td> <td>!/ Black - Ring</td> <td>100</td> <td>Tool</td> </tr> <tr> <td>Magnitude [Scale]</td> <td>#Map3d App / Magnitude [Scale]</td> <td>100</td> <td>Tool</td> </tr> <tr style="background-color: #e0e0ff;"> <td>Magntiude</td> <td>#Map3d App / Magntiude</td> <td>100</td> <td>Tool</td> </tr> </tbody> </table>	Menu Name	Linked Tool	Order	Type	Black - Ring	!/ Black - Ring	100	Tool	Magnitude [Scale]	#Map3d App / Magnitude [Scale]	100	Tool	Magntiude	#Map3d App / Magntiude	100	Tool
Menu Name	Linked Tool	Order	Type														
Black - Ring	!/ Black - Ring	100	Tool														
Magnitude [Scale]	#Map3d App / Magnitude [Scale]	100	Tool														
Magntiude	#Map3d App / Magntiude	100	Tool														

Analysis Window → #Map3D → 3D View

Page Settings (Panel) →
Configure Page →
3D View → Points: Seismic
Events → Marker Menu

Configure this marker menu for the events series.

Data	Isosurface	Marker Menu	Comments
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Marker Menu: (colours/shapes) #Map3d App / Marker Style Menu [Events]	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Marker Menu: (sizes) #Map3d App / Marker Style Menu [Events]	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Marker Menu: (3D attenuation) !/@Interface/Marker Style Menu / Generic Distance Attenuation	<input type="checkbox"/>

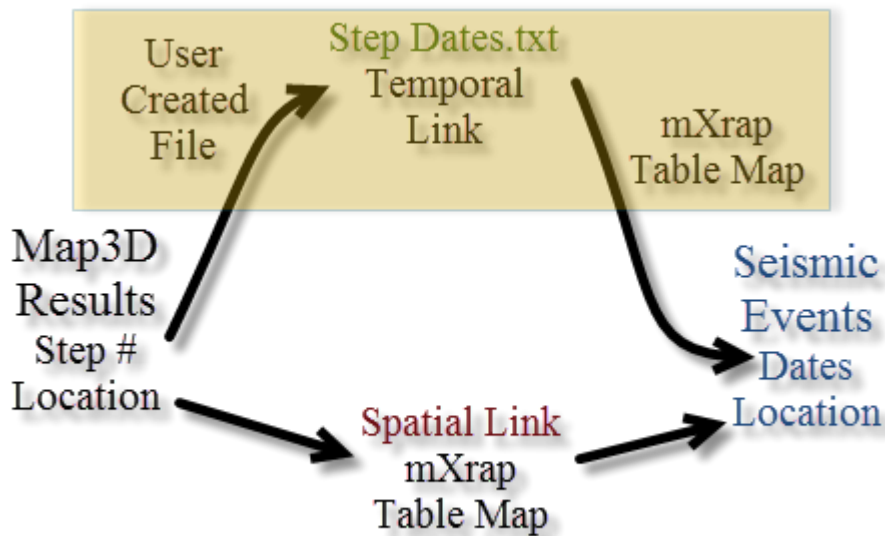


7 Filtering Events for Steps

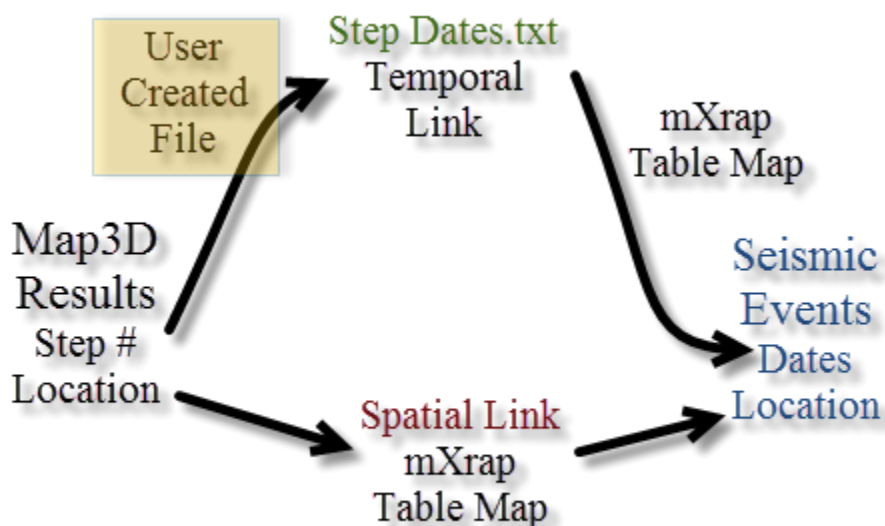
Up until now we have been manipulating single tables i.e. making marker styles for a column in the events alias table. Now we have to combine information from multiple tables.

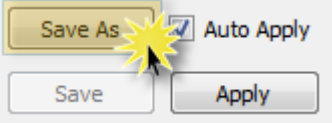
7.1 Filtering Events for Steps: Time

First Step will be to deal with creating a temporal link .This is a stepping-stone that will allow us to relate Map3D results (Step Number to Seismic Events (Dates)

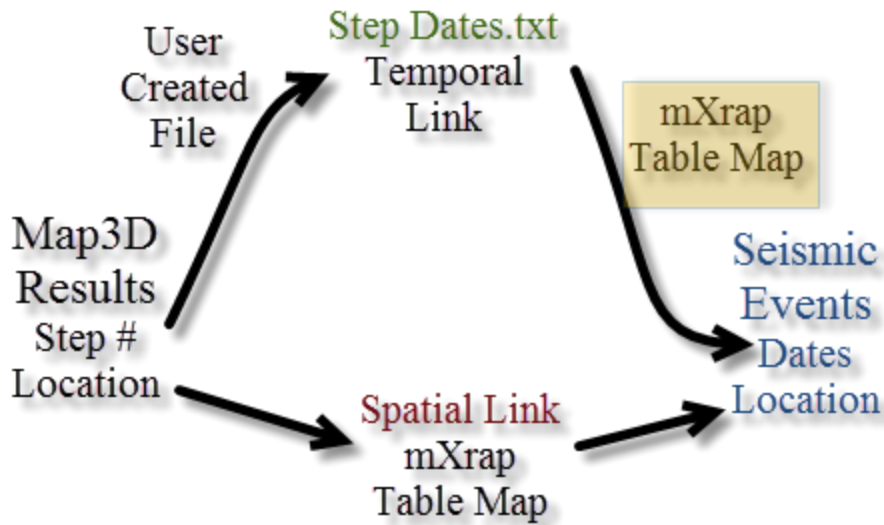


Let us bring in the extra info we need to link step number for dates via the Step Dates.txt



Settings Window → *New → *Import CSV		* Import CSV									
*New/Import CSV	Start by saving this tool: Save As Folder: #Map3d App Name: Step Dates Link										
#Map3d App → Step Dates Link	For the Input File: Browse to the Step Dates.txt										
#Map3d App → Step Dates Link	<p>Configure the format of this file: Add the required columns: Step Number (Number) Dates (Date) Date format : yyyy-MM-dd hh:mm:ss.zzz</p> <p>Important Note: Dates can be tricky. The format in the file must EXACTLY match the format in mXrap. The kicker is that every time excel opens a file, it changes the date format to 'its default'. Be Aware of this!! Solution is to re-specify the right custom format in excel. So the standard format generally is: mXrap: yyyy-MM-dd hh:mm:ss.zzz excel: yyyy-MM-dd hh:mm:ss.000</p> <p>Input File: <input checked="" type="checkbox"/> #Tasmania Map3D/Step Dates.txt</p> <div style="border: 1px solid gray; padding: 5px;"> <p>Applied config will load file: #Tasmania Map3D/Step Dates.txt</p> <p>Columns CSV Format Translation Cache Results</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Type</th> <th>Date Format</th> </tr> </thead> <tbody> <tr> <td>Step Number</td> <td>Number</td> <td></td> </tr> <tr> <td>Dates</td> <td>Date</td> <td>yyyy-MM-dd hh:mm:ss.zzz</td> </tr> </tbody> </table> <p>SAVE</p> </div>		Name	Type	Date Format	Step Number	Number		Dates	Date	yyyy-MM-dd hh:mm:ss.zzz
Name	Type	Date Format									
Step Number	Number										
Dates	Date	yyyy-MM-dd hh:mm:ss.zzz									
#Map3d App → Step Dates Link	<p>Check this import is doing what you think it should be! Open the Results tab for a preview.</p> <p>TIP (again): This is important. If the info doesn't come in correctly it will cause headaches when it is used 'downstream'</p>										

We now have a link between the data, but how do we actually go about saying this event happened after this mining step? We will be using a table map tool, although there are many ‘other’ ways. First, we will relate the link to the seismic events.



Settings Window → *New → *Table Map	
*New/Table Map	<p>Save As: Folder: #Map3d App, Name: Table Map [StepDates to Events] Hint: Be very clear with naming these, very easy to lose track of what is going where</p>
#Map3d App → Table Map [StepDates to Events]	<p>Before you start filling in boxes, have a think about the result we what to achieve.</p> <p>We want any event that happened after the step date to be assigned that step number and date.</p> <p>Map the last foreign row that is < primary [tick!]</p> <p><i>Ergo: map the last step date info that is less than (before) the event date.</i></p> <p>Primary Table: #Map3d App/ Seismic Events / Filter: *All Rows Values: Date</p> <p>Foreign Table: #Map3d App/ Step Dates Link / Filter: *All Rows Values: Date</p> <p>AND</p> <p>#Map3d App/ Step Dates Link / Step Number</p>

#Map3d App/ Step Dates Link / Step Dates

Configuration

Map exact matches
 Map the last foreign row that is < primary
 Map the last foreign row that is <= primary
 Map the first foreign row that is > primary
 Map nearest item

Primary Table

Table :

Filter :

Group by (1) :

Group by (2) :

Values :

Locations :

Max radius to search

Mapped Primary Columns (Only for "Map all" mode)

Foreign Table

Table :

Filter :

Group by (1) :

Group by (2) :

Values :

Locations :

Mapped Foreign Columns

Step Number (Numbers)
Step Dates (Dates)

Now this is quite a trick step, so let's make sure we have got this right by creating a table view for the events.

Analysis Window → *New → *Table View **Create * Table View**

Page Settings (Panel) →
Configure Page →
Columns Table

Open table configuration and fill in the fields

Table: #Map3d App / Seismic Events /

Filter: *All Rows

ID: #Map3d App/ Seismic Events / id

Select Date, Step Dates and Step Numbers for display

#Map3d App

- Seismic Events
 - Quality Events
 - date
 - id
 - location
 - localMagnitude
- Table Map [StepDates]
 - Step Dates
 - Step Number

Save As: Folder: #Map3D App, Name: Events Table


Audit the events table to make sure any event that occurs after a step date has that step date and step number in addition columns.

	date	Step Dates	↑ Step Number
834	2012-03-06 13:05:24.000	2012-03-06 13:03:55.0...	7
835	2012-03-06 13:04:55.000	2012-03-06 13:03:55.0...	7
836	2012-03-06 13:04:54.000	2012-03-06 13:03:55.0...	7
* ~ 837	2012-03-06 13:04:33.000	2012-03-06 13:03:55.0...	7
* ~ 838	2012-03-06 10:04:00.000	2012-02-19 18:00:47.0...	6
839	2012-03-06 07:25:43.000	2012-02-19 18:00:47.0...	6

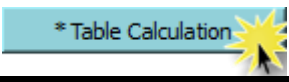
Now we can link that step number column to the previous variable we have made!

Settings Window → *New → *Range Filter * Range Filter

*New/*Range Filter	Save As: Folder: #Map3d App, Name: Mining Step Range Filter [Events]
#Map3d App → Mining Step Range Filter [Events]	<p>Configure this tool:</p> <p>Table: #Map3d App / Seismic Events /</p> <p>Columns: Table Map [StepDates to Events] Step number. HINT: 'Drag and Drop' From the bottom window onto the top '[]AND' Green bar.</p> <p>Configure Row: Link to Variables: #Map3d App/Variables/Mining Step</p> <p>Click on the '[]AND' Green bar to close</p> <p>Save</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 5px;"> <p>Table: #Map3d App / Import Map3D Results /</p> <hr/> <p>Range Filter Structure</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 5px;"> <p>AND</p> <ul style="list-style-type: none"> #Map3d App / Import Map3D Results / step number <input checked="" type="checkbox"/> Table: #Map3d App / Variables Column: #Map3d App / Variables / Mining Step to Table: #Map3d App / VariablesColumn: #Map3d App / Variables / Mining Step </div> </div>
...back to the Analysis Window	
Analysis Window → #Map3D App → 3D View	
Page Settings (Panel) → Configure Page → 3D View → Series → Points: Seismic Events	<p>Change the Filter</p> <p>Filter: #Map3d App / Mining Step Range Filter [Events]</p>
<p>PROBLEM!!!</p> <p>This means that we lose our Quality Filter... that is no good. We need to combine the filter we just made with the quality filter.</p>	

Settings Window → *New → *Composite Filter 	
*New/*Composite Filter	Save As: Folder: #Map3d App, Name: <i>Events Composite Filter</i>
#Map3d App → Events Composite Filter	Configure this tool: Table: #Map3d App / Seismic Events / Columns: #Map3d App / <i>Mining Step Range Filter [Events]</i> And Map3d App / Quality HINT: 'Drag and Drop' From the bottom window onto the top Save
<i>...back to the Analysis Window</i>	
Analysis Window → #Map3D App → 3D View	
Page Settings (Panel) → Configure Page → 3D View → Series → Points: Seismic Events	Change the Filter Filter: #Map3d App / Events Composite Filter
<p>PROBLEM!!! How long after the step, are the events allowed to be?</p> <p>Now, analysis considers all the events in the mine from the beginning of one-step until the next step. We only care about a subset of these events. We will deal with the spatial aspect later, but now let's finish up the temporal filtering by finish</p>	

Settings Window → *New → *Table Calculation



Warning: This tool lets you program in Javascript. We are moving away from the “as long as you have filled the boxes in right” to ... programming. If you miss one character in here, the computer will not forgive you. It will execute the code exactly how you have told it. If you program a loop with no stopping criteria, it will not stop. That being said, with untold responsibility, comes untold power.

*New/*Table Calculation **Save As:** Folder: #Map3d App, Name: Time Difference

#Map3d App → Time Difference

Configure this tool:

Step 1: Add an input table

Add new → **Add an Input Table:** #Map3d App / Seismic Events /
Assign JavaScript name: Events

Filter: IGNORE

Group 1: IGNORE

Group 2: IGNORE

Order: Date

Step 2: Add input/output columns.

Click right on ‘data’ and select Add Input Column:

#Map3d App / Seismic Event / date
JS identifier: event_date

Click right on ‘data’ and select Add Input Column:

#Map3d App / Table Map [StepDates to Events] /
JS identifier: step_date

Click right on ‘data’ and select Add Output Column:

JS identifier: time_difference

Save

You will need exactly this:

JS Identifier	In / Out	Type	Table	Column
▲ Events	IN Table	Table	#Map3d App / Seismic Events /	
<Filter>				<Double-click to set>
<Group By...>				<Double-click to set>
<Group By...>				<Double-click to set>
<Order>	IN Column Ascending	Dates		#Map3d App / Seismic Events / date
event_date	IN Column	Dates		#Map3d App / Seismic Events / date
step_date	IN Column	Dates		#Map3d App / Table Map [StepDates to Events] / Step Dates
time_differ...	OUT Column	Numbers		time_difference

```
#Map3d App → Time Difference

Time to code! What we need is a simple 'for loop' that, for every row reads the event date, step date and writes the time difference. Note that '/' before a line, ignores that line. Essentially comments.

You will need exactly this:

// Switch on Javascript 'strict mode' for safer code.
"use strict";
// start at the first event, until the last event, in increments on 1
// i is the index of the row in the event table. Note this index starts at '0'
for(let i = 0; i < Events.size(); i++){

    //read in the time of the step and event
    //this numbers are the number of milliseconds since 1970
    let event_t = Events.read_event_date(i);
    let step_t = Events.read_step_date(i);

    // What if they don't have a date?!
    // Check for this and only write if there is a date for both.
    if(event_t !==null && step_t !== null){
        // write out the difference.
        // This will be a positive number of milliseconds since the step.
        Events.write_time_difference(i, event_t - step_t);
    }
}
```

Analysis Window → #Map3D App → Seismic Events

#Map3d App / Seismic Events / **Add the time_difference column to the events table and audit your results**

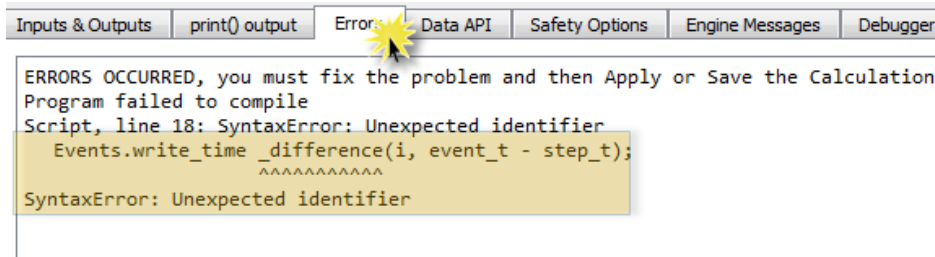
Hint: Configure Page →

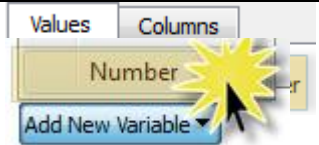
✕ Time Difference
✕ time_difference

Results should look like this:

	date	Step Dates	Step Number	Mining Step Range Filter [Events]	time_difference
2914	2012-01-08 23:08:24.000	2012-01-08 23:02:51.0...	3		333,000
2915	2012-01-08 23:07:53.000	2012-01-08 23:02:51.0...	3		302,000
2916	2012-01-08 23:07:43.000	2012-01-08 23:02:51.0...	3		292,000
2917	2012-01-08 23:06:25.000	2012-01-08 23:02:51.0...	3		214,000
2918	2012-01-08 23:06:17.000	2012-01-08 23:02:51.0...	3		206,000
2919	2012-01-08 23:06:07.000	2012-01-08 23:02:51.0...	3		196,000
2920	2012-01-08 23:05:46.000	2012-01-08 23:02:51.0...	3		175,000
2921	2012-01-08 23:05:44.000	2012-01-08 23:02:51.0...	3		173,000
2922	2012-01-08 23:05:16.000	2012-01-08 23:02:51.0...	3		145,000
2923	2012-01-08 23:05:12.000	2012-01-08 23:02:51.0...	3		141,000

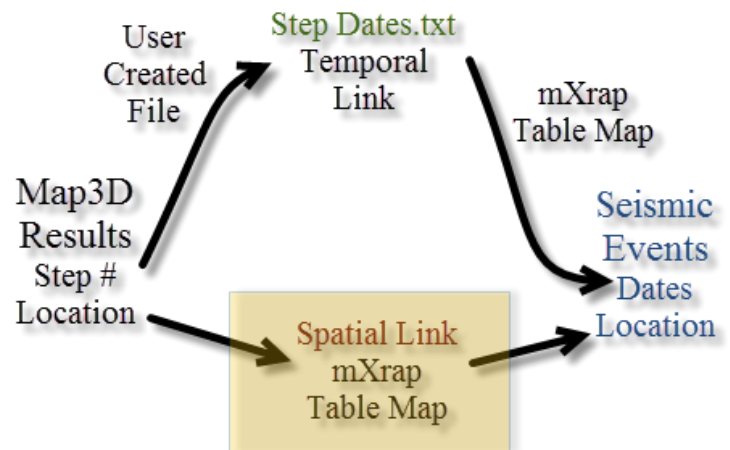
If not the error tab might provide some clues where things went wrong. (here is have a space in the code where there shouldn't be a space)



Settings Window → #Map3D App → Variables	
#Map3d App → Variables	<p>Add New Variable:</p> <p>Name: <i>Time Allowed After Step</i></p> 
#Map3d App → Variables → Mining Step (Number Variable)	<p>Configure to variable (number) as shown.</p> <p>Note: We must set the units, otherwise mXrap will think we mean milliseconds</p> <p>Default: 12 Hours</p> <p>Min: 0 Hours, No Max</p> <p>Do NOT allow this number to be null</p> <p>Do NOT allow the units to change</p> <p>Save</p>
#Map3d App → Mining Step Range Filter [Events]	<p>Drag the time_difference column onto this filter.</p> <p>Configure Row: Double click this new row to 'open' it. Configure the 'link' buttons for the upper and lower limits.</p> <p>Lower Variable: 0</p> <p>Upper Variable: #Map3d App/Variables/Time Allowed After Step</p> <p>Click on the '[]AND' Green bar to close</p> <p>Save</p>
Analysis Window → #Map3d App → 3D View & Events Table	<p>Add the Mining Step Range Filter [Events] filter column to the events table and audit your results</p> <p>Test the variables functionality in the 3D View.</p>

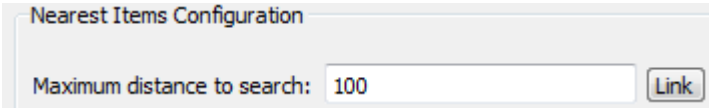
7.2 Filtering Events for Steps: Space

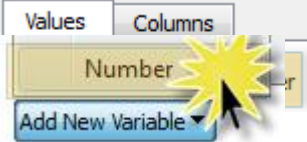
Ok so now we have events that happen soon after the step, however, anywhere in the mine. We now wish to limit how far away from the model we allow event to occur. Unlike the temporal link we have all the information we need, the location of the map3D results and the location of the seismic event. Again, we use a table map to make this connect, however, in a slightly different way.



Settings Window → *New → *Table Map	
*New/Table Map	<p>Save As: Folder: #Map3d App, Name: Table Map [Map3D to Events] Hint (again): Be very clear with naming these, very easy to lose track of what is going where</p>
#Map3d App → Table Map [Map3D to Events]	<p>We want the closest item (result point) for every event.</p> <p>Primary Table: #Map3d App/ Seismic Events / Filter: *All Rows Locations: Location</p> <p>Foreign Table: #Map3d App/ #Map3d App / Import Map3D Results Filter: *All Rows Locations: Location</p> <p>BUT WAIT!!! : This isn't quite right; we can't guarantee that events get the results from 'their' step. We could filter in this TableMap so we only calculate these results for the step we are looking at but this may be slow. Always better to do the calculations 'up front'. We get around this by using the 'Group By' option: Step Number.</p> <div style="border: 1px solid gray; padding: 5px; margin: 5px 0;"> <input checked="" type="checkbox"/> Group by (1) : #Map3d App / Table Map [StepDates to Events] / Step Number </div> <div style="border: 1px solid gray; padding: 5px; margin: 5px 0;"> Group by (1) : #Map3d App / Import Map3D Results / step number </div> <p>AND Add an extra (we need to pass the info to the events)</p> <p>#Map3d App/ Import Map3D Results / s1 #Map3d App/ Import Map3D Results / s2 #Map3d App/ Import Map3D Results / s3 #Map3d App/ Import Map3D Results / sfc</p>

Note: There is a limit on the Maximum Search Distance. In this case, 100m will be fine, but this may need to be modified depending on the application



Settings Window → #Map3D App → Variables	
#Map3d App → Variables	<p>Add New Variable:</p> <p>Name: <i>Maximum Distance from Map3D</i></p> 
#Map3d App → Variables → Maximum Distance from Map3D	<p>Configure to variable (number) as shown.</p> <p>Default: 5 (Note: Grid Spacing)</p> <p>Min: 0</p> <p>Max: 100 Note: Remember the Max Search Dist in the table map? – 100m limits that search, so it doesn't make sense to let this go past where there won't be results anyway.</p> <p>Do NOT allow this number to be null</p> <p>Do NOT allow the units to change</p> <p>Save</p>
#Map3d App → Mining Step Range Filter [Events]	<p>Drag the #Map3d App/Table Map [Map3D to Events] column onto this filter.</p> <p>Configure Row: Double click this new row to 'open' it. Configure the 'link' buttons for the upper and lower limits.</p> <p>Lower Variable: 0</p> <p>Upper Variable: #Map3d App/Variables/ Maximum Distance from Map3D</p> <p>Click on the '[]AND' Green bar to close</p> <p>Save</p>
Analysis Window → #Map3d App → 3D View & Events Table	<p>View the Mining Step Range Filter [Events] filter column to the events table and audit your results</p> <p>Test the variables functionality in the 3D View.</p>

7.3 Charting Results

Now we have seismic events with map3D results associated with them AND seismic events filtered for each step. Charts can be constructed showing the various aspects of these two tables. Any combinations could be explored; however, this example will assess the relationship between Sigma 1, Sigma 3, and Magnitude.

Analysis Window → *New → *Chart Create * Chart

***New / *Chart** **Save As:** Folder: #Map3D App, Name: Sigma 1 vs Sigma 3

Page Settings (Panel) →
Configure Page → Series

Configure this tool:

Add Up
Remove Down

Add a new series:

Configure this Series:

Data Tab:

Series Name: Events
Series Icon: Sphere_64x64
Filter: #Map3d App / Events Composite Filter
Id: #Map3d App / Seismic Events / id
X: #Map3d App / Table Map [Map3D to Events] / s1
Y: #Map3d App / Table Map [Map3D to Events] / s3

Markers Tab:

Configure this to the Marker Style Menu [Events] We previously made.

Data Markers Advance

#Map3d App / Marker Style Menu [Events]

#Map3d App / Marker Style Menu [Events]

Configure Axis:

Bottom: Show axis title, ticks and labels
Title: Sigma 1 [MPa]

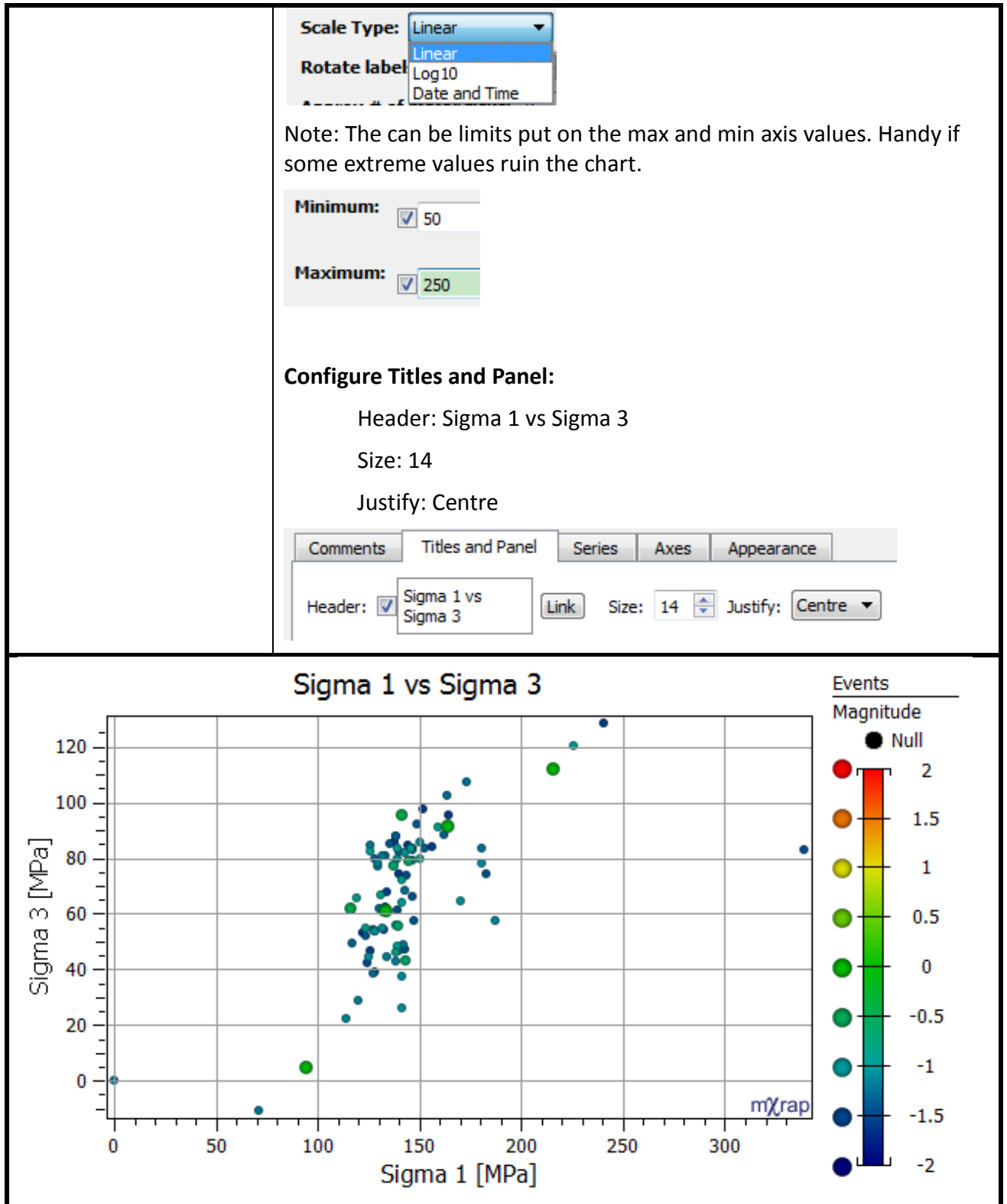
Left: Show axis title, ticks and labels
Title: Sigma 3 [MPa]

Bottom

Show axis title, ticks and labels

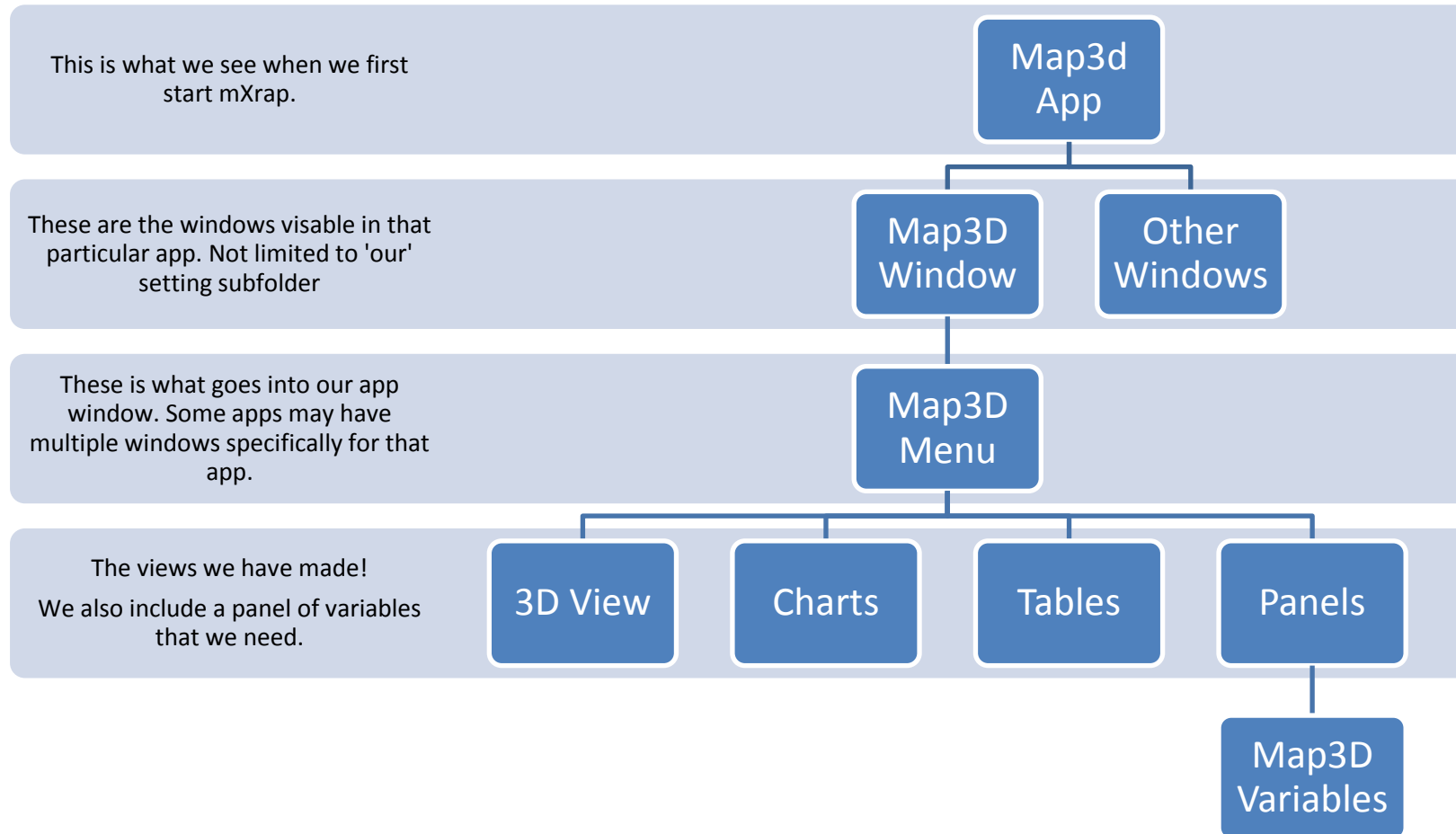
Title: Sigma 1 [MPa]

Note: Scale Type lets you use a log axis, or a date axis, dependent on what is being plotted

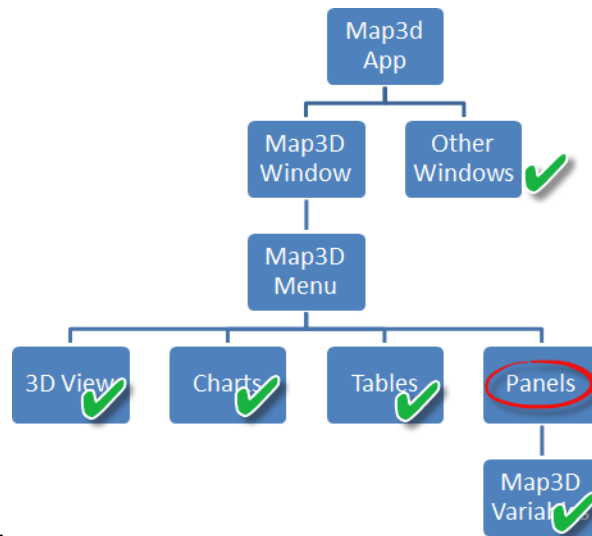


8 Interface Construction

The interface is a way to limit what the user can see and use. We will create a basic one here that won't cover all the features but will provide a good start for anyone wanting to make their own 'proper interfaced apps'. Below is a basic overview of how the interface tools work together. We will start from the bottom and work up, keeping in mind that we have already created the required 3d, chart and table views along with variables.



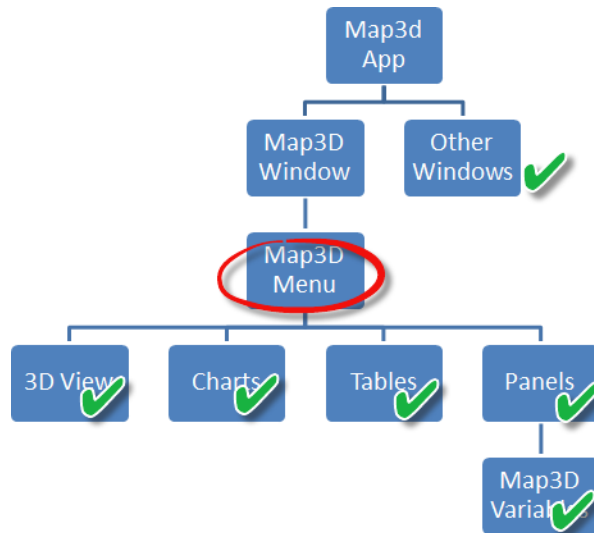
8.1 Variables Panel



Settings Window → *New → *Panel View * Panel View

*New / *	Save As: Folder: #Map3d App / Interface Name: Map3D Variables
#Map3d App → Interface →	Configure this tool: Add a 'slot' for a variable: <div style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <div style="display: flex; justify-content: space-between; align-items: center;"> Add ▾ Up </div> <ul style="list-style-type: none"> Line Text Value Display <li style="background-color: #ffffcc;">Variable Editor Embed a Tool (another Panel, Pick, Table View) </div> Specify the 'Variable to Edit' <div style="display: flex; justify-content: space-between; align-items: flex-start; margin-top: 10px;"> <div style="border: 1px solid #ccc; padding: 5px; width: 45%;"> Variable Editor </div> <div style="border: 1px solid #ccc; padding: 5px; width: 45%; background-color: #ffffcc;"> Variable to edit: Table: #Map3d App / Variables Column: #Map3d App / Variables / Mining Step History/Bookmark codename: </div> </div> <p>Complete this for our 3 Variables: #Map3d App / Variables / Mining Step #Map3d App / Variables / Time Allowed After Step #Map3d App / Variables / Maximum Distance from Map3D SAVE</p>

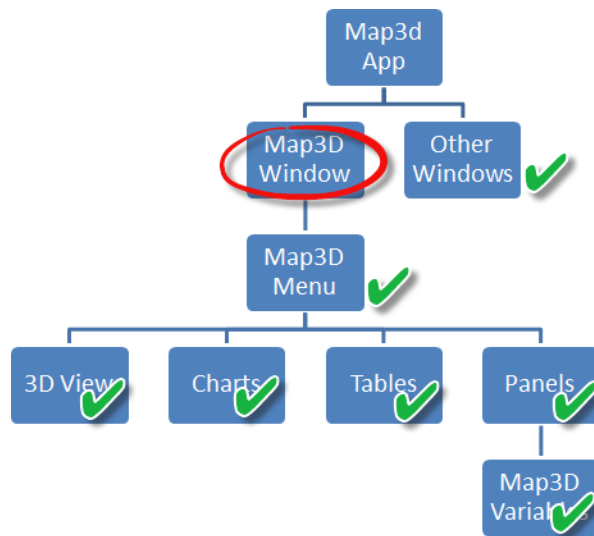
8.2 Menu Definition



Settings Window → *New → * Menu Definition * New Menu Definition

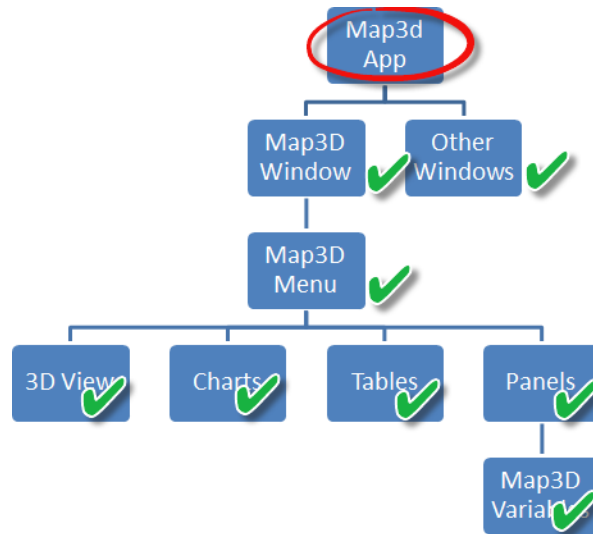
*New / * Menu Definition	Save As: Folder: #Map3d App / Interface Name: Map3D Menu																																																							
#Map3d App → Interface → Map3D Menu	<p>Configure this tool:</p> <p>Click Right → Add Tool → ‘Browse to the views and panels we require’</p> <p>Save the tools under appropriate subfolders by giving them ‘Directory Names’ e.g. <i>Tables/Events Table</i></p> <p>FINAL CONFIGURATION:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th colspan="5">Menu Definition</th> </tr> <tr> <th>Menu Name</th> <th>Linked Tool</th> <th>Order</th> <th colspan="2">Type</th> </tr> </thead> <tbody> <tr> <td>▲ 3D View</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> 3D View</td> <td>#Map3d App / 3D View</td> <td>100</td> <td colspan="2">Tool</td> </tr> <tr> <td>▲ Charts</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> Sigma 1 vs Sigma 3</td> <td>#Map3d App / Sigma 1 vs Sigma 3</td> <td>100</td> <td colspan="2">Tool</td> </tr> <tr> <td>▲ Panels</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> Variables</td> <td>#Map3d App/Interface / Map3D Variables</td> <td>100</td> <td colspan="2">Tool</td> </tr> <tr> <td>▲ Tables</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> Events Table</td> <td>#Map3d App / Events Table</td> <td>100</td> <td colspan="2">Tool</td> </tr> <tr> <td> Map3D Results Table</td> <td>#Map3d App / Map3D Results Table</td> <td>100</td> <td colspan="2">Tool</td> </tr> </tbody> </table> <p>SAVE</p>	Menu Definition					Menu Name	Linked Tool	Order	Type		▲ 3D View					3D View	#Map3d App / 3D View	100	Tool		▲ Charts					Sigma 1 vs Sigma 3	#Map3d App / Sigma 1 vs Sigma 3	100	Tool		▲ Panels					Variables	#Map3d App/Interface / Map3D Variables	100	Tool		▲ Tables					Events Table	#Map3d App / Events Table	100	Tool		Map3D Results Table	#Map3d App / Map3D Results Table	100	Tool	
Menu Definition																																																								
Menu Name	Linked Tool	Order	Type																																																					
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3D View	#Map3d App / 3D View	100	Tool																																																					
▲ Charts																																																								
Sigma 1 vs Sigma 3	#Map3d App / Sigma 1 vs Sigma 3	100	Tool																																																					
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Variables	#Map3d App/Interface / Map3D Variables	100	Tool																																																					
▲ Tables																																																								
Events Table	#Map3d App / Events Table	100	Tool																																																					
Map3D Results Table	#Map3d App / Map3D Results Table	100	Tool																																																					

8.3 Window Definition



Settings Window → *New → * Window Definition * Window Definition	
*New / * Window Definition	Save As: Folder: #Map3d App / Interface Name: Map3D Window
#Map3d App → Interface → Map3D Window	Here all we want to do is set the 'Menu Definition' to the Tool we just made in the previous step Note: We will be revisiting this tool when we go to capture the initial tabs of the app. <div style="border: 1px solid #ccc; padding: 5px;"> <div style="display: flex; border-bottom: 1px solid #ccc;"> Menu Definition Hot Keys Initial Tabs Appearance </div> <div style="margin-top: 5px;"> <input checked="" type="radio"/> Menu Definition: #Map3d App/Interface / Map3D Menu Clear </div> <div style="margin-top: 5px;"> <input type="radio"/> Use old menu (NOTE - will be removed in future, please migrate to new "Menu Definition") </div> </div> <p>SAVE</p>

8.4 App Definitions



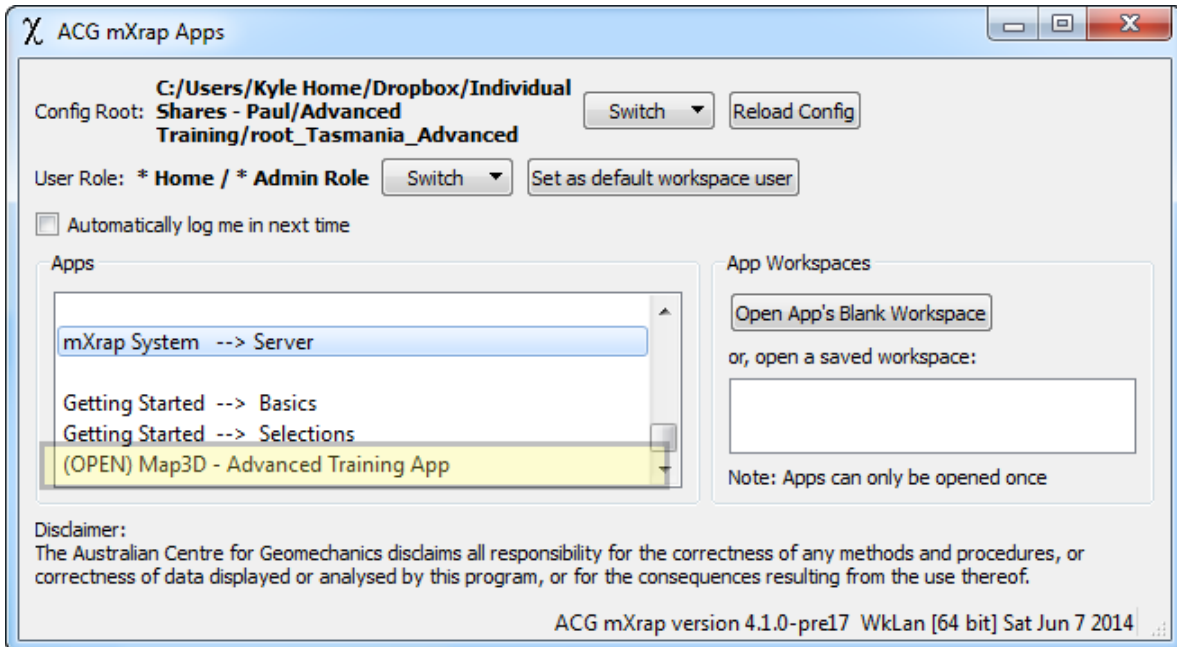
Settings Window → *New → * App Definitions * App Definition

*New / * App Definitions	Save As: Folder: #Map3d App / Interface Name: Map3D App									
#Map3d App → Interface → Map3D App	<p>Configure this tool:</p> <p>Similar to the menu definition, just click right on the space and browse to the windows that we need in there:</p> <p>#Map3d App → Interface → Map3D Window</p> <p>!/System Monitor / ~System Health Monitor Window</p> <p>Change the Open at Start for the Map3D Window to True (by double clicking the default False)</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>#Map3d App/Interface / Map3D App <input type="checkbox"/> Star this tool</p> <p>Title: Map3D - Advanced Training App</p> <p>Windows</p> <p><input type="checkbox"/> Server Mode: Automatically write cache files for loaded data sources, show server control</p> <p><input type="radio"/> Show all defined windows</p> <p><input checked="" type="radio"/> Limit available windows to:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th style="text-align: left;">Window Name</th> <th style="text-align: left;">Tool ID</th> <th style="text-align: center;">Open at Start</th> </tr> </thead> <tbody> <tr> <td>Map3D Window</td> <td>#Map3d App/Interface / Map3D Window</td> <td style="text-align: center;">True</td> </tr> <tr> <td>~System Health Monitor Window</td> <td>!/System Monitor / ~System Health Monitor Window</td> <td style="text-align: center;">False</td> </tr> </tbody> </table> </div> <p>SAVE</p>	Window Name	Tool ID	Open at Start	Map3D Window	#Map3d App/Interface / Map3D Window	True	~System Health Monitor Window	!/System Monitor / ~System Health Monitor Window	False
Window Name	Tool ID	Open at Start								
Map3D Window	#Map3d App/Interface / Map3D Window	True								
~System Health Monitor Window	!/System Monitor / ~System Health Monitor Window	False								

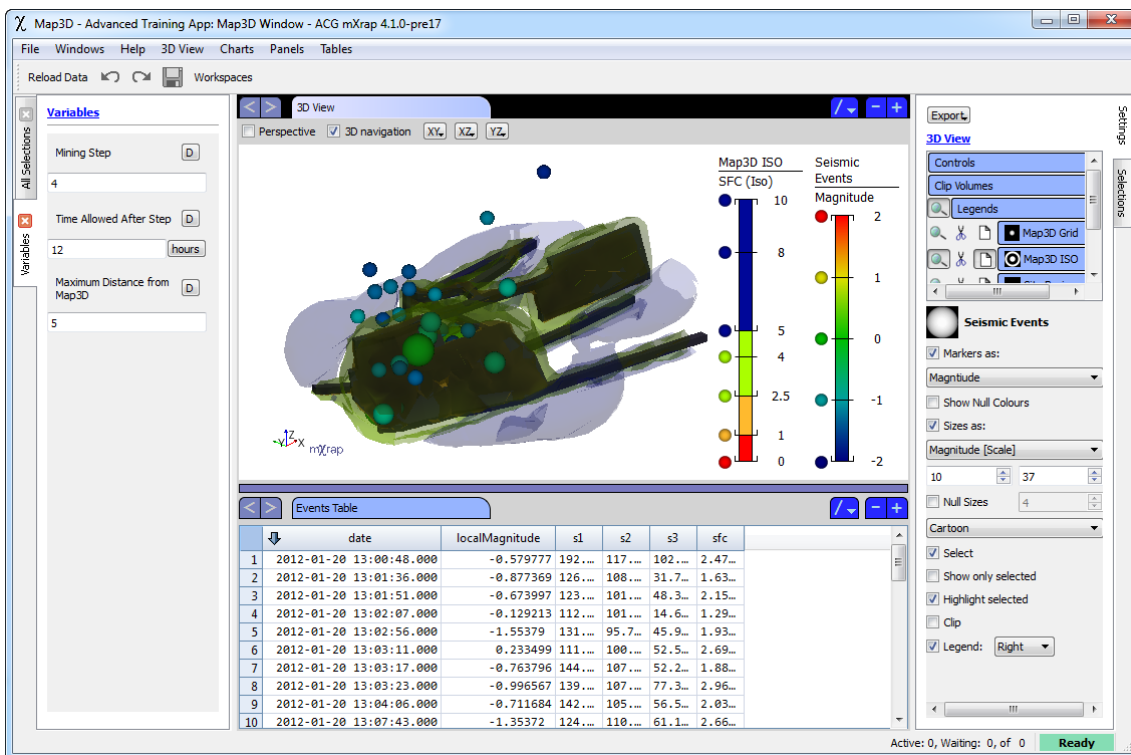
8.5 Final App Set up

There are a few last things we need to set up in the App so let's start by make sure all settings are saved in both the Settings and Analysis Window.

Close mXrap and re-open. Then Open the app we have made:



We now need to set up the app how you would like it to appear upon opening it. Make sure you have the Variables Panel open, but the rest is up to you! Here is mine:



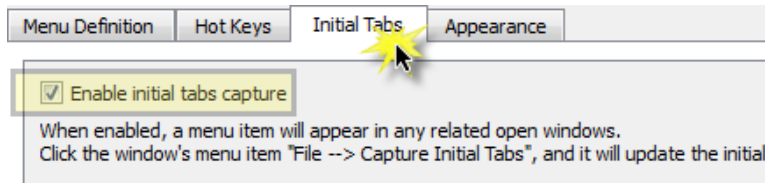
Now we need to capture this view. To do this go the

Menu: Windows → Settings Window

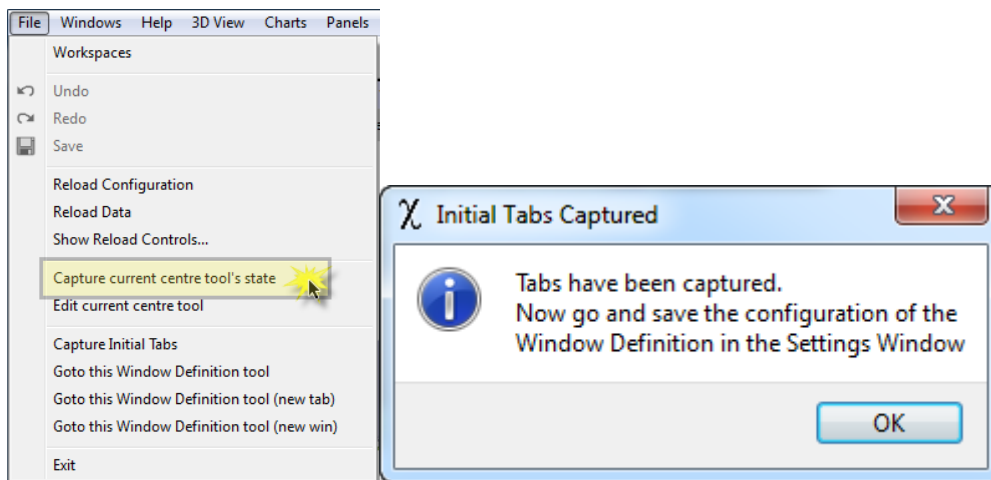
Then open the Initial tabs in the Map3D windows tool:

#Map3d App → Interface → Map3D Window → Initial Tabs (Tab)

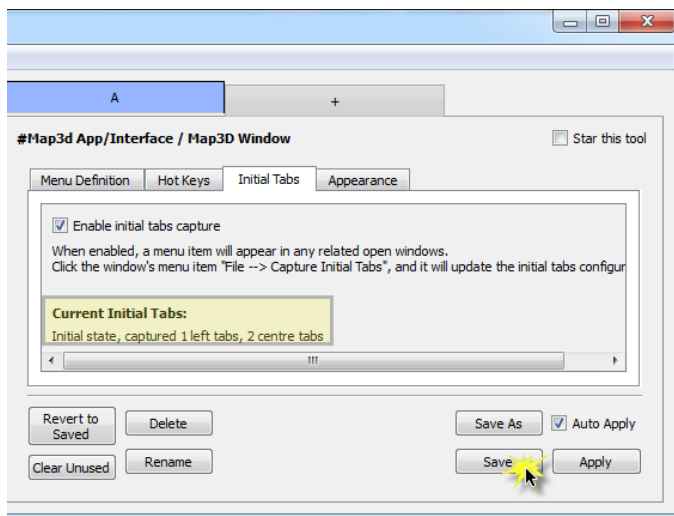
Enable initial tabs capture:



Now, go back to your app window and capture those tabs by heading to the *File* menu. You will receive confirmation:



Finally, back to the Setting Window to save the tool...



And we are done!

9 Extension Exercises

9.1 Easy Mode

9.1.1 Marker Styles

Make additional Marker styles (suitable for isosurfaces) for Map3D results (s1,s2,s3)

Bring in additional event source parameters (energy, moment etc.) and create marker styles for these new columns

9.1.2 Charts

Make an additional charts which shows:

Magnitude vs SFC

In the same chart, add Magnitude vs other map3D results

Sigma 1 vs Sigma 3

9.1.3 Interface

Spruce up the Panel View by adding lines and comments

9.2 Harder Mode

9.2.1 Associate Information from the Blast Database

- Modify the 'time difference' table calculation to output an additional column 'Hours Since Step'. Plot this value against information from the map3D results.
- Here is some information about the blasts associated with each of these modelling steps. This information exists in the blasts table. Plot the blast, and only the blast associated with each mining step.

Step Number	Name	Blast ID	Time
3	Stope # 177 - 1150 Level	40505	2012-01-08 23:02:51.000
4	Stope # 180 - 1150 Level	40509	2012-01-20 12:59:45.000
5	Stope # 185 - 1150 Level	40515	2012-01-31 15:25:54.000
6	Stope # 192 - 1150 Level	40523	2012-02-19 18:00:47.000
7	Stope # 195 - 1150 Level	40527	2012-03-06 13:03:55.000

9.2.2 Calculate maximum shear stress for the Map3D results

This is quite easy, however, use a **row calculation** (this isn't a table calculation) to find:

$$T_{MAX} = \frac{S_1 - S_3}{2}$$

We haven't been through this type of tool but is similar to entering an equation for excel.

E.g. create a new column that is equal to (column x + column y)/2;

If you name your input columns s1 and s3, the **only** piece of code you need is:

```
return (s1-s3)/2;
```

The rest... I will let you try and figure out.

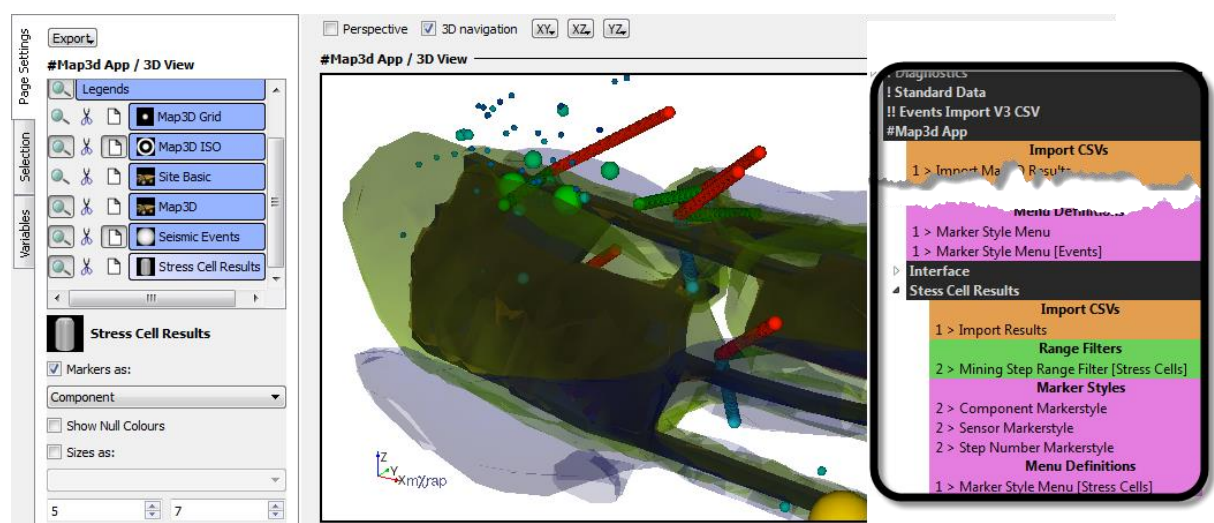
Extensions of this include:

- Make a marker style for this new column
- Map these values to events
- Make an event marker style for these values
- Make a chart plotting tmax vs magnitude for the events during a step.

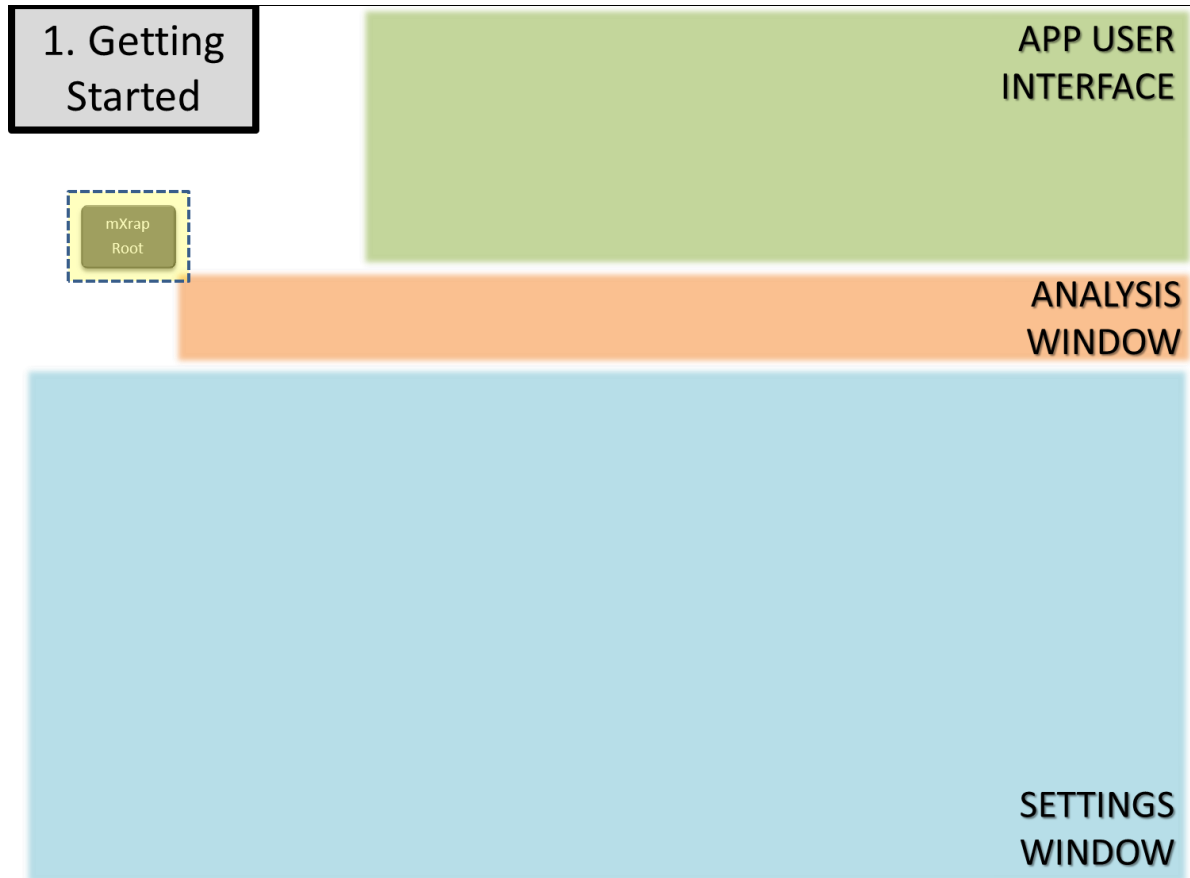
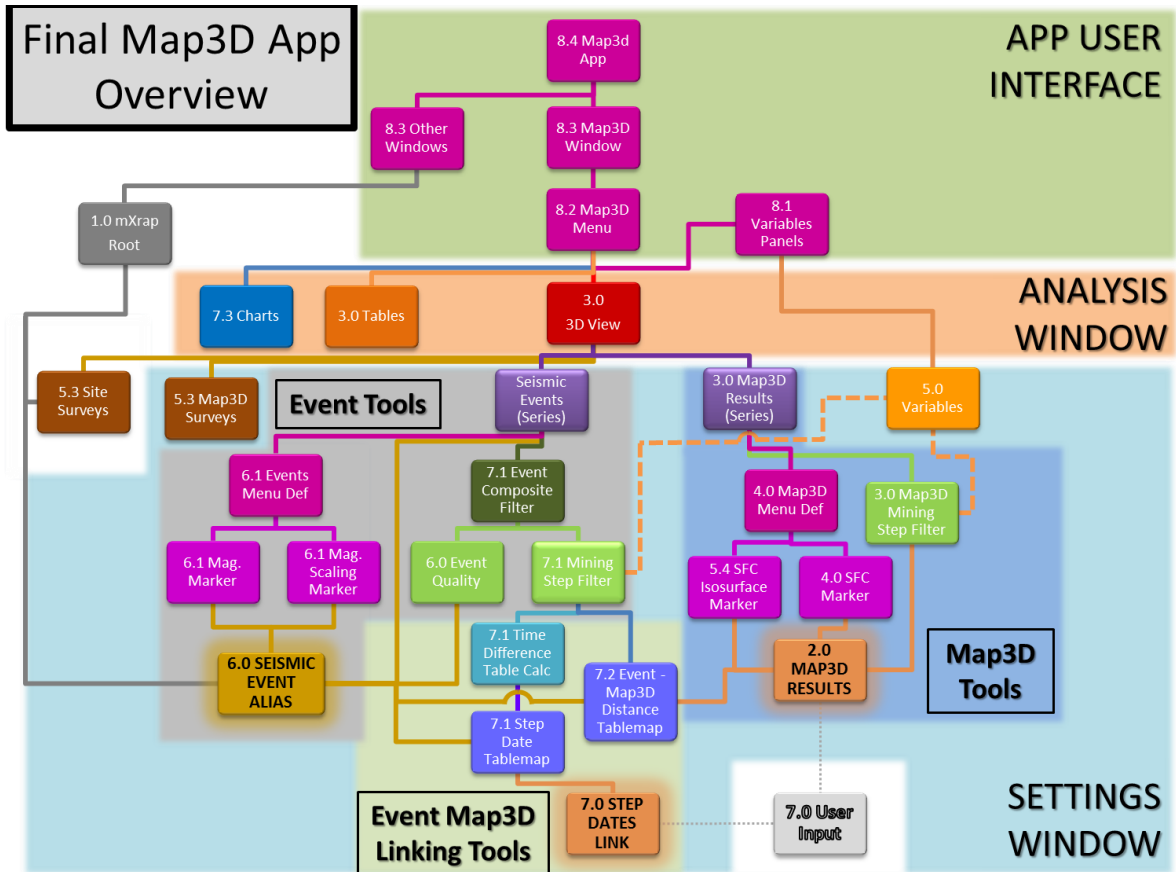
9.2.3 Stress Cell Results

In addition to the modelling results there is also a csv file called 'Stress Cell Sensor Readings.csv'. This file contains direction stress results (scaled by magnitude) for some sensors around the area of stoping. The format is simply some points to visualise these vectors along with columns for the component (principle '0', secondary '1', or tertiary direction '2'). *Disclaimer: I forgot to reorder these components for some sensors so the tertiary/secondary may be bigger than the primary. Ignore this, likely a bug in my pre-calculations somewhere.*

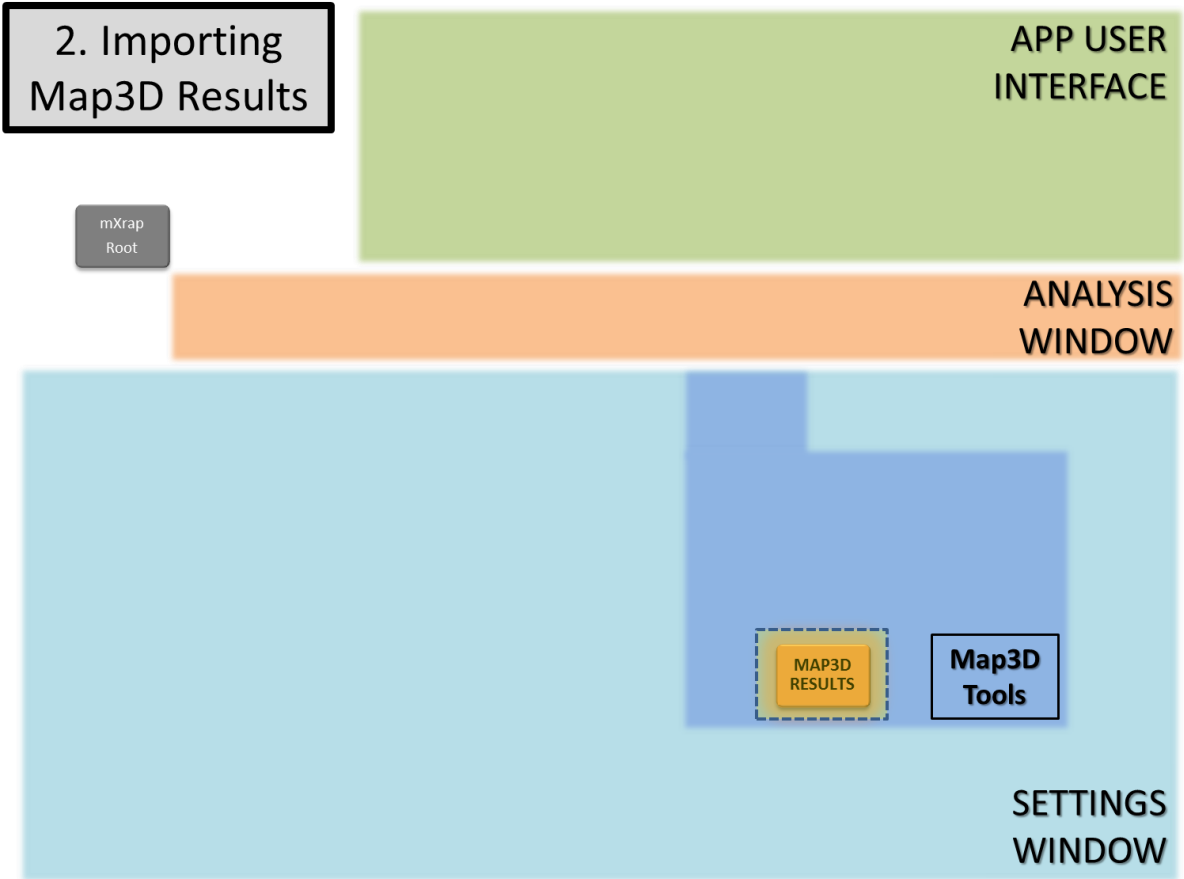
Also has a column for the sensor ID and step number. Create a sub folder 'Stress Cell Results'. Import this file and plot in 3D using component and sensor marker styles. Filter results for step number. HINT PREVIEW:



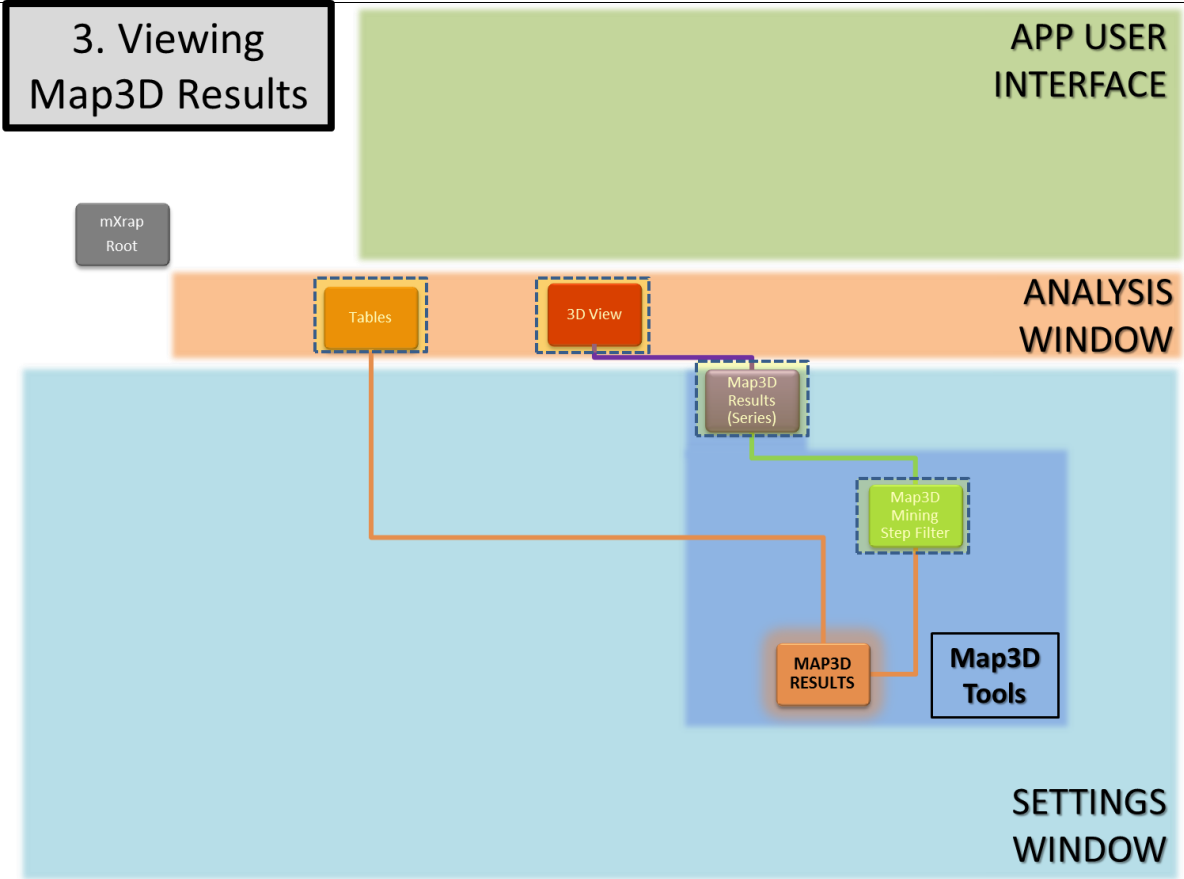
10 Appendix: Step by Step Presentation



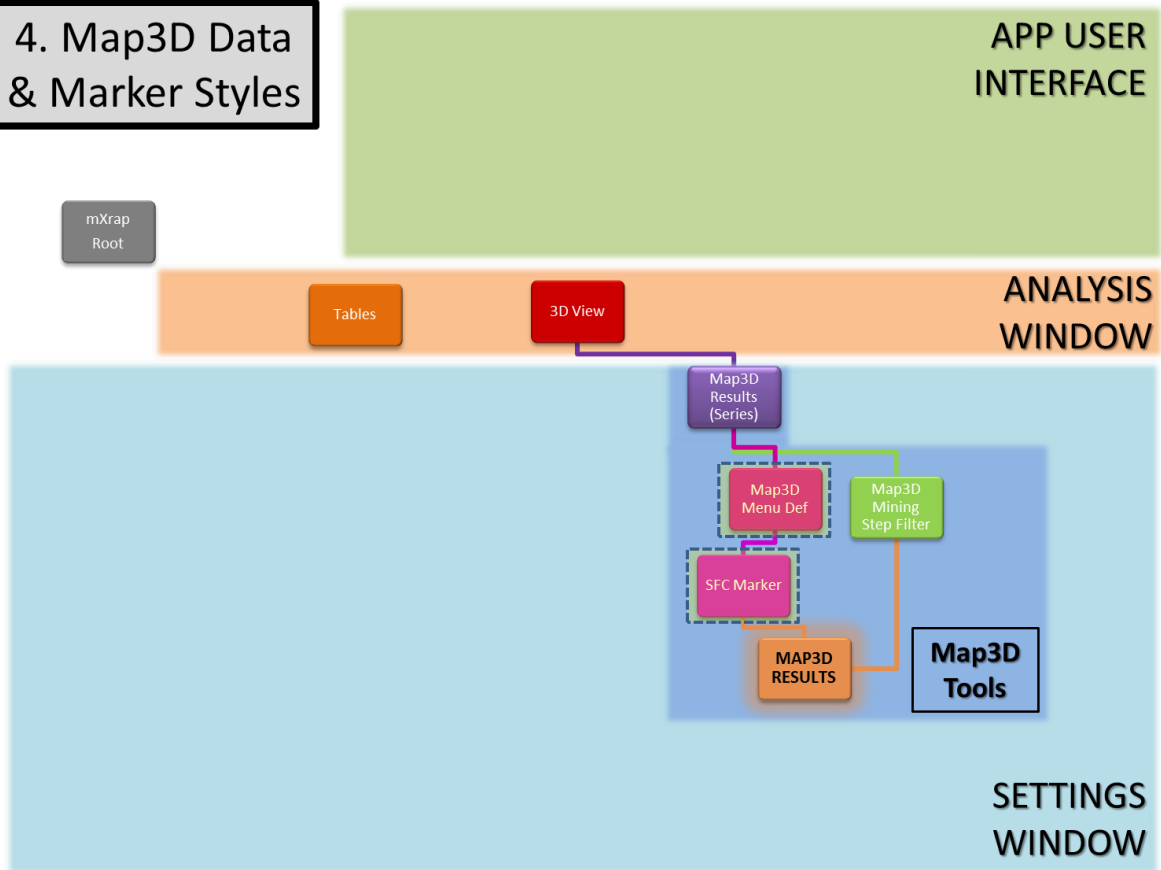
**2. Importing
Map3D Results**



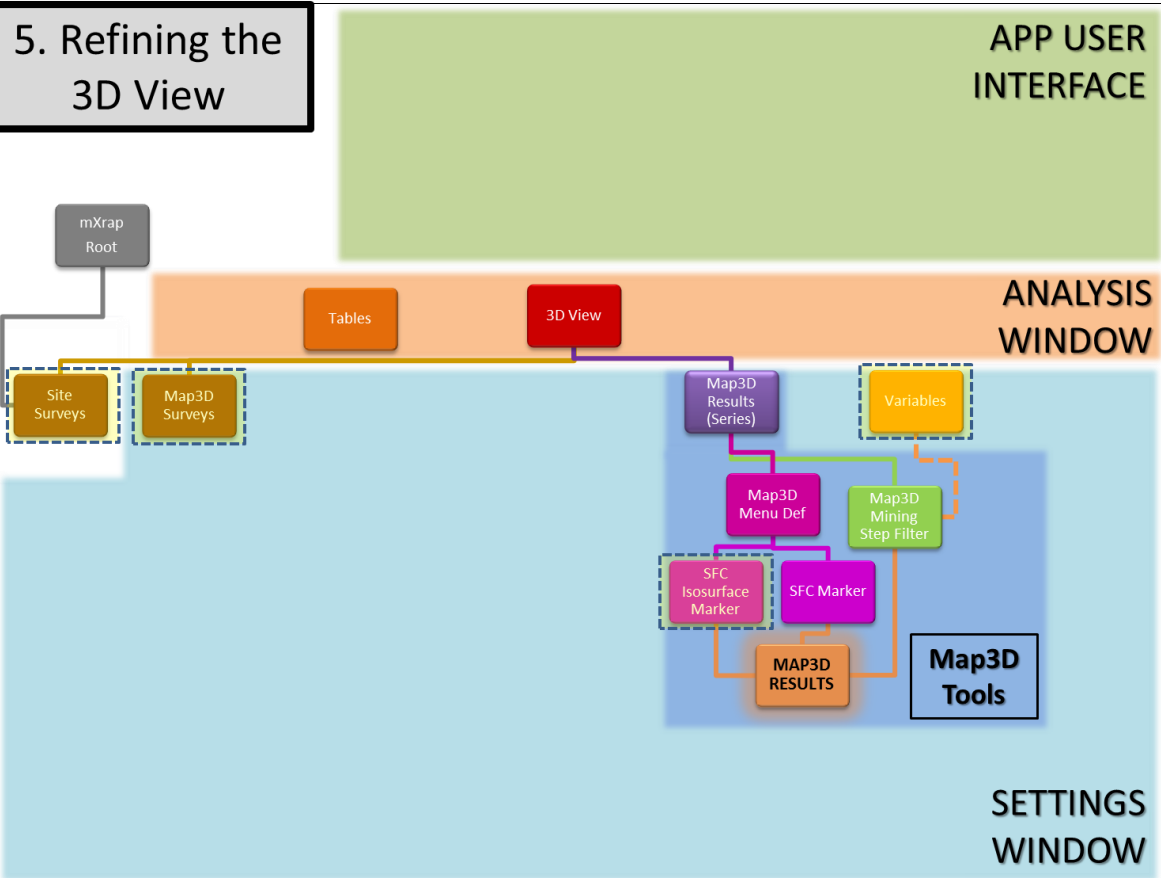
**3. Viewing
Map3D Results**

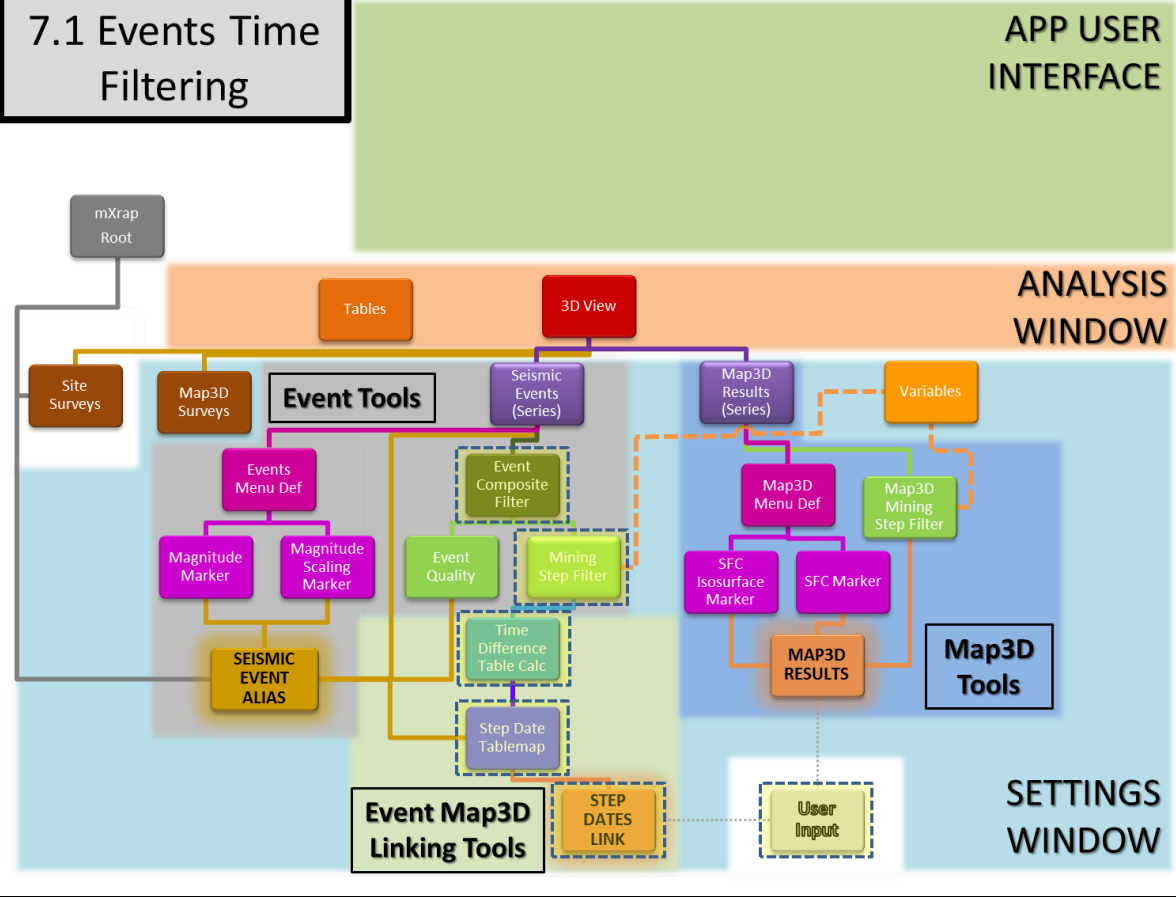
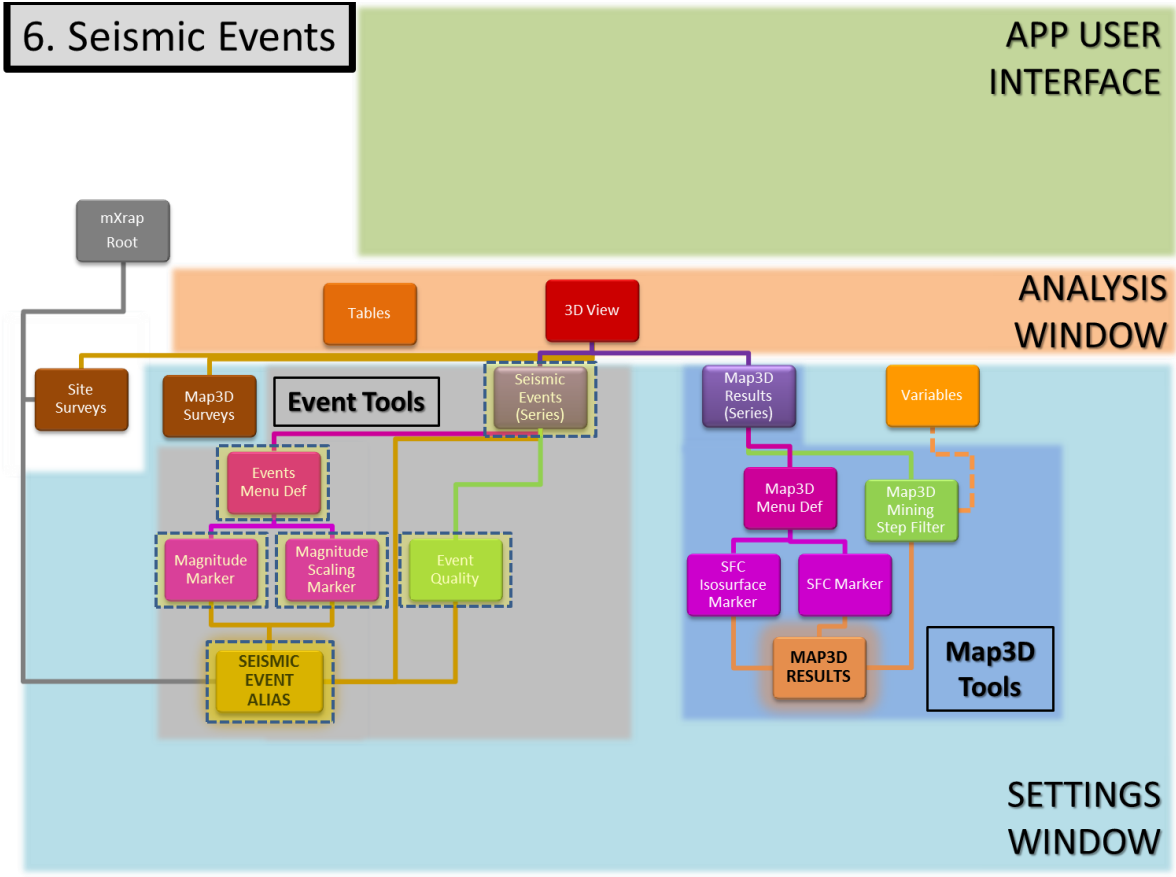


4. Map3D Data & Marker Styles

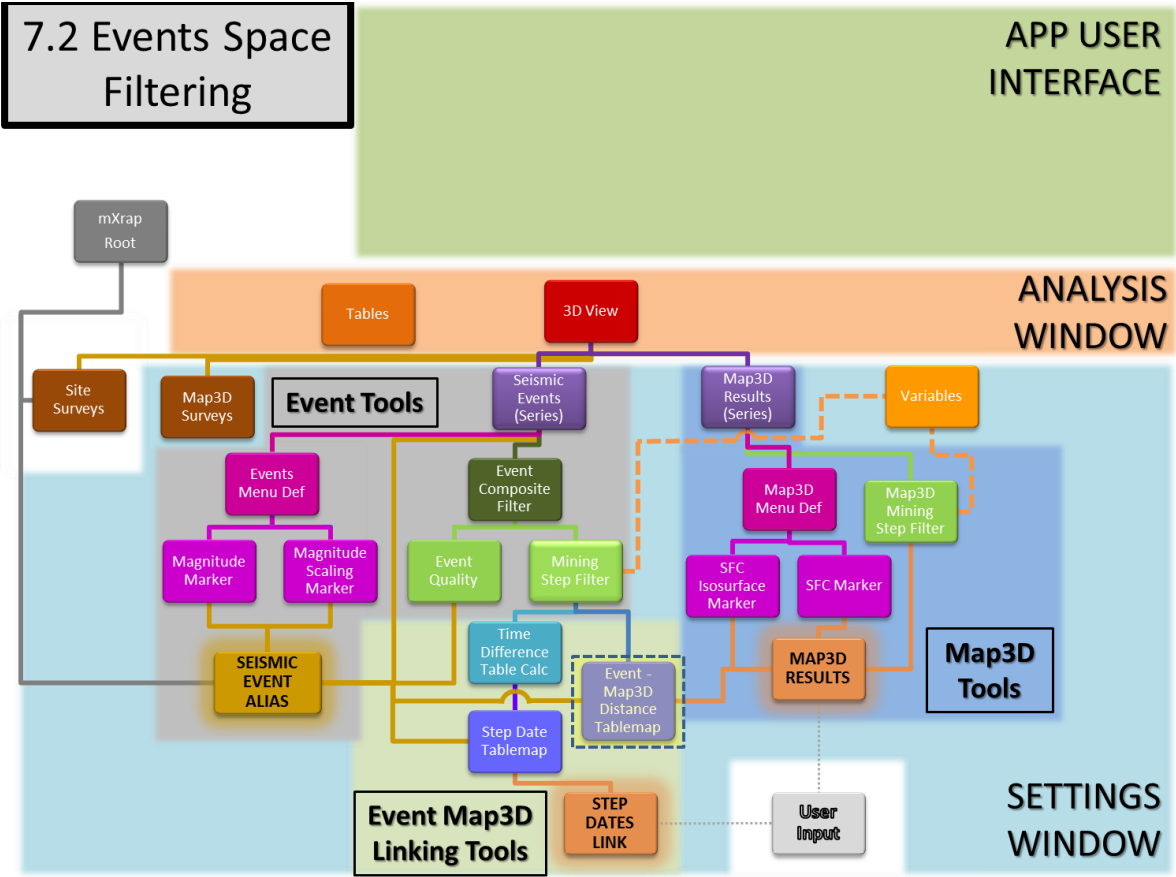


5. Refining the 3D View





7.2 Events Space Filtering



7.3 Charting Results

