

Merging Lithology & Stratigraphy Models with RockWorks2022

2/11/22

Consider a lithology model that represents laterally discontinuous overburden such as interfingering sands, gravels, and clays (Figure 1-A). The voxel colors are determined by the **Lithology Types Table** (Figure 1-B). Now, consider a stratigraphic block model that represents bedrock – a sequence of laterally continuous carbonates, sandstones, shales, and an underlying meta-diorite (Figure 1-C). The voxel colors are determined by the **Stratigraphy Types Table** (Figure 1-D). These two models can be merged by selecting the **ModOps / Solid / Filters / Merge** program (Figure 1-E). This program will replace all of the voxels within an existing model (Lithology) below a specified surface (Epikarst Top) with the voxels from another model (Fractured Stratigraphy).

When specifying the options for the **3D Solid Diagram**, specify a **Custom Color Scheme** (Figure 1-F) and select the new **“Merge Lithology & Stratigraphy Tables”** option (Figure 1-G). This will create a custom color table that includes all of the G-Values and associated colors for both the lithology types and the stratigraphy types. Please note that this assumes that the **G-Values** within the **Lithology Types Table** are unique relative to the **Order Values** (which define the stratigraphic block model G-Values) within the **Stratigraphy Types Table**.

The net result (Figure 1-H) is a numeric geologic block model and diagram that represents a combination of lithology and stratigraphy.

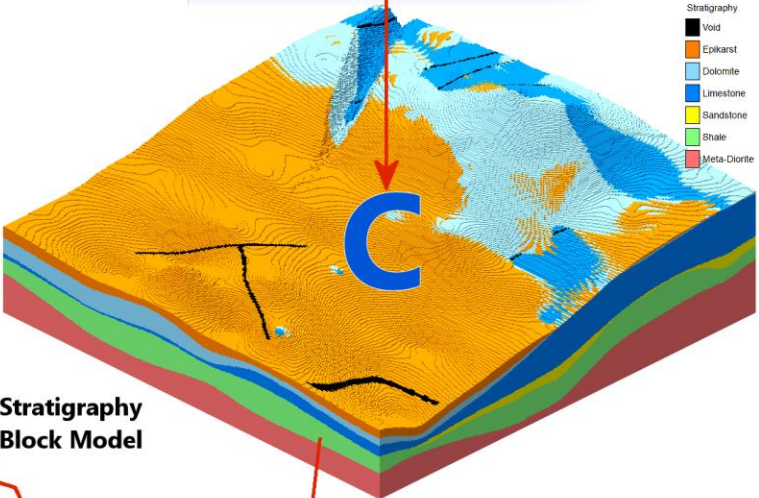
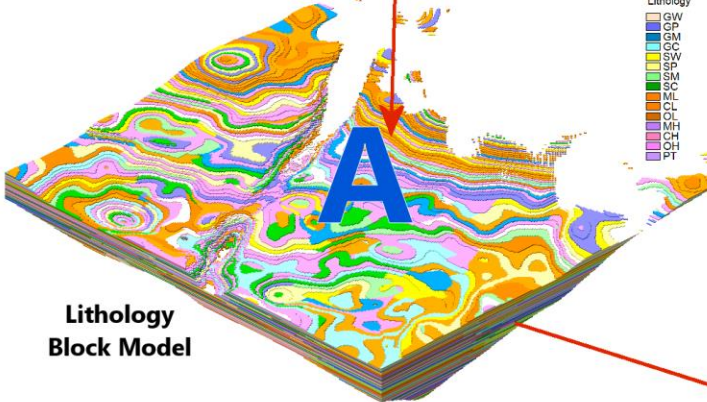
Borehole Database

Lithology Types Table

G-Value	Keyword	Pattern	Fill Percent	Density	Show in Legend	Description
13.0	CH		100	1.0	<input checked="" type="checkbox"/>	Inorganic clay
10.0	CL		100	1.0	<input checked="" type="checkbox"/>	Inorganic clay
4.0	GC		100	2.6	<input checked="" type="checkbox"/>	Clayey gravels
3.0	GM		100	1.8	<input checked="" type="checkbox"/>	Silty gravels
2.0	GP		100	1.0	<input checked="" type="checkbox"/>	Poorly-graded
1.0	GW		100	1.0	<input checked="" type="checkbox"/>	Well-graded g
12.0	MH		100	1.0	<input checked="" type="checkbox"/>	Inorganic silts
9.0	ML		100	1.0	<input checked="" type="checkbox"/>	Inorganic silts
14.0	OH		100	1.0	<input checked="" type="checkbox"/>	Organic clays
11.0	OL		100	2.2	<input checked="" type="checkbox"/>	Organic silts
15.0	PT		100	1.0	<input checked="" type="checkbox"/>	Peat and other
8.0	SC		100	2.5	<input checked="" type="checkbox"/>	Clayey sands
7.0	SM		100	2.6	<input checked="" type="checkbox"/>	Silty sands
6.0	SP		100	2.7	<input checked="" type="checkbox"/>	Poorly graded
5.0	SW		100	2.5	<input checked="" type="checkbox"/>	Well-graded s

Stratigraphy Types Table

Order	Formation	Pattern	Fill Percent	Density	Show in Legend
0.0	Void		100	1.0	<input checked="" type="checkbox"/>
16.0	Epikarst		100	1.0	<input checked="" type="checkbox"/>
17.0	Dolomite		100	1.0	<input checked="" type="checkbox"/>
18.0	Limestone		100	1.0	<input checked="" type="checkbox"/>
19.0	Sandstone		100	1.0	<input checked="" type="checkbox"/>
20.0	Shale		100	1.0	<input checked="" type="checkbox"/>
21.0	Meta-Diorite		100	1.0	<input checked="" type="checkbox"/>



RockWorks 2022
Version 2022.2.9

Project Folder: C:\Users\jim\Documents\RockWorks Data\TCE Site\

Summary | Dimensions | Coordinates | Units | Image | Notes

UTM System WGS-84 1984 (NAD-83) 13 Meters 481,875.0 482,175.0 4,399,725.0 4,400,025.0

Borehole Operations: Maps, Stratigraphy, T-Data, Fractures, I-Data, P-Data, Aquifers, Lithology

ModOps: Grid, Maps, Hydrolog, Solid, 3-D, Hydroch

Utilities: Display As IsoShells, Paper Solid, Solid & Boolean, Merge, Replace Node, Round, Smoothing, Tunnel Clipping, Borehole Clipping, Fill Voids

Project Manager | Datasheet (untitled)

Borehole Data: MW-01 to MW-12

Lithology Legend: GW, GP, GM, GC, SW, SP, SM, SC, ML, CL, OL, MH, CH, OH, PT

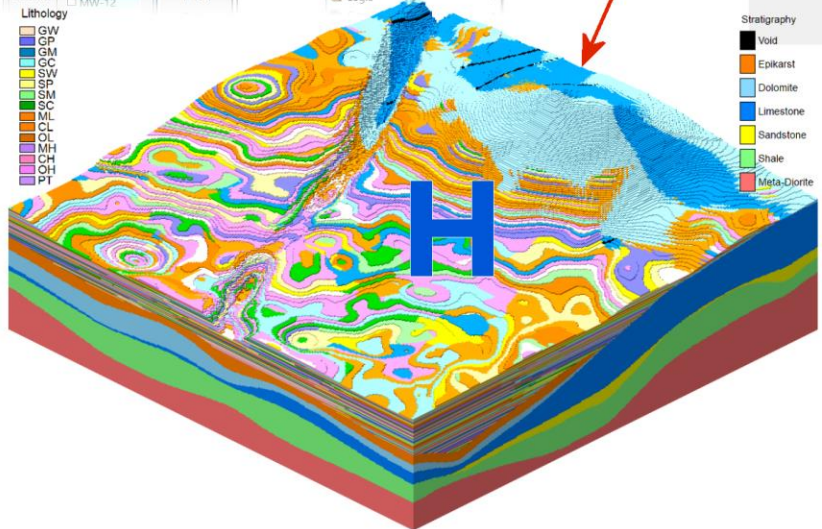
Solids & Unconformity Grid - Merged Solid

Main Options | Spatial Filter | Time Filter | Strat. Rules | 3D Look Design

Options: 3D Solid Diagram

Input: Solid Model That Contains Upper Nodes (Lithology.rwmod), Grid Model Used To Define Upper/Lower Demarcation (Epikarst_Top.RwGrd), Solid Model That Contains Lower Nodes (Fractured_Stratigraphy.rwmod)

Output: Merged Solid Model (Geology.rwmod)



Color Table

Custom (Table-Based)

Color Table: Edit Table..., New Table

K-Value Colors: Lith+Strat

TCE Contour Colors

Color Fill Table: Lith+Strat

Order	Minimum	Maximum	Color	Show Label
1.0	12.995	13.005		<input checked="" type="checkbox"/>
2.0	9.995	10.005		<input checked="" type="checkbox"/>
3.0	3.995	4.005		<input checked="" type="checkbox"/>
4.0	2.995	3.005		<input checked="" type="checkbox"/>
5.0	1.995	2.005		<input checked="" type="checkbox"/>
6.0	0.995	1.005		<input checked="" type="checkbox"/>
7.0	11.995	12.005		<input checked="" type="checkbox"/>
8.0	8.995	9.005		<input checked="" type="checkbox"/>
9.0	13.995	14.005		<input checked="" type="checkbox"/>
10.0	10.995	11.005		<input checked="" type="checkbox"/>
11.0	14.995	15.005		<input checked="" type="checkbox"/>
15.0	1.005	5.005		<input checked="" type="checkbox"/>
16.0	16.005	17.005		<input checked="" type="checkbox"/>
17.0	15.995	16.005		<input checked="" type="checkbox"/>
18.0	18.005	19.005		<input checked="" type="checkbox"/>
19.0	21.005	21.005		<input checked="" type="checkbox"/>
20.0	19.005	20.005		<input checked="" type="checkbox"/>
21.0	19.995	20.005		<input checked="" type="checkbox"/>
22.0	-0.005	0.005		<input checked="" type="checkbox"/>

Figure 1

Filtering this composite model in combination with the custom color table will produce diagrams that show both the lithology and the stratigraphy. For example, Figure 2 depicts a combination of a cutaway of the model shown within Figure 1 with a planned spiral mining decline drift model. The decline model was created by using the ModOps / Solid / Filter / Tunnel Clipping program to “nullify” all of the voxels within the geologic model that are outside of the decline tube diameter thereby rendering them invisible. Note how the decline model shows not just the soil and rock types but also where to expect fractures that may require dewatering.

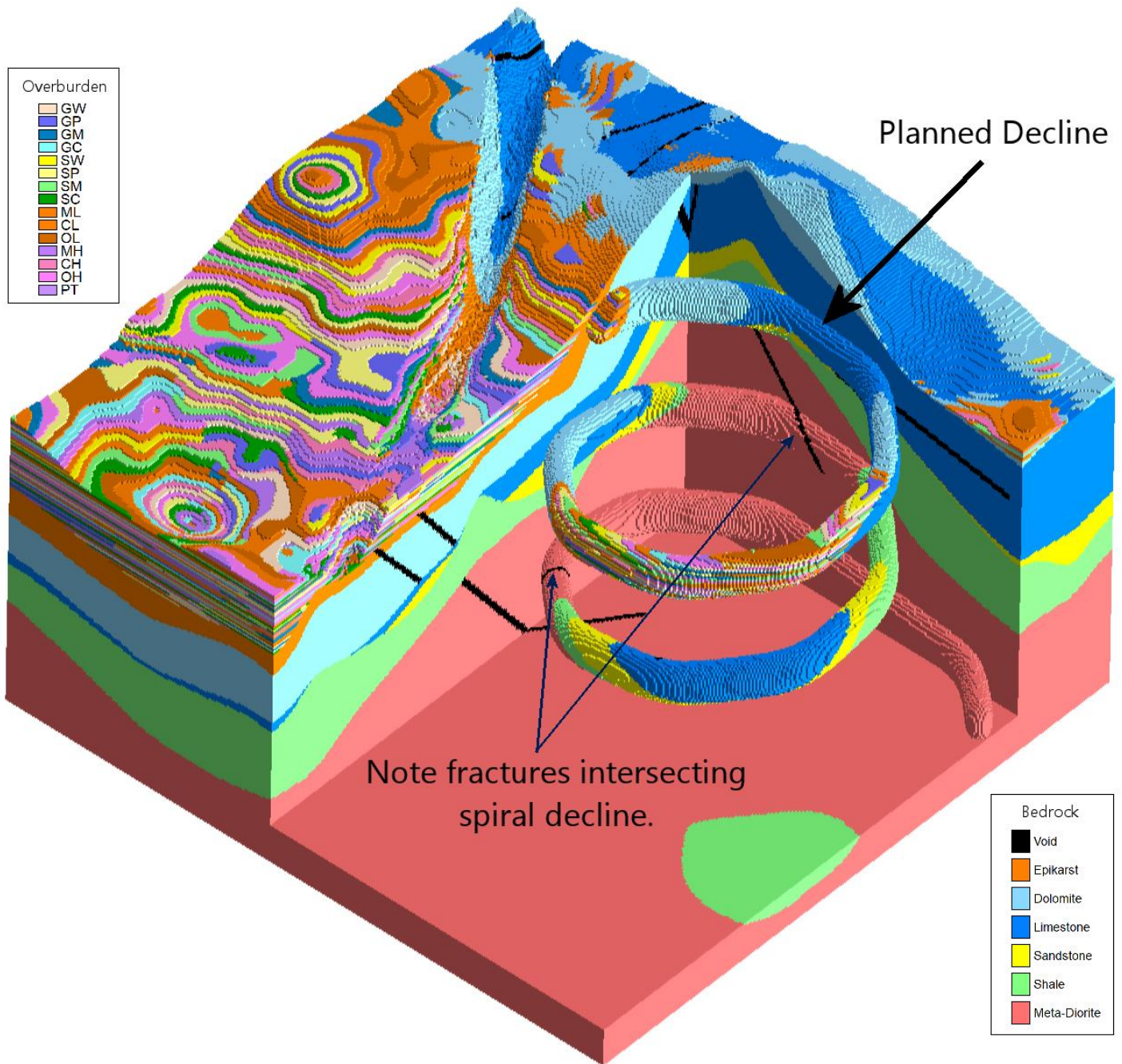


Figure 2