



Seamless Bedrock Mapping and GeMS Conversion in the Greenbrier Valley Karst System of Southeastern West Virginia

Abstract

With the U.S. Geological Survey's (USGS) goal to establish a seamless nationwide geologic map through the U.S. Geo-Framework Initiative, the West Virginia Geological and Economic Survey (WVGES) has undertaken a project to integrate current bedrock geologic mapping with adjacent areas recently mapped by USGS geologists under the FEDMAP program into a seamless, high resolution geologic map of southeastern West Virginia. With a particular focus on the Greenbrier Valley Karst System, WVGES is working to create a geologic map that differentiates the individual carbonate units of the Mississippian-age Greenbrier Group from Central Pocahontas County, WV through the southern end of Greenbrier County, WV. The primary goal of this mapping is to map the Greenbrier Group at formational level and to further define areas of karst development within the units. Current work shows that karst development can occur within all of the Greenbrier Group, but karst features (especially caves) tend to concentrate within the Union and Hillsdale Limestones. South of Greenbrier County, the USGS mapped the entirety of Monroe County, WV (including the Greenbrier Group). Completion of this mapping by both entities has created an opportunity for integration of geologic data over a significant area between agencies. Prior to the seamless integration with the USGS, WVGES is working to create an internal, seamless Enterprise Dataset that will contain all of the 1:24,000 scale geologic mapping that has been completed within the state. In concert with the creation of this seamless Enterprise Dataset WVGES will also be implementing the new GeMS schema on new mapping and the backlog of digital geologic maps created in the past. Our GeMS workflow has been evolving, as our understanding of the schema has expanded, and our current methodology reflects the most up-to-date iteration. Updating the WVGES workflow and geologic map databases, as well as map compilation in coordination with the USGS will work towards achieving the completion of a nationwide geologic map.







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GeMS Conversion

Schema (or GeMS for short) is a new, standardized data schema that the USGS has implemented as a reirement for all geologic maps produced with their funding. The implementation of the GeMS model requires additional fields associated with geospatial data (see below) as well as the inclusion of non-spatial tables that describe data sources and unit lithology, among other things.

Harman_CNT		
Field	Value	
OBJECTID	28	
Shape	Polyline	
Туре	1	
Confidence	1	
Symbol	11	
Unit_Abbrv	Mmc	
Shape_Length	9137.635767	

The table above shows the attribute data of the former WVGES data schema for contact lines while the table to the right shows the updated attribute fields for the same contact line following conversion to the new USGS GeMS data schema. While they both contain some of the same data (highlighted in green) the GeMS schema also contains a significant number of added fields including FGDC symbology, expanded confidence information and the original source(s) of the data. Similarly, the table below shows the attribute data of the former WVGES data schema for unit polygons while the table to the lower right shows the updated GeMS data schema for unit polygons.

Harman_CNT_Poly		
Field	Value	
OBJECTID	8	
Shape	Polygon	
Unit_Abbrv	Mmc	
GeoAge_Lab	Mmc	
Shape_Length	37271.70958	
Shape_Area	17918900.38	

Harman_ContactsandFaults		
Field	Value	
OBJECTID	28	
Shape	Polyline	
Confidence	1	
WVGS_Type	1	
WVGS_Symbl	11	
Symbol	01.01.01	
Type_Text	Contact, Certain	
IdCon	certain	
IsConceald	N	
ExistCon	certain	
Type_GEMS	Contact	
Label	Mmc	
Shape_Length	9137.635767	
created_user	<null></null>	
created_date	<null></null>	
last_edited_user	DSPURGEON	
last_edited_date	9/8/2022 12:41	
DataSourceID	DAS01	
ContactsAndFaults_ID	CAF28	
LocationConfidenceMeters2	-9	

Harman MapUnitPolys		
Field	Value	
OBJECTID	8	
Shape	Polygon	
Unit_Abbrv	Mmc	
GeoAge_Lab	Mmc	
Shape_Length	37271.70958	
Shape_Area	17918900.38	
IdentityConfidence	certain	
Label	Mmc	
Symbol	145,176,117	
DataSourceID	DAS01	
Notes	Mauch Chunk	
MapUnit	Mmc	
MapUnitPolys_ID	MUP16	

Developing an Enterprise Geodatabase

- Allows for integration of discrete polygons from individual legacy maps.

- Creates an interactive environment for edge-matching legacy geologic data.

- All datasets integrated in GeMS compliant formats with the appropriate non-spatial tables.

- Will allow for seamless future mapping as all relevant data will be contained in one place.

Future Developments

- Standardize field data collection through the use of the Form-Builder capabilities in ESRI's ArcGIS Online apps.
- Integration of GeMS-compliant fields within Form-Builder that will minimize the need for field data conversion.

- Continue current edge-matching corrections both within the state of West Virginia and by working with adjoining states' mapping programs.