



Goal:

Data Curators maintain geologic map datasets and deliver the current best information via web services. Data consumers do not have to maintain their own geologic data management systems and can access the information they need in a useful manner.

Problem:

In a federated system of geologic map data providers, maps from different providers will have different portrayal schemes (map legends). This makes the maps difficult to use together.

What kind of map unit scheme and information architecture can be devised with categories that will apply broadly across large regions, and automate assignment of the portrayal scheme for different users.

Current status:

Existing published regional maps use a variety of schemes typically involving aspects of age, genesis, rock type, and tectonic setting.

For maps that present interpretations of the same geology (bedrock, surficial, tectonic, environmental...), it is reasonable to expect there should be some mapping between the units on different maps.

OneGeology Europe requires that each geologic map unit be characterized by a single representative rock type from the CGI SimpleLithology vocabulary

Design considerations:

- Geologic map units should convey information useful for applications. Different applications require different kinds of information, thus one system of unit categorization will not satisfy all users.
- Basic information about lithology are parmount for applications in engineering and environmental management
- Age and lithogenesis are paramount for geoscience research and resource explora-
- The variety and arrangement of rock types within the unit is key information, thus characterization using a single rock type category of the kind defined in the CGI simple lithology scheme is not optimal.

Approach:

Rarely is a regional unit composed of a single rock type. The variety and arrangement of rock types within a unit may be conveyed in part indicating the genetic category of the unit—focusing on genetic environment, process or both. A unit dominantly composed of sandstone deposited in an eolian, fluvial, or submarine-fan environment will have different characteristics.

For research and mineral exploration, geologists are typically interested in anomalies; for applications in engineering and environmental management, understanding of typical kinds of units is more important. For target users, the map should convey information about the kinds of materials that will typically be encountered in a landscape, and help users learn relationships between the landscape they see and the kinds of geologic units that underly the landscape.

A system of lithogenetic categories for regional geologic maps has been compiled based on frequency analysis of lithology/genesis categories in digital geologic map datasets for North America (USGS Mineral Resources State Geologic Map Datasets), Australia (Raymond, pers. comm., 2011), and the Arctic region (Harrison et al., 2008), and inspection of other regional maps.

Group related kinds of units with low occurrence extent

Provide finer distinction between kinds of units with extensive outcrop area.



http://lab.usgin.org This material is based upon work supported by the Department of Energy under Award Numbers DE-EE0002850 and DE-EE0001120 and by National Science Foundation grant EAR-0753154



Summary

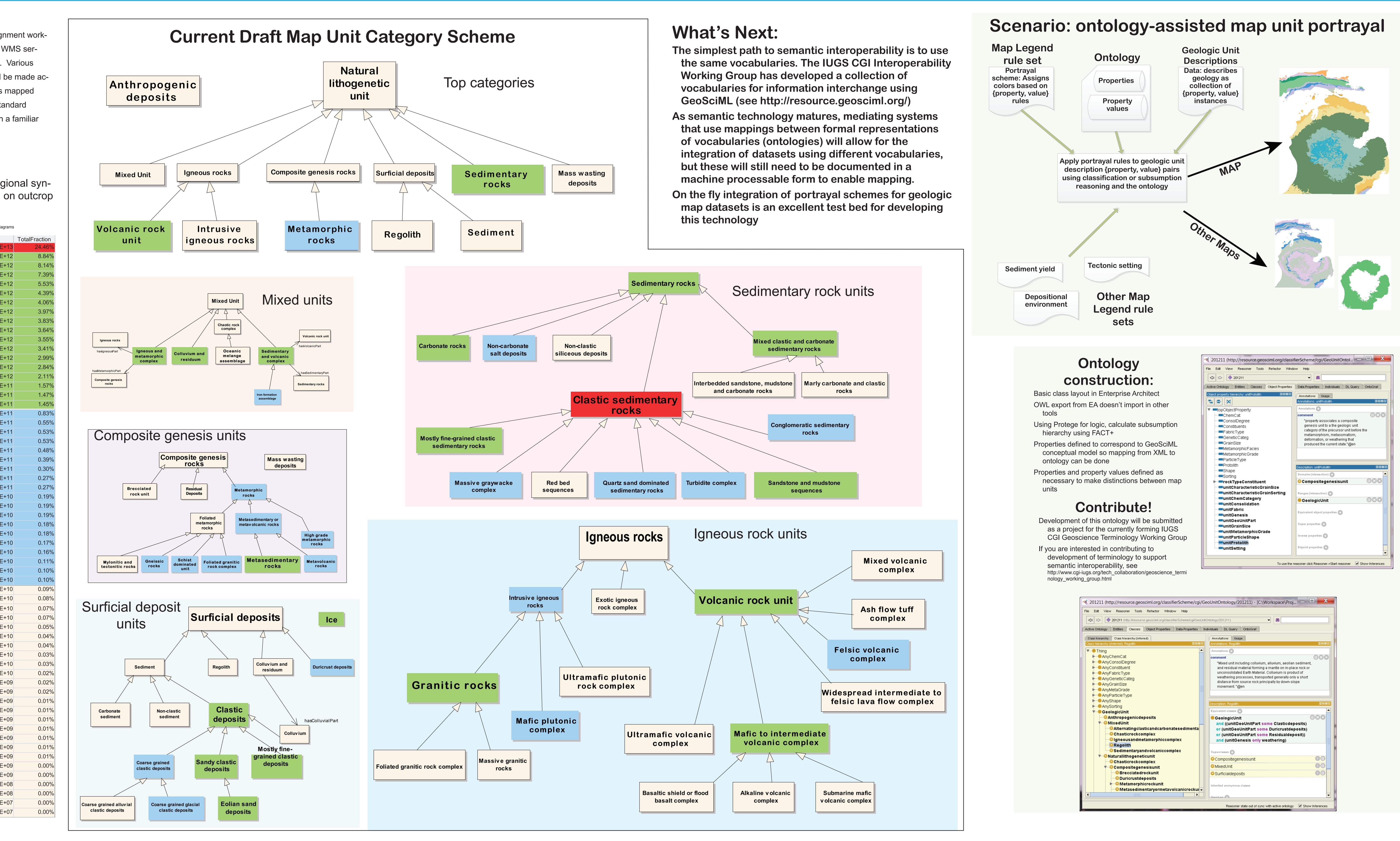
This is a work in progress. The goal is a map unit assignment workflow that can be used for regional map portrayals from WMS services to achieve a high degree of visual harmonization. Various portrayal schemes expressed as formal rule sets could be made accessible as community resources, and if data providers mapped their unit descriptions properties and vocabularies to standard schemes, users could obtain geologic map images with a familiar legend, making use of geologic information easier.

Frequency abundance of occurrence of regional synthesis lithogenetic units. Calculated based on outcrop areas (m²) in map datasets.

GenLithogenUnit	SumOfArea
Clastic sedimentary rocks	1.224E-
Sedimentary rocks	4.422E-
Carbonate rocks	4.075E-
Mixed clastic and carbonate sedimentary rocks	3.695E-
Sedimentary and volcanic complex	2.767E-
Colluvium and residuum	2.197E-
Mafic to intermediate volcanic complex	2.029E-
Ice	1.986E-
Igneous and metamorphic rock complex	1.915E-
Sandstone and mudstone sequences with or without coal	1.822E-
Mostly fine-grained clastic sedimentary rocks	1.776E-
Granitic rocks	1.704E-
Eolian sand deposits	1.498E-
Clastic deposits	1.423E-
Mostly fine-grained clastic deposits	1.057E-
Sandy clastic deposits	7.852E-
Volcanic rock unit	7.363E-
metasedimentary rocks	7.260E-
Felsic volcanic complex	4.128E-
Iron formation assemblage	2.740E-
Duricrust deposits	2.659E-
Mafic plutonic rocks	2.656E-
Metasedimentary or metavolcanic rocks	2.421E-
Quartz sand dominated sedimentary rocks	1.954E
Gneissic rocks	1.484E
Coarse grained clastic deposits	1.375E-
High grade metamorphic rocks	1.361E-
Conglomeratic sedimentary rock	9.492E
Schist dominated unit	9.420E-
Foliated granitic rocks	9.356E [.] 8.994E [.]
Metamorphic rocks Non-carbonate salt deposits	8.913E-
metavolcanic rocks	8.262E-
Turbidite complex	7.932E
Intrusive igneous rocks	5.557E-
Coarse grained glacial clastic deposits	5.041E
Massive graywacke complex	4.795E-
Intermediate to felsic lava flows	4.374E
Ash flow tuff assemblage	4.170E-
Alkaline volcanic rocks	3.683E-
Non-clastic siliceous deposits	3.490E-
Ultramafic plutonic rock complex	2.555E-
Surficial deposits	2.000L
Sediment	1.860E
Oceanic melange assemblage	1.560E
Ultramafic volcanic rock complex	1.340E-
Interbedded sandstone, mudstone and carbonate rock	1.200E
Brecciated rock	9.640E-
Coarse grained alluvial clastic deposits	9.274E-
Mixed volcanic complex	5.863E
Red bed sequences	5.324E
Non-clastic sediment	4.922E-
Carbonate clastic deposits	4.580E-
Mylonitic and tectonitic rocks	4.458E
Submarine mafic volcanic complex	4.375E
Geologic unit	4.373L 3.934E
Marly carbonate rocks and clastic rocks	1.508E
Igneous rocks	1.319E
Foliated metamorphic rocks	9.978E-
Exotic igneous rocks	9.169E
Composite genesis material	9.109L 8.661E-
Anthropogenic deposits	5.784E-
	0.704L

A Geologic Unit Scheme for Regional Geologic Map Integration

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GSA National Meeting 2012