GeoSciML--A GML application schema for geologic information: Version 3.0 Release

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What?

XML markup for geologic units, structures, and material descriptions

Standards-based -- Open Geospatial Consortium and ISO (International Organization for Standardization).

Developed by international group as general domain solution

Designed in framework of other markup languages for geometry and geography (GML), geologic time, Earth resources, and observation/measurement.

Whats new for V.3

- Uses GML 3.2
- Intended for WFS 2.0 services
- Simplify term and quantity value scheme
  - Use SWE category and quantityRange
  - Controlled concepts by reference (xlink:href, xlink:title)
- Collection of SKOS vocabularies for property value assignments
- Add resolutionScale on MappedFeature
- Revise model for GeologicHistory, Fossil
- Add Geomorphology, Laboratory analysis, Geochronology, Alteration description
- Refactor into 15 packages
- Consistent use of patterns

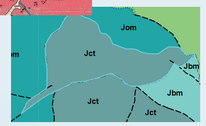
Conceptual Framework

Earth material (rock, sediment, water)

Composition

Geologic unit (parts of the Earth)

Interpretation, portrayal



Geologic events

Manifestation

Configuration

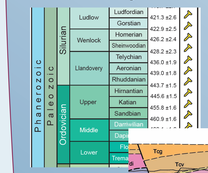
Locate

Mapped feature (geography)

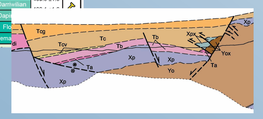
Sample

Sampling feature (borehole, outcrop, specimen)

History



Geologic structure (configuration of material)



Observations, analytical data

Where?

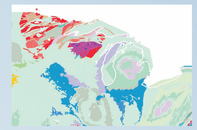
home page: http://geosciml.org
schemas:
http://schemas.geosciml.org
vocabulary services
http://resource.geosciml.org
OneGeology:
Portal: http://portal.onegeology.org
Cookbooks for services:
http://onegeology.org/wmsCookbook/home.html

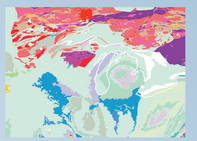
Portrayal scheme

- Simple flat-file view (GML simple feature)
  - Geologic Unit
  - Faults, contacts
- Use controlled vocabularies for interoperability
- Includes free text attributes for people to read
- Link to full GeoSciML feature for information analysis

USGIN | USGIN + GSC

Lithology
standard scheme





Age
standard scheme

Geologic map units

Portrayal scheme content in table form:

objectid	identifier	name	description	g	rl	lithology	geologichistory	source	g	representativeLithology_uri	representativeAge_uri	rl	rl	specification_uri	metadata_uri	genericSymbolizer
integer	[PK] character	text	text		tx	character varying	character varying(255)	text	tx	character varying(255)	character varying(255)	cd	cd	text	text	character varying
27	2180	GMNAgely.1023	Cretaceous, early, granitic rocks		Gl	Ni	Granitoid	Early Cretaceous		ReedEtal2005USGSMR	Digital ht	http://resource.geosciml.org/cl	ass	http://resource.geosciml.org/	ht	ht	http://www.opengis.n	http://catalog.usg	Kg	
28	2181	GMNAgely.1024	Jurassic to Cretaceous sedimentary rocks		Cretaceous a	Gl	Ni	Sedimentary rock	Jurassic to Cretaceous		ReedEtal2005USGSMR	Digital ht	http://resource.geosciml.org/cl	ass	http://resource.geosciml.org/	ht	ht	http://www.opengis.n	http://catalog.usg	JK	
29	2182	GMNAgely.1025	Miocene sedimentary rock		Miocene sedi	Gl	Ni	Sedimentary rock	Miocene		ReedEtal2005USGSMR	Digital ht	http://resource.geosciml.org/cl	ass	http://resource.geosciml.org/	ht	ht	http://www.opengis.n	http://catalog.usg	mT	
30	2183	GMNAgely.1026	Cretaceous granitic rocks		Cretaceous u	Gl	Ni	Granitoid	Cretaceous		ReedEtal2005USGSMR	Digital ht	http://resource.geosciml.org/cl	ass	http://resource.geosciml.org/	ht	ht	http://www.opengis.n	http://catalog.usg	Kg	
31	2184	GMNAgely.1027	Neogene volcanic rocks		Neogene und	Gl	Ni	Volcanic rock	Neogene		ReedEtal2005USGSMR	Digital ht	http://resource.geosciml.org/cl	ass	http://resource.geosciml.org/	ht	ht	http://www.opengis.n	http://catalog.usg	nTv	
32	2185	GMNAgely.1028	Neogene to Quaternary volcanic rocks		Quaternary a	Gl	Ni	Volcanic rock	Neogene to Quaternary		ReedEtal2005USGSMR	Digital ht	http://resource.geosciml.org/cl	ass	http://resource.geosciml.org/	ht	ht	http://www.opengis.n	http://catalog.usg	nTv	

New vocabularies in development--get involved

https://www.seegrid.csiro.au/twiki/bin/view/CGIModel/ConceptDefinitionsTG

- FaultType vocabulary
- Mineral vocabulary
- FoliationType
- LineationType
- Tectonic environment
- Drilling Methods
- Alteration Type
- Alteration intensity
- Alteration distribution
- MaterialClass -- kinds of specimens
- Boulder frequency

Observation model provides common framework for field data, geochemical and geochronologic data, borehole logs...

What is an **Observation**

- *Procedure* with specific time and place
- determine Result -- *Observed property* value
- property is bound to a *Feature of interest*

Procedure:

Involves instruments & sensors that respond to a stimulus from local physics or chemistry.

Intention may concern local source or remote source (brunton compass vs. camera), or a re-located feature (a sample)

Has relations to observers, algorithms, simulations, processing chains...

Observed Property:

Sensible phenomenon or property-type (Length, mass, temperature, shape, location, event-time, colour, chemical concentration, count/frequency, presence, species or kind...). Not necessarily physical.

Expressed using a reference system or scale, may be ordinal or categorical, may have complex data structure

Feature of Interest:

The observed property is associated with something--the observation target

"Location" does not have properties, some thing at a location does

Observed property must be logically consistent with the domain feature-type (E.g. rock sample->density, pixel->colour, city-> population, ocean-surface->temperature)

GeoSciML use cases

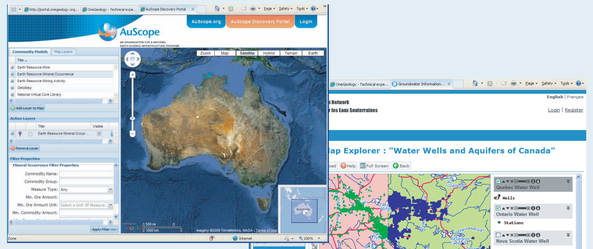
- Data publication/interchange
  - Geologic maps
  - Borehole geology
  - Specimen descriptions
  - Earth material substrate for soil map
- Input/output format for applications
  - 3-D models
  - Mineral resource assessment
  - Hazard assessment
- Shared schema for specifying properties of interest
  - Queries
  - Data discovery
  - Symbolization

GeoSciML in use:

One Geology level 2 WFS services

Auscope mineral resource service

Geol. Survey Canada groundwater information network (wet GIN)



Countries advertising GeoSciML services from OneGeology

Brazil Canada
Australia Sweden
United Kingdom Italy
France

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