Encoding of Geological knowledge in the GeoPiemonte Map Data Base

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In modern digital geological maps and geo-database, namely those devoted to interactive WebGIS services, there is the need to make explicit the geological assumptions in the process of the design and compilation of the Map Geodatabase.

The Geodatabase of the Piemonte Geological Map, which consists of several thousands of Geologic Units and Geologic Structures, was designed in a way suitable for linking the knowledge of the geological domain at hand to more general levels of knowledge, represented in existing Earth Sciences ontologies and in a domain ontology (OntoGeonous), specifically designed for the project, though with a wide applicability in mind.

The Geologic Units and Geologic Structures of the GeoPiemonte Map have been spatially correlated through the whole region, referring to a non-formal hierarchical scheme, which gives the parental relations between several orders of Geologic Units, putting them in relations with some main Geologic Events. The scheme reports the subdivisions we did on the Alps-Apennines orogenic belt (which constitutes the Piemonte geological framework) on which the architecture of the GeoDB relied.

This contribution describes how the two different knowledge levels (specific domain vs. general knowledge) are assimilated within the GeoPiemonte informative system, providing relations between the contents of the geodatabase and the encoded concepts of the reference ontologies.

Initiatives such as GeoScience Markup Language (GeoSciML 4.01, 2016 (1) and INSPIRE "Data Specification on Geology" (an operative simplification of GeoSciML, last version is 3.0, 2013) (2), as well as the recent terminological shepherding of the Geoscience Terminology Working Group (GTWG), provided us the authoritative standard geological source for knowledge encoding. Consistency and interoperability of geological data were thus sought, by classifying geologic features in an ontology-driven Data Model, while objects were described using GeoSciML controlled vocabularies and concepts derived from NASA SWEET ontology (3) (4) (5).

At the state of the art the GeoPiemonte Map informative system is thus suitable for integration in trans-national Data Infrastructures and/or WebMap Services that require interoperability and harmonised semantic approaches.

References
(1)http://www.geosciml.org/geosciml/4.0/documentation/html/ - GeoSciML Data Model -
(2)http://inspire.ec.europa.eu/documents/Data_Specifications/INSPIRE_DataSpecification_GE_v3.0.pdf - INSPIRE DS Technical Guidelines
(3)http://resource.geosciml.org/vocabulary/cgi/201211/simplelithology.html
(4)http://resource.geosciml.org/vocabulary/cgi/ - CGI GTWG controlled vocabularies repository
(5) SWEET (Semantic Web for Earth and Environmental Terminology), http://www.sweet.jpl.nasa.govAppel
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