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# OntoGeonous-GS: Implementation of an ontology for the geologic structures from the IUGS CGI and INSPIRE standards

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This contribution regards the encoding of an ontology for the GeologicStructure class. This is one of the sections of OntoGeonous, a bigger ontology for the geosciences principally devoted to the representation of the knowledge contained in the geological maps; the others regard the Geologic unit, Geomorphologic feature and Geologic event. OntoGeonous is developed by the University of Turin, Department of Computer Sciences, and the Institute of Geosciences and Earth Resources of the National Research Council of Italy (CNR-IGG).

The encoding of the knowledge is based on the definitions and hierarchical organization of the concepts proposed by the international standard: GeoScienceML directive(1) and INSPIRE Data Specification on Geology(2) drive the architecture at more general levels, while the broader/narrower representation by CGI vocabularies(3) provide the internal taxonomies of the specific sub-ontologies.

The first release of OntoGeonous had a complete hierarchy for the GeologicUnit class, which is partly different from the organization of knowledge of the international standard, and taxonomies for GeologicStructure, GeologicEvent and GeomorphologicFeature. The encoding process of OntoGeonous is presented in Lombardo et al. (2018) and in the WikiGeo website(4), while a method of application to the geological maps is presented in Mantovani et al (2020).

This contribution shows how the international standard guided the encoding of the sub-ontology for the GeologicStructure and the innovations introduced in the general organization of OntoGeonous compared to the OntoGeonous first release. The main differences come from the analysis of the UML schemata for the GeologicStructure subclasses(5): first, the presence of the FoldSystem class inspired the creation of more general class for the associations of features; second, the attempt to describe the NonDirectionalStructure class made us group all the remaining classes into a new class with opposite characteristics. Similar modification have been made all over the GeologicStructure ontology.

Our intent is to improve the formal description of geological knowledge in order to practically support the use of ontology-driven data model in the geological mapping task.

Refereces

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(1) http://www.geosciml.org.

(2) http://inspire.jrc.ec.europa.eu/documents/Data_Specifications/INSPIRE_DataSpecification_GE_v3.0.pdf

(3) http://resource.geosciml.org/def/voc/

(4) https://www.di.unito.it/wikigeo/index.php?title=Pagina_principale

(5) http://www.geosciml.org/doc/geosciml/4.1/documentation/html/EARoot/EA1/EA1/EA4/EA4/EA356.htm