Geophysical Research Abstracts
Vol. 12, EGU2010-12133, 2010
EGU General Assembly 2010


# The Semantic Management of Environmental Resources within the Interoperable Context of the EuroGEOSS: Alignment of GEMET and the GEOSS SBAs

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EuroGEOSS is a European Commission funded project. It aims at improving a scientific understanding of the complex mechanisms which drive changes affecting our planet, identifying and establishing interoperable arrangements between environmental information systems. These systems would be sustained and operated by organizations with a clear mandate and resources and rendered available following the specifications of already existent frameworks such as GEOSS (the Global Earth Observation System of systems)[1] and INSPIRE (the Infrastructure for Spatial Information in the European Community)[2]. The EuroGEOSS project's infrastructure focuses on three thematic areas: forestry, drought and biodiversity. One of the important activities in the project is the retrieval, parsing and harmonization of the large amount of heterogeneous environmental data available at local, regional and global levels between these strategic areas. The challenge is to render it semantically and technically interoperable in a simple way.

An initial step in achieving this semantic and technical interoperability involves the selection of appropriate classification schemes (for example, thesauri, ontologies and controlled vocabularies) to describe the resources in the EuroGEOSS framework. These classifications become a crucial part of the interoperable framework scaffolding because they allow data providers to describe their resources and thus support resource discovery, execution and orchestration of varying levels of complexity.

However, at present, given the diverse range of environmental thesauri, controlled vocabularies and ontologies and the large number of resources provided by project participants, the selection of appropriate classification schemes involves a number of considerations.

First of all, there is the semantic difficulty of selecting classification schemes that contain concepts that are relevant to each thematic area. Secondly, EuroGEOSS is intended to accommodate a number of existing environmental projects (for example, GEOSS and INSPIRE). This requirement imposes constraints on the selection. Thirdly, the selected classification scheme or group of schemes (if more than one) must be capable of alignment (establishing different kinds of mappings between concepts, hence preserving intact the original knowledge schemes) or merging (the creation of another unique ontology from the original ontological sources) (Pérez-Gómez et al., 2004). Last but not least, there is the issue of including multi-lingual schemes that are based on free, open standards (non-proprietary). Using these selection criteria, we aim to support open and convenient data discovery and exchange for users who speak different languages (particularly the European ones for the broad scopes of EuroGEOSS).

In order to support the project, we have developed a solution that employs two classification schemes:

- the Societal Benefit Areas (SBAs)[3]: the upper-level environmental categorization developed for the GEOSS project and
- the GEneral Multilingual Environmental Thesaurus (GEMET)[4]: a general environmental thesaurus whose

[1]GEOSS: http://www.earthobservations.org/
[2]INSPIRE: http://inspire.jrc.ec.europa.eu/
[3]SBA: http://www.geoportal.org/web/guest/getting_started
[4]GEMET: http://www.eionet.europa.eu/gemet/groups?langcode=en

conceptual structure has already been integrated with the spatial data themes proposed by the INSPIRE project. The former seems to provide the spatial data keywords relevant to the INSPIRE's Directive (JRC, 2008).

In this way, we provide users with a basic set of concepts to support resource description and discovery in the thematic areas while supporting the requirements of INSPIRE and GEOSS. Furthermore, the use of only two classification schemes together with the fact that the SBAs are very general categories while GEMET includes much more detailed, yet still top-level, concepts, makes alignment an achievable task. Alignment was selected over merging because it leaves the existing classification schemes intact and requires only a simple activity of defining mappings from GEMET to the SBAs.

In order to accomplish this task we are developing a simple, automated, open-source application to assist thematic experts in defining the mappings between concepts in the two classification schemes. The application will then generate SKOS mappings (exactMatch, closeMatch, broadMatch, narrowMatch, relatedMatch) based on thematic expert selections between the concepts in GEMET with the SBAs (including both the general Societal Benefit Areas and their subcategories).

Once these mappings are defined and the SKOS files generated, resource providers will be able to select concepts from either GEMET or the SBAs (or a mixture) to describe their resources, and discovery approaches will support selection of concepts from either classification scheme, also returning results classified using the other scheme.

While the focus of our work has been on the SBAs and GEMET, we also plan to provide a method for resource providers to further extend the semantic infrastructure by defining alignments to new classification schemes if these are required to support particular specialized thematic areas that are not covered by GEMET. In this way, the approach is flexible and suited to the general scope of EuroGEOSS, allowing specialists to increase at will the level of semantic quality and specificity of data to the initial infrastructural skeleton of the project.

**References**

Joint research Centre (JRC), 2008. *INSPIRE Metadata Editor User Guide*

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