UP-TO-DATE, HIGH-QUALITY, POLICY-RELEVANT SUBSURFACE GEOSCIENTIFIC INFORMATION CAN BE FAIR?

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The subsurface is the new frontier of modern society demanding sustainability. Decision-makers, private companies, and citizens ask for geological subsurface knowledge to address sustainable development goals while preserving a natural and safe environment. Geological Survey Organizations face this growing demand by looking for new solutions that comply with FAIR principles; translating up-to-date, high-quality, and policy-relevant subsurface geoscientific information to new user communities is now their challenge.

Like most Geological Survey Organizations, also the Servizio Geologico d'Italia produces and disseminates 2D and 3D national base geological data. Dissemination of 2D data (i.e. geological maps), according to INSPIRE standards, has a well-defined workflow, on the other hand, the delivery of subsurface geological data deriving from geological 3D models suffered the lack of a dedicated data model and easy-to-use delivery-format, also compliant with INSPIRE standards. In the framework of the GO-PEG project (https://www.go-peg.eu), Epsilon Italia with the Servizio Geologico d'Italia developed (Go-Depth use-case) an efficient approach to manage and deliver subsurface geological data in an easy-to-use (GIS for a broader range of end-users), interoperable, INSPIRE-compliant, and handable form.

The structure and encoding of the geological features constituting the 3D model are defined according to international standards to guarantee interoperability. Based on the output data requirements and characteristics, the INSPIRE data model Geology has been considered the reference model, extended to cater to the complexity and peculiarity of the 3D subsurface data.

INSPIRE concepts and code lists are referenced when possible, and GeoSciML concepts and related code lists are reused and extended to delimit and identify the geological units in a 3D model.

The stratigraphic horizons and faults are distributed according to the GeoPackage encoding of INSPIRE datasets (https://github.com/INSPIRE-MIF/gp-geopackage-encodings/blob/main/spec/GeoPackage_Good_Practice_initiation_fiche.md) INSPIRE good practice (https://inspire.ec.europa.eu/portfolio/good-practice-library). On the other hand, a dedicated metadata ISO-compliant has been tested following the EPOS activities.

This approach fulfills the institutional mandate of the Servizio Geologico d'Italia; it will be the starting point for the implementation of the "Geological 3D subsurface models database" related to the National Geological Mapping Programme as well as for two ongoing projects for Research Infrastructures funded by NextGeneration EU national plan (GeoSciences IR http://geosciences.isprambiente.it and MEET https://meet.ingv.it) and could be tested in other EU initiatives.

The overall goal of this approach is to provide a methodology to conceptualize, organize and deliver geological subsurface information enhancing interoperability and facilitating the reuse and integration of cross-border data.