

Selected cartographic products of the Polish Geological Survey in light of the international data standards and OneGeology experience

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Abstract:

According to the Polish Geological and Mining Law, the Polish Geological Institute – National Research Institute (PGI-NRI) acts as the Polish Geological Survey and as such (i.a.) “coordinates and performs works in the field of geological mapping (...)” as well as “collects, provides, processes and stores geological information.”

It is to be noted that not only has the PGI-NRI been a main provider of geological maps in Poland but it has also held a leader position in introducing GIS based solutions to the map production chain. All of the geological cartographic compilations realized by the PGI-NRI’s Geological Mapping and Regional Geology Programme use dedicated GIS applications or advanced cartographic tools provided by ESRI. Digital geological map data is stored in the Central Geological Database, where it is divided into appropriate Spatial Database Engine (SDE) layers according to its scale, geometry and nature.

Nevertheless, because the currently applied production solutions are designed for printed maps specifically, some of the serial maps are originally divided into the paper sheets. Therefore the consistency of the GIS layers needs to be verified in order to develop a harmonized digital map. The issue is clearly visible e.g. in case of the Detailed Geological Map of Poland 1:50k which is a fundamental product of the Polish geological cartography published by the PGI-NRI since 1954. The whole edition of the Detailed Geological Map of Poland consists of 1069 map sheets. Consecutive map sheets compiled in the previous years are being gradually updated to reflect the current state of the geological structure recognition, what results in the necessity to extend the list of geological units.

In case of other compilations, such as e.g. the Detailed Geological Map of the Tatra Mountains 1:10k or Lithogenetic Map of Poland 1:50k, that base on the available map sheets of the Detailed Geological Map of Poland, it has been possible to prepare closed vocabularies in advance and so they are unified for the entire series.

All the same, the cartographic product that stands out here is the Geological Map of Poland 1:1M – developed as a Polish contribution to the OneGeology initiative – the international initiative of geological surveys and organizations. A new concept of a global GeoSciML (Geoscience Markup Language) exchange language has been tested in OneGeology-Europe and OneGeology-Global. The resulted approach has led to the establishment of harmonization procedures for geological maps in Europe and worldwide in a distributed network. The Geological Map of Poland 1:1M has been the first Polish geological map adjusted and translated (almost 10 years ago) into the GeoSciML language (prototype version of a standard). The map uses the GeoSciML vocabularies and GeoSciMLite data model. GeoSciML is a GML (Geographic Markup Language) specification for geological data description and since 2017 an official OGC (Open Geospatial Consortium) standard that comprises both – a full GeoSciML model (GeoSciML Basic and GeoSciML Extension) as well as the simplified one – so called GeoSciMLite. The GeoSciML vocabularies are maintained and managed externally by the IUGS-CGI (Commission for the Management and Application of Geoscience Information – a subcommittee of the International Union of Geological Sciences).

The Geological Map of Poland 1:1M was originally compiled in 2008 and followed by the other maps to a scale of 1:1M (Glaciotectonic Map of Poland, Bedrock Horizontal Cutting Map of Poland with 6 levels of horizontal cutting and Bedrock Geological Map of Poland) in the years 2011-2013. The PGI-NRI plans to update all of the maps 1:1M according to the current geological knowledge and upgrade them to the newest version of GeoSciML in the years 2019-2020.

Simultaneously, in light of the European INSPIRE directive that obliges the EU member countries to transform their spatial data into the one unified (in case of geological data – GeoSciML based) model, the PGI-NRI plans to apply the OneGeology experience and best practices to make geological data from other cartographic projects semantically and technically interoperable on the European and global level.

Both GeoSciML and INSPIRE vocabularies are being introduced to the currently compiled cartographic products such as the Polish part of the International Quaternary Map of Europe 1:2,5M (IQUAME) and a new edition of Geological Maps of Poland 1:500k. Depending on the purpose and character of the product (realized on a domestic ground or within the international cooperation etc.) they are to be used exclusively or along with the traditional terms and/or Polish translation. The GeoSciML terminology will also be gradually incorporated into continued serial compilations such as e.g. the Detailed Geological Map of Poland 1:50k. Mapping national dictionaries regarding i.a.: lithology, stratigraphy, genesis of the deposits etc. to the GeoSciML/INSPIRE vocabularies is a complex task. Although it can be partially based on the outcomes of the OneGeology initiative, the technology is still in the test phase and requires a close cooperation between technical experts and scientists.

In fact, the preliminary results of the works on the Polish contribution to the IQUAME project have already revealed some problematic issues concerning description of the Quaternary (especially glacial) deposits. Apart from the substantial inadequacies and gaps in the existing terminology, there are also discrepancies in case of its hierarchy. What is more, the INSPIRE hierarchy limited to the parent-child relations appears to be insufficient, especially in case of larger-scale compilations. That is why the PGI-NRI considers applying the hierarchical structure of the GeoSciML terminology based on the one developed in the frame of the OneGeology initiative. In case of the serial cartographic products whose legends were originally designed for the purposes of the printed versions, the parallel works should encompass unification of the vocabularies from different map sheets.

In order to apply the GeoSciML and INSPIRE exchange formats, the structure of the GIS databases have to be redesigned. The currently compiled products (IQUAME and Geological Maps of Poland 1:500k) remain flat but at the same time they include main elements of the destined GeoSciML model. This solution follows the one applied in OneGeology and will facilitate easier transition to the proper GeoSciML files in the next steps. To transform the data from the spatial database to the GeoSciML and INSPIRE GML format the PGI-NRI plans to use the available ETL (“extract, transform, load”) tools (hale studio or FME – Feature Manipulation Engine).