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GeoSciML version 4.0 - a coming of age

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GeoSciML is the international standard for transfer of digital geological maps and associated data. GeoSciML was developed over the past decade by the IUGS Commission for the Management and Application of Geoscience Information (CGI), and was adopted as an Open Geospatial Consortium (OGC) standard in June 2016. Ratification as an official OGC standard marked a coming of age for GeoSciML - it now meets the highest standards for testing, documentation and best practice for interoperable data transfer. GeoSciML is the preferred standard for geoscience data sharing initiatives worldwide, such as OneGeology, the European INSPIRE directive, the Australian Geoscience Portal, and the US Geoscience Information Network (USGIN). GeoSciML is also used by OGC's GroundWaterML2 data standard [1] and CGI's EarthResourceML standard [2].

Development of GeoSciML version 4 was considerably influenced by user experiences with version 3.2, which was released in 2013 [3]. Although the GeoSciML v3 data model was conceptually sound, its XML schema implementation was considered overly complex for most use cases. Version 4 developments therefore focussed strongly on designing XML schemas that allow data providers and consumers to interact with the data stream at various levels of complexity. As a result, GeoSciML v4 provides three levels of user experience - 1. *GeoSciML-Portrayal* for simple map representation, 2. *GeoSciML-Basic* for geological feature age and lithology data, and 3. *GeoSciML-Extended*, which extends *GeoSciML-Basic* to deliver more detailed and complex relational data. As per GeoSciML v3, additional GeoSciML v4 schemas also extend the ISO Observations & Measurements standard to cover geological boreholes, sampling, and analytical measurements. These separate levels of GeoSciML make it easier for software vendors to develop capabilities to consume relatively simple GeoSciML data without navigating the full range of complex GeoSciML schemas.

Previously mandatory elements of GeoSciML, that were found to be overly taxing on data providers in version 3, are now optional in version 4. Schematron validation scripts can be used to create profiles of GeoSciML v4 to suit particular user community needs. For example, the European INSPIRE community has developed Schematrons for web service validation that require its users to populate otherwise-optional *GeoSciML-Basic* elements, and to use particular community vocabularies for geoscience terminology. Some example Schematrons are provided with GeoSciML v4.

Considerable attention has been paid to improving online assistance for data providers to use GeoSciML version 4, with user communities such as OneGeology, INSPIRE, and USGIN providing user guides explaining how to create both simple and complex GeoSciML web services. CGI also provides a range of on-line standard vocabularies that can be used to populate GeoSciML data services. Full documentation and user guides are available at www.geosciml.org.

References:

[1] Brodaric B (2015) OGC GroundWaterML 2 – GW2IE Final Report, OGC Document 15-082

[2] http://www.cgi-iugs.org/tech_collaboration/earthResourceML.html

[3] Raymond O et al. (2012) Proceedings of the 34th International Geological Congress 2012, 1560