OGC Working Groups Standards and Activities for GeoScience

Mickaël BEAUFILS & Sylvain Grellet (BRGM), Eric Boisvert (NRCan), Boyan Brodaric (NRCan), David Blodgett (USGS), Matthew Harisson (BGS), Carina Kemp (AARNet),

ESSI2.6 - Communities, tools and policies for integrated Earth and Space Science (e)infrastructures session
EGU2019, Vienna – 11 April 2019
Open GeoSpatial Consortium – 25 years of standardization

### Topics

**Containers, Content and Packaging of Data**

- Technical Framework (Computer Scientists)
- Content Description (Domain Specialists)
- Bibliographic Metadata (Librarian Specialists)

**Domains**

- Geosciences & Environment
- Defense & Intelligence
- Smart Cities, IoT & sensor webs
- Energy & utilities

**3D and Built Environment**

- Geosciences & Environment
- Defense & Intelligence
- Smart Cities, IoT & sensor webs
- Energy & utilities

**Interoperability experiments (IE), Pilot projects, Concept Development Study (CDS)**

- Temporary activities / groups to define needs, experiment existing standards for a defined topic / use case

### Organization

**Domain Working Groups (DWG)**

Ensure standards coherence and answer to requirements (technical, thematical) in their domain

**Standard Working Groups (SWG)**

Build and update standards

**Interoperability experiments (IE), Pilot projects, Concept Development Study (CDS)**

- Temporary activities / groups to define needs, experiment existing standards for a defined topic / use case
OGC Standards and Working Groups for Geoscience

OGC (The Open Geospatial Consortium) is an international organization dedicated to developing open standards for the global geospatial community. Its mission is to promote, develop, and maintain technical specifications that enable geographic information to be created, managed, shared, and discovered. By providing a common framework for geographic data, OGC standards facilitate interoperability and ensure that geospatial data can be easily accessed, shared, and used across different systems and applications.

GeoSciML

GeoSciML is an OGC standard that supports the exchange of digital geoscientific information. It includes a comprehensive representation and description of phenomena typically found on geologic maps, logs, and core descriptions. GeoSciML provides a framework for describing geological features such as strata, faults, and geophysical data. This standard is particularly useful for the discovery and sharing of geoscientific data.

GroundWaterML2

GroundWaterML2 is an OGC standard that supports the representation and exchange of groundwater data. It extends the original GroundWaterML standard to include new features such as groundwater modeling. GroundWaterML2 is designed to facilitate the exchange of groundwater data, enabling researchers, practitioners, and decision-makers to better understand and manage groundwater resources.

BoreholeIE

BoreholeIE is an OGC standard that supports the exchange of borehole data. It provides a framework for describing borehole data, including the locations of boreholes, their depths, and the materials encountered during drilling. BoreholeIE is particularly useful for the exploration and development of oil and gas resources.

GeoscienceDGW

GeoscienceDGW is an OGC standard that supports the exchange of geoscience data. It provides a framework for describing geoscience data, including the locations of geologic features, their attributes, and the methods used to gather the data. GeoscienceDGW is particularly useful for the exploration and development of mineral resources.

GroundWaterML2

GroundWaterML2 is an OGC standard that supports the representation and exchange of groundwater data. It extends the original GroundWaterML standard to include new features such as groundwater modeling. GroundWaterML2 is designed to facilitate the exchange of groundwater data, enabling researchers, practitioners, and decision-makers to better understand and manage groundwater resources.

BoreholeIE

BoreholeIE is an OGC standard that supports the exchange of borehole data. It provides a framework for describing borehole data, including the locations of boreholes, their depths, and the materials encountered during drilling. BoreholeIE is particularly useful for the exploration and development of oil and gas resources.

GeoscienceDGW

GeoscienceDGW is an OGC standard that supports the exchange of geoscience data. It provides a framework for describing geoscience data, including the locations of geologic features, their attributes, and the methods used to gather the data. GeoscienceDGW is particularly useful for the exploration and development of mineral resources.
1 - GeoScience DWG

- The joint Domain Working group (DWG) between OGC and CGI-IUGS
- Officially created in September 2017
- One goal: leveraging geoscience data interoperability
A logical model of geological features commonly described and portrayed in geological maps, cross sections, geological reports and databases.

Age: V 4.1

Key features:
- Covers the domain of geology (earth materials, geological units and stratigraphy, geological time, geological structures, geomorphology, geochemistry) and sampling features common to the practice of geoscience, such as boreholes and geological specimens.

Weight: Full and ‘Lite’ versions

Children / Family: Reused by many geological surveys and countries, continent wide spatial data/research infrastructures (INSPIRE, EPOS, AuScope, …) and OneGeology

On-going: Currently moving to the semantic web

Resource: https://www.opengeospatial.org/standards/geosciml
A conceptual and logical model for groundwater resources management

Age: V 2.2

Key features:
- Core groundwater elements such as aquifers, their pores, and fluid bodies,
- Wells and construction component, springs, and monitoring sites,
  Observations: constituents (bio, chemical, materials constituent), groundwater flow within/between containers,
- AquiferTest / pump test

Weight: Full and draft ‘Lite’ versions

Children / Family: Reused by many geological surveys

On-going: Currently moving to the semantic web

Resource: https://www.opengeospatial.org/standards/gwml2
"Bonus" – Observations & Measurements (ISO 19156)

- Conceptual and logical model for observations and features involved in sampling when making observations for the exchange of information within and between different scientific and technical communities.
- Age: V 2.0
- Key features
  - Description of the observation acts and their results
  - Also applicable for estimations, results of calculus or simulations
  - A common set of sampling feature types classified primarily by topological dimension, as well as samples for ex-situ observations.
  - Relationships between sampling features (subsampling, derived samples)
- Weight: Full and ‘Lite’ versions
- Children / Family: Many international reuse by communities, profiles
- On-going: Just arrived in the semantic web
- Resource: https://www.opengeospatial.org/standards/om

D2.9 - EU INSPIRE guidelines for O&M
• **Borehole Interoperability Experiment** targeting a common Borehole conceptual model

• **Done:**
  – Kick-off in June 2018
  – Definition of use cases: position along borehole, geotechnics, from raw data to interpretation, hydrogeologic boreholes, …
  – Use cases finished: just need to polish and add Oil & Gas ones
  – 1st consolidated needs for vocab done:
    [https://github.com/opengeospatial/boreholeie/tree/master/Vocabulary](https://github.com/opengeospatial/boreholeie/tree/master/Vocabulary)
  – BhML (name of the conceptual model we are building) initialized:
    [https://github.com/opengeospatial/boreholeie/wiki/BhML](https://github.com/opengeospatial/boreholeie/wiki/BhML)

• **Now:** Challenging BhML VS the consolidated needs for vocab
5 - Environmental Linked Features IE (ELFIE)

• Demonstrate the use of existing and pending OGC standards for the encoding of environmental observation data in an integrated dataset of features linked according to ReSTful and Linked Data principles.

• Several nGS involved (USGS, LandCareResearch NZ, BRGM,NrCAn, …)

• Status:
  • Engineering report available: https://docs.opengeospatial.org/per/18-097.html
  • Second ELFIE on the run
    • Kick off around the week of April 22
    • First results expected for Leuven OGC TC (June 2019)
Two good reasons to use Linked Data

- Complex data with many attributes and properties
- Load the Index feature and discover the rest

Data collection and connected data (lineage)
- Load one feature and discover the others through their relationships
OGC® Standards and Working Groups for Geoscience

GeoSciML

The GeoSciML Mark-up Language (GeoSciML) is a data model and data exchange standard for geoscience data. It formalizes the description of geoscience features commonly found in geological maps, aerial images, geophysical surveys and reports and databases. It provides geologist surveys, and other geoscience data providers, a common vocabulary for the electronic dissemination of geoscience information.

GeoSciML is an XML-based data model standard for the exchange of digital geoscience information, with an emphasis on the representation and description of features typically found on geological maps (e.g., geology, rock types, mineral deposits, etc.) within an enterprise or across an enterprise network. The data model includes support for sifting, querying, and analyzing data.

Supporting objects such as the geologic framework and metadata are also provided in standard resources, so that users and professionals can use the data in the primary objects on the Earth's surface.

GeoSciML is used in the Ontologize project to propose a dynamic digital geoscience data for the world.

GroundWaterML2

The Groundwater Markup Language 2 (GroundWaterML2) is an open-source tool for the online exchange of groundwater data that addresses the problem of data heterogeneity.

This problem makes groundwater data hard to find and use because the data are distributed and aggregated in diverse datasets. Developing data interoperability requires a common data format, and the GroundWaterML2 of APPG-Index contributes a fundamental standard for the data.

As part of the USGS, 2.0 content is linked to GeoSciML, which will drive data interoperability and support of metadata and management of groundwater resources.

It describes a conceptual and logical model for the exchange of groundwater data, as well as a DtdMML encoding with a metadata schema.

DWG has developed, tested, and implemented several groundwater data providers for North America, Europe, and Australia, and is collaborating with the development of online and portal and tools.

Resources: https://www.opengis.org/standards/groundwater

GeoSciencesWG

While addressing these use cases, the IF has aimed to address issues of storing data as specific views of a linked data graph and the fact that the graph views are expected to support additional linking, linked data categorization, and indexes.

For example, data providers can use the linked data graph views in a way to extend the current data views, or new features in graphs applications that extend the current data views, and index data views. Although merged and related data views, and other features, the IF has produced numerous experimental demonstrations of a linked data and a number of other features.

Resources: https://www.opengis.org/standards/groundwater

BoreholeIE

GeosciencesWG

The GeosciencesWG is a joint group between OGC and the Commission for the Management and Application of Geoscience Information (COMAGI) of the International Union of Geodesy and Geophysics (IUGG).

The OGC Geo-Science Domain Working Group (ESWG) is a forum to discuss, exchange and develop geoscientific information standards.

OGC's Geoscience Working Group (WG) is a forum to discuss, exchange and develop geoscientific information standards.

OGC's GeosciencesWG includes five diverse technical subgroups which support interoperable data definitions, services and architectures for publishing and exchanging geoscience information across diverse environments.

The ESWG has defined a number of geoscience-related standards, and one standard, a framework for interoperable data definitions, services and architectures for publishing and exchanging geoscience information across diverse environments.

The ESWG has defined a number of geoscience-related standards, and one standard, a framework for interoperable data definitions, services and architectures for publishing and exchanging geoscience information across diverse environments.

While addressing these use cases, the IF has aimed to address issues of storing data as specific views of a linked data graph and the fact that the graph views are expected to support additional linking, linked data categorization, and indexes.

For example, data providers can use the linked data graph views in a way to extend the current data views, or new features in graphs applications that extend the current data views, and index data views. Although merged and related data views, and other features, the IF has produced numerous experimental demonstrations of a linked data and a number of other features.

Resources: https://www.opengis.org/standards/groundwater

Michael Beaudoin – BRISG (michael.beaudoin@brisg.fr), Eric Beaudoin – MSCG (eric.beaudoin@mscg.rwedu.com), Byron Broderick – MSAC (byron.broderick@msac.rwedu.com)

Carina Kemp – AARNET (carina.kemp@aar.net.edu.au), Matthew Harrison – BGI (matthew.harrison@bgi.co.uk), David Blackett – USGS (david.blackett@usgs.gov), Sylvain Goulet – BRISG (sylvain.goulet@brisg.fr)

Authors and contact:

Want a PDF version of this poster? Just catch that QRCode.
Thanks for your attention

- m.beaufils@brgm.fr