

FOUR YEAR  
REPORT TO THE  
INTERNATIONAL  
UNION OF  
GEOLOGICAL  
SCIENCES

2012-  
2016

<http://www.cgi-iugs.org/>



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## 1. OVERALL OBJECTIVES, MISSION AND AIMS

An understanding of geology is crucial in protecting human life, health and assets, and sustaining our environment and resources. As in many areas of life today, information technology is having a dramatic impact on the way geological data and knowledge is being captured, processed and disseminated. The effective application of IT is the key to the future exploitation of geological knowledge for the benefit of society.

CGI aims to:

1. provide the means for transferring knowledge on geoscience information and systems
2. stimulate international dissemination of best practice in geoscience information
3. stimulate and support initiatives which are developing standards
4. establish and occupy an accepted position in the international geoscience information community and represent IUGS on geoscience information matters.

The CGI vision is

- that geoscience information can be exchanged, understood, and used without limitation,
- • that geoscience information can be readily integrated with standards-based information from other knowledge domains,
- • that geoscience information is semantically rich and structured to enable seamless interaction in all environments,
- • that education about the management, modelling, exchange, and use of geoscience information enables its best possible application, for the benefit of all society.

The CGI 4-year Action Plan for 2012 – 2016 can be summarised as follows:

- Catalyse alliances
- Stimulate progress and standard geological concepts
- Promote use of data exchange standards: evidence
- Facilitate outreach
- Role in coordination of regional initiatives

## 2. ROLE WITHIN IUGS SCIENCE POLICY

IUGS mission: With 121 national members, the Union aims to promote development of the Earth sciences through the support of broad-based scientific studies relevant to the entire Earth system; to apply the results of these and

other studies to preserving Earth's natural environment, using all natural resources wisely and improving the prosperity of nations and the quality of human life; and to strengthen public awareness of geology and advance geological education in the widest sense.

The CGI fills the role of the “geoscience information body of the IUGS” and promotes in particular two of the four IUGS “themes of special consideration”, i.e. Geoscience information and international Standards. Thus the CGI

- represents IUGS on geoscience information matters,
- provides the means for transferring knowledge on geoscience information and systems,
- assists international dissemination of best practice in geoscience information,
- stimulates and supports initiatives which are developing standards and
- its Council members hold several significant positions within the international geoscience information community.

### 3. CGI MEMBERSHIP

CGI now has 291 members in 68 countries across the world.



### 4. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS

Other than the substantial in-kind contribution of the geological organisations who pay the salaries and expenses of CGI Council and members, there is no additional support from other sources.

### 5. INTERACTION WITH OTHER INTERNATIONAL PROJECTS

The CGI is continuing to develop Geoscience ML (GeoSciML), now in an OGC Working group, a markup language allowing the digital exchange of geoscience information locally, continentally and globally. Both, the linked global OneGeology project and the European EC project OneGeology-Europe are using GeoSciML to make geological data interoperable and accessible via their web portals. The EC Directive INSPIRE in its geology theme is also using GeoSciML and a vocabulary derived from the CGI Vocabularies as part of their Data Specifications and legal Implementing Rules.

In addition The CGI is hosting Earth Resource ML which is a mark-up language to exchange mineral and energy resources information. This is also used by the INSPIRE Directive within its mineral resources theme.

## 6. CHIEF ACCOMPLISHMENTS AND PRODUCTS

### Annual Accomplishments

#### CGI – 2012 Activities

##### *CGI Council for 2012–2016 elected and endorsed by IUGS in Brisbane*

CGI sought nominations for its Council during 2012. By the deadline 10 nominations were received for the 12 places available. An additional Council Member has now been provisionally agreed.

The new Council is:

- François Robida (Chair) – France
- Kristine Asch (Secretary General) - Germany
- Robert Tomas (Treasurer) - Czech Republic
- Gabriel Asato – Argentina
- Zhang Minghua – China (joined 2014)
- Kombadayedu K. Mhopjeni – Namibia
- Santiago José Muñoz Tapia - Dominican Republic
- Kazuhiro Miyazaki – Japan
- Oliver Raymond – Australia
- David Percy – USA
- Betty Adrian – USA temporary replacement of Mike Frame
- [Mike Frame – USA (withdrawn in October 2015)]
- [Peter Baumann – Germany (withdrawn in July 2015)]

Ex-officio CGI Council representative: Gemma Nash (BGS, UK)), CGI media administrator

The CGI working groups are coordinated by:

GeoScience MLWorking Group – Oliver Raymond – Australia  
Geoscience Terminology Working Group – Mark Rattenbury, Newzealand  
EarthResourceML Standard Working Group – Jouni Vuollo, Finland  
Geoscience Information Network (GIRAF) – Kristine Asch, Germany

The current CGI secretariat is located at the Federal Institute for Geosciences and Natural Resources, Germany (BGR). The contact is [cgisecretariat@bgr.de](mailto:cgisecretariat@bgr.de).

##### *Geoscience Information Super-Symposium at the IGC in Brisbane 2012*

Working in collaboration with the Geoscience Information Consortium, CGI played the key role in the organization and operation of a large and comprehensive Geoscience Information Symposium at the International Geological Congress in Brisbane, Australia in 2012. The Symposium focused on the acquisition, management, use, and dissemination of geoscience data.

This was the second time that all geoscience information abstracts at the IGC were coordinated. The two-agency approach used for the Geoscience Information Super Symposium was deemed a success and the same success recipe is used again at the coming next IGC in 2016 in Capetown.

*CGI COUNCIL Meeting at the 125th Anniversary Annual Meeting of the Geological Society of America, 31st October – 1st November in Denver, Colorado, USA*



*CGI Council Meeting in Denver, Colorado, USA 2013*

The annual meeting of the CGI COUNCIL took place from 31st October to 1st November just after the annual meeting of The Geological Society of America in Denver, Colorado. The new Council met for one and a half days. Among the discussed issues especially the following subjects were important:

- Reconstruction of the CGI website
- Candidates for free positions of membership in the CGI Council
- CGI membership
- Organization of the budget administration
- Regional and Working Group reports
- Participation of CGI at FOSS4G-Europe 2014
- GIRAF workshop in Maputo, Mozambique in 2015
- Organization of a Geoinformation Super-Symposium at the International Geological Congress 2016 (IGC) in South Africa.

### **CGI - 2013 Activities**

- Finalising and releasing GeoSciML v3.1 in December 2012.
- Finalising and releasing GeoSciML v3.2 in August 2013. This is last version of GeoSciML to be produced under the auspices of the CGI IWG.
- Finalising and releasing EarthResourceML v2 in September 2013.
- Agreement for a MoU between the CGI and OGC.
- The initiation of the OGC GeoSciML SWG under which all future GeoSciML development will be carried out.
- The initiation of work on GeoSciML v4 under the auspices of the OGC GeoSciML SWG. This will be based on the abstract specification of GeoSciML v3, but be structured to be consistent with OGC conformance classes.
- The extension of GeoSciML Portrayal to include boreholes.

- Continued development of the GeoSciML schematron.
- Initiation of work on EarthResourceML Portrayal.
- Close contact has been maintained with the development of the INSPIRE Geology and Mineral Resources data specifications. GeoSciML and EarthResourceML have been adapted to enable them to be used to implement the INSPIRE specifications.
- Organise the 3<sup>rd</sup> Geoscience Information in Africa Workshop-Conference “Geoscience Information in Africa, Mapping and Mining” in Accra, Ghana, together with AusAid and the German Federal Ministry for Economic Cooperation and Development (BMZ) and Australian Aid (AMDC) and the UNESCO

## CGI - 2014 Activities

### CGI Council Meeting

*CGI Council Meeting in Beijing, China 2014.*

The annual meeting of the CGI Council took place from 28<sup>th</sup> to 29<sup>th</sup> October and was kindly hosted by the Development and Research Center of the Chinese Geological Survey, Beijing, China and organized by the new CGI Council member Zhang Minghua. The Council met for two days. Among the discussed issues especially the following subjects were important:

- Reconstruction of the CGI website
- Organization of the budget administration
- Regional and Working Group reports
- Participation of CGI at FOSS4G-Europe 2014
- GIRAF workshop in Maputo, Mozambique in 2015 and its funding
- Organization of a Geoinformation Super-Symposium at the International Geological Congress 2016 (IGC) in South Africa.

### *Progressing interoperability*

#### **GeoSciML**

#### Revision of the GeoSciML conceptual model:

Only very minor revision of the GeoSciML version 3 conceptual model has occurred to address change requests from INSPIRE and other users.

#### Repackaging of the GeoSciML model:

Considerable repackaging of the GeoSciML model has been undertaken to turn the conceptually-based GeoSciML version 3 model into a more user-friendly implementation model for version 4. The current and relatively complex GeoSciML version 3 data standard is not the easiest model to implement for providers of relatively simple geological data. So the repackaging effort involves creation of three separate GeoSciML schema levels that will allow data services to be more easily delivered and consumed for common use cases ranging from very simple to very complex:

- GeoSciML-Portrayal – for simplest delivery of geological maps and boreholes (eg, WMS, shapefile)
- GeoSciML-Basic – for slightly more complex delivery of geological map data which supports intelligent querying of age and lithology properties for the most common geological feature types. Satisfies all INSPIRE use cases.



- GeoSciML-Extension, Boreholes, LaboratoryAnalysis-Specimens, GeologicTimescale – extended schemas for delivery of rich and complex geological data

#### OGC Documentation:

Progress has been made in documenting requirements and conformance classes for the GeoSciML v4 data model. This work is in preparation for the compilation of the OGC Specification document required for recognition as an OGC standard. Progress has been slower than had been hoped (see *Issues*).

#### *Geoscience Terminology Working Group*

In 2014 eighteen vocabularies required for the EarthResourceML have been collated, debated, reviewed and adopted. Jouni Vuollo (GTK, Finland) led much of activity, in part driven by the Minerals4EU project timetable that requires these vocabularies for the European implementation of mineral occurrence and mining data models.

#### *The ERML conceptual model*

The current release of the ERML v2 has been published in October 2013. See - <http://www.earthresourceml.org/>. This ERML model will now be trialled in projects such as Minerals4EU project (26 European Union Geological Surveys - 09/2015), as well as being used in the implementation of the INSPIRE Mineral Resources data specification. Any further versions of EarthResourceML will await feedback from use of EarthResourceML v2.



*The CGI working groups met in Tucson, Arizona in late June-early July including for the 2nd GTWG face-to-face meeting. From left to right are John Laxton (UK), Steve Richard (USA), Carlo Cipolloni (Italy), Eric Boisvert (Canada) and Jouni Vuollo (Finland).*

#### CGI - 2015 Activities

#### CGI Council Meeting



*CGI Council Meeting in Arona/Ispra. Italy 2015.*

The 2015 meeting of the CGI Council took place from 2nd to 3rd November in Ispra, Italy, Italy and was kindly hosted by the EC Joint Research Centre in Ispra and organized by the CGI Council member Robert Tomas. The Council met for two days. Among the discussed issues especially the following subjects were important:

- The CGI website
- Release of GeoSciML 4 and its certification as OGC standard
- Regional and Working Group reports
- The successful organization of the Geoscience Information in Africa Workshop in October 2015 in Maputo. Mozambique
- Organization of a Geoinformation Super-Symposium at the International Geological Congress 2016 (IGC) in South Africa.
- The expected change of CGI Council membership in 2016 due to the Council elections

## CGI Working Groups

### Geoscience ML Standards Working Group

In late 2012-early 2013, the CGI GeoSciML Standards Working Group entered into a formal MoU with the Open Geospatial Consortium (OGC) to form a collaborative working group to develop the GeoSciML v4 data transfer standard. Bringing the GeoSciML data standard under the umbrella of OGC gives GeoSciML a wider audience in the geospatial data community, and the imprimatur of a world-leading geospatial standards organisation. The GeoSciML v4 schemas and data model were released in December 2015. The OGC Modular Specification documentation, which is required for final adoption as an official OGC standard, is still in production. A draft was submitted to OGC in July 2016. Final submission and voting by OGC should occur later in 2016.



The working group has met via several teleconferences and in person at Wellington, NZ (2012), Redlands, USA and St Petersburg, Russia in 2013; Arlington and Tucson, USA (2014); Ispra, Italy (2015); and Dublin (2016).

Three of these meetings (Redlands, Arlington, and Dublin) were held as part of OGC Technical Committee meetings, while the others were organised to coincide with meetings of the CGI EarthResourceML and Geoscience Terminology working groups.

GeoSciML versions 3.0, 3.1, and 3.2 were published during 2012 and 2013. The GeoSciML v4 data standard is a significant refactoring of the v3 data standard. The purpose of this work is to enable easier use of the data standard by the majority of users, following feedback from users of version 3.2. In particular, important communities such as INSPIRE and OneGeology provided valuable feedback that the large and complex data standard needed to be broken up into easier-to-use “bite-sized” pieces.

The conceptual model of the data standard has changed very little from version 3 to version 4. The v4 data standard now has three levels - 1. *GeoSciML-Lite* (previously known as *GeoSciML-Portrayal*) for simple map representation (eg, WMS and simple WFS), 2. *GeoSciML-Basic* for geological feature age and lithology data (to be used by INSPIRE and OneGeology), 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. The three separate levels of GeoSciML also make it easier for software vendors to develop capabilities to consume relatively simple GeoSciML data without navigating the full range of complex GeoSciML schemas.

Ollie Raymond is still acting in the role of Chair of the SWG. Without a substantive Chair, the work of the SWG continues to be slower than would have been hoped. The majority of documentation work in the last 12 months has been done by Eric Boisvert of the Canadian Geological Survey. Lack of active participation from more than a small handful of SWG members is an ongoing concern for the SWG.

Full documentation of the work and products of the GeoSciML Standards Working Group can be found at:

- [www.geosciml.org](http://www.geosciml.org) (public website with schemas and data models)
- [http://external.opengeospatial.org/twiki\\_public/GeoSciMLswg/WebHome](http://external.opengeospatial.org/twiki_public/GeoSciMLswg/WebHome) (public wiki with minutes and actions of meetings), and
- <https://www.seegrid.csiro.au/subversion/GeoSciML/> (Subversion working document repository)



*Attendees at the 2013 CGI standards working groups meeting, GNS Science, Wellington, New Zealand.*



*Attendees at the 2013 CGI standards working groups meeting, A.P.Karpinsky Russian Geological Research Institute (VSEGEI), St Petersburg, Russia.*



*Attendees at the 2014 CGI standards working groups meeting, Arizona Geological Survey, Tucson, USA.*



Attendees at the 2015 CGI standards working groups meeting, EC Joint Research Centre, Ispra, Italy.

## Earth Resource ML Standard Group

The EarthResourceML Working Group was established by in 2009 to continue the work started by the Australian Government Geoscience Information Committee (GGIC). The first versions of the model – MineralOccurrenceML – was born developed by the GGIC from 2004 – 2008. The name of the model changes to EarthResourceML 2009 and the version 1.1 was released. The second and current EarthResourceML version 2.0 was released in October 2013.

In particular, important communities such as INSPIRE and Minerals4EU project provided valuable feedback to develop EarthResourceML 2.0 model and now EarthResourceML 2.0 is the preferred standard for mineral resource data sharing initiatives and projects, such as the European Union's INSPIRE directive, EURare, Minerals4EU, and ProSUM projects, and the Australian AuScope, and Geoscience Portal projects. After 205 small modifications, the full INSPIRE Mineral Resource model and CGI EarthResourceML models are identical.



EarthResource Lite version was accepted August 2016 and released August 2016 and included to IGC35th presentation. EarthResourceML Lite delivers a simplified flat view of key elements of the full EarthResourceML data model. It can be used to standardise delivery of mineral resource data via Web Map Services (WMS) and simple features Web Feature Services (WFS SFO).

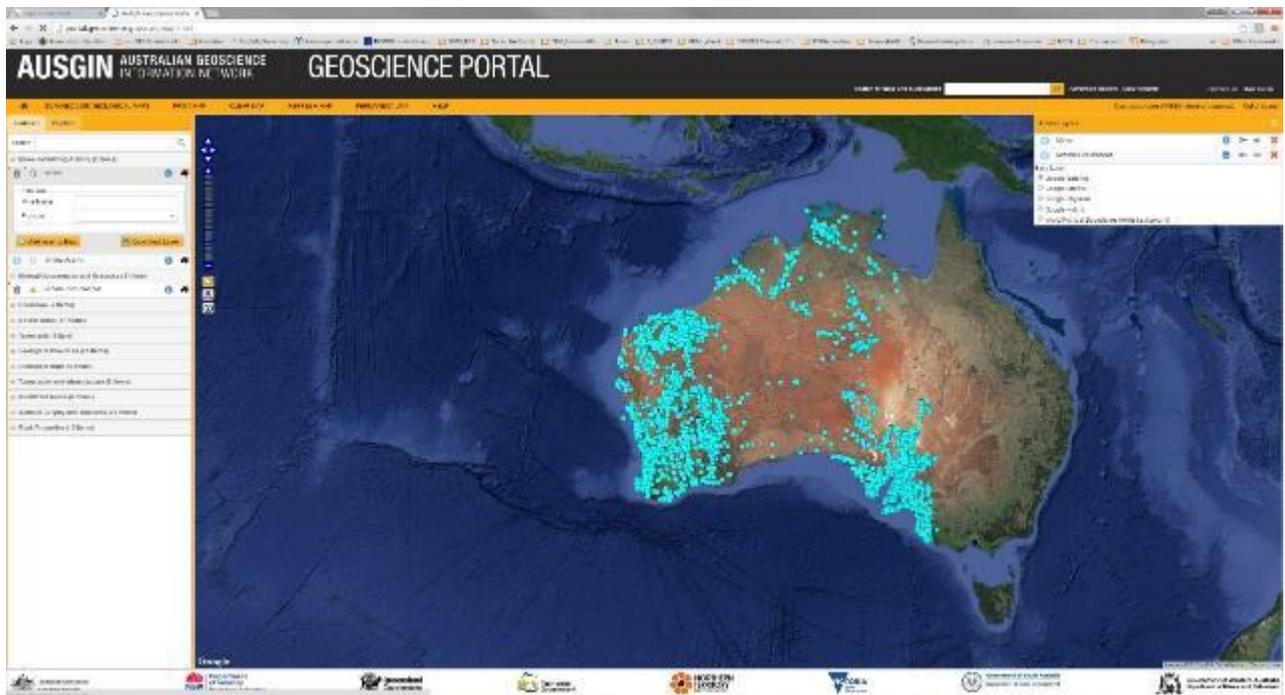
The working group has met in person at Wellington, NZ (2012), St Petersburg, Russia in 2013; Tucson, USA (2014) and Ispra, Italy (2015). All meetings were organized to coincide with meetings of the CGI GeoSciML and Geoscience Terminology working groups.

The membership of the group has been 7-8 and they came from Australia, New Zealand, France, USA, Sweden, Great Britain and Finland. Jouni Vuollo (GTK) is acting in the role of Chair of the SWG from 2013. Previous chair has been Bruce Simons from CSIRO. Membership is now defined and managed through a Google Group with membership rights administered by Jouni Vuollo

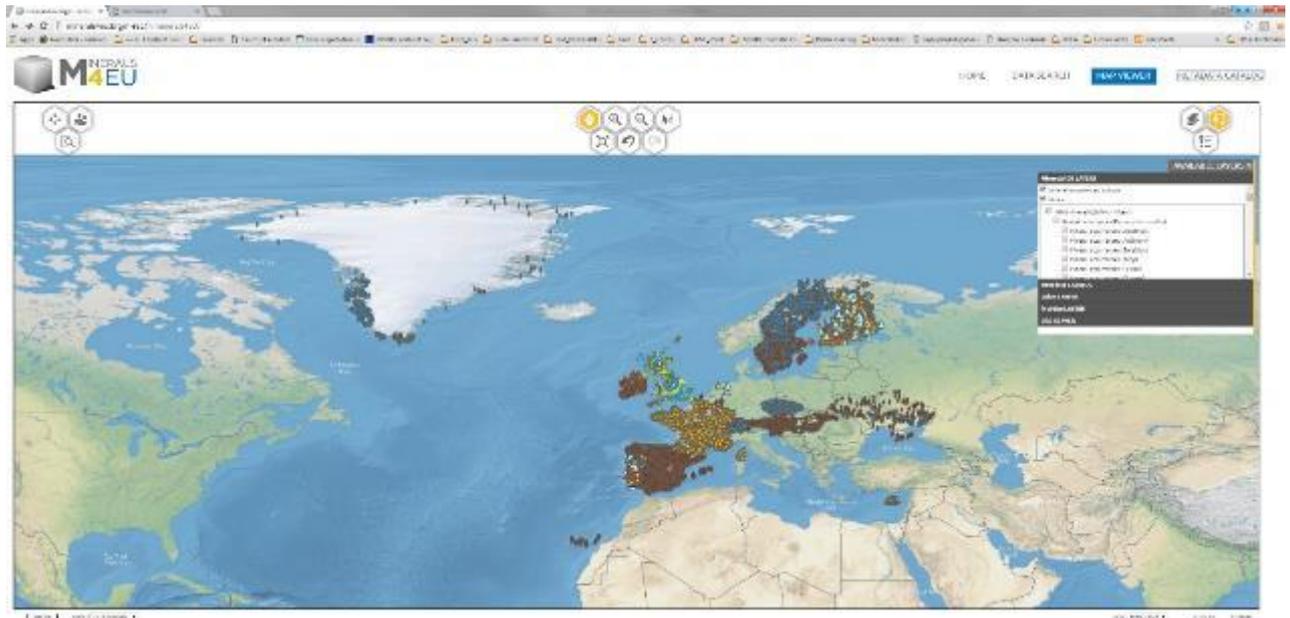
Full documentation of the work and products of the EarthResourceML Standards Working Group can be found at:

- <http://www.earthresourceml.org/> (public website with schemas and data models)
- [http://external.opengeospatial.org/wiki\\_public/GeoSciMLswg/WebHome](http://external.opengeospatial.org/wiki_public/GeoSciMLswg/WebHome) (public wiki with minutes and actions of meetings), and
- <https://www.seegrid.csiro.au/subversion/xmml/GGIC/> (Subversion working document repository)

Nineteen vocabularies required for the EarthResourceML have been collated, debated, reviewed and adopted (2014-2016). Jouni Vuollo (GTK, Finland) led much of activity, in part driven by the Minerals4EU project timetable that required these vocabularies for the European implementation of mineral occurrence and mining data models.



The snapshot (2.8.2016) of AUSGIN Geoscience portal - mines - <http://portal.geoscience.gov.au/gmap.html>



The snapshot (2.8.2016) of Minerals4EU portal – mines and mineral occurrences from 17 countries - <http://minerals4eu.brgm-rec.fr/minerals4EU/>.

## Geoscience Terminology Working Group

The Geoscience Terminology Working Group (GTWG) was established in late 2012 following a CGI Council recommendation earlier that year. The CGI has had two previous workgroups involved in vocabulary production; the Multi-lingual Thesaurus Working Group (formed in 2003) and the Concept Definition Task Group (formed by the CGI Interoperability Working Group in 2007). The latter was formed to develop concept vocabularies for populating GeoSciML interchange documents. Because of overlapping interests between these groups the CGI Council has determined that it will be more efficient and effective to merge their efforts.

The mission of the GTWG has been to develop, review, adopt, publish, and steward vocabularies and associated documentation for use in geoscience information systems. In addition the group should develop liaisons with other semantic interoperability groups to ensure cross-domain interoperability, and to involve participants and integrate concepts and requirements from regional communities outside of North America, Europe and Australia.

### Activities

Steve Richard as inaugural chair accepted volunteers for membership and organised the first face-to-face meeting in St Petersburg, Russia in conjunction with the GeoSciML Working Group, the EarthResourceML Working Group and the OneGeology Technical Working Group.

Since then there have been two further face-to-face meetings; in Tucson, Arizona (2014) and Ispra, Italy (2015), again in conjunction with the GeoSciML and EarthResourceML working group meetings.



The second GTWG face-to-face meeting was held at Tucson in 2014, organised by Steve Richard and the Arizona Geological Survey.

The membership of the group has risen from 23 to 27 members over this four year period. Members come from Australia, Brazil, Canada, Denmark, Finland, France, Germany, Great Britain, Italy, New Zealand, Russia, Slovenia, Sweden and USA. Membership is now defined and managed through a Google Group with membership rights administered by Mark Rattenbury (NZ, chair since 2014) and Steve Richard (USA). Members are information modelling specialists, technical experts in all areas of geoscience and regional geological experts. Actual participation in vocabulary development and management involves only about half of the membership.

The GTWG activities are described under link from CGI's website [http://www.cgi-iugs.org/tech\\_collaboration/geoscience\\_terminology\\_working\\_group.html](http://www.cgi-iugs.org/tech_collaboration/geoscience_terminology_working_group.html) and from the GeoSciML website at <http://www.geosciml.org/>

The GTWG accept proposals and requests for vocabularies to add to a CGI vocabulary portfolio. Each vocabulary is assigned a 'shepherd' responsible for chairing a task team to develop a draft vocabulary, reach out to the community for review and comment, respond to comments, and recommend adoption to the Working Group. Vocabulary development is undertaken with Google Sheets spreadsheets for their ease of text editing and review, versioning and multi-user input. When the vocabulary is review and adopted, it is migrated into SKOS, an RDF application for encoding concepts with identifiers, definitions, source information, standard thesaurus type relationships, and multilingual labels. The vocabulary is then registered in the CGI vocabulary repository.

### Achievements

Five vocabularies have been collated, debated, reviewed and adopted since 2012 to support the GeoSciML data model. Considerable progress has been made on some large complicated vocabularies including *regionalLithologicUnit*, *mineralDepositType*, *naturalGeomorphologyFeature*, *relationRoleTerm*, *physicalPropertyTerm*, *samplingMethod*, *specimenType* and *materialClass*.

Eighteen vocabularies required for the EarthResourceML have been collated, debated, reviewed and adopted. Jouni Vuollo (GTK, Finland) led much of activity, in part driven by the Minerals4EU project

timetable that required these vocabularies for the European implementation of mineral occurrence and mining data models. The important *commodityCodeValue* vocabulary was completed and adopted in 2015; a highly hierarchically organised vocabulary of 291 parent and child natural and processed earth resource commodity terms. The adoption of *mineralDepositType* and *mineralDepositGroup* (required for ERML) was rejected and a new approach to its compilation has been recommended.

The CGI vocabulary service SISSVoc continues to be hosted by the CSIRO, Australia who initially developed the technology and have continued to maintain and update the service. CSIRO have indicated they no longer can host the service. A replacement CGI vocabulary service is currently being established by Geoscience Australia that complements other Australian vocabulary requirements. Development of the new service is proceeding, albeit slowly. There have been some unexpected technical hurdles which require regenerating of all the CGI vocabularies and necessary changes to the SISSVoc application front end. The service is expected to be operational in late 2016.



Vocabulary adopted by GTWG and predecessor groups, and work in progress.

### Future Work and Issues

There remains a number of outstanding GeoSciML and ERML data model vocabularies still to complete, approximate half of those required for both of the models. The compilation of many of these has been started. In addition, considerable work remains to be done to integrate multilingual geoscience terms developed by the MLT Working Group with existing CGI vocabularies to provide multilingual support.

A recurring concern over the last four years is that international standards in geoscience terminology are being decided by too few people and that they are unlikely represent the diversity of thinking around the world. The face-to-face meetings are the best opportunity to get progress but these are not well attended.

With the completion of GeoSciML v4, the opportunity for joint annual face-to-face meetings with that group has been lost. Face-to-face meetings have been particularly productive for the GTWG but because these always involve considerable travel for some participants there is a concern that progress in the working group will continue to be slow. Co-alignment with other meetings can help overcome this. Options include may be to align with annual meetings of OneGeology or CGI Council but organising GTWG meetings at large events such the IGC or the European Inspire Conference has proved impractical with too many competing interests for people's time.

## Concluded Working Groups:

### Interoperability Working Group (2004 — 2013)

The Interoperability Working Group was formed to develop data standards to facilitate the query and exchange of geological information between data providers for environmental, scientific, legal and social purposes. The ultimate objective of the working group was to enable seamless integration over the internet of geological information hosted at different agencies in varied formats. The working group conducted several testbeds to test the viability of technologies and standards within the context of individual agency activities.

The specific objectives of the working group were:

- to develop a conceptual model of geoscientific information drawing on existing data models
- to implement an agreed subset of this model in an agreed schema language
- implement an XML/GML encoding of the model subset
- develop a testbed to illustrate the potential of the data model for interchange
- identify areas that require standardised classifications in order to enable interchange

The Interoperability Working Group comprised several task groups to address specific aspects of the work:

- **GeoSciML Design** task group designed the GeoSciML data model and XML schemas for transfer of geological data. The work of the GeoSciML task group is being carried forward by the CGI/OGC [GeoSciML Standards Working Group](#).
- **Use Cases and Requirements** task group developed technical goals for GeoSciML by describing new use-cases and requirements;
- **Service Architecture** task group developed and documented the formal architecture required to deliver GeoSciML services
- **Implementation Testbed** task group coordinated interoperability testbeds using GeoSciML;
- **Geoscience Concept Definitions** task group was responsible for designing vocabulary services that satisfy the requirements of GeoSciML. The work of this task group has been merged with the Multilingual Thesaurus Working Group into the [Geoscience Terminology Working Group](#).
- **Outreach and Technical Assistance** task group provided advice and assistance to direct collaborators, assisting them to deploy conformant GeoSciML Services.

- **EarthResourceML** task group developed the CGI data model for mineral occurrences and mines data, based on the Australia/NZ mineral deposits model. This task group has now been elevated to a CGI working group.



Material developed by the Interoperability Working Group, including the GeoSciML and EarthResourceML UML models, XML/GML schemas, instance documents, documentation, and vocabularies are available through the [GeoSciML](#), [EarthResourceML](#), and [Geoscience Terminology Working Group](#) web pages.

### Multi Lingual Thesaurus Working Group (- 2012)

The Multilingual Thesaurus Working Group (MLTWG) was merged with the Concept Definitions Task Group in 2012 to form the [Geoscience Terminology Working Group](#).

#### Mission

The mission of the MLTWG was to enable the global exchange of geoscience information with the help of a common multilingual core vocabulary by developing and expanding the Multilingual Thesaurus of Geosciences.

The Multilingual Thesaurus of Geosciences (MTG) was designed to be easily accessible (including on the web), and available free of charge. The participants recognized the importance of ensuring the compatibility of national information systems with commonly accepted international standards.

#### Main Objectives

- Updating categories and terms
- Establishing a polyhierarchy
- Adding synonyms and related terms
- Installing the thesaurus as a web based tool
- Adding new languages

## CGI supported Projects and Organisations

### ONEGEOLOGY

OneGeology is an initiative in which CGI and its members play a significant part. Only two and a half years after the concept had been introduced OneGeology and its portal was formally launched at the 33rd IGC.

At the beginning of the 33rd IGC in Oslo in 2008 81 nations were participating in OneGeology. Of the 81 nations, 30 were serving data to the OneGeology portal by 6 August 2008 – this equated to almost 100 map datasets from national sources and also, importantly, from the prime international scientific body in global geoscience mapping, the CGMW.



Currently 119 nations are participating in OneGeology and over 50 of these are serving datasets to the OneGeology web portal (<http://portal.onegeology.org/>).

The technology to achieve OneGeology is not complex, but it in terms of the scale of the deployment it is truly world leading. A basic principle of OneGeology is that it must be open to all geological surveys to participate, regardless of development status and the project has devised protocols and systems to ensure this.

OneGeology is thus open to those who currently possess only traditional paper geological maps, and to those operating sophisticated web mapping systems. The end-user does not require specialist software, only access to the Internet via a web browser. In this first phase OneGeology is delivering digital geological map data from participating nations using Web Map Services (WMS). This is a distributed, dynamic and sustainable model, which unlike Google Earth leaves the data where it is best looked after and updated; that is with the provider nations. Each survey either registers its web service with the OneGeology Portal or works with a partner survey (a “buddy”) to serve that data. OneGeology technology is compliant with the international Open Geospatial Consortium (OGC) Web Map Service standard. Geological surveys may use a variety of software (e.g. MapServer) to serve their data. The Portal displays the map data served by each country and provides users with the ability to zoom, pan, switch map data on and off, change its opacity and transfer it to Google Earth.

Technically, OneGeology also continues to progress well in close collaboration with the CGI Interoperability Working Group and we are seeing more nations move from Web Map Services (WMS) to Web Feature Services (WFS) which offer significantly more functionality for the user.

OneGeology is synergistically using the vehicle of creating a tangible geological map to accelerate progress of a global geosciences data model and interchange standard (GeoSciML). Most importantly the project is transferring know-how to those who wish to deliver spatial data on the Internet and especially developing countries. To do this several training courses were held. Reducing the length and expense of the learning curve allows developing nations to serve geological maps and data that will attract interest and investment.

OneGeology is not a legal entity: it is a now non-corporate body (a Consortium) supported through the trust of its Members and, in particular, the Lead Parties (BGS and BRGM).

Exchange know-how and skills so that all nations can participate

The WMS and WFS Cookbooks (technical manual) have been updated several times and are available for download on the OneGeology website.

[www.onegeology.org](http://www.onegeology.org)

**OneGeology–Europe and EGDI****Major advance in Europe**

OneGeology-Europe, a 20 nation project which was sitting within the OneGeology global framework and which was funded by the European Commission (€3.25 over two years), under its eContent*plus* programme, is now finished and is continuing by the EGDI initiative programme form all European Geological Surveys.

EGIS is building a European Geological Data Infrastructure and is lead by the Danish Geological Survey GEUS: <http://www.europe-geology.eu/>

**Open Geospatial Consortium (OGC)**

CGI continues to strengthen its connections with the Open GeoSpatial Consortium. OGC ([www.opengeospatial.org](http://www.opengeospatial.org)) is a non-profit, international, voluntary consensus standards organization that is leading the development of standards for geospatial and location based services. OGC is an international consortium of



526 companies, government agencies, and universities participating in a consensus process to develop publicly available interface specifications. OGC specifications support interoperable solutions that "geo-enable" the Web, wireless and location-based services, and mainstream IT. The specifications empower technology developers to make complex spatial information and services accessible and useful with all kinds of applications.

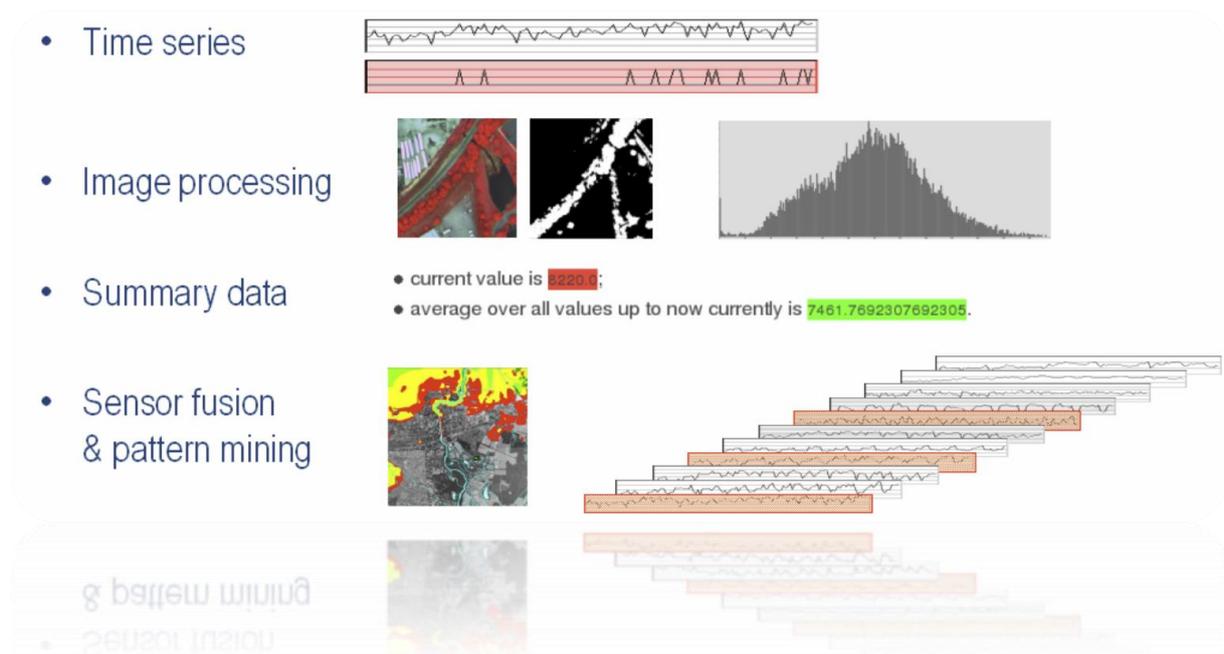
To this end, OGC closely cooperates with relevant neighbored bodies, such as ISO (in particular TC 211), OASISOpen, and W3C. ISO specifications form the basis for OGC's specifications; for example, ISO 19123 has been adopted as Abstract Specification Topic 6 in OGC. Conversely, ISO issues OGC standards in parallel. Since 2007, a liaison also exists with CGI to foster mutual information as well as harmonization of specifications.

Given the complexity of geo services, OGC does not aim at a single, monolithic standard, but rather issues a family of modular specifications which are initiated on demand and through active participation. All specifications are based on the unified architecture laid down in OWS Common and the Abstract Specifications.

While OGC historically has started with a GIS perspective in mind, today "geo service" is understood as servicing any kind of location-based information over the Internet. As such, there are tight connections into domains like atmosphere and ocean modeling, security (such as air traffic control).

It is safe to state that OGC is the most relevant geo service standardization body today, and actually driving the field. For example, the European INSPIRE initiative which defines a regulatory framework for geo services offered by governmental agencies within the European Union is completely based on OGC standards. The steadily growing number of OGC members as well as OGC-compliant products and operational services hints that OGC will continue to play an important role in open, interoperable geo services.

In the spirit of cooperation for technological interoperability a mutual acknowledgement of specifications among CGI/IUGS and OGC is advantageous and will send an encouraging signal to the relevant user communities.



CGI has established a very close connection and strong relationship with the global spatial standards body OGC. There have been many strategic and technical discussions between members of the organisations.

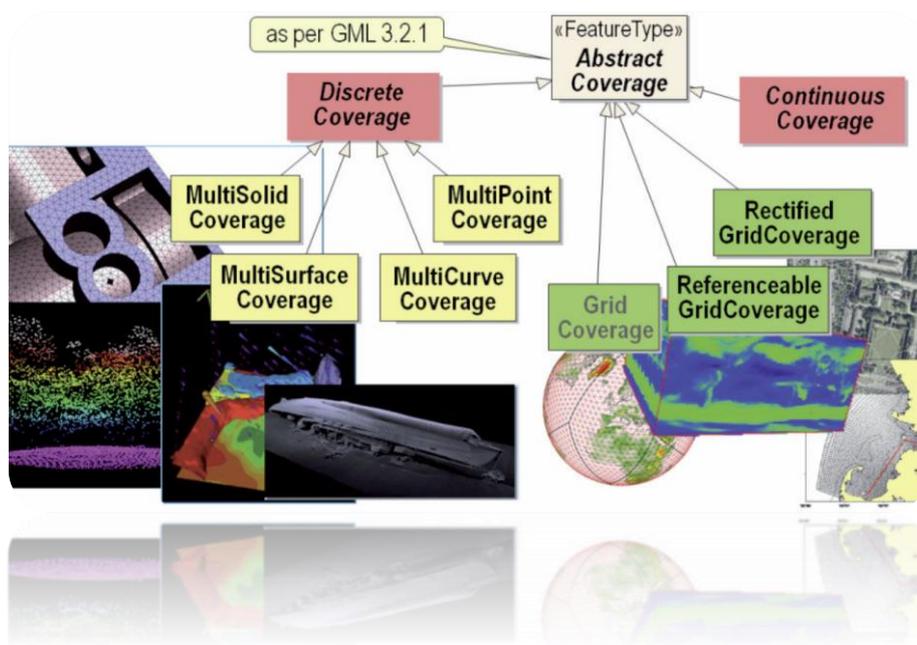
A MOU has been signed between OGC and CGI to jointly create a GeoSciML SWG in OGC, and options to extend it to 3D standards are currently discussed.

#### **Web Coverage Service (WCS) 2.0**

The OGC Web Coverage Service (WCS) 2.0 standard has been officially adopted by OGC in August 2010. WCS 2.0 defines a standard interface and operations that enable interoperable access to geospatial coverages, i.e.: space/time-varying phenomena such as sensor data, satellite imagery, digital elevation models, and climate/ ocean data. An important aspect of the WCS standard is that it allows access and retrieval of raw, unprocessed data, which is more and more required by processing and rendering tools.

The WCS 2.0 standard has several significant enhancements over previous versions, following intensive hearings of many stakeholder communities. WCS 2.0 is harmonized with the Geography Markup Language (GML) coverage model, leading to increased interoperability across OGC standards. Further, WCS 2.0 supports all GML and ISO coverage types, therefore extending WCS from pure raster data to point clouds, curvilinear grids, general meshes, and more coverage types. Additionally, WCS 2.0 is highly modular and follows the OGC's new Modular Specification Policy, which describes a design pattern that makes standards easier to understand and implement. The WCS 2.0 standard is available for free download at

<http://www.opengeospatial.org/standards/wcs>



Further, a NetCDF Working Group has been established in OGC with the goal of making NetCDF an OGC standard. A similar step is under way with GeoSciML. Among the benefits expected is an intensified harmonization of these specifications with the relevant OGC standards, such as WCS.

Altogether, core specifications for geology in particular and the Earth Sciences in general have made important steps towards increased interoperability and, ultimately, enable a new level of service quality for Earth Science data access and retrieval.

## CGI Across the Globe

### CGI in Asia

The Geological Survey of Japan (GSJ) is presently implementing five major projects related to web-based geoinformation processing, storage and sharing system using OGC-based standards and web services. These are the following: (1) OneGeology-Asia, (2) the 1:1 M Seamless Geological Map of Southeast Asia, (3) CCOP Geoinformation Sharing infrastructure for East and Southeast Asia (GSi), (4) Asia-Pacific Region Global Earthquake and Volcanic Eruption Risk Management (G-EVER) and (5) ASEAN Mineral Information System Development training series (on its third year). GSJ and PHIVOLCS also developed the PHIVOLCS FaultFinder Mobile WebApp.

#### (1) OneGeology Covering East Asia

The OneGeology-CCOP project, which is the implementation of the OneGeology Global project covering East and Southeast Asia is ongoing. The Geological Survey of Japan (GSJ) provides the leadership in the implementation of the project with the cooperation of the Coordinating Committee for the Geoscience Programmes in East and Southeast Asia (CCOP) member countries. CCOP and GSJ is currently implementing the ASEAN WebGIS training series and the 1:1 million seamless geological mapping project. Myanmar, Thailand, Vietnam, Laos and Cambodia are presently working on the harmonization of their 1:1 million geological maps' legends. The seamless map will be registered to the OneGeology portal when it is finished. The geological map of Myanmar is the new addition to the list of WMSs registered to the OneGeology - Global portal while Cambodia is the latest country that signify interest in joining the OneGeology project. Most of WMSs of the geological maps of the

countries in East and Southeast Asia are hosted by GSJ servers. These are the MWSs of the geological maps of Indonesia, Malaysia, Vietnam, Myanmar, Philippines and Papua New Guinea. The WMSs of Laos, Thailand and South Korea are hosted by these countries' servers.

## (2) 1:1 M Seamless Geological Map of Southeast Asia

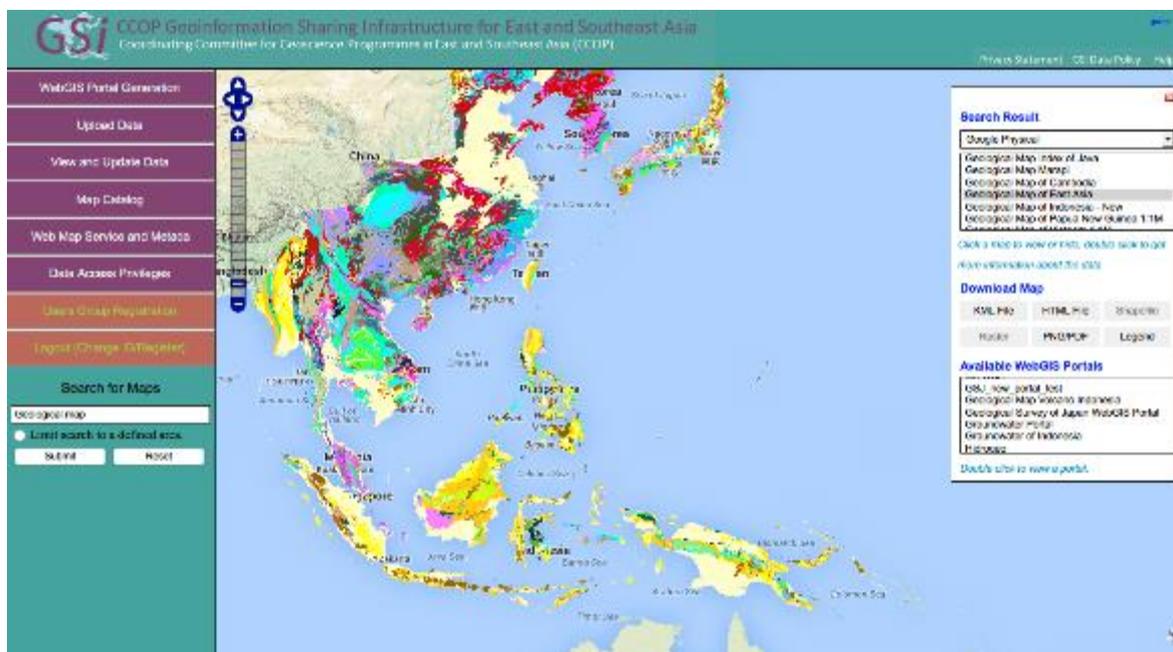
GSJ has been supporting the ASEAN Seamless Geological Map (1:1,000,000) project since the Department of Mineral Resources (DMR) of Thailand proposed the project at ASOMM+3 held in Bali, Indonesia in November 2013. At the Steering Committee (SC) meeting of CCOP held in Chiangmai, Thailand in March 2014, CCOP decided to support the ASEAN Seamless Geological Map project and called the project the CCOP-ASEAN Harmonized Geology Project. The kick-off meeting was held at CCOP office in Bangkok on 16-17 July 2014, with 21 participants from Thailand, Laos, Vietnam, Cambodia, Indonesia and Japan. At the SC meeting held in Papua New Guinea in October 2014, the CCOP-ASEAN Seamless Geological Map project was listed in CCOP Workplan 2015. At a side meeting of the SC meeting in Krabi, Thailand, the unified legend was adopted and schedule of the project was discussed. Also, at a side meeting of SC meeting held in Siem Reap, Cambodia in March 2016, the field workshop in western Cambodia in Nov., 2015 was reported and future plan of the project (2016 in Myanmar, 2017 in Laos and 2018 possibly in Vietnam) was presented. The CCOP and GSJ are currently implementing the 1:1 million seamless geological mapping project. Myanmar, Thailand, Vietnam, Laos and Cambodia are presently working on the harmonization of their 1:1 million geological maps' legends (Figs 1). The seamless map will be registered to the OneGeology portal when it is finished.



*National boundary between Myanmar and Laos on the Myanmar-Lao Friendship Bridge over the Mekong River. 17 June 2016.*

### (3) CCOP Geoinformation sharing infrastructure for East and Southeast Asia (GSI)

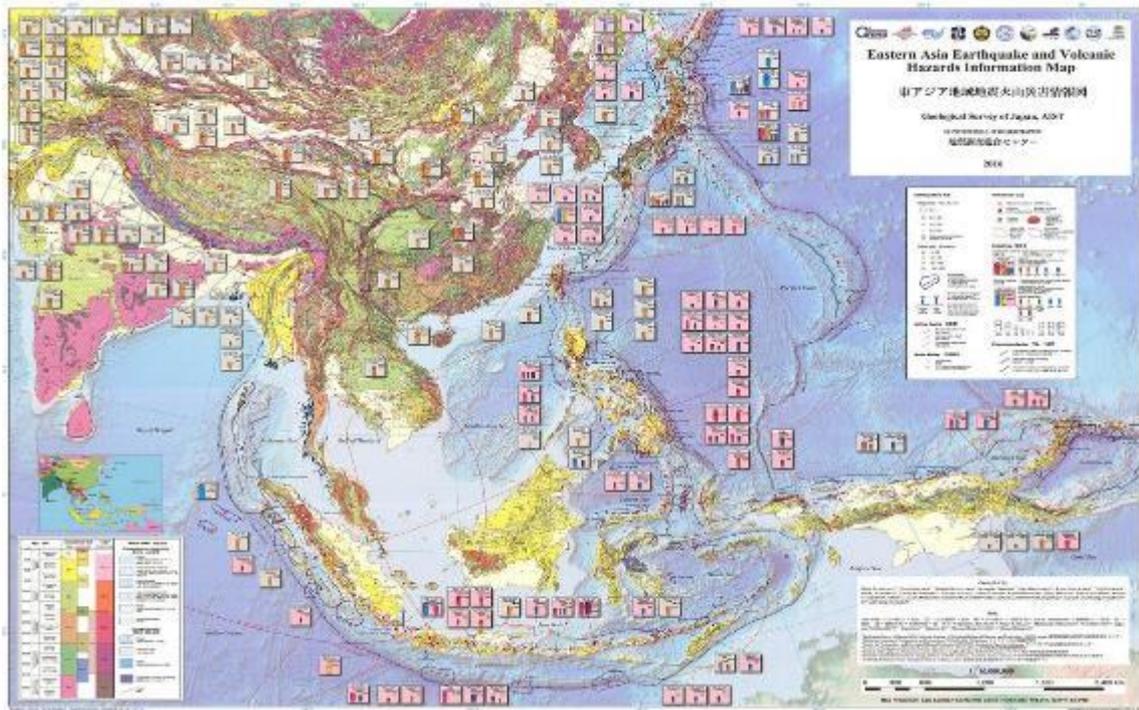
The CCOP Geoinformation Sharing Infrastructure Project is implemented by CCOP and GSJ. The main objective of the project is to develop a web-based system for the sharing of geoscience information among the countries in the Asia-Pacific region. The information system will also make geoscience information readily accessible in the region. The GSI main portal site (Fig. 1) provides Web-based functions for spatial data rendering and analysis in the forms of Web Map Service (WMS) and Web Processing Service (WPS), respectively. It could also be used to download data in several formats. The system follows the standard model of Spatial Data Infrastructure (SDI). However, unlike the conventional SDI, it uses a unique system of controlling data access privileges of the users. Data owners could decide who can view, edit and download their data using the system's data access privileges component. Users' group could also be created to classify users with the same data access privileges. The system also provides interface for the creation of a customized WebGIS portal for spatial data viewing and processing. The GSI project was officially started during the kick-off meeting on September 1 to 2, 2015 in Bangkok, Thailand. Twenty-three (23) participants from the CCOP member countries (Cambodia, Indonesia, Japan, Korea, Lao PDR, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand and Vietnam) including the staff of the CCOP Technical Secretariat (CCOP TS) attended the meeting. The project plan and data policy were discussed in this meeting. Currently, CCOP and GSJ provide the servers to host the GSI main portal site and the database. Indonesia uses their database server for the storage of the country's data. The 1st CCOP GSI International Workshop will be held at Solo, Indonesia, on Sep. 20-22, 2016.



CCOP GSI's main portal site.

### (4) Asia-Pacific Region Global Earthquake and Volcanic Eruption Risk Management (G-EVER)





*Eastern Asia Earthquake and Volcanic Hazards Information Map*

The Eastern Asia Earthquake and Volcanic Hazards Information Map (Fig. 3, 4), published in 2016, is a collaborative product of the G-EVER Promotion Team organized in the Geological Survey of Japan, AIST and several geological institutes in SE Asia. The Map contains a extensive of information about geohazard in the SE Asia region as well as its geology and tectonics, the distribution of active faults, earthquake hypocenters and source areas, Holocene volcanoes, calderas, large-scale ignimbrites and ash falls. The map also provides information about fatalities caused by major volcanic eruptions, earthquakes and tsunami occurrences. The fatalities in earthquakes and volcanic eruptions are classified by the main cause of the death and graphically illustrated to facilitate visual understanding of the magnitude of the damage from these disasters. The map contents will also be made available on the G-EVER hazard information system (<http://ccop-geoinfo.org/G-EVER/>). The map which

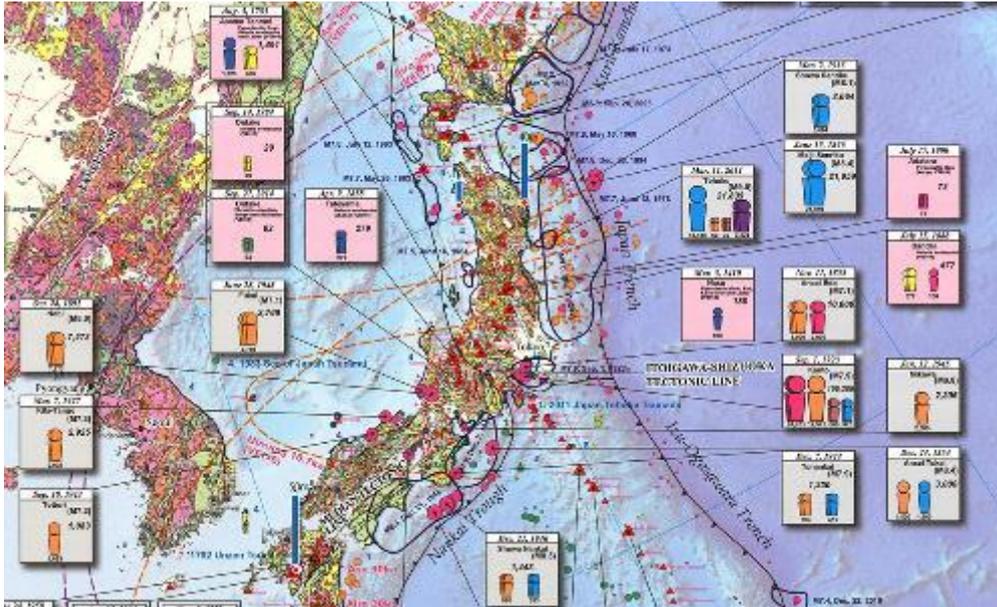
provides valuable information about geological hazards, is a powerful outreach tools and is very useful in their mitigation.

*A close-up view of the hazard information map showing Japan and its surrounding areas.*

The map and documentation can be downloaded from the following sites:

Map: [https://www.gsj.jp/data/ASIA/JPG/GSJ\\_MAP\\_ASIA-E\\_HZD02\\_2016\\_300dpi.zip](https://www.gsj.jp/data/ASIA/JPG/GSJ_MAP_ASIA-E_HZD02_2016_300dpi.zip) (64MB).

Document: [https://www.gsj.jp/data/ASIA/PDF/GSJ\\_MAP\\_ASIA-E\\_HZD02\\_2016\\_D.pdf](https://www.gsj.jp/data/ASIA/PDF/GSJ_MAP_ASIA-E_HZD02_2016_D.pdf) (30MB).



##### (5) ASEAN WebGIS and Mineral Database Information System Training Series

Japan International Cooperation Agency (JICA) and Geological Survey of Japan (GSJ) implemented the ASEAN WebGIS and Mineral Database Information System Training Series. The trainings are intended for the countries comprising the Association of Southeast Asian Nations (ASEAN). JICA financed the project while GSJ provides the experts and lecturers. The project started on April 28, 2014 with the training in Manila, Philippines. For this year, the training was held in Japan and Myanmar. The Japan leg was held at GSJ from July 25 to August 12, 2016. The training in Myanmar was held at the Department of Geological Survey and Mineral Exploration (DGSE), NayPyiTaw, Myanmar from August 15 to 19, 2016. This was followed by on site field training in Myanmar from August 20 to 24. These trainings were preceded by a field survey at the border area between Myanmar, Laos and Thailand (Fig. 5). The training mainly focused on the development of the ASEAN Mineral Information System using Free and Open Source Software (FOSS) and Open Geospatial Consortium (OGC) Standards. It includes web based database creation, database population, querying the database using Sequential Query Language (SQL) and the formulation of Web Map Services (WMS) and WMS clients.

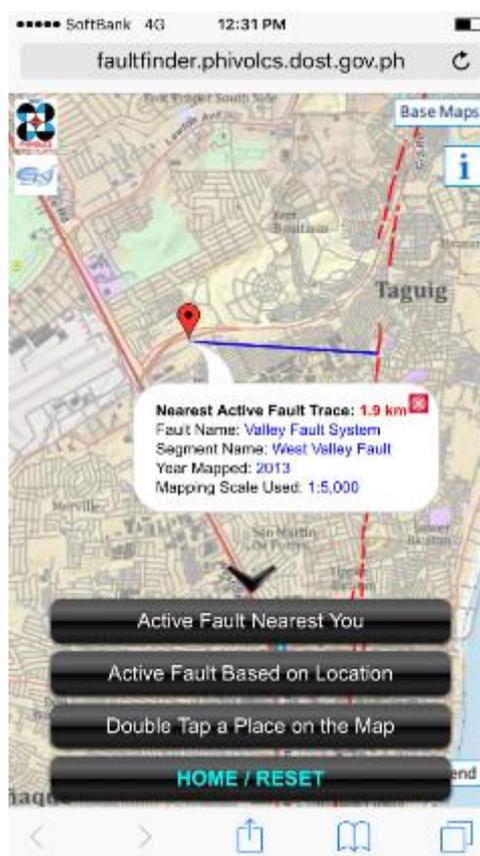
### PHIVOLCS FaultFinder Mobile WebApp

The Philippine Institute of Volcanology and Seismology (PHIVOLCS) and the Geological Survey of Japan (GSJ) collaborated to develop a mobile app for easy determination of the active fault locations and related information in the Philippines. The main purpose of the app is to inform the users to easily determine the active fault location relative to the users' current location, home, office, school or any location of interest. The app's user interface is intuitively designed for the users to easily get the needed information. The app is very useful for a wide range of users from prospective home owners and real estate developers to parents who want to decide which school to send their children to. The app was officially launched on July 25, 2016. Figure 5 shows the screen shot of the app.

*The PHIVOLCS FaultFinder Mobile App*

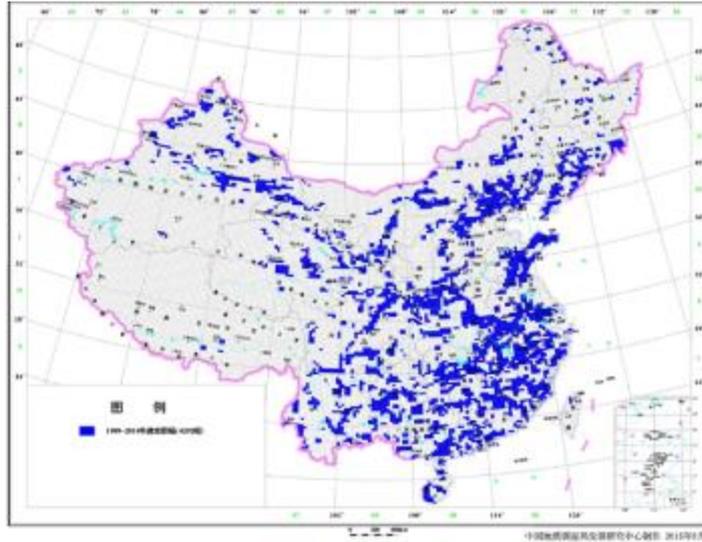
### Geological Information Management and Application Activities of China

In order to meet new demands of national economic and social development on geological survey data and information, China Geological Survey (CGS) has put big efforts on both collecting new geological data through more than 300 projects and updating existing national geo-databases. A series of demand-oriented digital geological information products has been provided this year. Significant progress were also made in geological data collecting, processing and data integration with new information and data techniques, such as big data and private cloud. Users, including field geoscientists can now get more efficient and timely service of both thematic geo-data release and general geo-information packages. Geological data is now used more often and more accurate by decision-makers in geological survey, mineral exploration and other related industries.



#### 1. Geo-database Achievements

With the release of China 1:1million geological map data via OneGeology portal in 2015, one bigger spatial database of 1:50000 scale regional geological map had completed by the end of 2015. This database contains more than 4 600 sheets of 1:50000 scale spatial regional geological map data in the format of both MapGIS and ArcGIS, see figure 1. And it is regard as the key basic geological data sources of large scale. Progress of steady releasing through the web has already been made. And more than 300 sheets data map had been released via CGS web so far.



*Distribution of 1:50,000 scale geological maps in China*

A database of historical, graphic and geological archives is established and come to service in 2016. After some 10 years of scanning and coordination, CGS has completed the digitization of some 130 000 volumes of geological archives. This database is about 20TB, contains historical and graphic geological information of China. And it's open to the society as well.

Data of more than 900 000 boreholes have also been digitized in 2016 and put in national geological drilling database.

Database of *Chinese Regional Geology* of the second generation has completed in 11 provinces and 2 major regions (Jiangnan and Qilian orogenic belt). And database of *Chinese Geotectonic Map by Period* (1:10million) which reproduces the formation and evolution history of the Chinese mainland through ten tectonic epochs is also established.

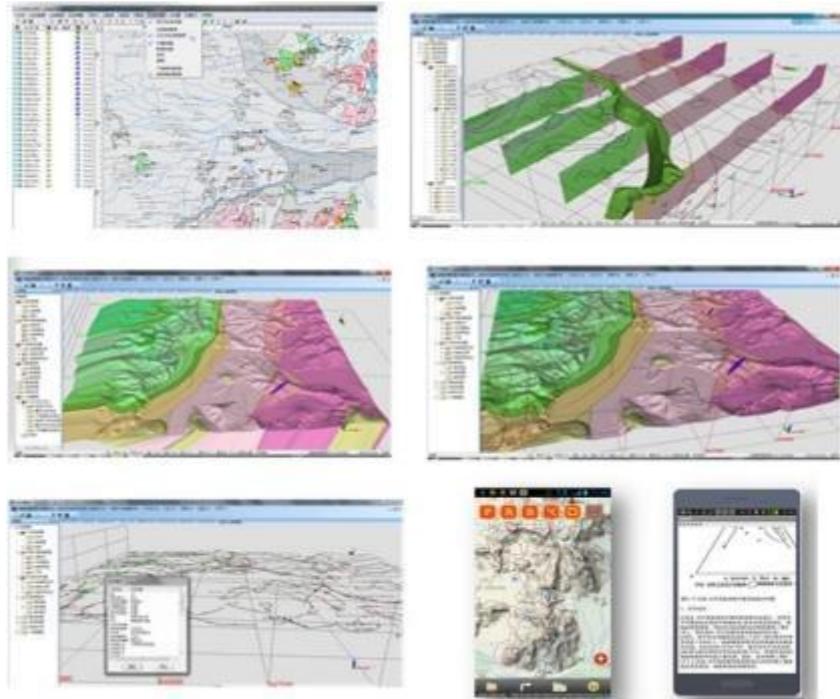
## **2. Supporting Information Techniques**

The supporting platform for geo-big-data has been developed smoothly, and capacity for field work, data collection, data processing and release have been further enhanced.

Comprehensive supporting system for auxiliary decision making of national geological surveys has been put into practice and also been improved continuously, which highly improved the efficiency and computation level of geological survey management.

3D geological data exchanging standard is released.

Breakthroughs have been made in the integration of traditional geological mapping methods and 3D modeling methods and intelligent modeling technology of 3D geological map is basically established, see figure 2.



*Intelligent 3D Geological Mapping and Modeling Technical System and Process*

### **3. Geological information Activities in Asia and else where**

(1) The 6th training course on geological mapping capacity for ASEAN by CGS on 26 Oct, 2015 in Nanjing to be very successful, see figure 3. 20 participants from Cambodia, Indonesia, Laos, Malaysia, Burma, Philippines, Thailand, Vietnam and South Korea participated in the 10-day training course, including 2 days of fieldwork.



*The 6th training course on geological mapping capacity for ASEAN*

(2) The 3rd CCOP-CGS Capacity Building for Geophysical and Geochemical Data Processing (IGDP) was successfully held in Beijing, China in Nov., 2015. see figure 4. 24 professionals from CCOP member countries such as Cambodia, China, Indonesia, Japan and Malaysia took part in the training course. The training yielded fruitful results since 2012 by passing on geophysical and geochemical

technologies and the software RGIS-IGDP.



*The 3rd CCOP-CGS workshop/training on IGDP.*

(3) CGS staff helped Laos in field geological mapping with digital technology in Nov. 8-23,2015 in Laos, funded by China government and with gracious assistance of the Department of Geology and Mineral Resources of the Ministry of Natural Resources and Environment of Laos, with a 4-day training course and 12 days fieldwork on digital geological mapping on a demonstration zone in a selected 1:200,000 geological mapping project, see figure 5.



*Digital geological mapping training in Laos.*

(4) Workshop/Training of ASEAN-China Cooperation Foundation project on IGDP gained great success in March 2016, focused on integrated geological data processing (IGDP). 23 professional staffs from ASEAN member states and ASEAN secretariat, including Cambodia, Indonesia, Laos, Malaysia, Burma, Philippines, Thailand and Vietnam participated, see figure 6.



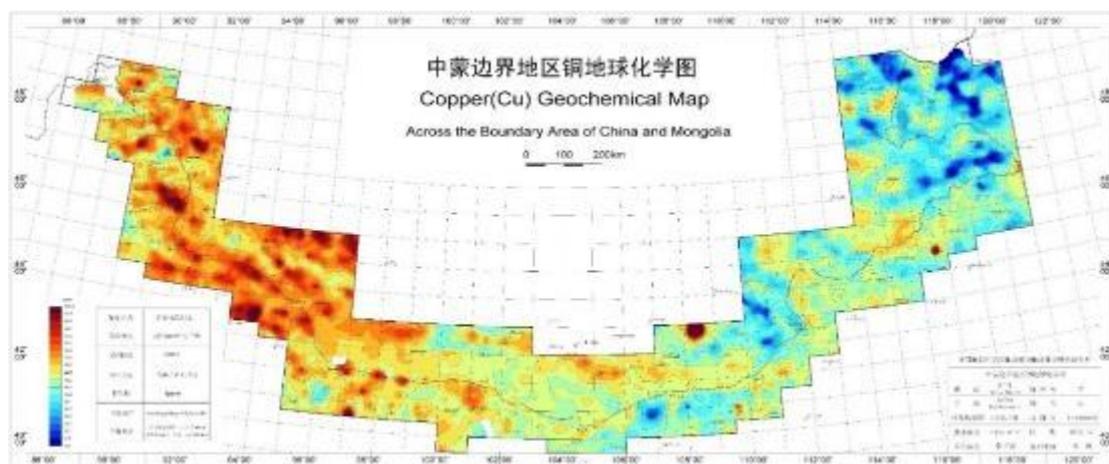
*Workshop/Training of ACCF project on IGDP in Mar.2016*

(5) China's digital geological mapping technology in practice in Peru in 2016. CGS sent a team on digital geological mapping to Peru for a 14-day visit in May, 2016, on the purpose of enhancing the geo-mapping capacity of INGEMMET personnel, see figure 7. 15 participants from INGEMMET took part in a field work for practicing the digital field geological data acquisition system in southern region of Lima, Peru for the 1:250,000 scale field mapping in the northern work area of Chiclayo.



*Digital geological mapping training in Peru 2016*

(6) China and Mongolia have jointly completed 1: 1,000,000 national - scale geochemical mapping. It is the first time to get the high- quality geochemical data for 69 elements in Sino - Mongolian border of 1.3 million square kilometers, drawing geochemical map with 69 elements, see figure 8 for reference.



*Copper geochemical map in China-Mongolia border region.*

(7) China-ASEAN marine geoscience research and geohazards reduction and prevention project was launched late 2015, aimed at sharing the experiences and knowledge and to support the ASEAN member countries coping with the coastal challenges and mitigating hazard, and to improve the research capability on coastal and offshore geology. Coastal environmental research and disaster

mitigation, Sea-land compilation of geoscience map series are the two key tasks of this 4 year long project. Technical trainings and workshops will be held in the second half of 2016 as planned.

(8) CGS staff remotely joined the 3D geoscience, Bohole ad hoc meeting of OGC TC, OneGeology and IUGS-CGI in Dublin on 21 June, 2016. CGS delegates introduced the Geo3dML standard and joined the discussion. Suggestions were also given to the 3D geological data/model standard work of next

## CGI in Africa

### Geoscience InfoRmation in AFrica Network (GIRAF)

[www.giraf-network.org](http://www.giraf-network.org)



The Geoscience Information in Africa (GIRAF) network was formed/founded in 2009 with the support of the IUGS, UNESCO, CGI and the German Federal Ministry for Economic Cooperation and Development (BMZ). It brings together African scientists, authorities, national experts and other stakeholders in geoscience. Since its inception, GIRAF has increased the number of members and affiliations, and is now comprised of a mix of geoscientists from a variety of cultural and technical backgrounds.

The aims are to exchange and share geoscience information and good practice, stimulate and support cross-border geoscience information projects and to make Africa a more active partner in the international geoscience information community. GIRAF endeavours to serve as a positive driving force contribution solutions to geoscience information issues in Africa.

At the moment GIRAF has 392 Members, mainly from African countries. Today, GIRAF has 17 active ambassadors in Africa. GIRAF is associated with 7 organisations including the Geological Society of Africa (GSaf), Commission for the Geological Map of the World (CGMW), Southern and Eastern African Mineral Centre (SEAMIC) and Young Earth Scientists (YES) network. Since its inception four workshops have been held in Africa:

- 6 to 9 October 2015 in Maputo, Mozambique.
- 22 to 27 September 2013 in Accra, Ghana. The workshop was held concurrently with the Centennial celebrations of the Geological Survey of Ghana.
- 5 to 9 December 2011 in Dar es Salaam, Tanzania.
- 16 to 20 March 2009 in Windhoek, Namibia.

In addition, GIRAF was represented and held workshops or sessions at the Colloquium of African Geology (CAG) in 2006 (planning workshop, Maputo), 2011 (OneGeology, GIRAF and AEGOS, Johannesburg), 2013 (Session, Ethiopia) and 2014 (Workshop, Dar es Salaam). variety of geoscience information issues pertinent to Africa have been covered in these workshops. Apart from workshops, GIRAF regularly participates in the key events of its affiliated organisations. For instance the GIRAF network is regularly present at each Colloquium of African Geology (CAG) with a workshop or a session.

The GIRAF Network/initiative now has 392 members from 49 countries, 14 of which are non-African: India, Australia and 12 European countries. Today, GIRAF has 17 active ambassadors in Africa.

4<sup>th</sup>

GIRAF workshop participants Maputo, Mozambique

**Sustainability:** The GIRAF network is undergoing a transition to transfer of the coordination and management to African GIRAF members. This process will be finalised with a special symposium at the next Colloquium of African Geology (CAG) in November 2016 in Ibadan, Nigeria.

Detailed information on GIRAF activities and documentation can be found at <http://www.giraf-network.org/>.

- Continue the building of a pan-African geoscience information knowledge network to exchange and share geosciences information knowledge and best practice
- To review the realization of the GIRAF 15-point-GIRAF agreement set up at the First workshop and signed by all 97 participants
- Gather up-to-date feedback on the actual situation of geoscience information status and progress in Africa
- And in long-term planning improve the way geoscience information contributes to improve the health and prosperity of the people in Africa.

This and other GIRAF issues were presented and discussed in the Africa Session of the Conference of the European Geosciences Union (EGU 2010).

### CGI in Europe

#### INSPIRE

<http://inspire.ec.europa.eu/>

The implementation of the *INSPIRE* legal and technical requirements = building the European spatial data infrastructure covering 34 data domains (geology, mineral resources included), by 28 European Union Member States (+ some EFTA and EU candidates countries) is right on its way to meet the major completion milestone in 2020. (Infrastructure for Spatial Information for European Community

Since the beginning (2006) the European IUGS-CGI experts have been heavily involved making GeoSciML, EarthResource ML and the CGI vocabulary a part of the INSPIRE data specifications, and

thus a legal standard to describe Geology and Mineral Resources in Europe with a common data model and vocabulary!

### **Minerals Intelligence Network for Europe (Minerals4EU)**

<http://minerals4eu.brgm-rec.fr/>

The completion of the Minerals4EU project, co-financed by the European Union under the FP7 programme, represented a major milestone in the provision of interoperable geoscience data&information (related to mineral resources) in Europe. Several members of the IUGS-CGI Council and WGs took active part in this project which delivered a fully operational distributed (web services based) system of structured and unstructured data related to the mineral resources in Europe (26 EU countries where members the project consortium).

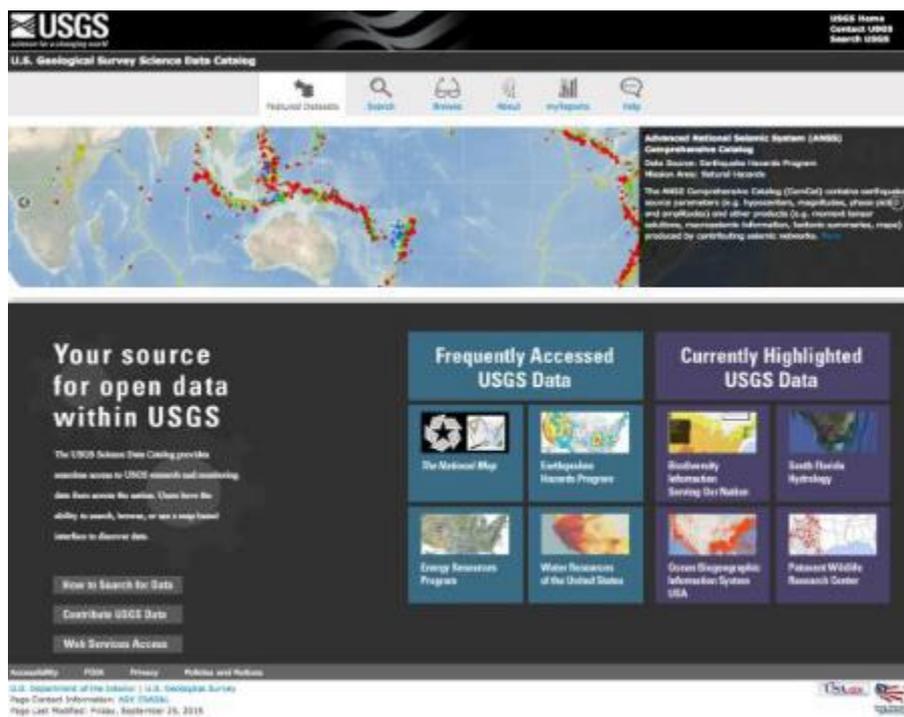
### **The European Marine Observation and Data Network (EMODnet)**

<http://www.emodnet.eu/> <http://www.emodnet.eu/geology>

EMODnet was established in 2007 by the European Commission (EC) as part of the Integrated Maritime Policy Action Plan. It is a long-term marine data initiative from the EC DG for Maritime Affairs and Fisheries (DG MARE) underpinning its Marine Knowledge 2020 strategy.: The EMODnet “geology” subproject aims to provide free access to (i) geological data and metadata held by various organisations in Europe based on international standards and (ii) geological data products compiled at a scale of 1:250,000 using the standards - including CGI and INSPIRE vocabularies.

### **CGI in North America**

In North America, significant progress was made in geoscience standards development and provision. The United States Geological Survey (USGS), Portland State University (PSU), and the Arizona Geological Survey have a number of significant accomplishments this past year. Highlights related from United States Government Open Data activities, the US Interagency Big Earth Data initiative, the Federal Geographic Data Committee (FGDC), the USGS National Geological and Geophysical Data Preservation Program, the USGS National Cooperative Geologic Mapping Program, and the Arizona State Geological **Society** are all contained in this yearly report



US Government Open Data

### *USGS Science Data Catalog (SDC)*

Since the White House released the Executive Order, “Making Open and Machine Readable the New Default for Government” in 2013, USGS and its partner agencies in the U.S. Government have undertaken a number of initiatives to more effectively document and share prioritized USGS scientific data.

USGS released a Science Data Catalog (SDC) (<http://data.usgs.gov/datacatalog>) in 2014 to provide comprehensive access to data produced from USGS research, and has significantly updated SDC with new capabilities and content in 2015.

The USGS SDC currently provides access to over 6,800 resources, an increase of ~15% over 2014’s tally.

### **Big Earth Data Initiative**

The Big Earth Data Initiative (BEDI) seeks to improve the collection, management, and delivery of U.S. Government Earth system data.

BEDI represents a specialized implementation of the broader Open Data Initiative, the Administration’s signature data sharing effort.

The USGS and Department of the Interior, along with the National Aeronautics and Space Administration (NASA), and National Oceanographic and Atmospheric Administration (NOAA), continuing to work on improving data discoverability, use of data, comprehensive treatments (i.e., sufficient metadata) of critical earth observing systems data in support of the BEDI effort.

**GeoPlatform** – implementing the GeoPlatform embodies the principles and spirit of OpenDataandGovernment, emphasizing government-to-citizen communication, accountability, and transparency across the Federal and non-Federal communities.

The GeoPlatform supports open formats, data standards, and common core and extensible metadata (e.g., project open data, ISO, OGC, and others).

In coordination with Data.gov and FGDC member agencies, it provides access to almost 126,000 geospatial metadata records.

## CGI in South America

### 2013-2016 period

Since the promotion activities of the CGI in South-America, the ongoing global OneGeology activities meetings and of course the activities of the Commission of the Geological Map of the World (CGMW) towards digital maps, the countries of the South America are becoming to recognize the importance of geoinformation technology and the role of technical knowledge and experience sharing among them.

So the CGI activities in South America are focused on the development of outreach activities to encourage the development of geoinformation, promote the adoption of CGI standards and create awareness about the rule of information technologies in GS activities at decision levels.



This is mainly comprising of organising and participating in meetings and .....

### 2013

Argentina, Brasil, Colombia and Perú participated in a special mining and oil a commercial event about data management and geoscience (Natural Resources Data Management Meeting) that was held in Río de Janeiro, Brazil. There are a growing interest on Big Data analysis and management, human factors in data management and Data Management as a new professional discipline. Brasil and Perú presented their own corporate database systems and Argentina point-out in a presentation the importance of the human issues of technology adoption in South America

### 2014. Meeting at the Ministry of Science and Technology of Argentina

Argentina recently enacted ministerial decisions about the development of national science digital repositories. In that way an interview was solicited to the Joint Science Technological Secretariat. Then a meeting with the Secretariat, Dr. Alejandro Ceccatto was arranged and the rules and aims of CGI-IUGS was presented to him. Dr. Ceccatto was very pleased to know CGI-IUGS activities he told me that geoscience digital information is close to the project of national repositories. <http://www.mincyt.gob.ar/ministerio/secretaria-de-articulacion-cientifico-tecnologica-20>



From left to right: G. Asato, Dr. Ruben Matheos UnderSecretariat, Dr. Cecatto Secretariat of Joint Science Technological, Ministry of Science, Technology. and Production Innovation

### Seminars:

The CGI South America representative Gabriel Asato attended the Research Data Alliance (RDA) webinar. Simon Cox, former CGI-IUGS Council is member of the Technical Advisory Board of this

organization. His term will ends in September 2016.

**Workshops:****2014**

OneGeology Consortium organized a technical meeting in Rio de Janeiro, Brasil hosted by the Geological Survey of Brasil (CPRM). The CGI South America representative Gabriel Asato attended and represented SEGEMAR at the meeting which was a success thanks to the Geological Survey of Brazil and OneGeology Consortium. An agreement was drafted to improve the SA presence in the Consortium. Brazil already signed the agreement for being a principal member. This event was a success.

**2015**

An on-line meeting with Luis Bermudez, Executive Director of Compliance and E-Learning of Open Geospatial Consortium was made in June 2015. We discussed some issues about training on OGC standards and SDI in South America about. In regards of CGI-IUGS he strongly recommend us to test geosciml with the OGC compliance program (<http://www.opengeospatial.org/compliance>) by using the OGC special test application named Team Engine ( <http://cite.opengeospatial.org/teamengine/> ).



OneGeology Meeting in Rio de Janeiro

**2016**

A coordination meeting about the development of OneGeology initiative in South America was had with GS of Brasil and OneGeology representatives.

**Regional update:****2016**

New authorities at SEGEMAR.

With a new government, new authorities were designated at SEGEMAR: Julio Ríos Gómez, president; Carlos Cuburu Executive Secretariat; Eduardo Zappettini, Regional Geology and Mining Resources Director.

100 years celebration at GS of Colombia: With the participation of international organization like IUGS, CGMW, and Association of Iberoamerican Geological and Mining Surveys, was celebrated the 100 year of existence of the GS of Colombia.

**2015****ASGMI AND EGS Meeting**

The past October 21 directors of geological surveys of Latin América, Spain, USA, Canadá and Europe had a meeting in Madrid in order to foresee future ways of cooperation. They signed a MOU and it is expected some financial proposals from World Bank and European Commission in both sides of Atlantic Ocean.



Representatives from ASGMI and EGS shaking hands.

**Colombia Geological Survey**

The Geological survey of Colombia, recently released a new version of their national geological map at 1:1M scale. It was more than seven year of compilation work.



Colombia Geological Map 1:1M. Jorge Gomez Tapias, Nohora Emma Montes Ramírez, Maria Fernanda Almanza, Hans DIEDERIX, Fernando Alcarcel Gutierrez, Cesar Augusto Madrid y Alejandra Gomez.

#### 2014

CGWM and Colombia geological survey organized a Geological Map of South America Workshop in Villa de Leyva, on July 21-26. With a strong participation of SA GS it was discussed the development of national geological maps, how was the participation of CGWM in the region during the last 50 years, the tectonic map of South America, criterias for the development of 1:1M an 1:5M maps of this continent.

#### 2013

Colombia mining and geological institute recently split in two new institutes. The Geological Survey of Colombia and the Mining Institute. At present Colombia is going to lead the development of a workshop around the project of the geological map of South America.

#### OneGeology and South America

After a long period of stagnation, 1G seems to have new impulse thanks to the 1G meeting held in Rio de Janeiro, Brasil in 2014. After that geological survey of Brasil (CPRM) decide to take the leadership of the initiative in this region.

Despite of these success stories there are still some difficulties that have to be mentioned:

- 1) Problem of enroll countries as principal members
- 1) Confusion about the aims and legal status of 1G
- 2) Territorial claims

#### Problem of enroll as principal members

At present OneGeology have a special enrollment system where main members contributes with funds to the development of 1G infrastructure and operations. It has to be noted that several LA countries have a difficult administrative system that makes a strong impediment to send funds from their countries to others. For that reason those LA countries thinks that will be very difficult for them to contribute to 1G as principal members.

**Confusion about the aims and legal status of 1G**

It has to be noted that in South America there are a still confusion about the aims of OneGeology. For example 1G and CGWM. In that way some people thinks that both commissions are competitors and not partners of common interests. What add more confusion is the wrong translation and understanding of the word “harmonization”, put in some talks and messages. Some people understood that this word means “thematic geological harmonization” subject of CGMW, instead of “harmonization of geoscience information systems” then some people understood that there are a superposition of OneGeology aims over CGMW. It is advisable to explain much better to South America the purpose of OneGeology as a “information tool“ and explain also the meaning of semantic interoperability concept tied to GeoSciML.

**Territorial claims**

For more than 180 years Argentina is making a territorial claim of Islas Malvinas (Falkland for UK). It is well know the war between Argentina and United Kingdom during 1982. Argentina made a formal protest to OneGeology about “Why OneGeology recognize Falkland Island as contributor to OneGeology” during the past ASGMI meeting (Ibero American Geological and Mining Surveys Association). Other initiatives like Steering Committee for Global Mapping and the Scientific Committee on Antarctic Research had similar problems and they resolved just sharing their data as “Islas Malvinas / Falkland Islands”.

**Main problems encountered in 2013-2016**

Despite many efforts and the network of collaboration now created, communication between professionals from different countries is still not easy. This problem may have different causes:

- 1) The geoscience information discipline is still not fully recognised as part of geological science.
- 2) Trips and travel expenses are usually allowed only for senior positions in organisations.

The difficulties in communication and meeting organization make it also more difficult to maintain group cohesion and stay informed about the problems and issues that each of SA countries have. In this context, outreach activities have to be organized based on immediate opportunities when support and funding appear, rather than a clear medium term strategy.

Since 2013 the OneGeology map service in Argentina is still shutdown. This situation is in fact a difficult reality because SEGEMAR was the first Latin America GS who published geoscience information in OneGeology. With a new government and a new foreign policy it seems that will be possible to have Argentina on-line again during 2017.

## CGI in Oceania

### 1. Australia/New Zealand Government Geoscience Information Committee (GGIC)

GGIC is comprised of representatives of the geological survey organisations of New Zealand and the Australian Commonwealth, States and Northern Territory. GGIC's aims and activities in Oceania align with CGI's global goals to foster the exchange of interoperable geoscience information, by active community leadership, collaboration, education, and the development and promotion of geoscience information standards and best practice.

GGIC continues to actively promote interoperability of geological data being delivered by its member geological surveys. Australasian geologists and geological agencies are active participants in all CGI and OGC geoscience standards working groups, including chairing the OGC/CGI GeoSciML and CGI Geoscience Terminology Working Groups (Ollie Raymond and Mark Rattenbury respectively).

#### 1.1. Australian Geoscience Information Network and AuScope

The most significant development in the 2012-2016 period is the launch by GGIC of the [Australian Geoscience Information Network \(AusGIN\)](#). AusGIN is the largely the result of the geoscience information infrastructure funding program known as AuScope which has been running since 2007. The AuScope program, led by CSIRO and the Australian geological survey agencies, has made huge advances in the development of data standards, vocabulary services, and open source applications for serving and consuming web services. These standards and applications (e.g., Geoserver, GeoNetwork) are used across the world for standards-based data management and delivery. AuScope has also funded the establishment of web services infrastructure in all Australian geological surveys.

As part of AusGIN, Geoscience Australia will establish a vocabulary service to serve AusGIN-community-agreed geoscience vocabularies. The current CGI vocabulary services, which are hosted by CSIRO, will also be moved to the new Geoscience Australia vocabulary server in 2016-2017 in a move to guarantee the long term management of CGI vocabulary resources following funding cuts to CSIRO.

#### 1.2. AusGIN Geoscience Portal

The flagship of AusGIN is the [Geoscience Portal](#) (Fig. 1). This web mapping portal provides access to data a standard web services (WMS, WFS) delivered by all Australian geological surveys using CGI and OGC data standards. The portal was built using an open source code base developed under the AuScope program. This open source code base now forms the platform for 5 other mapping portals developed by other science communities (e.g., [Virtual Geophysics Laboratory](#)).

#### 1.3. GGIC Web Service Standards Development

In 2013, GGIC published two Simple Features WFS/WMS [data standards](#) - MinOccML for delivery of mineral occurrences and MineralTenementML for mineral exploration and mining tenements. Two standard [vocabularies](#) associated with the MineralTenementML standard have also been published. These standards are used actively in the Australian Geoscience Information Network.

NZ and Australian geologists from GGIC were instrumental in the publication of the [EarthResourceML-Lite](#) data standard by CGI in August 2016. ERML-Lite will replace the MinOccML

standard that Australian geological surveys have been using since 2013, and will be used by all Australian and NZ geological surveys to deliver their mineral resources data.

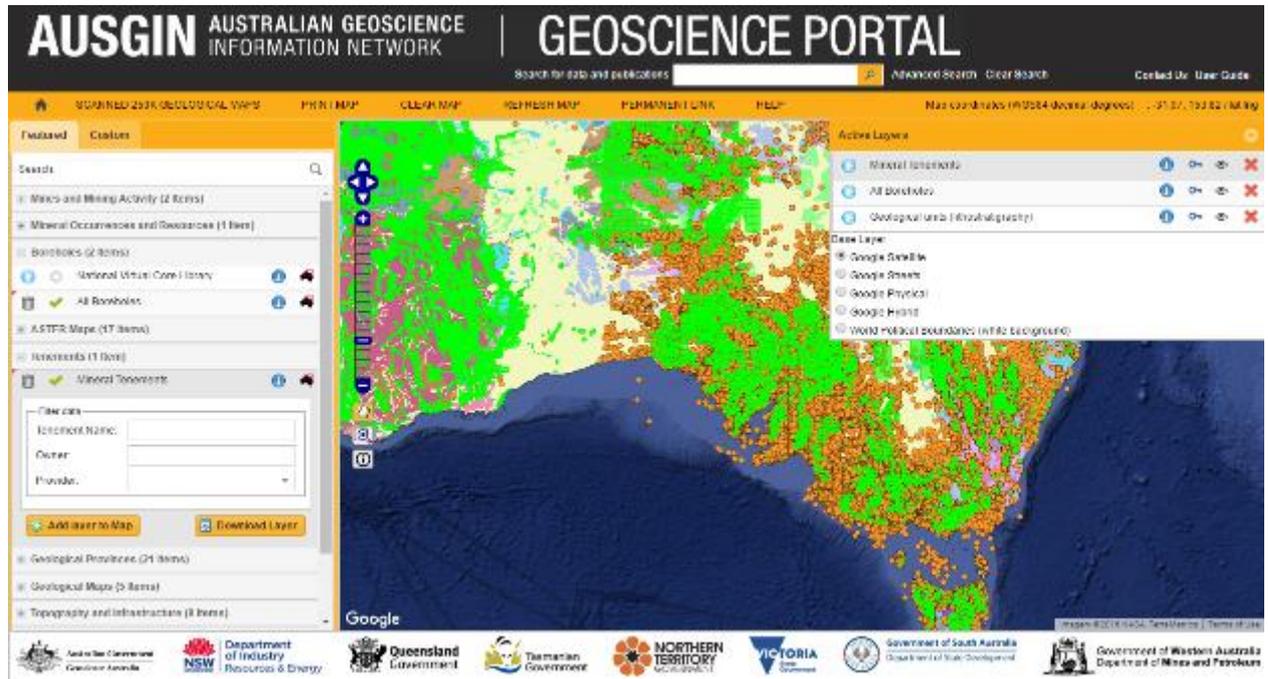


Figure 1. The AusGIN Geoscience Portal was released in June 2016.

## 2. OneGeology

GNS Science (NZ) have completed GeoSciML Portrayal-compliant web services for the 1:1 million Geological Map of New Zealand dataset and the Southern Victoria Land (Antarctica) dataset, being awarded 4-star accreditation for these services. A more complicated 1:250,000 scale Geological Map of New Zealand dataset, conforming to the GeoSciML standard, is in progress. Geoscience Australia and the Geological Survey of Victoria also provide 1:2.5 million, 1:1 million, and 1:250,000 scale geological web map services to OneGeology.

## 3. Data Management Initiatives in Oceania Geological Surveys

OGC web services are increasingly being used by all Oceania geological surveys as a primary method of spatial data delivery. For instance, Geoscience Australia now has over 100 web services for all kinds of geoscience, topographic, and legislative data. GNS Science (NZ) provides an equally wide range of web services for groundwater, active faults, glacial geomorphology, bathymetry, geothermal, rock and geochemical sample sites, seismic survey lines, urban geology, tsunami modelling, and landslides.

Significant recent projects have been undertaken in the geological surveys to remediate geoscience data holdings using OGC and CGI data models and data transfer standards. Examples include boreholes, samples, petrophysical, seismic, and geophysical imagery data at Geoscience Australia; mineral resources and borehole web services at the Geological Survey of NSW; geochemical and mineral resources data at GNS Science (NZ); and GGIC are currently undertaking an initiative to establish a unique borehole identification system across Australia.

Data rescue efforts at three Oceania geological surveys were recognised in 2015 at the [Elsevier International Data Rescue Award in the Geosciences](#). This award recognises efforts to rescue, collate <http://www.cgi-iugs.org>

and deliver data that may be languishing in old digital and non-digital formats. The Geological Survey of Western Australia submitted its program of delivering geological field observation data, while Geoscience Australia and GNS Science both submitted their projects which rescued petrophysical and geochemical data.

#### 4. International GeoSample Number (IGSN)

CSIRO and Geoscience Australia both became members of the [IGSN](#) consortium in 2014, and are implementing IGSN identification on all their samples. Other Oceania geoscience agencies are currently evaluating the IGSN system for their samples.

#### 5. Petroleum-related geoscience data

Initiatives in geoscience data standards and interoperability in Oceania have, until now, been strongly focussed in mineral resources and geological mapping-related geoscience. The petroleum geology community is only very recently coming to recognise the benefits of interoperable data. To that end, the petroleum-related data agencies of Australia have established the National Resources Data Initiative (NRDI) in 2016 to focus on improving interoperability of data of interest to the petroleum industry, especially environmental data from all levels of Australian government (local to national). The [National Offshore Petroleum Information Management System \(NOPIMS\)](#) was released in 2016 to provide improved online access to Australian offshore well and seismic survey data.

#### 6. Research Data Storage Infrastructure (RDSI)

The [RDS](#) is a project to link eight high performance computing facilities in Australia to provide big data storage and supercomputing resources to the science research community. In the geosciences sphere, the [National Computing Infrastructure \(NCI\)](#) supercomputer site at the Australian National University is being used for large geophysical datasets and 3D geological models. The RDS infrastructure is also committed to using international data transfer standards, including CGI and OGC standards, to serve and consume geoscience “non-big” data such as geological maps, boreholes, and samples.

#### 7. Oceania Membership of CGI committees

CGI Council

- Ollie Raymond – Geoscience Australia Standards Working Groups

- Ollie Raymond - Geoscience Australia (acting chair – GeoSciML; ERML, GTWG)
- Mark Rattenbury - GNS Science, New Zealand (chair – GTWG; GeoSciML, ERML)
- Alastair Ritchie - Landcare Research, New Zealand (GeoSciML)
- Bruce Simons - CSIRO, Australia (GeoSciML, ERML)
- Michael Sexton - Geoscience Australia (ERML)
- Simon Cox - CSIRO, Australia (GTWG)

#### CGI Global

CGI, its Working groups and members deliver GeoSciML, which is the “interoperability engine” that powers OneGeology. OneGeology is a project tightly linked to CGI; it made progress on several fronts: 117 nations are now participating, data services are increasing in number and sophistication, an

accreditation scheme was launched, and critical governance issues (incorporation) were taken forward.

### *Main Global Problems Encountered*

#### **Economy Impact**

The World's economic and political crisis is having strong impact on monetary support for regional activities of the CGI, e.g. in South America by usually supportive countries such as Spain, or in Africa.

#### **Cross-border communication difficulty**

The difficulties in cross-border communication and low budget meeting organization make it a challenge to maintain the group cohesion and stay informed on the problems and issues that each of the CGI member countries are struggling with.

#### **Financial Difficulty**

This the CGI Council acknowledges the financial plight of representatives from lesser funded nations, and that travel expectations of Council members should not be applied as strictly to them.

#### **IUGS-CGI account**

Still no solution has been found for the transfer of the CGI accounts, kept as private ones by the former Treasurer (Francois Robida) to the actual CGI Treasurer (Robert Tomas).

This matter was discussed by the IUGS treasurer - Prof. Dong Shuwen and the CGI treasurer Robert Tomas, but was not solved.

### **CGI at the 35th IGC in South Africa**



**35<sup>th</sup> INTERNATIONAL GEOLOGICAL CONGRESS**  
27 AUGUST - 4 SEPTEMBER 2016 | CAPE TOWN, SOUTH AFRICA

The CGI, in conjunction with the GIC, are jointly organising a Geoscience Information Super-symposium at the 2016 35th IGC. The geoinformation sessions are about data and information management and services, including informatics standardization.

This super-symposium is consisting of six major themes encompassing:

Title	Description	Convenors
1. Geoscience Spatial Data Infrastructures	Building of the geoscience spatial data infrastructures interoperability (GSDI) – making geoscience complex data accessible and interoperable – offers an excellent potential to improve our understanding of the Earth and its natural processes, as well as our immediate environment. GSDI also helps to better manage the vast amount of geoscience related data and information that are being created worldwide in regional, national or even continental and international scales. GSDIs are components of more generic Spatial Data Infrastructures at all levels (international, national, regional) whose objective is to overcome “interoperability	Kristine Asch, Robert Tomas, Francois Robida

Title	Description	Convenors
	<p>barriers” in applying technology, policies, standards, and human resources necessary to access, distribute, and improve utilization of geospatial data. This symposium presents contributions demonstrating examples at any scale how to manage the large range of data, make them discoverable, accessible and last, but not least interoperable to the wide range of geoscience user communities.</p>	
<p>2. Information Management - Interoperability and Standards</p>	<p>The use of data transfer standards ensures that similar data from different data providers adheres to agreed data structures and data content. Such interoperable data allows many data providers to communicate their data in the same way, and enables efficient access and repeatable analysis of their data by users. This session will describe data standards for several types of geoscience data, and how those standards are used to share data nationally and internationally.</p>	<p>Ollie Raymond, Mark Rattenbury, Steven Richard</p>
<p>3. Data analysis, Delivery, Dissemination and Exploitation of Geoscience Data and information, Tools – software</p>	<p>Geo-information has in the last two decades played an undisputed role in the development of the earth-sciences, where its application has progressed from a largely data capturing phase to the application phase. Many web applications for the viewing and exploring of data have become available. Much data have become available in the public domain and on the internet. The technology enables sophisticated interpretation and modelling. The purpose of this session is to showcase the application of geo-information science and to probe innovative approaches in different aspects of the earth-sciences.</p>	<p>Gabriel Asato, Dana Capova; Hermanus Brynard</p>
<p>4. Multi-dimensional modelling and visualisation of solid earth models - 2D, 3D, 4D, nD</p>	<p>This session is dedicated to best practice, methods and issues when building and delivering geological solid models. Different aspects are considered as 3D geological modelling in the frame of national geological programs, predictive analysis tools, model architecture, visualization tools, links between database and models requirements, exploitation , sharing and delivery of models to the Geoscience community.</p>	<p>Matt Harrison, Gabriel Courrioux</p>

Title	Description	Convenors
5. Geoscience Information and Data in Africa	Geoscience organizations in Africa possesses essential geoscience information needed by African policy makers and communities to locate and sustainably manage natural resources. Geoscience data and information play a key role in mitigating societal challenges such as location of groundwater resources, assessing the impacts of climate change and land-use planning. In this sub-symposium, projects demonstrating the importance of geoscience data and information in Africa, and on the effective management, dissemination and use of geoscience information, are presented.	Kombada Mhopjeni, Anna Nguno, Kristine Asch
6. CGMW: International Geoscience Maps in the 21st Century	Making our complex geological environment understandable implies its simplification and reduction to a human scale in the form of a map, either on a paper or as a series of digital images on a screen. To reach this aim, science uses hypotheses and models. Actually, a geological map is not only a painting full of nice colors to be exposed on a wall. The potential of geological maps was fostered by data processing techniques that open access to spatial information. The geological map is a key tool for geoscientists, business planners and decision makers and remains the place where academic research and educational purpose converge. As they act as a mirror of the general knowledge of our planet and reflect science progress, Geological maps have to be periodically updated.	Philippe Rossi, Manuel Pubellier; Pierre Nehlig

The CGI Council will meet during and just after the IGC for the last time in its momentary composition and welcome and introduce the new Council members.

## 7. FINANCE & BUDGET

	\$ account		€ account	
	in	out	in	out
<b>October 2002 kickoff "new" CGI</b>	<b>2 172.81</b>		<b>1 113.59</b>	
2002 allocation IUGS (3000\$)	3 000.00			
2001/2002 grant ICSU (5000\$)	5 000.00			
Council meetings				-10.00
new web site		-2 512.32		
CGI bank account costs		-0.60		
<b>balance 2002</b>	<b>7 659.89</b>		<b>1 103.59</b>	
<b>2003</b>				

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2012-2016

	\$ account	€ account
2003 allocation IUGS (5000\$)		4 104.75
Council meetings		-826.27
MT workinggroup		-426.00
CGI bank account costs		-25.00
<b>Balance 2003</b>	<b>7 659.89</b>	<b>3 931.07</b>
<b>2004</b>		
2004 allocation IUGS (5000\$)		4165.28
debudgetting unclaimed expenses 2003		426.00
Council meetings		-138.00
CGI Flyer		-696.00
MT Workinggroup		-426.00
Firenze prep. & participation		-294.60
Website		-2006.05
CGI bank costs		-20.00
<b>Balance 2004</b>	<b>7 659.89</b>	<b>4 941.70</b>
<b>2005</b>		
domain name CGI website (28.2£)		-43.00
2005 allocation IUGS (5000\$)	5000.00	
council meetings		-286.30
Cost CGI bank account 2005		-20.00
<b>Balance 2005</b>	<b>12659.89</b>	<b>4 592.40</b>
<b>2006</b>		
IUGS Grant outreach workshop (10000\$)	10 000.00	
UNESCO Grant outreach workshop leaflet (5000\$) contract	5 000.00	
2006 IUGS allocation (5000\$)	5 000.00	
Refund Datamodel workshop Perth dec 2004		-367.68
Maputo outreach workshop		-2941.23
Printing and Shipping leaflet		-4690.00
internal transfer \$ => €		-5000.00
<b>Balance 2006</b>	<b>19660.98</b>	<b>2 520.96</b>
<b>2007</b>		
cost CGI bank account 2006		-20.00
2007 IUGS Grant allocation	7500.00	
Cost domain name CGI website (24.99£)		-41.79
cost CGI bank account 2007		-30.00
<b>Balance 2007</b>	<b>27160.98</b>	<b>2 429.17</b>
<b>2008</b>		
Travel expenses preparation Giraf Schutte		-240.00
cost CGI bank account 2008		-30.00
cost transfer accounts Fortis--> LCL		-43.26
<b>Balance 2008</b>	<b>27160.98</b>	<b>2 115.91</b>
<b>2009</b>		
<b>ACCOUNTS TRANSFERED</b>		
Travel expenses Broome CODATA		-1139.69
Repro banner Giraf		-216.91
2009 IUGS allocation	15 000.00	
cost transfer IUGS --> CGI		-23.01
Travel expenses S. Richard - MLT St Petersburg		-2808.85
transfer charges		-24.60
<b>2010</b>		
Payment maintenance of CGI web site (NERC/BGS)		-2300.00
2010 IUGS allocation	7 500.00	
transfer charges		-23.17
transfer charges		-21.16
<b>2011</b>		
2011 IUGS allocation	10000.00	
transfer charges		-23.54
Payment maintenance of CGI web site (NERC/BGS)		-1779.01
transfer charges		-30.00
transfer charges		-22.00

2012-2016

	\$ account	€ account
transfer account USD --> €	-1900.00	1377.81
transfer account USD --> €	-19000.00	13777.10
transfer charges		-25.90
Payment to BGR - GIRAF workshop		-13783.00
transfer account USD --> €	-8900	6610.71
transfer charges		-22
Payment to BGS (update cookbooks, schematron rules)		-6600
Transfer charges		-3,90
<b>Balance December 2011</b>	<b>23 496,96</b>	<b>1 398,81</b>
<b>Balance 2011</b>	<b>23.496,96</b>	<b>1.398,81</b>
<b>2012</b>		
<i>Bank account charge</i>		-5,96
<i>CCOP hosted CGI meeting</i>	--12.000,00	
transfer charges	-21,75	
<i>IWG developments</i>	-6.580,00	
transfer charges	-21,64	
<i>2012 IUGS allocation</i>	10.000,00	
transfer charges	-21,59	
Payment from CCOP	858,43	
transfer charges	-20,15	
transfer account USD --> €	-715	546,34
transfer charges		-22
<i>CSIRO hosting CGI-IWG websites</i>		-550,00
transfer charges		-16,5
<b>Balance November 2012</b>	<b>14.975,26</b>	<b>1.350,69</b>
Back payment from BGR (balance from Giraf 2011) December 2012		4.967,79
<b>Balance 2012</b>	<b>14.976,26</b>	<b>6.318,48</b>
<b>2013</b>		
<i>transfer charges</i>		-3,98
<i>Payment to BGR – Giraf workshop 2013</i>		-5.000,00
<i>Subscription Visa card</i>		-39,96
<b>Balance 2013</b>	<b>14.976,26</b>	<b>1.274,54</b>
<b>Balance 31/12/2013</b>	<b>14.975,26</b>	<b>1.274,54</b>
	\$ account	€ account
<b>2014</b>		
transfer account USD --> €		-47,07
Payment to BGS for CGI website (2479.04£)	-4160	
2014 IUGS allocation	7.967,00	
transfer charges	-23,38	
bank charges		-2,69
<b>Balance October 25th 2014</b>	<b>18.758,88</b>	<b>1.224,78</b>
<b>2015</b>		
subscription VISA card		-39,96
Travel cost IUGS Council Kombada (meal)		-18,43
Travel cost IUGS Council Kombada (hotel)		-522,60
transfer account USD --> €	-6000	
transfer account USD --> €		5371,43

2012-2016

	\$ account	€ account
Payment to BGR - Giraf workshop 2015)		-5000,00
transfer charges		-4,40
2015 IUGS allocation	7.980,00	
transfer charges	-18,88	
subscription VISA card		-41,40
<b>Balance 07/12/2015</b>	<b>20.720,00</b>	<b>969,42</b>
	\$ account	€ account
<b>2016</b>		
2015 IUGS allocation	7.979,00	
transfer charges	-19,53	
<b>Balance 11/05/2016</b>	<b>28.679,47</b>	<b>969,42</b>
	\$ account	€ account

## 8. WORK PLAN FOR THE YEAR 2016

The major aims for 2016 are:

- Represent the IUGS in Geoscience information matters
- Make GeoSciML an OGC Standard
- Continue the development of Earth ResourceML
- Publish more publications of CGI related issues within IUGS "Episodes"
- Organize successfully the CGI-GIC Geoscience Information Supersymposium and a Geoscience Terminology workshop at the IGC in Capetown
- Transfer successfully the GIRAF Network completely to the African GIRAF members
- Update the CGI website regularly
- Publish the CGI newsletter regularly

## 9. CRITICAL MILESTONES

The most important critical milestone for CGI by far was the installation of a new Council and with several new officers at the IGC in August 2012 in Brisbane.

The new Council is now established and worked well – unfortunately with the withdrawal of Mike Frame (USGS) and Peter Baumann (University Bremen, OGC) – However – Betty Adrian replaced Mike, and with the addition in 2015 of Zhang Minghua from Development and Research Centre of the China Geological Survey

The future critical milestones will encompass

- Organization of the Geoscience data and information Super-Symposium with the GIC at the International Geological Congress 2016 in South Africa.
- The CGI Council election at the IGC 2016 in South Africa

## 10. REVIEW CHIEF ACCOMPLISHMENTS OVER LAST FIVE YEARS (2011-2016)

The Commission CGI through its Working Groups, members and associated initiatives, has been extremely successful in

- catalyzed alliances
- aid OneGeology (1G), GIC, ICSU, IAMG, INSPIRE, GGIPAC, AUSCOPE, ICS, CGMW, EGS, OGC, USGIS
- stimulated progress and standard geological concepts
- promoted the use of data exchange standards
- facilitated outreach, i.e. GIRAF (2011, 2013, 2015), South American, European and Asian workshops and OneGeology
- and played a full role in the coordination of and participation in regional initiatives
- The CGI-GIC Geoscience Information Super-Symposium at the IGC in Brisbane in 2012
- parts of the CGI vocabularies are being used for the INSPIRE themes “Geology” and “Mineral Resources”
- The CGI GeoSciML is soon be accepted as OGC standard

## 11. OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2016-2021)

The goals are:

- Continue to catalyze productive alliances between geo-information bodies, including OGC;
- Stimulate progress in development and application of standard geoscience concepts and their representation in multiple languages;
- Promote international use of data exchange standards (specially broad adoption of GeoSciML and EarthResourceML);
- Facilitate outreach, knowledge transfer and take-up of best practice in geo-information (e.g. with the South America initiative, the Asia initiative and GIRAF, the African geoinformation network).
- Create a task force to evaluate the feasibility of developing interoperability of 3D - 4D geosciences data models
- Enhance collaboration with other IUGS commissions, e.g. ICS.
- Facilitate outreach, knowledge transfer and take-up of best practice in geo-information (e.g. with the South America initiative, the Asia initiative and GIRAF)
- Play a role in coordination of regional initiatives, e.g. by organizing workshop and training courses on geoscience information management, standards and language.
- Adoption of GeoSciML as an OGC Standard in 2016
- Organize the Geoinformation Super-Symposium at the IGC 2016 in South Africa successfully
- And organize the geoinformation super-symposiums at the IGC 2020 (India) and 2024.

## 12. SUGGESTIONS FOR IMPROVEMENT OF IUGS ACTIVITIES, ESPECIALLY IN REFERENCE TO ACTIVITIES OF IUGS BODIES

Understandably, given the remit of our Commission, we would urge the IUGS Executive to give greater prominence in terms of discussion time, publication space and funding, to the area of geoscience information and especially digital standards. In a world which is increasingly data and IT driven and dependent, it is imperative that the IUGS takes a lead in pushing forward digital advances and ensuring consistency of approach in geoscience data content and applications. Without this, holistic solutions to transnational geological challenges will be that much more difficult to deliver. We believe there is a need for geoscience information expertise to be present at the highest level in IUGS, ie a member of the Executive; if necessary by co-option.

Another suggestion is referring to the issue that the IUGS is building on the IUGS commissions' willingness to open private accounts in order to administer IUGS finances. Due to governmental issues, the transfer of the CGI finances from the former CGI treasurer to the new one could still not be accomplished. This matter was discussed by the new IUGS treasurer - Prof. Dong Shuwen and the CGI treasurer Robert Tomas, but was not solved. It would be excellent, if a common way could be found to open IUGS-CGI accounts not as a private person in order to establish a transparent process of the use of IUGS resources to support CGI activities.

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*The CGI Council*



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