CGI ANNUAL REPORT 2018

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1. Main role of CGI

- *Mission*

To foster the interoperability and exchange of geoscience information, by active community leadership, collaboration, education, and the development and promotion of geoscience information standards and best practice.

- *Vision*

- 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 global education about the management, modeling, exchange, and use of geoscience information enables its best possible application,
- the benefit of all society.

2. Role within IUGS science policy

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

3. Organization, Council members and officers

- *Council Officers 2017-2020*

The CGI Council members are:

- François Robida (Chair) – France
- Zhang Minghua (Co-Secretary General)– China
- Kombadayedu Mhopjeni (Co-Secretary General)– Namibia
- Ollie Raymond (Treasurer and Web Manager)– Australia
- Gabriel Asato – Argentina
- Kazuhiro Miyazaki – Japan
- Tomasz Nałęcz - Poland
- David Percy – USA
- Harvey Thorleifson–USA
- Robert Tomas –Czech Republic

The CGI working groups are coordinated by:

- GeoSciML Working Group (GeoSciML) – Eric Boisvert, Canada

- EarthResourceML Standard Working Group (ERML) – Jouni Vuollo, Finland
- Geoscience Terminology Working Group (GTWG) – Mark Rattenbury, New Zealand
- GeoScienceDWG Working Group – Beaufils, Mickael, France
- Geoscience Information in Africa – Network (GIRAF) –Mesfin Wubeshet Gebremichael, Tanzania

The current CGI secretariat is located at the Development Research Center of China Geological Survey, Ministry of Land and Resources, P. R. China (DRC of CGS). The contact email is CGIsecretariat@mail.cgs.gov.cn.

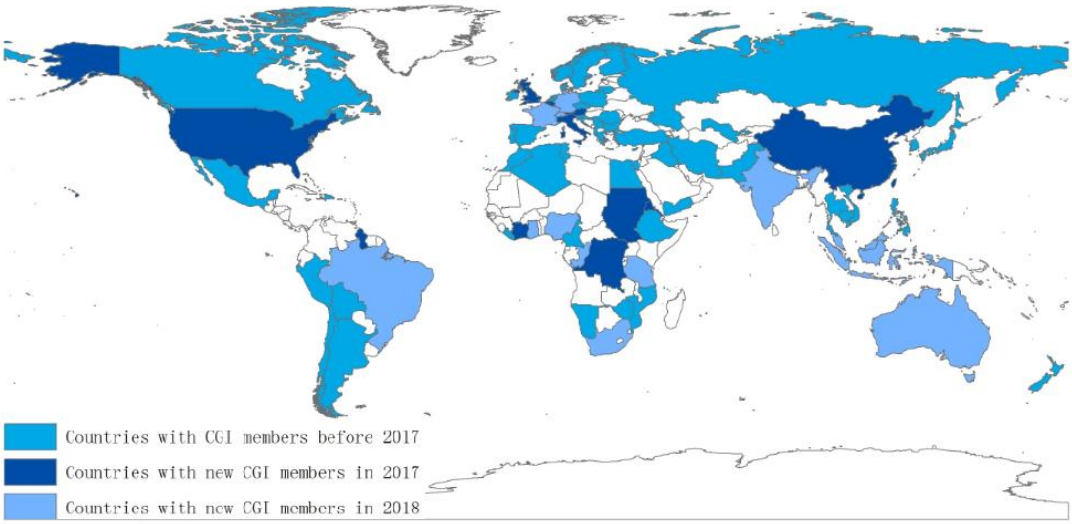
- *Council web presence*

The CGI Council provides constantly the necessary updates to the Council web presence. http://www.cgi-iugs.org. The intent of the CGI web site, which is still hosted by the BGS, is to provide easily discoverable information, better highlight CGI activities, emphasize CGI support emerging standards, and provide an area to showcase CGI sponsored Working Groups.

A CGI LinkedIn group has existed since December 2013. The group provides a forum for CGI and LinkedIn members to connect with other geoscience professionals, to post news of upcoming events, to ask questions and to discuss CGI related issues.
http://www.linkedin.com/groups?gid=6539642

- *Membership*

CGI now has 457 members in 76 countries across the world. There are 2 new countries and 62 new members from 9 different countries this year 2018.



4. Extent of support from sources other than IUGS

Other than the substantial in-kind contribution of the geological organizations that pay the salaries and expenses of CGI Council and members, the CGI does not receive additional support. Sometimes CGI workshops and activities are co-organized or supported by other organizations such as UNESCO, geological survey of Canada, China geological survey, the German federal ministry for economic cooperation and development (BMZ), the Geological Survey of Namibia, Australian Aid, SEGEMAR, the United Nations Development program who have been contributing to these events.

5. Interaction with other international projects

The CGI, in collaboration with OGC, is continuing to review GeoSciML. Both the linked global OneGeology project and the past European EC project OneGeology-Europe are using GeoSciML to make geological data interoperable and accessible via their web portals. The EC Directive INSPIRE used for the Geology and Mineral Resources Implementing Rules CGI products: the GeosciML and Earth Resource ML (ERML) data model and CGI vocabularies. ERML was adopted by major EU funded projects as Mineral4EU or EURare.

The GeoSciML are now hosted on the OGC GeoSciML website.
The original CGI GeoSciML website still maintains access to all historic versions of GeoSciML and links to other supporting resources like UML models and vocabularies.

6. CGI Online Presence

CGI maintains several websites, online newsletters, a LinkedIn group, and online file repositories for its Working Groups. The main CGI website, online newsletters, and LinkedIn group are addressed in this report. The CGI Working Group reports will address their specific online resources.

- *CGI Website –www.cgi-iugs.org*

The major redevelopment of the CGI website in 2018 is mainly to focus on CGI activities and major events and news of globe geological science information and news from IUGS in the future.

- *CGI Website Statistics*

The CGI Website is maintained under contract by the British Geological Survey. Google Analytics statistics are available from May 28 to Dec 5, 2018. Comparative statistics are not available for the 12 months prior due to a technical failure in the Google Analytics configuration in 2017.

Total website sessions	639
Weekly average sessions	23
Ave. pages per session	1.12

Session duration (% of sessions)

0-10 seconds	89%
11-30 seconds	0%
31-60 seconds	2%
61-180 seconds	0%
181-600 seconds	9%

Device type (% of sessions)

desktop	86%
mobile	12%
tablet	2%

Country of origin (% of sessions)

France	48%
United States	8%
Italy	6%
Brazil	5%
United Kingdom	3%
India	3%
Germany	3%
Canada	3%
Australia	3%
Russia	2%
Netherlands	2%
Yemen	2%

Page Views	Total	%
cgi-iugs.org	552	85%
/tech_collaboration/geoscience_terminology_working_group.html	19	3%
/tech_collaboration/earthResourceML.html	10	2%
/tech_collaboration/geosciml.html	10	2%
/participation/home.html	9	1%
/misc/standards.html	6	1%
/participation/council_members/frobida.html	5	1%
/misc/home.html	4	1%
/participation/council_members/rTomas.html	4	1%
/participation/council_members/tNalecz.html	3	0%
/participation/council.html	3	0%
/participation/join_form.cfm?language=english	3	0%

Traffic to the CGI website is very low compared to previous years, both in the number of visits and the number of pages viewed per visit. It must be considered, however, that a great deal of traffic to the website in recent years (2015, 2016) was of dubious origin.

In particular, given revelations about nefarious internet actors in the last year or so, the strong concentration of Russian internet traffic to the website in 2016 cannot be trusted.

Almost all visitors to the CGI website visit only one web page in their session, 85% of those visits are to the CGI home page, and are less than 10 seconds long.

This suggests that there is great scope to:

a) more regularly update and better promote the CGI website, and
b) better engage visitors to view pages other than the home page

- *CGI Newsletter*

No CGI newsletter was published in 2018.

- *CGI LinkedIn group*

The CGI LinkedIn group (http://www.linkedin.com/groups?gid=6539642) is used to publicize conferences (in particular RFG 2018 this year) and other CGI-related. The group has 77 members, 10 more than in 2017.

- *CGI Working Group Websites*

All CGI working groups maintain web pages and services.:
GeoSciML:http://www.cgi-iugs.org/tech_collaboration/geosciml.html
EarthResourceML:http://www.cgi-iugs.org/tech_collaboration/earthResourceML.html
GeoScience Terminology working group:
http://www.cgi-iugs.org/tech_collaboration/geoscience_terminology_working_group.html
GIRAF network: http://www.giraf-network.org
GeoScienceDWG:http://external.opengis.org/twiki/GeoScienceDWG/WebHome

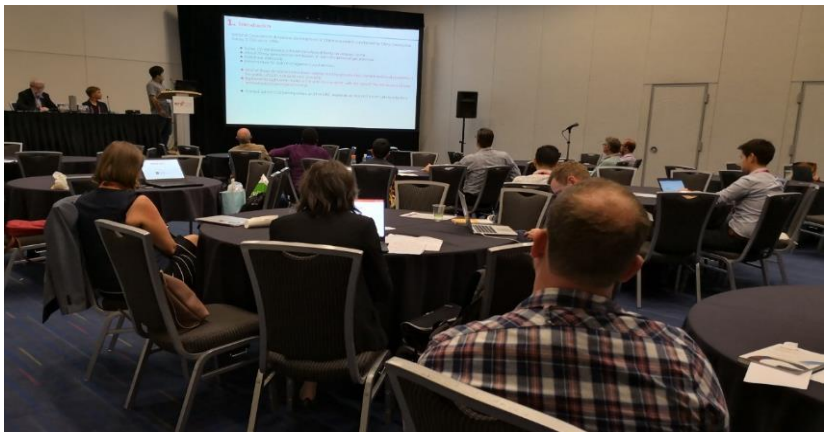
(by Ollie Raymond)

7. Chief accomplishments and products

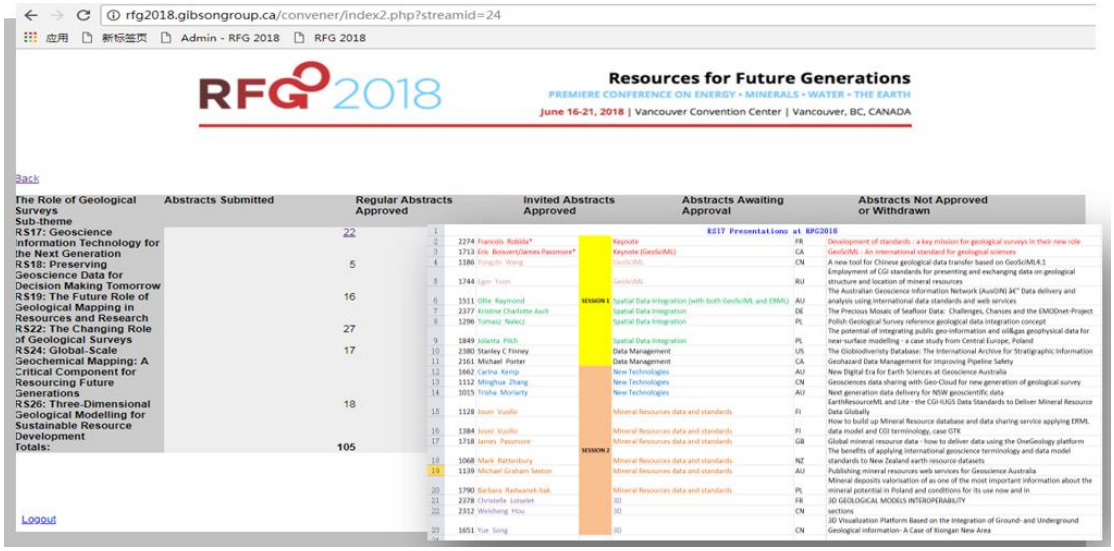
7.1 CGI News

- CGI had very successful session at RFG2018 on June 16–21, 2018 in Vancouver Convention Centre, Canada

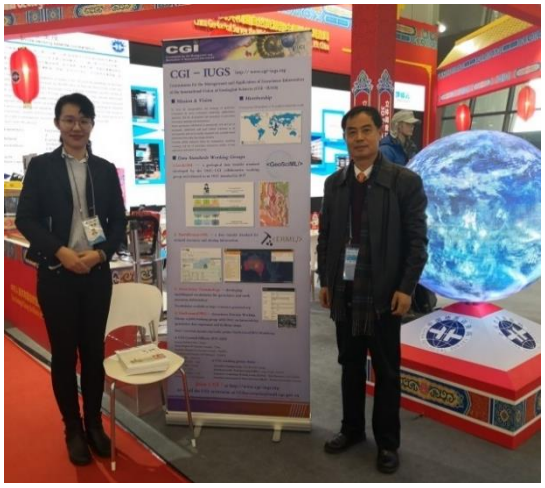
The CGI Council worked hard and achieved a successful session on "Geoscience Information Technology for the Next Generation" (Session RS17) at RFG2018. There are 22 papers/oral presentations in total, 2 more than expected, and two sub-sessions to cover these oral presentations of cutting edge developments in geoscience information management and technology. And this successful session RS17 become the second largest session in total 6 sessions under the



theme of The Role of Geological Surveys.



- Promotions of CGI-IUGS and CGI standards



The CGI council has taken part in different international and regional activities to promote CGI-IUGS and CGI/OGC standards.

CGI attend the first United Nations World Geospatial Information Congress (UNWGIC-Who aim to advance the potential and usefulness of geospatial information for sustainable development and to tackle global challenges) in China on 19-21 Nov. 2018 with the flyer on CGI-IUGS and pamphlets of CGI-IUGS and CGI/OGC standards , which attracted by many professionals in the field of geospatial worlds and officials for regional admiration and urban planning, and they realized by the time that geological standards are critical for the sustainable development of a smart society.

CGI-IUGS and CGI standards were introduced to geologists and officials of geological organizations at several training courses in China, such as the geoinformation training courses for developing

countries, the digital geological mapping courses for Africa, integrated geological data processing training for CCOP/ASEAN states, etc.

7.2 Working Group Reports

7.2.1 GeoSciML Standards Working Group

- *Membership*

The official OGC GeoSciML Standards Working Group (SWG) membership stands at 36 members and observers. However, the public GeoSciML mailing list (which does not require OGC membership and is a better measure of actual SWG observers) has 77 registered Members from Australia, Austria, Belgium, Canada, China, Czech Republic, Finland, France, Germany, Italy, Japan, Netherlands, New Zealand, Poland, Portugal, Russia, Sweden, UK, and USA.

- *Meetings and activities*

The GeoSciML SWG working group met at two occasions in 2018. Formally at OGC Technical Committee meeting in Orléans, France on March 20th 2018 and in Vancouver in June 2018, leveraging OneGeology/IUGS board and technical meetings and RFG (Resources for Future Generations) conference. The official OGC Orléans session attracted about 20 persons, including three remote participants to address regular business of the SWG.

We are happy to report that the new schemas are now on OGC public schema site at http://schemas.opengis.net/gsml/4.1/ .

The GeoSciML SWG now has a GitHub repository provided by OGC at https://github.com/opengeospatial/GeoSciML. Sylvain Grellet (BRGM) and Eric Boisvert (GSC) have management privileges.

Aa full day meeting was organized in Orléans after the closing of OGC meeting to further discussions about new encodings and learn from BRGM and Atos experience in building OWL out of UML models.
They published a strategy document on GeoSciML github https://github.com/opengeospatial/GeoSciML/tree/master/documents .

The Vancouver meeting, hosted a week before RFG at the Geological Survey of Canada (Vancouver office of the Pacific Division) was the occasion to report progress from ERML, GeoSciML vocabulary working group and GeoSciML SWG to IUGS/CGI and OneGeology TIG. Several GeoSciML related papers were also presented in a special session at RFG.

The recent increase in activities around Artificial Intelligence and Machine Learning confirmed the growing need of an OWL version of GeoSciML and some plans were made to go forward. The group concluded that a revised UML model, stripped of XSD artefacts, is needed. The role and nature of OWL model and vocabularies were debated. Version 3 of GeoSciML was seen as more suitable that version 4 (that has a lot of such artefacts) for a basis for the OWL encoding a first experiment is published on Git-hub. This test will guide decisions whether the model can be reused or new modelling efforts are needed. The group also saw an opportunity to better integrate the vocabularies in the model as its natural extension, as other groups who adopted GeoSciML for their ontologies did.

A demonstration of Linked Open Data with a preliminary GeoSciML OWL encoding was presented as a potential next step for OneGeology portal. This work followed the recommendation from the 2017 OneGeology workshop in Vienna (http://www.onegeology.org/docs/meetings/OneGeology-Linked-Open-Data-Workshop-report-austria-240517.pdf).

Several members of GeoSciML SWG are now busy working on the OGC Borehole Interoperability Experiment (BoreholeIE). At least two OGC standards (GeoSciML and GroundwaterML) require boreholes and yet they have different models (both derived from previous work). Neither have a formal conceptual model, but are instead extensions of Observation and Measurement. It is expected other domains (Energy, Civil Engineering, Environment, etc,) might have needs for a borehole model and this IE, lead by BRGM, is doing the groundwork to propose a conceptual model. It is expected the output of this effort will be considered by future versions of GeoSciML.
https://geoconnex.ca/gsip/id/geologicUnits/017000/GSCC00053017020

(by Eric Boisvert)

7.2.2 Geoscience Terminology Working Group

- *Membership*

The membership of the group numbers 24 members. Members come from Australia, China, Denmark, Finland, France, Germany, Great Britain, Italy, New Zealand, Russia, Slovenia, Spain and USA. Membership is defined and managed through a Google Group with membership rights administered by Mark Rattenbury (NZ, chair since 2014) and Steve Richard (USA). Actual participation in vocabulary development and management involves only about half of the membership. The face-to-face GTWG meeting at Vienna on 26 May 2017 resolved to ask inactive members whether they still wish to continue their membership of the GTWG and as a result three

memberships were discontinued.

- *Meeting and Activities*

The GTWG activities are described under link from CGI's website, simplified and updated in late 2016, http://www.cgi-iugs.org/tech_collaboration/geoscience_terminology_working_group.html and from the GeoSciML website at http://www.geosciml.org/ The page has been enhanced with addition of the "Our Vocabularies" section that includes links to the SISSVoc repositories of four key vocabularies.

A financial grant from CGI Council for ~€9880 to fund multi-lingual translation work has been granted. The work is being coordinated by Rachel Heaven of the British Geological Survey and will add European and Asian language label translations that have been extracted from the former CGI's Multi-Lingual Thesaurus of Geosciences product. The work is on track for completion in early 2018.

- *Achievements*

Two vocabularies, planar Polarity Code and mapping Frame, have been adopted since the last report and limited progress has been made with others. The Vienna meeting identified *collectionTypeValue* as a vocabulary that could be easily assembled and other vocabularies requiring little further work will be put up for review in by 30 September; notably *geoscientific Themes*, *borehole Purpose*, *event Environment* and *event Process*.

A new path forward for the problematic *mineral Deposit Type* vocabulary has been identified through engaging an external shepherd, Professor Molnàr Ferenc of GTK, Finland working with group member Jouni Vuollo. and engaging a wider representation of ore system specialists from the members' and other organisations. A working group has been assembled.

Work on compiling *natural Geomorphology Feature* terms has resulted in some uncertainty as to the scope of the vocabulary. The Vienna meeting resolved that GTWG should discuss options and the use case(s) and to decide whether there may need to be more than one vocabulary to describe these features.

The Vienna meeting resolved to promote and adopt the *regionalLithologicUnit* vocabulary forward as soon as possible, recognizing that the improvements will be more easily identified through its implementation by various geoscience organizations.

The vocabulary host service has successfully been migrated to Geoscience Australia. The use of persistent URIs has meant no user changes are needed to link to the

service e.g. http://resource.geosciml.org/def/voc/ These vocabularies are all published for general discovery in the Australian National Data Service (ANDS)'s Research Vocabularies Australia (RVA) Portal: https://vocabs.ands.org.au/search/#!/?p=1&publisher=CGI%20Geoscience%20Terminology%20Working%20Group&q=

Particular thanks are due to Ollie Raymond and his GA team for making their server facilities available for CGI. Details on the upload and editing of vocabularies have not yet been finalized but it is likely that several GTWG members will be granted permission to effect changes to the vocabulary service content.

- *Future work and Issues*

There remain a number of outstanding GeoSciML data model vocabularies still to complete, approximate half of those required and mostly for the extension schemas. The EarthResourceML data model still requires the key but problematic *mineralDepositType* vocabulary. The compilation of many of these remaining vocabularies has been started. In addition, considerable work remains to be done to integrate multilingual geoscience terms with existing CGI vocabularies to provide multilingual support.

Face-to-face meetings are particularly productive periods for the GTWG, including the build up to and aftermath of the meeting. The co-alignment with other meetings such as CGI Council, GeoSciML SWG, ERML WG and GIC is effective for increasing the participation level.

(by Mark Rattenbury)

7.2.3 EarthResourceML(ERML) Standards Working Group

This ERML SWG-report covers the period from November 2017 to December 2018.

- *Membership*

The EarthResourceML Working Group (ERML WG) has nine active members (2017-2018):

• Jouni Vuollo	GTK – Finland (Chair)
• Daniel Cassard	BRGM – France
• James Passmore	BGS – Great Britain
• Michael Sexton	GA – Australia
• Ollie Raymond	GA – Australia
• Mark Rattenbury	GNS – New Zealand
• Lin Zhiyong	China Geological Survey - China
• Wang Yongzhi	Jilin University - China
• Cui, Yao	British Columbia - Canada

- *Meetings*

ERML SWG members attended one face-to-face meeting in Vancouver, BC, Canada on 14th June 2018 hosted by British Columbia Geological Survey. The meeting was held after the meetings of the GeoSciML Standards Working Group (SWG), the Geoscience Terminology Working Group (GTWG) in connection with the meeting of RTG2018 (www.frg2018.org).

- *Data Model Development and Documentation*

The ERML conceptual model

Version 2.0 of the CGI data standard for mineral occurrences and mines has been published 2014 see - http://www.earthresourceml.org/. After small modifications (2015-16) ERML is now fully compatible with the requirements of the European Commission's INSPIRE data specification for Mineral Resources.

In particular, important communities such as INSPIRE and Minerals4EU project provided valuable feedback to develop ERML 2.0 model and now ERML 2.0 is the preferred standard for mineral resource data sharing projects EURare, Minerals4EU, and ProSUM projects, and the Australian AuScope, and Geoscience Portal projects.

EarthResourceML Lite v. 1.0 version was accepted August 2016 and released August 2016. ERML Lite delivers a simplified flat view of key elements of the full ERML data model. New version of ERML Lite v. 2.0.1 was published September 2018. It can be used to standardize delivery of mineral resource data via Web Map Services (WMS) and simple features Web Feature Services (WFS SF0). Geological Surveys in Australia and New Zealand have also endorsed the ERML Lite standard for delivery of mineral occurrence data. ERML Lite 2.0 has been submitted in December 2018 as a proposal for INSPIRE Mineral Resource simplified model.

Documentation

All the CGI SWG web pages have been harmonized and the ERML web pages (http://www.cgi-iugs.org/tech_collaboration/earthResourceML.html) have been updated. The data model documentation has been published in the ERML web pages.

- *Uptake of EarthResourceML*

It is pleasing to note that there has been wide uptake of the ERML data standard in national and provincial Geological Surveys (Australia - Europe), mainly through its adoption by data sharing communities such as AuScope, AuSGIN, INSPIRE/Minerals4EU and EGDI. In the short term, the major challenge is to get USGS/USA and GCS/Canada to join as active participants to develop/implement the

ERML standard. Recently the Chinese organizations and British Columbia Survey from Canada have been activated to join our SWG.

IUGS/CGI WS's session RFG2018 (www.rfg2018.org) - RS17: "Geoscience Information Technology for the Next Generation" have several ERML related presentations – OneGeology – ERML model – National Presentations. At the meeting one issue was to demonstrate – how to use ERML Lite model for "Global Mineral Resource" service (GA – GNS – GTK – BGS –BRGM). The first step to "Global Mineral Resource" service will be OneGeology portal and the thematic layer of Minerl Resources (early 2019) – see draft picture.

New version of OneGeology portal (will be published early 2019). Datasets are from Circum Arctic and Fennoscandian area and based on ERML Lite 2.0.1 data model.

- *Issues*

Work planned

Future development of ERML and ERML Lite will be undertaken by the ERML Working Group based on the feedback from use of ERML v2.0 like Minerals4EU and ProSum projects. The next versions of ERML v.3.0 will be published 2019.

The last ERML data model vocabularies (MineralDepositGroup, MineralDepositType, Product and WasteType) will need more work in the future year. Much more activity from the whole GTWG is really needed to review/vote/adopt shepherd's proposal next year!

(by Jouni Vuollo)

7.2.4 Report of the Joint CGI/OGC Geoscience Domain Working Group

Following its official creation in September 2017, two sessions of GeoScienceDWG were held in 2018: Orleans TC in March, Stuttgart TC in September. The first enabled to set the final perimeter of the Borehole Interoperability Experiment and organize its kick-off in June. Today, several use cases have been identified and are addressed by the 15 participants of the initiative.
Efforts were also made to foster the geoscience community by the organization of a presentation session that highlighted several thematic included in geoscience (hydrogeology, seismology, volcanology, astro-geoscience, LIDAR use and geotechnics) in Orleans OGC Technical Committee in March 2018. Geotechnics and connection with Building Information Modeling was the main topic of the session in Stuttgart and contributed to prefigure a collaboration in that domain between OGC and building Smart International (bSI).

- *The Borehole Interoperability Experiment (Borehole IE)*

Even though several standards already exist to describe a borehole, its associated data and their position along a borehole (including OGC standards), they all restrict themselves to a specific viewpoint.
Involving key implementers and editors of the existing standards, the Borehole Interoperability Experiment (Borehole IE) aims at defining a domain agnostic and comprehensive (umbrella) vocabulary for a general concept of boreholes, which may eventually become its own specification and be properly reused by various domains when needed.
Based on a wide variety of use cases such as 'scientific exchange within and across research infrastructures', 'industrial', 'building and construction', 'regulatory obligations' and 'georesources monitoring and exploitation' it will provide the basis for establishing a better integration of existing standards and possibly a future common approach for describing boreholes.
The Borehole IE is defining a domain neutral semantic for a general concept of borehole and its associated data. It will also produce a public OGC engineering report summarizing the overall cross-domain, inter-standard findings and recommendations for a best practice implementation that should follow.

About Borehole IE: https://github.com/opengeospatial/boreholeie
About GeoScienceDWG:
http://external.opengis.org/twiki_public/GeoScienceDWG/WebHome

Resources: https://github.com/opengeospatial/boreholeie/
http://www.opengeospatial.org/projects/initiatives/boreholeie

(by Francois Rabida)

7.3 CGI Regional Group Reports

7.3.1 CGI in Asia

- *Meetings and activities*

Geological science information is one of the most active areas in Asia 2018. There are more than 10 projects of regional geo-information cooperation implemented or continuously conducted this year, which are Lead mainly by China, Japan and Korea. Numbers of technical training courses and meetings related with geological information are remained high in this region.

China Geological Survey (CGS) has been continuously conducted several regional cooperation projects in 2018 in Asia as list in the following table. Typical activities are digital geological mapping (DGM), integrated geological data processing (IGDP) and cross border geoscience map compilation.

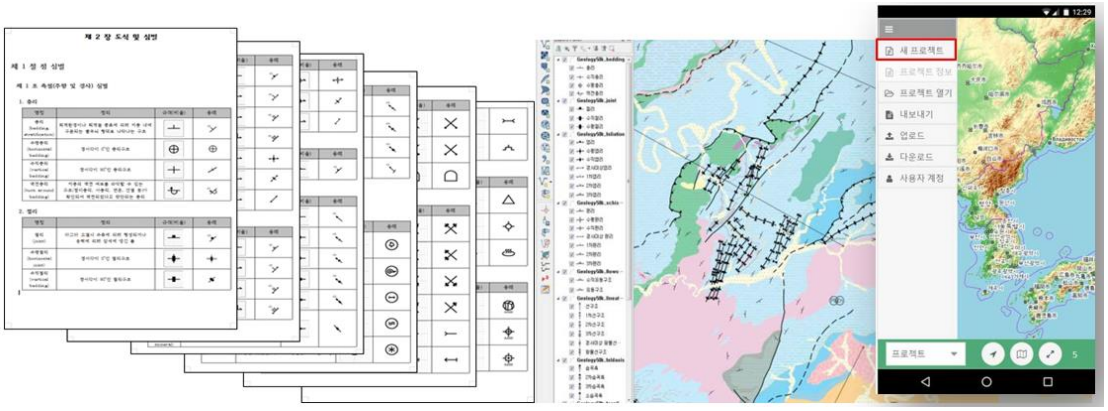
No.	List of Events funded by China in geological information 2018 in Asia
1	8th Training Course on Geological Mapping Capacity Building: Digital Geological Mapping System, November, 2018
2	Training courses on Digital Geological Mapping System in Malaysia in cooperation with JMG (Oct. 10-16, 2018) and in Myanmar in cooperation with DGSE (Dec. 8-23,2018)
3	Utilization of Remote Sensing Technology in Resources and Environment (March, 2018)
4	A training course on Remote Sensing in Thailand in cooperation with DMR (November, 2018)
5	3rd Training on Integrated Geological Data Processing (IGDP) in Nanning China, November 17-18, 2018.
6	Seminar on China-ASEAN Cross-border Geological Correlation and Map Compilation

The Geological Survey of Japan (GSJ) is leading in implementation three major project related to web-based geoinformation processing, storage and sharing system using OGC-based web services and Free and Open Source Software (FOSS). These projects are (1) OneGeology-Asia, (2) CCOP Geoinformation Sharing infrastructure for East and Southeast Asia (GSi), and (3) Asia-Pacific Region Global Earthquake and Volcanic Eruption Risk Management (G-EVER).

GSJ released 3D Urban Geological Map on 29 March 2018. GSJ also starts offering a new regular training course for young geological researchers in East and Southeast Asia entitled “GSJ International Training Course on Practical Geological Survey Techniques – Application to Geological Disaster Mitigation. For this year, the course

started on June 25 and ends on July 14, 2018.

Korea Institute of Geoscience and Mineral Resources (KIGAM) developed the standardization guidelines for geological information such as geological symbols and rock units based on KIGAM's information. And a digital field survey and mapping system KMapper 1.0 has been developed.



The Geosciences Data Repository (GDR) system as a geological resource research data platform has been improved in accordance with the mid and long-term plan of Integrated management system of geological resources information in 2018, including metadata system upgrading and joining IGSN as an IGSN Allocating Agent.

1. Integrated Geosciences Data Processing (IGDP) capacity building for ASEAN states and CCOP member countries.

(1) IGDP capacity building for CCOP member countries.

The 2nd workshop of CCOP-CGS IGDP project phase II (IGDP-II2) was held in Guangzhou, China on 17-19 July 2018, which is funded by China Geological Survey (CGS), and hosted by Guangzhou Marine Geological Survey. There were 26 participants from Cambodia, China, Indonesia, Japan, Lao PDR, Malaysia, Philippines, Thailand attended this training.

Country report on geoscience database development, geoscience data processing technology, application & case study of RGIS-IGDP software, and national geophysical compilation were presented. Training courses on multiple disciplines of geosciences data integrated and web-based database and data sharing technology including OneGeology data server and data preparation, geophysical and geochemical data processing technology and use of RGIS-IGDP software, CCOP regional geophysical compilation technology and requirement were conducted. And the working Group for CCOP magnetic and gravity map compilation has been formed and a plan of the way forward was discussed and finalized.

(2) CCOP-CGS-IGDP project meeting in Busan in October 2018

The IGDP project phase II meeting was held in Busan, Republic of Korea, on 30 October 2018, as part of the 54th CCOP Annual Session. 15 participants from Cambodia, China, Indonesia, Japan, Lao PDR, Malaysia, Philippines and Thailand presented output of the project in 2018 and discussed next step work of the project. The meeting agreed to make the RGIS-IGDP software available to the teaching in Universities of the CCOP member countries and also the meeting requested China to conduct a 6 months to one year short term training courses on specific data processing technology for the

member countries.

(3) The 3rd China-ASEAN IGDP training courses sponsored and supported by China Geological Survey (CGS) was held in Nanning, China on Nov.17-18, 2018. More than 20 officials, technicians and university students from Cambodia, Myanmar, and Indonesia participated in this 2-day training course. Training courses were mainly focused on integrated geological sciences database and data sharing technology, geophysical and geochemical data processing, interpretation and joined 3D inversion techniques for minerals and petroleum exploration. Trainees expressed their highly gratitude to the CGS for organizing the IGDP project training and presented them also with the software packages.

2. Digital geological mapping (DGM) technology for field geological survey and mineral exploration.

(1) DGM training in Malaysia 2018
An 8-day training course on DGM including 5 days indoor trainings and 3 days field practices was conducted by CGS on 8-15 Oct. 2018 in Kota

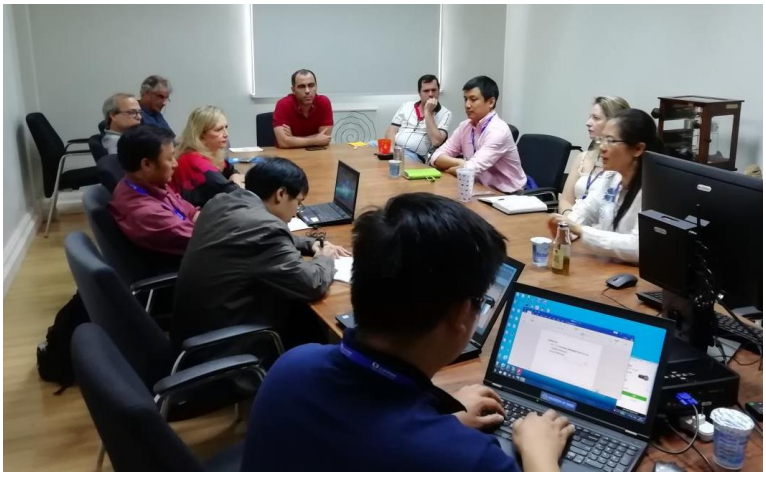
Kinabalu, Malaysia. 50 professionals form 6 different organizations under the mineral and geological science of Malaysia and 4 universities participated this training course. Geological mapping along 1 profile was completed during the field practice and another 1 test sheet of draft geological map was finished.

(2) DGM training courses in Myanmar 2018

The 8-day training course on DGM was conducted by CGS on 8-16 Dec. 2018 in Naypyidaw, capital of Myanmar. This training course was co-sponsored by the ministry of nature resources of China and ministry of nature resource and environment protection of Myanmar. 75 professionals form geological survey and mineral exploration bureaus of the Myanmar ministry of natural resources and environment protection and 4 mineral exploration companies participated. The training courses consisted of 5 day training in the office for data collection techniques and 3 day field practices, which including observation point and line data collection, draft map compilation and database construction and 3D modeling techniques based on the data collected.

(3)DGM training in Brazil

Invited by the geological survey of Brazil, the CGS DGM group delivered a successful training course on digital field geological mapping technology on 26-30 Nov. 2018. There were 15 professionals from geology and mineral, land, data analysis and geo-information divisions attend the training and discussion. Digital mapping technology are introduced and related new development toward an intelligent space frame were discussed. Geobank of Brazil were also presented at the discussion.



3. Training courses on satellite remote sensing technology and application

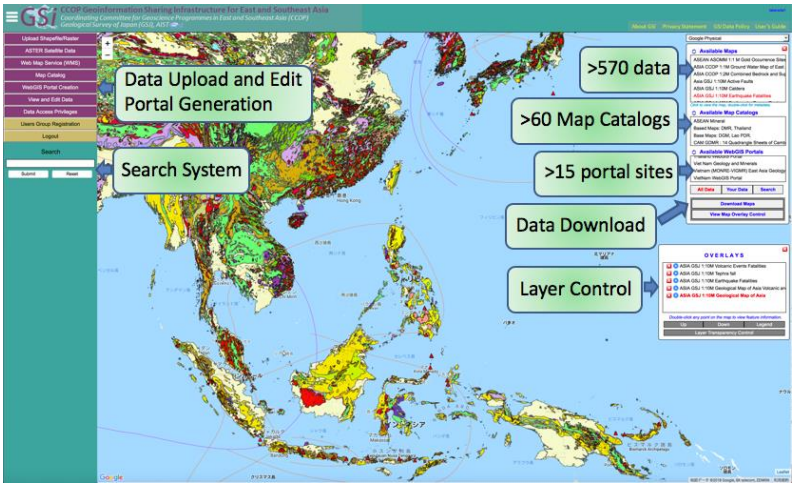
A training course on this purpose was held on 19-26 November 2018 in Bangkok, Thailand by CGS. 30 trainees from the department of mineral resources, land development department, geo-Informatics and space technology development agency, Chiang Mai university and Chulalogkorn University of Thailand participated. Training courses include remote sensing frontier, theories, methodologies as well as application cases. This training was conducted as the following action of the seminar on remote sensing technology and application in resources and environment for Lancang-Mekong cooperation countries held on 19-24 Mar. 2018 in Beijing, China.

4. OneGeology Covering East Asia

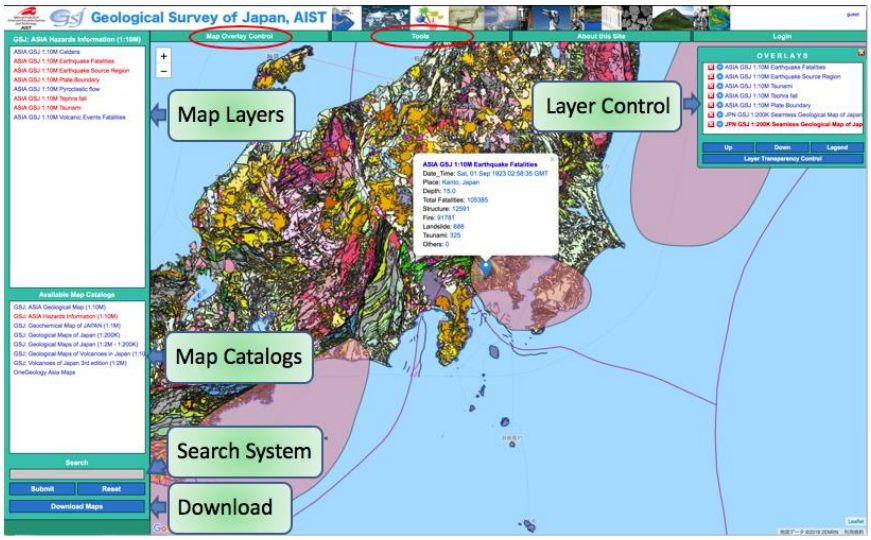
The GSJ is continuously implementing the OneGeology project covering East and Southeast Asia in cooperation with the Coordinating Committee for the Geoscience Programs in East and Southeast Asia (CCOP) and its member countries. Most of WMSs of the geological maps of the countries in East and Southeast 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. The steering committee meeting was held in Vancouver, Canada on June 2018. The OneGeology project was also presented during the CCOP 54th Annual Session in Busan, South Korea on October 30, 2018. The OneGeology covering East Asia website is now moved to the GSi system and the site's new URL is
https://ccop-gsi.org/gsi/onegeologyasia/index.php

5. 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. Currently, CCOP and GSJ provide the servers to host the GSi main portal site and the database . The GSi portal was **officially launched on September 19, 2018**, during the 3rd International Workshop on CCOP Geoinformation Sharing Infrastructure (GSi) for East and Southeast Asia Project in Langkawi, Malaysia. The workshop was attended by 43 delegates from 11 countries. The GSi system currently shares around 570 maps data. More than 15 customized GSi generated WebGIS portal are also available for viewing. Special GSi session was also organized during the CCOP 54th Annual Session in Busan, South Korea on October 30, 2018.



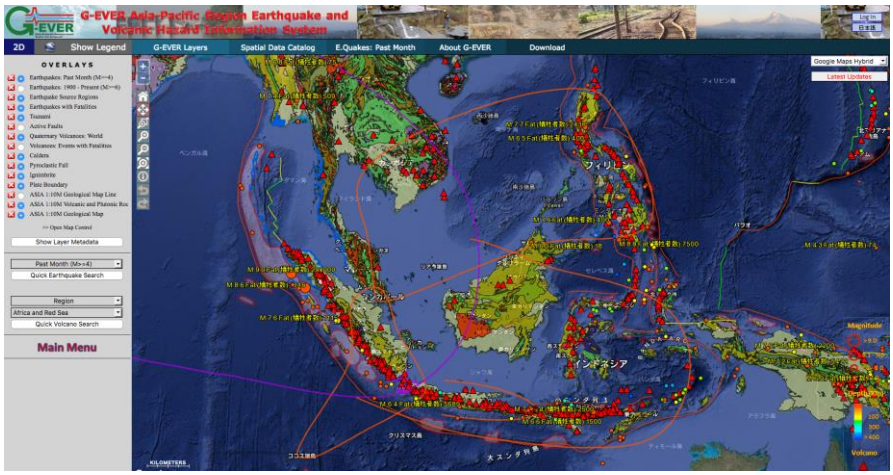
The GSi main portal (https://ccop-gsi.org/main)



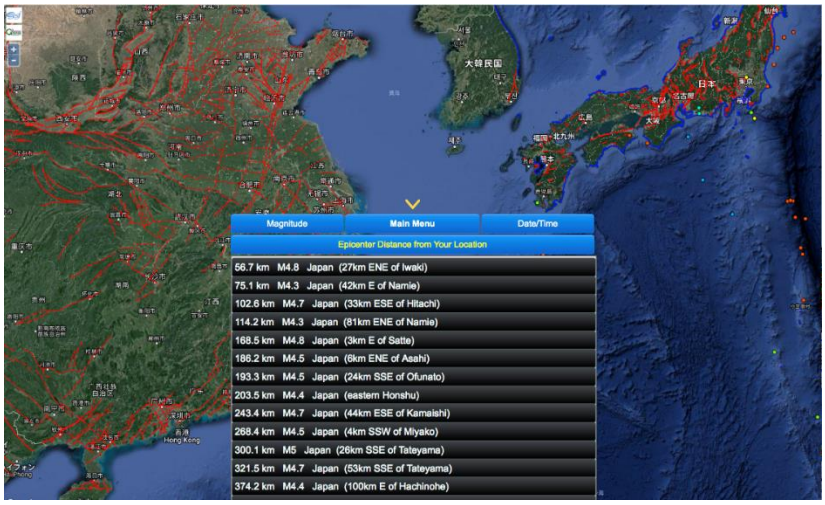
The GSi generated customized WebGIS portal of GSJ (https://ccop-gsi.org/gsi/gsj_webgis/)

6. Asia-Pacific Region Global Earthquake and Volcanic Eruption Risk Management (G-EVER)

The Asia-Pacific Region Global Earthquake and Volcanic Eruption Risk Management (G-EVER) is a consortium among the geohazard research institutes in the Asia-Pacific region (http://g-ever.org). The Asia Pacific Region Earthquake and Volcanic Hazard Information System contains GIS hazard information, which were used for the publication of the geological hazard map covering East Asia (Takarada et al. 2016). Geological map, active faults, earthquakes hypocenters and source areas, fatalities of major earthquakes, tsunami hazards, distribution of volcanoes, calderas, pyroclastic falls and ignimbrites (large-scale pyroclastic flows), and fatalities of major volcanic events are available on the system. Mobile version of the Hazard Information System is also developed.



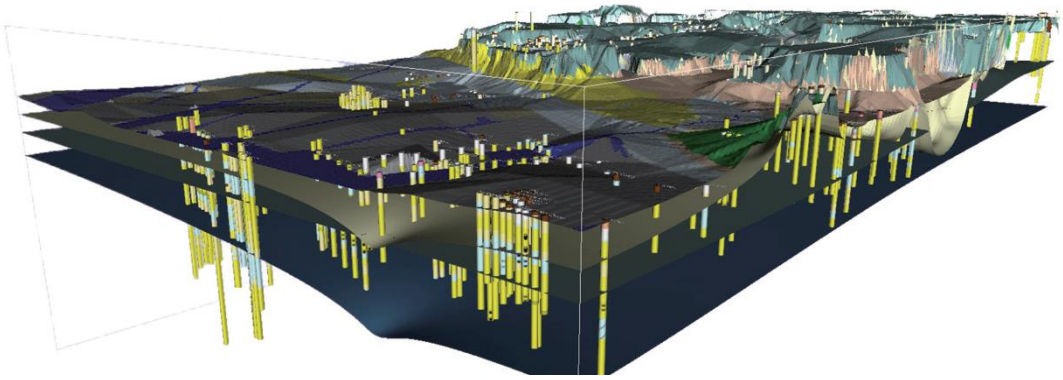
G-EVER Asia-Pacific region earthquake and volcanic hazard information system (http://ccop-geoinfo.org/G-EVER/).



The G-EVER Mobile site (https://ccop-geoinfo.org/G-EVER-MO/).

7. 3D Urban Geological Map

GSJ released 3D Urban Geological Map on 29 March 2018. The 3D Urban Geological Map covered norther part of Chiba prefecture, which is located in metropolitan area of Japan. This map provides subsurface 3D geological model and borehole data thorough the portal site (https://gbank.gsj.jp/urbangeol/). These data are important for mitigation of liquefaction and geo-pollution.



3D geological model of a coastal urban area.

8. GSJ International Training Course on Practical Geological Survey Techniques – Application to Geological Disaster Mitigation.

The Geological Survey of Japan (GSJ) started regular training course for young geological researchers and engineers in the CCOP member countries from 2018. This training course focuses on practical geological survey techniques, considering that accurate geological mapping is fundamental for natural

resources development, environmental conservation, and mitigation of geological disasters. This training course performed improvement of geological survey skills through intensive lectures, field trips, and laboratory practices. This year, the GSJ`s researches on geological disaster mitigation were also introduced in the course.

(by Zhang Minghua and Kazuhiro Miyazaki)

7.3.2 CGI in Africa

The planned Geoscience InfoRmation in Africa (GIRAF) meeting/session did not take place at the 27th Colloquium of African Geology (27 CAG) and 17th Conference of the Geological Society of Africa (GSAf17) in July 2018 in Aveiro, Portugal, for the CAG27.

As GIRAF remained mostly inactive, bulk of the CGI activities in South America centered on outreach activities. Raised awareness on CGI at geoscience meetings and workshops. Advocated CGI with the local National Spatial Data Infrastructure (NSDI) team at Namibia Statistics Agency (NSA), Geo-Spatial Sciences and Technology lecturers at Namibia University of Science and Technology (NUST) and visiting information scientists from Botswana Geoscience Institute (BGI).

(by Kombadayedu Mhopjeni)

7.3.3 CGI in South/Latin America

- *Chief accomplishment*

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.

- *Regional update:*

Progress of Standards in South America

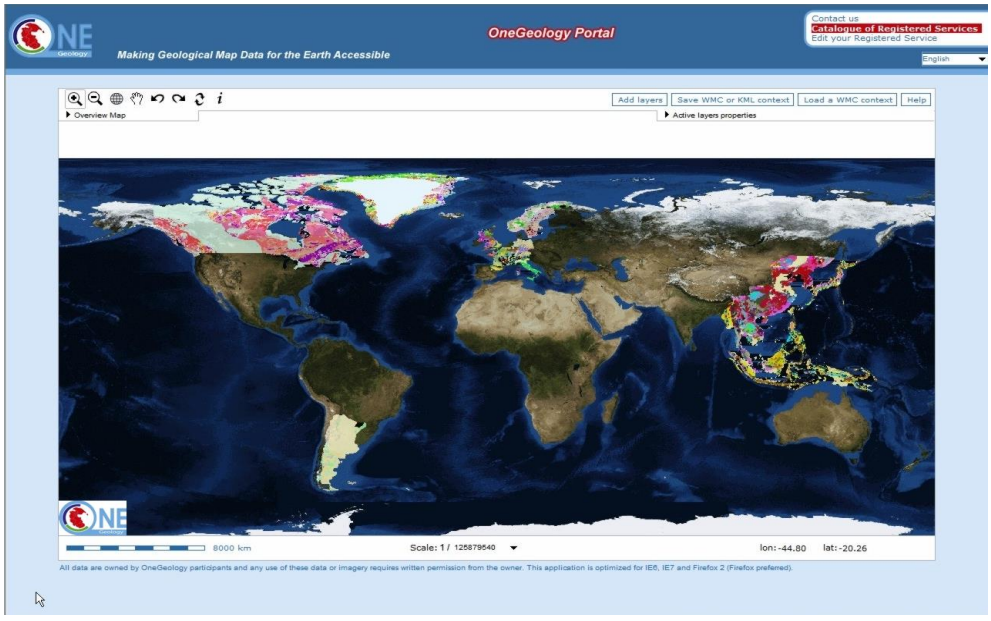
Since more than ten years ago CGI activities in South America had a strong support given by actors that belongs to different organizations. CGI, IUGS, OneGeology and different professionals from Latin america and international geological surveys helped in the development of different activities like the diffusion of IUGS-CGI electronic standards, organization of seminars and training activities.

After the OneGeology meeting in Brighton, UK in 2007 Argentina, Chile, Brasil, Perù, Dominican Republic (in this order) put their geological information on line as Web

Mapping Services and about four years ago Brazil started to publish his information following the GeoSciML standard. As experience, it was perceived that the success of the adoption of IUGS-CGI standards in SA not only depended of the willings of the regional geological surveys but in a mayor degree by their national context and by political interest given to technologies like e-government and national geospatial data infrastructures.

At present Brazil is the only country that is publishing their data using GeoSciML standard. They also are having active participation to the OneGeology Technical Implementation Group. This country is currently hosting in a “buddy service” mode the data of Uruguay. It is also expected that in next time the geological data of Venezuela and the CGMW tectonic map of South America will be available under the same service.

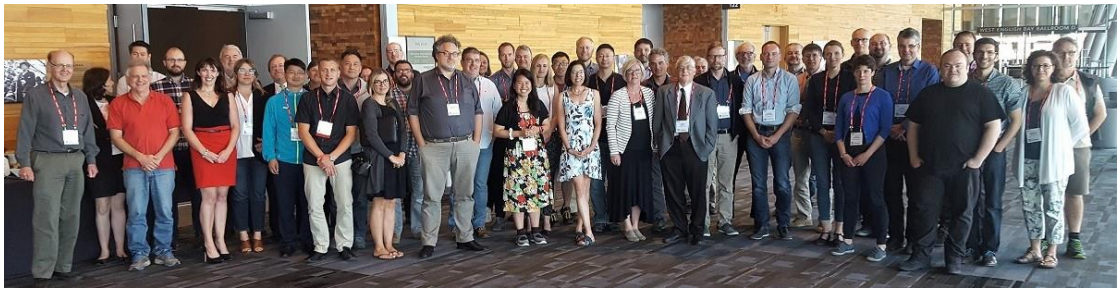
During the last years the Geological Survey of Colombia have been strongly active in his organizational development. This include the project of their geoscience information system. In that way Margarita Bravo (mbravo@sgc.gov.co) head of Information Management Area (DGI) contacted the CGI South America representative in order to organize personal meetings with different national surveys and heads of information areas.



Look of the beginning. WMS services published by geological surveys in the context of OneGeology

(by Gabriel Asato)

7.3.4 CGI in North America



Participants at the North American 3D Geological Mapping Workshop, June 2018, Vancouver

3D Workshop: 3D geological mapping workshops have been held approximately every other year in North America since 2001. The 2018 workshop in Vancouver was a great success, illustrating the transition of 3D from pilots two decades ago, to methods development a decade ago, to the current emergence of national strategies such as Canada-3D and US EarthMAP. Options are being considered for the 2020 workshop. At present, the focus is on a 2nd edition of "Synopsis of Current Three-dimensional Geological Mapping and Modeling in Geological Survey Organizations", due for release in mid-2019.

3Deep: A December 2017 White House Order and a Secretarial Order from the Department of the Interior, which houses the US Geological Survey, initiated a program referred to so far as 3Deep. The orders asserted that availability of strategic and critical minerals that may be required by the US should be made more assured through a program to enhance comprehensive, machine-readable data concerning topographical, geological, and geophysical surveys.

American Geophysical Union (AGU): AGU plays many roles, with the work of the Earth and Space Sciences Informatics (ESSI) Section being one example.

Digital Mapping Techniques (DMT): DMT is the annual conference for information science professionals who are responsible for digital geological mapping and related geoscience information systems. CGI meetings were held in association with DMT in 2007. The 22nd DMT, held in Lexington, Kentucky on May 20 – 23, 2018, was attended by 100 people, and the focus was on the NCGMP09 geologic map database standard, now known as GeMS. The 2019 DMT will be held May 19-22, 2019, in Butte, Montana.

EarthCube: EarthCube is a National Science Foundation program designed to transform geoscience research by developing cyberinfrastructure to improve access, sharing, visualization, and analysis of all forms of geosciences data and related resources. EarthCube participants meet regularly. Macrostrat is an example of an

EarthCube initiative.

Geologic Mapping Forum (GMF): Whereas US state and federal geological survey directors and program managers regularly meet to work out geological mapping funding and administration, and geological mapping information science professionals meet at DMT, the GMF has now been established to facilitate coordination between geological map authors on geological mapping topics, in a context where money and information science are not considered. The 1st GMF, in March 2018, was a great success, and the 2nd meeting will be held in Minneapolis on April 10-12, 2019.

Geological Society of America (GSA): The GSA Geoinformatics and Data Science Division facilitates the GSA role in cyberinfrastructure, through short courses, symposia, books, and awards.

Geospatial Data Act of 2018: The Geospatial Data Act of 2018 (GDA) was signed and became law in October, 2018. The law further formalizes the roles of, for example, the Federal Geographic Data Committee (FGDC), and the National Geospatial Advisory Committee (NGAC). Geology is one of the National Geospatial Data Assets (NGDAs) coordinated by the FGDC.

National Cooperative Geologic Mapping Program (NCGMP): NCGMP consists of geologic mapping by federal (Fedmap), state (Statemap), and university (Edmap) partners. It has long been funded at a level of about $25M per year, which supplements a similar amount spent by other agencies each year.

National Geologic Map Database (NGMDB): Maintenance of the National Geologic Map Database (NGMDB) is required by law. It includes a publications catalog, a 20-year long and ongoing initiative to build information standards, and a planned geologic mapping database.

National Geologic Mapping Act (NGMA): The federal NGMA, which authorizes the NCGMP and requires the NGMDB, is due for re-authorization, and a bill to do so was passed by the House of the US Congress in autumn 2018.

National Geological and Geophysical Data Preservation Program (NGGDPP): The Energy Policy Act of 2005 authorized the NGGDPP, whose role is to facilitate the preservation and availability of geological samples, logs, maps, and data. The National Digital Catalog describes geoscience collections managed by USGS and state geological agencies. NGGDPP plays an active role in promotion of information standards.

National Geothermal Data System (NDGS): The NGDS is a catalog of documents and datasets that provide information about geothermal resources located in the US.

Resources for Future Generations (RFG): The June 2018 RFG conference in Vancouver – a mid-term equivalent of the International Geological Congress meant to focus on government and industry geology – provided a broad array of opportunities to confer on many topics, including geoscience information.

US Geoscience Information Network (USGIN): USGIN is a federated information-sharing arrangement that uses free and open-source technology that is able to interact with similarly configured data-sharing networks.

(by Harvey Thorleifson)

7.3.5 CGI in Europe

Two large European initiatives avec contributing to the support and implementation of CGI standards: GeoERA and EPOS.

- *GeoERA* http://geoera.eu/

45 national and regional Geological Survey Organisations (GSOs) from 32 European countries have joined forces to develop an ERA-NET Co-Fund Action to "Establishing the European Geological Surveys Research Area to deliver a Geological Service for Europe (GeoERA)".

Funding of the projects will partly be covered by the GeoERA consortium members (70%) and partly by European Commission (30%). The programme has a total budget of 30.3 M€, and the projects will run for three years starting in June of 2018. Only members of the GeoERA consortium will be beneficiaries of the GeoERA projects.

The main objective of GeoERA is to contribute to the optimal use and management of the subsurface. GeoERA will fund 15 research projects that will aim to support 1) a more integrated and efficient management and 2) more responsible and publicly accepted, exploitation and use of the subsurface. The projects will cover the applied geosciences, addressing the following four themes: geo-energy, groundwater, raw materials, and information platform. The information platform will support the requirement of the 3 other themes, and in particular for data dissemination. It will be built on the top of the EGDI (European Geological Data Infrastructure).

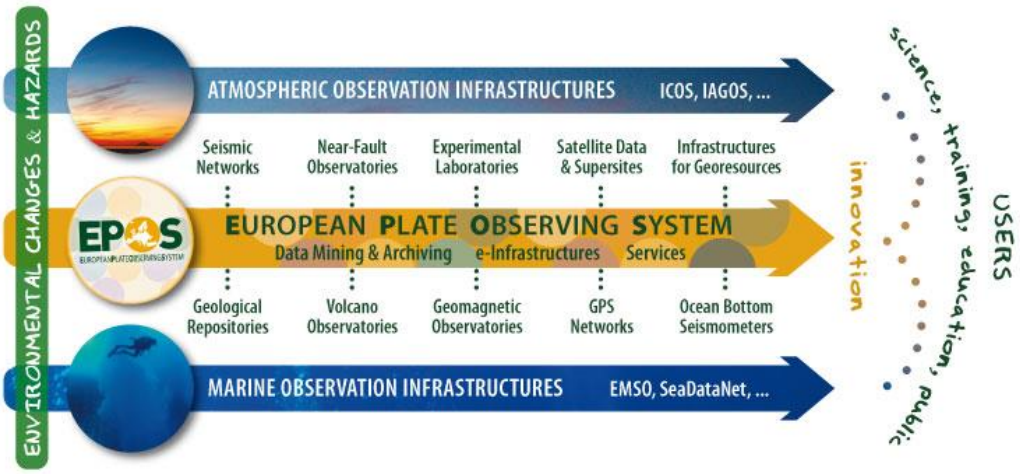
The GeoERA projects will implement the CGOI services and contribute to the evolution of 3D practices.

- *EPOS* https://www.epos-ip.org/

EPOS, the European Plate Observing System, is a long-term plan to facilitate integrated use of data, data products, and facilities from distributed research infrastructures for solid Earth science in Europe.
EPOS will bring together Earth scientists, national research infrastructures, ICT (Information & Communication Technology) experts, decision makers, and public to develop new concepts and tools for accurate, durable, and sustainable answers to societal questions concerning geo-hazards and those geodynamic phenomena (including geo-resources) relevant to the environment and human welfare.

EPOS vision is that the integration of the existing national and trans-national research infrastructures will increase access and use of the multidisciplinary data recorded by the solid Earth monitoring networks, acquired in laboratory experiments and/or produced by computational simulations. The establishment of EPOS will foster worldwide interoperability in the Earth sciences and services to a broad community of users.

EPOS mission is to integrate the diverse and advanced European Research Infrastructures for solid Earth science, and build on new e-science opportunities to monitor and understand the dynamic and complex solid-Earth System. EPOS will identify existing gaps and promote implementation plans with environmental, marine and space science to help solve the grand challenges facing the Earth and its inhabitants.



EPOS has been initiated through H2020 co-funded projects, and became a legal body in October 2018. The CGI standards are being used in particular for the Geological Theme, which is driven by geological surveys, for delivering millions of borehole data

across Europe. EPOS contributes to the CGI/OGC Borehole Interoperability Experiment.
A specific focus is also put on delivery of 3D geological models.

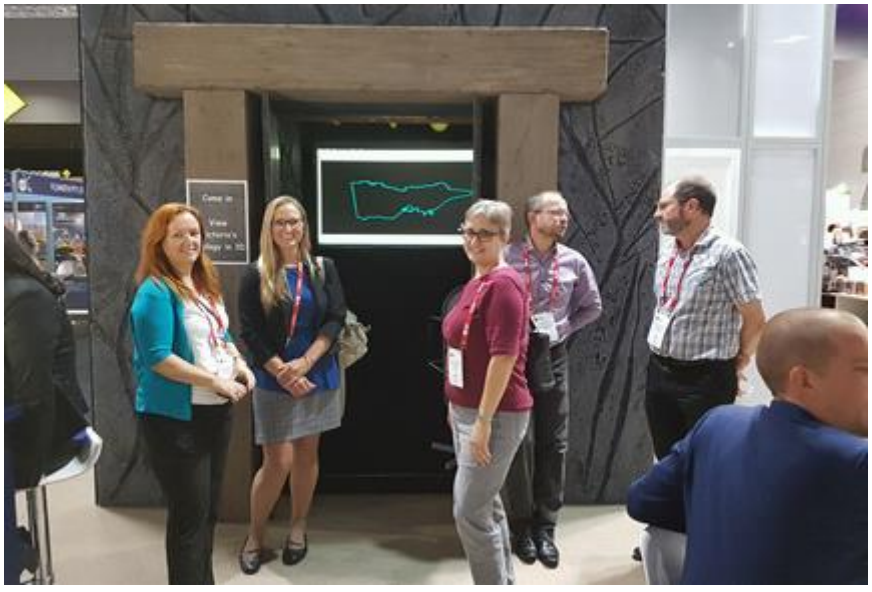
(by Francois Robida)

7.3.6 CGI in Oceania

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

The Australia-New Zealand Government Geoscience Information Committee (GGIC) continues to coordinate Australasian information management best practice in government geological agencies. GGIC nominate a member to representative Oceania on CGI Council (currently Ollie Raymond).

All Australian Commonwealth, States and Territories, and New Zealand, are represented on the GGIC. The Australian geological survey agencies provide funding for information management activities in Australia under the banner of the "Australian Geoscience Information Network" (AusGIN). Additional funding is provided to AusGIN by a geoscience research infrastructure funding program called AuScope.



GGIC representatives meet in Melbourne in October 2018.

All GGIC member organizations make extensive use CGI data standards (GeoSciML, EarthResourceML, and vocabularies) to deliver geological map, borehole, mineral resources, and mineral tenements data as OGC web services. All the Australian web services are all available through the AusGIN Geoscience Portal. In this web portal, geological data such as boreholes, mineral occurrences, mines and commodity

resources can be analysed and downloaded in CGI-standard formats.

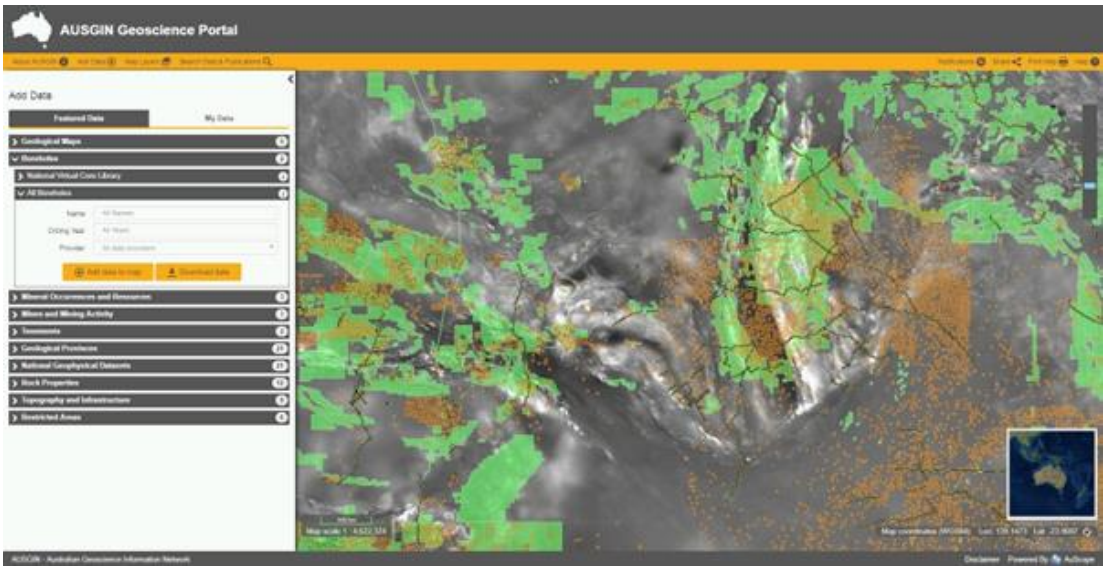


Figure 2. The redeveloped interface of the AusGIN Geoscience Portal

GGIC and AuScope hold regular online technical workshops via videoconference and face-to-face training of geological survey staff in the use of CGI standards to deliver data. The AusGIN website includes links to all CGI and OGC geoscience data standards to promote their use.

GGIC have recently established two new working groups to further the influence of data standards in Oceania:

1. A working group to develop an Oceania data standard for delivering inorganic geochemistry data from all data provider agencies. This data standard will be heavily influenced by the CGI/OGC GeoSciML standard and the OGC's Observations and Measurements data standard.

2. A working group to coordinate the implementation of geoscience data standards to petroleum-related geoscience data. Until now, GGIC has been focused on minerals-related data management and delivery. But now GGIC hope to apply their minerals data experience to petroleum-related data.

2. Engagement in OneGeology

GNS New Zealand and Geoscience Australia continue to provide GeoSciML-standard national scale geological datasets to OneGeology. GNS Science's New Zealand OneGeology web service received 5-star accreditation in April 2018. The service provides layers for the 1:1 000 000 Geological Map of New Zealand and 1:250 000 geological map of southern Victoria Range, Antarctica.

The GNS Science-led project compiling “best available” geological map data for Antarctica, supported by the Scientific Committee for Antarctic Research, involving Geoscience Australia and many other geological surveys from around the world, has made excellent progress. The compilation has been completed at its first pass for many regions of Antarctica, with a data structure aligned to the GeoSciML geology data model utilising CGI-IUGS vocabularies. Options for delivering the dataset are being explored; one possibility is that they will be exposed as web service layers including to the OneGeology Portal if there are no intellectual property and copyright issues. Delivery should occur before June 2019.

3. Engagement in CGI Working Groups

Geoscience Australia and GNS New Zealand continue to have a strong presence in CGI working groups, notably the Geoscience Terminology and ERML Working Groups. In particular, the experience of GA in building their own ERML mineral resources web services led to significant improvements in the ERML and ERML-Lite data standards during 2018.

As part of its contribution to IUGS CGI, Geoscience Australia (GA) continues to host the suite of CGI GeoSciML and EarthResourceML websites, and the CGI's geoscience vocabulary service. The CGI vocabularies are also available through the Research Vocabularies Australia website. GGIC also coordinates the contribution from Australasian geological surveys to CGI working groups, most notably the Geoscience Terminology Working Group, of which Mark Rattenbury (GNS NZ) is chair.

ERML Working Group meeting, Vancouver, June 2018. L-R: Michael Sexton (Geoscience Australia), Zhang Minghua (China Geological Survey), James Passmore (British Geological Survey), Wang Yongzhi (Jilin University, China), Ollie Raymond (Geoscience Australia)

(by Ollie Raymond)

8. Main problems encountered

The World's economic and political crisis is having strong impact on monetary support for regional activities of the CGI, in South America and of GIRAF for instances.

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.

The CGI Council acknowledges the financial plight of representatives from lesser foundations, and that travel expectations of council members should not be applied as strictly to them. While every effort should be made by all council members to attend annual meetings in person, if this is not possible, then Council members are expected to participate in meetings via teleconference.

Also other outreach activities are often being organized synergistically, based on any opportunities given, rather than merely on medium term planning.

Another difficult issue is to find a common way 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.

9. Annual Financial Report

- *2018 Transaction Summary*

The CGI started with a balance of AUD 33,337.35 on 1 December 2017. IUGS allocated an operating grant of **USD 2,500** (AUD3244.23) to CGI in 2018, a significant decrease on previous years.

Two significant expenditures occurred in the past 12 months:

1. A contract paid to the British Geological Survey (BGS) to apply multiple language translations to existing CGI vocabularies, building on previous work undertaken by European and Asian multi-lingual thesaurus working groups - AUD 16,197.88 (GBP 8,684.20).

This funding of this significant project was made possible through the saving of several years' worth of annual IUGS grants.

2. The CGI was targeted by an international criminal syndicate who stole the identities of two CGI committee members (CGI chair Francois Robida and Argentinian councilor Gabriel Asato) to secure the fraudulent transfer from the CGI account of AUD 2,935.00. This elaborate fraud has been reported to the police in France and Australia, but it is not expected that the money can be recovered.

The CGI balance of funds at 5 December 2018 is AUD 17,437.11 (approximately USD 12,824).

Date	Description	Debit (AUD)	Credit (AUD)	Balance (AUD)
1/12/2017	Balance carried forward			$33,337.35
20/12/2017	International Transfer Fee	$10.00		$33,327.35
20/12/2017	International transfer - BGS vocabulary contract - payment 1	$8,051.36		$25,275.99
30/12/2017	Monthly Interest		$2.56	$25,278.55
31/01/2018	Monthly Interest		$2.14	$25,280.69
28/02/2018	Monthly Interest		$1.93	$25,282.62
31/03/2018	Monthly Interest		$2.14	$25,284.76
30/04/2018	Monthly Interest		$2.07	$25,286.83
31/05/2018	Monthly Interest		$2.14	$25,288.97
27/06/2018	IUGS Annual Grant		$3,244.23	$28,533.20
27/06/2018	International Transfer Fee	$15.00		$28,518.20
29/06/2018	International Transfer Fee	$10.00		$28,508.20
29/06/2018	International transfer - BGS vocabulary contract - payment 2	$8,146.52		$20,361.68
30/06/2018	Monthly Interest		$2.06	$20,363.74
31/07/2018	Monthly Interest		$1.72	$20,365.46
31/08/2018	Monthly Interest		$1.72	$20,367.18
29/09/2018	Monthly Interest		$1.67	$20,368.85
31/10/2018	Monthly Interest		$1.72	$20,370.57
16/11/2018	Internet Withdrawal internet fraud	$1,528.00		$18,842.57
16/11/2018	Western Union 1831985975742211 internet fraud	$1,507.00		$17,335.57
16/11/2018	Western Union 18319856752358402 internet fraud fee	$6.00		$17,329.57
16/11/2018	Internet Withdrawal internet fraud	$1,407.00		$15,922.57
19/11/2018	Western Union 18319856752358402 internet fraud fee recovery		$6.00	$15,928.57
19/11/2018	Western Union 18319859757422102 internet fraud recovery		$1,507.00	$17,435.57
30/11/2018	Monthly Interest		$1.54	$17,437.11
5/12/2018	BALANCE			$17,437.11

TRANSACTION SUMMARY - 2018	Debit (AUD)	Credit (AUD)	
IUGS grant		$3,244.23	
Interest		$23.41	
Payment for services	$16,197.88		
Bank fees	$35.00		
Internet fraud loss	$2,935.00		
2018 TOTALS	$19,167.88	$3,267.64	-$15,900.24

- *2019 Budget*

Income

- CGI expects a similar operating grant from IUGS in 2019 (USD 2,500 in 2018).

Expenditure

- BGS maintenance of CGI website - approximately AUD 4,000 (GBP 2,500)
- Advertising and promotion of CGI data standards - amount to be determined

10. Work plan for next year

- Actively participate and to paly important role in IUGS Deep-Time Digital Earth program
- 3D group of CGI/OGC. Continue to push forward the Joint CGI/OGC Geoscience Domain Working Group work, especially a strategy work plan for CGI within the DWG.
- Continue to push forward the implementation of GeosciML after becoming an OGC Standard.
- Continue the development and implementation promotion of EarthResourceML.
- Continue to push forward promotion of CGI products and to draft a marketing plan.
- Update and enrich the CGI website.
- Take measures to publish the CGI newsletter regularly.
- Take measures to publish more publications of CGI related issues within IUGS "Episodes".
- Represent the IUGS in Geoscience information matters
    - More effective connection with CODATA
    - Eenhanced relation with RDA
- Councils to complete a draft 4-year future action plan of CGI in his region and working group for a more visible CGI.
- Next CGI Council meeting will be held in Madrid, Spain from the 6th to the 10th of May 2019 with GIC meeting. But in Leuven, Belgium in 17th June 2019 would be the second choice.

11. Critical milestones

- Official creation of CGI/OGC Geoscience Domain Working Group and two sessions of GeoScienceDWG held in 2018.

The GeoScience Domain Working Group aims to connect people interested in this topic to develop, improve and promote technologies for GeoScience data description and sharing. This working group is to be hosted by the OGC and co-chaired with CGI / IUGS.

12. Budget for 2019 and potential funding sources

CGI Council expects a similar budget to that provided by IUGS in previous years.

Through the budget form IUGS is not sufficient for the next year 11 main activities/events, CGI will search for outside support from both Council organizations and in collaboration with regional activities to uphold and realize its annual goal.

Obviously, the CGI is now at a well-recognized established position in the international geoscience information community and represents IUGS well on geoscience information matters.

13. Objectives and work plan for the next 5 years

- Actively participate and take responsibility in the IUGS-recognized 'Big Science Program' of Deep-Time Digital Earth (DDE) by providing standards, tools and methodologies to support harmonized Deep Time data in a convenient form to science, public and industry, i.e. to provide insights into the distribution and value of earth's resources and materials, as well as hazards.
- Play a more visible role in coordination of regional initiatives, e.g. by organizing workshop and training courses on geoscience information management, standards and language.
- Continue to push forward GeoScienceDWG in developing interoperability of 3D - 4Dgeosciences data models.
- Catalyze productive alliances between geo-information bodies, including OGC, CODATA, RDA;
- Stimulate progress in development and application of standard geoscience concepts and their representation in multiple languages.
- Promote international use of data exchange standards (especially broad adoption of GeoSciML and EarthResourceML,) in regions, commissions,

countries, and organizations in collaboration; Facilitate outreach, knowledge transfer and take-up of best practice in geo-information (e.g. with the South America initiative, the Asia initiative, and the GIRAF).

- Enhance collaboration with other IUGS commissions, e.g. ICS.
- Prepare a CGI geoscience information symposium at IGC 2020 in India.

14. Suggestions for improvement of IUGS activities

- It would be excellent, if a common way could be found to open CGI accounts not as a private person in order to establish a transparent process of the use of IUGS resources to support CGI activities.

- It would be helpful if IUGS Council can continue to approve CGI's management of annual IUGS allocations to provide the best value for the application of international standards in geoscience data, for a single year's funds from the IUGS is insufficient to do significant work.

  In order to engage contractors to do worthwhile development work, as well as pay for website maintenance and a CGI presence at major conferences (eg, IGC), multiple years of the small amounts of IUGS funding must be saved to create a large enough funds base. For instance, this year CGI spent over USD 11,000 to engage a contractor to insert multi-lingual translations of geological terms into CGI's standard vocabularies. This valuable work was only possible through CGI saving IUGS allocations over several years.

15. Conclusion

As a commission of IUGS for geosciences information, CGI has been very successful in the past 2018 for several big events in geoinformation sciences and milestone achievements in geo-data standards, successful thematic session at RFG2018, local organizations like Asia with several successful regional geoinformation cooperation projects, and a significant increase of CGI members worldwide, etc. We would like to express our thanks to all members of the CGI and its regional and the working groups, and also to the members of the IUGS Executive for their help and encouragement. We are looking forward very much to a continuous productive cooperation in 2018.

CGI Council, 30 December, 2018.

16. Contact – CGI Council members

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