



CGI ANNUAL REPORT 2016

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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,
- for 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 geoscience information matters, provides the means for transferring geoscience information and systems, assists international dissemination of best practice 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. Organization, Council members and officers

Council Officers 2016-2020

The CGI Council members are:

- François Robida (Chair) – France
- Zhang Minghua (Co-Secretary General)– China
- Kombadayedumhopjeni (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:

- GeoScienceML Working Group (GeoSciML) – Oliver Raymond – Australia
- EarthResourceML Standard Working Group (ERML) – Jouni Vuollo, Finland
- Geoscience Terminology Working Group (GTWG) – Mark Rattenbury, New Zealand
- Geoscience Information in Africa - Network (GIRAF) – Kristine Asch, Germany

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 is CGIsecretariat@mail.cgs.gov.cn.

Council web presence

The CGI Council provides constantly the necessary updates to the Council web presence. The intent of the CGI web site, which is 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. <http://www.cgi-iugs.org>

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 252 members in 65 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 organizations that

pay the salaries and expenses of CGI Council and members, the CGI does not receive additional support. Sometimes CGI workshops are co-organized by other organizations such as the UNESCO, the German Federal Ministry for Economic Cooperation and Development (BMZ), the Geological Survey of Namibia, Australian Aid, SEGEMAR, the United Nations Development program, SEAMIC or Development Research Center of China Geological Survey who have been contributing to the events.

5. Interaction with other international projects

The CGI, in collaboration with OGC, is continuing to review Geoscience ML (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.

News

The GeoSciML version 4.0 data transfer standard was recently accepted by a unanimous vote of the Open Geospatial Consortium (OGC) Technical Committee. This significant milestone cements GeoSciML's place as an international geological data transfer standard.

The v4 data standard now has three levels. 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.



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 2016 is mainly to promote the newsletters that was circulated in January and December.

More space on the page will be focused on CGI activities and major events and news of global geological science information and news from IUGS in the future.

The screenshot shows the CGI website homepage. At the top left is the CGI logo with the text "Commission for the Management and Application of Geoscience Information". To the right is the GeoSciML/IUGS logo. Below the header is a navigation menu with links: Home, About Us, Join CGI, Data Standards, Publications, Useful links, and Contact Us. The main content area is divided into several sections:

- Welcome to the CGI:** A section with a "Join Now" button and text describing CGI's mission to foster interoperability and exchange of geoscience information.
- Current Working Groups:** A list of working groups including GeoSciML, EarthResourceML, Geoscience Terminology, and Geoscience Information in Africa (GIRAF).
- 35th International Geological Congress:** A section reporting on a successful symposium in Cape Town, mentioning over 40 presentations and a workshop on geoscience web services.
- News:** A section with two news items:
 - GeoSciML data transfer standard:** Announcing its acceptance by the Open Geospatial Consortium (OGC) Technical Committee.
 - Dr Stephen Richard:** Reporting on his recent award of the 2016 IUGS Science Excellence Award.
 - Ollie Raymond:** Reporting on his visit to the China Geological Survey (CGS) in Beijing to present on geoscience information standards.

The website content continues to be coordinated by Ollie Raymond. The British Geological Survey (BGS) hosts the CGI website: Future work required on the website includes:

- further update the "Commission Documents" pages to include most recent documents.
- minor updates to Working Group pages to keep their content current.

Google Analytics continues to provide a wealth of information about the number of visits and the behavior of people visiting the website. Detailed website statistics for the period October 2014 - October 2016, and a comparison with the previous 12 months shows that there is more than double the amount of visitors than that of last year.

Key statistics:

- Greatly increased website visits in the past 12 months
 - 8,425 visits
 - 7,329 users
- But, significantly less time spent on the website per visit
 - visitors opened an average of 1.6 pages per session, down from an average of 2.5 in the previous year
 - average time per visit decreased to less than a minute
 - 90% of all traffic spent less than a minute on the website (up from 81% last year)
 - 82% of visitors did not progress beyond their landing page
- Of the visits where a country of origin could be determined (>90%), the increase in traffic was concentrated in:

- Russia (2,127 visits, 25% of total visits, up from only 2% in the previous year)
- USA (1,645 visits, 20% of total, up from 14%)
- Brazil, China, Japan and Italy also saw very significant increases in visits
- An unusual increase in visits occurred between April and August 2016, with traffic increasing from an average of ~10 visits per day to up to ~100 per day at the peak of activity in June 2016. Almost 50% of all website traffic during this time originated from Russia.
- 96% of sessions were from desktop devices (up from 93% last year). Mobile and tablet platforms continue to be a very small fraction of the market for the CGI website.

The website's Home page is still by far the most popular page and point of entry to the website (60% of all page views, and 75% of all landing pages) so we must continue to be sure that it contains our most critical information, displayed prominently. Outside of the homepage, the most popular content on the website is the GeoSciML SWG (936 views), followed by the "About Us" and "Data Standards" information pages (~500 views), and the Geoscience Terminology (456) and EarthResourceML (224) Working Group pages.

CGI Newsletter

Only one CGI newsletter was circulated to CGI members, in January 2016, due to Ollie Raymond's increased work commitments to his employer, Geoscience Australia. It would be beneficial to CGI publicity if another CGI Council member could take on the task of producing two or three newsletters per year, especially now that there is a standard template that can be used for the newsletter.

CGI LinkedIn group

The CGI LinkedIn group was created in October 2014 and currently has 53 members. There has been negligible activity on the LinkedIn group, but it remains a viable option for CGI communications should Councilors or members wish to use it.

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

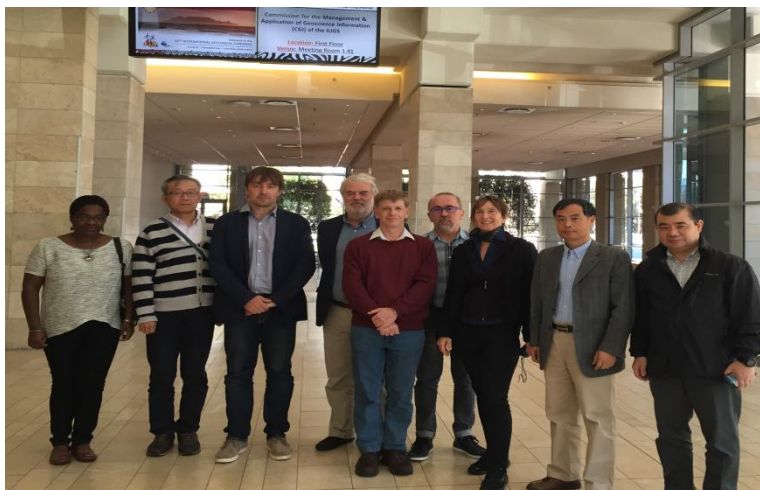
GIRAF network: <http://www.giraf-network.org>

7. Chief accomplishments and products

CGI Council

CGI Council Meeting in South Africa during 35th Congress

The 2016 meeting of the CGI Council took place on 29 Aug. and 3 Sep. 2016 in Cape Town, South Africa, during the 35th International Geological Congress, with the help of the 35th IGC.



CGI Council Meeting in CapeTown, South Africa, .30Aug and 3Sep. 2016.

The meeting was separated into 2 parts in two days accordingly.

Part 1 is on 29 Aug. 2016 in Cape Town Congress Centre by participants Francois Robida, Kristine Asch, Ollie Raymond, Gabriel Asato, Zhang Minghua, Kazu Miyazaki, Mark Rattenbury, TomascNalencz, KombadaMhopenji, Robert Tomas andJouniVuolli, and Harvey Thorleiffson as observer.Part 1 is on 3 Sep. 2016 in Cape Town Congress Centre by participants Francois Robida, Kristine Asch, Ollie Raymond, Gabriel Asato, Zhang Minghua, Kazu Miyazaki, KombadaMhopenji, Robert Tomas and JouniVuolli.

Among the discussed issues especially the following subjects were important:

- **Election of CGI Board (Executive Committee members)**

The CGI councils at the meeting elected new CGI Executive Committee board members as follows.

Chair: François Robida

Co-Secretary General: Zhang Minghua andKombada Mhopjeni

Treasurer: Oliver Raymond

Kristine Asch had to leave the council due to her election as vice-president of IUGS.

- **Common issues concerned discussion**

Participants of this CGI council meeting discussed some important and common issues and pointed out actions as the followings.

- o 3D working group setting up activities since 2014 Beijing meeting by François;
- o CODATA connection by Robert Tomas;
- o Google-drive problem in China;.
- o GeosciML implementation by commercial software vendors like ESRI and MapInfo;
- o marketing plan of CGI products.
- o relation with RDA

- **Near future actions**

- o Ollie Raymond to open an account in Geosciences Australia or Australia before December 2016 so as for François Robida to transfer the CGI money to him as the new treasurer.
- o Kristine to send CGI member list and other related information to Zhang Minghua and Kombada Mhopjeni.

- o Preparation for RFG2018. Francois and Zhang take action to contact RFG2018 organization committee ask for a CGI session.
- o 3D group of CGI. Francois continue to push forward to setup a collaborating working group on 3D geosciences data.
- o Robert to draft a introduction of CGI product promotion before the end of Dec.2016.
- o All the CGI council are asked to think about the future action plan of CGI and his regional activities on CGI-IUGS related and were encouraged to send emails to the new secretary general in time.
- Next CGI Council meeting time and place
CGI-IUGS council meeting will be held in June 2017 in Vienna together with GIC.
- Leaving speech by Kristine Asch.
Kristine expressed her happiness that worked together with such a constructive and excellent team since 2002. She was a delight to work with the last Council and regret that she have to leave the CGI Council Commission in order to fulfill her up-coming as IUGS Vice-president. And all the participants expressed their hope for Kristine to attend CGI-IUGS council meeting as a former secretary general and at least attend the terminology working group meetings as a group member. The CGI councils hope Kristine can support and work together with CGI as in the position of IUGS Vice-president.

CGI at the 35th IGC in South Africa

The CGI, in conjunction with the GIC, jointly organized a Geoscience Information 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:

- 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.
- Information Management - Interoperability and Standards. 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.
- Data analysis, Delivery, Dissemination and Exploitation of Geoscience Data and Information, Tools – software 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.
- Multi-dimensional modeling and visualisation of solid earth models - 2D, 3D, 4D, nD. This session is dedicated to best practice, methods and issues when building and delivering geological solid models.

- Geoscience Information and Data in Africa. Geoscience organizations in Africa possess 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.
- 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.

Symposium at the 35th International Geological Congress

A successful geoscience data and information systems symposium “Working with Interoperable Geoscience Data” was held at the 35th IGC in Cape Town. Over 20 presentations and a practice on Building Geoscience Web Services were given on a wide range of digital geological data management, data analysis, and data delivery topics.

More than 20 people attended the CGI workshop on geoscience web services. Presentations were given by the leaders of all the CGI/OGC working groups, and experts from the OneGeology and INSPIRE projects.



CGI symposium in Cape Town, South Africa, 27 Aug. 2016

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, Czech Republic, Finland, France, Germany, Italy, Japan, Netherlands, New Zealand, Poland, Portugal, Russia, Sweden, UK, and USA. Of these, less than 10 members are active contributors to development and testing work for GeoSciML v4.

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.

Meetings

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 organized to coincide with meetings of the CGI EarthResourceML and Geoscience Terminology working groups.



Screen shots of ad hoc meeting of OGC TC, OneGeology and CGI. June, 2016

Data Model Development and Documentation

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.

GeoSciML file repository and website

The SWG continues to maintain a Subversion file repository hosted gratis by CSIRO in Perth, Australia. This file repository holds all UML models, schemas, and documentation for the entire history of GeoSciML development, and enables shared editing by many SWG contributors.

The GeoSciML website (www.geosciml.org, schemas.geosciml.org) is also hosted by CSIRO. The

only cost to CGI in this arrangement is the very small ongoing fee for the “geosciml.org” hostname. The website contains the published XML schemas and data model documentation for GeoSciML and GeoSciML-Portrayal, and cookbooks for using GeoSciML in web services. The website content is managed remotely by Ollie Raymond from Geoscience Australia in Canberra. The only new content on the GeoSciML website in the last 12 months has been the addition of the RC schemas for GeoSciML v4. These schemas have not been officially released to the public (ie, a “soft” release only) but can be used by SWG members to test GeoSciML v4 web services.

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

- <https://www.geosciml.org> (public website with schemas and data models)
- 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)

Uptake of GeoSciML

There continues to be uptake of the GeoSciML data standard (particularly GeoSciML-Portrayal) in national and provincial Geological Surveys, mainly through its adoption by data sharing communities such as OneGeology (global), INSPIRE (Europe), USGIN (USA), AuScope (Australia), and GWIN (Canada). Feedback and requirements from these user communities has largely driven the design and publishing schedule for GeoSciML v4.

Future of the GeoSciML SWG

It is likely that following publication of GeoSciML v4 as an OGC Specification, the GeoSciML SWG will transform into a Revision Working Group (RWG) which will collect change requests (CR's) from users and evaluate potential bug fixes for the standard. At this stage, it is not planned to undertake additional development work on the GeoSciML data model.

Future work in areas related to GeoSciML (eg, the use of GeoSciML in the delivery of 3D geological information; the use of the SWE Common data model to deliver geochemical data related to geological specimens) may be carried out in new working group(s) under a CGI or combined CGI/OGC purview.

Active Participation of SWG Membership

While the numbers of SWG members and observers is strong, the number of actively contributing members continues to be very small as previously active members are increasingly diverted on to the work requirements of their employers (notably Ollie Raymond and Steve Richard in 2016).

GeoSciML as a Global Standard

Ongoing diligence is required from all SWG members to ensure that major providers of geoscientific data support the GeoSciML data standard by using it as intended – as a truly global data transfer standard. In particular, where an agency's requirements are not met by GeoSciML, SWG members should encourage those agencies to work with the SWG to improve or extend

GeoSciML (e. g.INSPIRE), and not attempt to establish local parallel data standards.

Geoscience Terminology Working Group

Membership

The membership of the group has risen from 23 to 27 members over this last four year period. Members come from Australia, Brazil, Canada, China, 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 modeling 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.

Meeting

Steve Richard as inaugural chair accepted volunteers for membership and organized 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.

Operation

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 reviewed 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.

Work achievements

Five vocabularies have been collated, debated, reviewed and adopted since 2012 to support TheGeoSciML 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.

<p>alterationTypeTerm compositionCategory compoundMaterialConstituentPartRoleTerm consolidationDegree contactCharacter contactTypeTerm conventionCode descriptionPurpose determinationMethod eventEnvironment eventProcessTerm faultDeformationStyle faultMovementSenseTerm faultMovementTypeTerm faultTypeTerm featureObservationMethod foliationTypeTerm geneticCategory geologicalTimescale geologicUnitMorphology geologicUnitPartRoleTerm geologicUnitTypeTerm lineationTypeTerm lithologyConcept mappedFeatureObservationMethod metamorphicFacies metamorphicGrade orientationDeterminationMethod particleAspectRatio particleShape particleTypeTerm proportionTerm simpleLithologyTerm sorting stratigraphicRankTerm strikeDipMeasurementReportig valueQualifier vocabularyRelationTerm</p>	<p>Adopted (pre 2011)</p>	<p>classificationMethodUsedValue commodityCodeValue earthResourceExpressionValue earthResourceFormValue earthResourceMaterialRoleValue earthResourceShapeValue endusePotentialValue environmentalImpactValue explorationActivityTypeValue explorationResultValue geologicHistoryRelationshipTerm importanceValue linearDirectedCode mineralOccurrenceTypeValue mineStatusValue miningActivityTypeValue processingActivityTypeValue rawMaterialRoleValue reserveCategoryValue resourceCategoryValue samplingFrame UNFC_Value_2009 wasteStorageTypeValue</p>	<p>Adopted (since 2012)</p>	<p>ageEvent ageSystem beddingPattern beddingStyle boreholeDrillingMethodCode boreholeInclinationCode boreholePurposeCode boreholeStartPointCode colour fabricTypeTerm foliationIntensity isotopicEventType isotopicSystemName lineationIntensity materialClass mineralDepositGroupValue mineralDepositTypeValue naturalGeomorphologicalFeatureTypeTerm outcropCharacter planarPolarityCode productValue regionalLithUnit samplingMethod specimenType</p>	<p>Draft</p>	<p>importanceSize mineralDepositType miningWasterType mineralDepositGroupValue</p> <p>In review</p>	<p>alterationDegree alterationDistribution analyticalMethodTerm anthropogenicGeomorphologicalFeatureTypeTerm associationType boundaryRelationshipTerm compositionPartRole continuity definingElement definingElement definingStructureRelationshipTerm deformationStyleTerm exposureColor extractionMethod foldProfileTypeTerm geneticModel geochronologicEraRank geologicSamplingMethodTerm geologicSpecimenPreparationTerm geologic unit lithology categories geomorphologicRelationshipTerm hingeLineCurvature hingeShape instrumentTypeTerm interLimbAngle limbShape materialRelationshipType nameOfMeasureTerm nonDirectionalStructureTypeTerm physicalPropertyTerm relationRoleTerm samplingFeatureRelation statisticalMethodTerm supergeneProcessType symmetry</p>	<p>Proposed and/or required</p>
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Vocabulary adopted by GTWG and predecessor groups, and work in progress.

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.

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.

EarthResourceML(ERML) Standards Working Group

Membership

The membership of the group has been 7-8 and they came from Australia, New Zealand, France, USA,Sweden, Great Britain and Finland. JouniVuollo (GTK) is acting in the role of Chair of the SWG from2013. Previous chair has been Bruce Simons from CSIRO. Membership is now defined and managedthrough a Google Group with membership rights administered by JouniVuollo.

Meetings

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 CGIGeoSciML and Geoscience Terminology working groups.

Data Model Development and Documentation

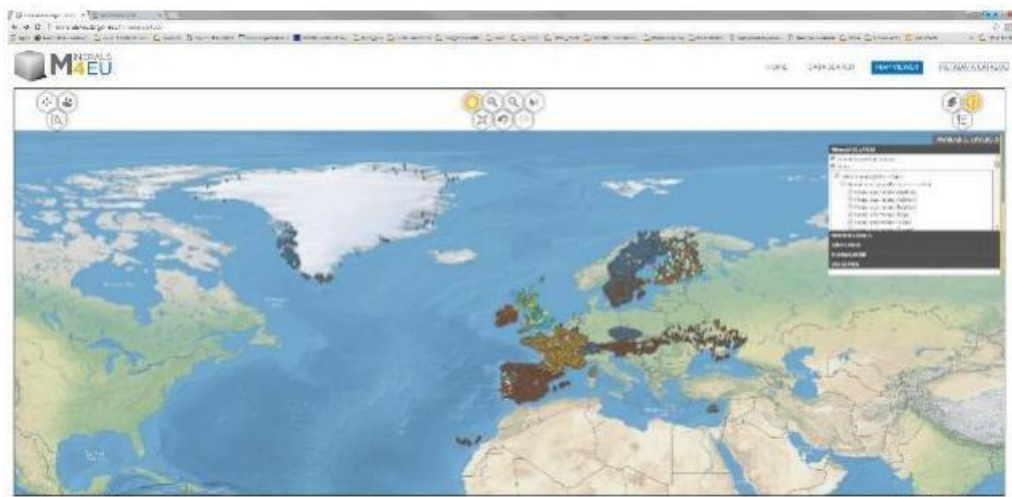
EarthResource Lite version was accepted August 2016 and released August 2016 and included toIGC35th presentation.EarthResourceML Lite delivers a simplified flat view of key elements of the fullEarthResourceML data model. It can be used to standardise delivery of mineral resource data via WebMap Services (WMS) and simple features Web Feature Services (WFS SFO).

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

- <http://www.earthresourcml.org/> (public website with schemas and data models)
- http://external.opengeospatial.org/twiki_public/GeoSciMLswg/WebHome (public wiki withminutes and actions of meetings), and
- <https://www.seegrid.csiro.au/subversion/xmml/GGIC/> (Subversion working documentrepository)



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



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

ERML and INSPIRE

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.



CGI'S REGIONAL GROUPS

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

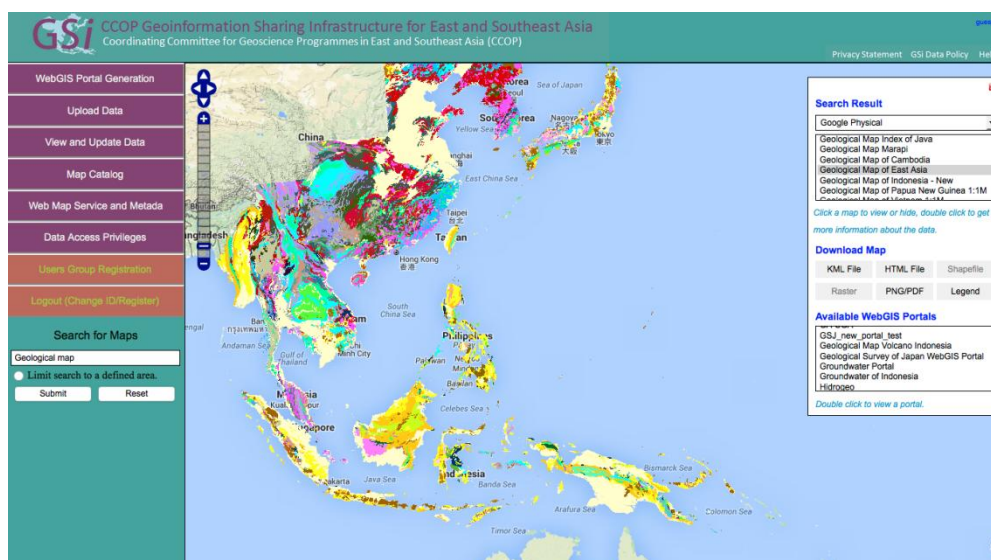
covering East and Southeast Asia is ongoing. The Geological Survey of Japan (GSJ) provides the leadership in the implementation of the project with the cooperation of the Coordinating Committee for the Geoscience Programs in East and Southeast Asia (CCOP) member countries. CCOP and GSJ is currently implementing 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.



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

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.

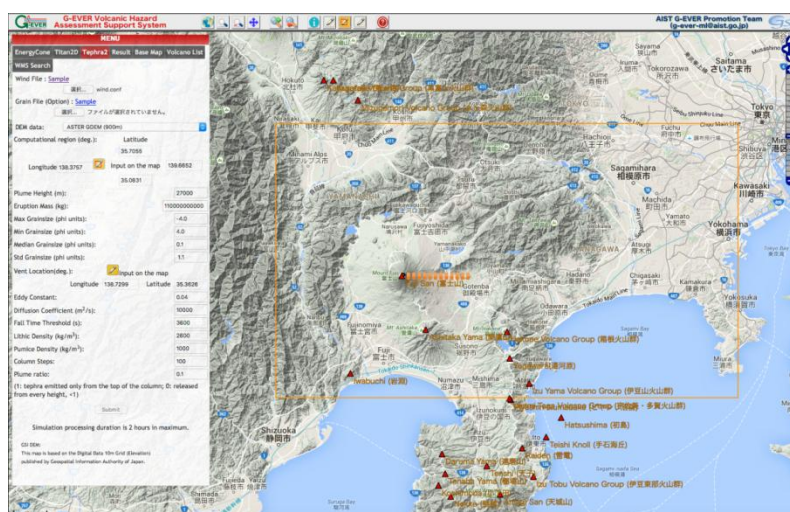
(4) Asia-Pacific Region Global Earthquake and Volcanic Eruption Risk Management (G-EVER)

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>). It was established in 2012 with the objective of formulating strategies to reduce the risks caused by the occurrence of earthquakes, tsunamis and volcanic eruptions worldwide. G-EVER provides two web based information systems that are useful for the reduction of risks caused by earthquakes, tsunamis and volcanic eruptions. These are the Earthquake and Volcano Hazard

Information System (<http://ccop-geoinfo.org/G-EVER/>) and the Volcanic Hazard Assessment Support System (Fig. 2; <http://volcano.g-ever1.org/>). The two applications provide users information needed in assessing the risks about volcanic eruptions and earthquake occurrence. They also provide spatial data analysis platform which is needed in mapping and identifying areas that would be affected by the occurrence of the aforementioned geological hazards. The G-EVER volcanic hazard assessment support system (<http://volcano.g-ever1.org/>), which has been developed based on eruption history, volcanic eruption database and numerical simulations, is a user-friendly online system that delineates areas prone to volcanic eruptions.

It also estimates the volcanic hazard risk at specific locations such as major roads, residential zones and evacuation areas by overlaying the distribution of volcanic deposits on a GIS-enabled map. For the hazard assessment of gravity currents, the Energy Cone and Titan2D simulations are available. Potential risk of ash fall for a volcano can be assessed with the Tephra 2 on the system, which numerically simulates Tephra fall hazard. The system can be used to assess the potential risks of all volcanoes in the world using the ASTER Global DEM (10m resolution in Japan). The WMS, WPS and WCS technologies are used on this system.

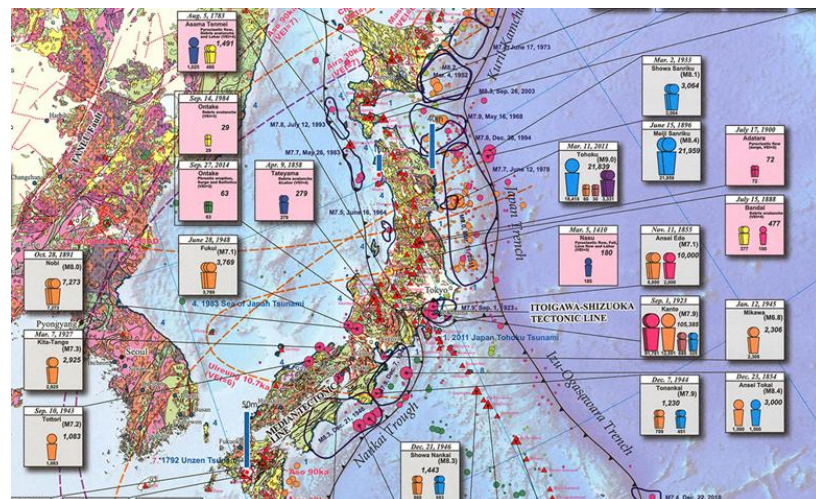
The Eastern Asia Earthquake and Volcanic Hazards Information Map, published in 2016, is a collaborative product of the G-EVER Promotion Team organized in the Geological Survey of Japan, AIST and several geological institutes in SE Asia. The Map contains an extensive of information about geohazard in 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 tool and is very useful in their mitigation.



G-EVER Volcanic hazards assessment support system showing the ash fall simulation at Mt. Fuji using Tephra2.



Eastern Asia Earthquake and Volcanic Hazards Information Map



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 (64MB).

Document: 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.

(6) 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.



(7) Digital Geological Mapping Capacity Building Activities for ASEAN

The 6th training course on geological mapping capacity for ASEAN by China Geological Survey (CGS) on 26 Oct, 2015 in Nanjing China to be very successful, see figure 4. 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

(8) Digital Field Geological Mapping Training in Laos

China Geological Survey 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.



Digital geological mapping training in Laos,2016

(9) Digital Field Geological Mapping Training in Malaysia

CGS staff helped Laos in field geological mapping with digital technology in Nov.13-22, 2016 in Malaysia, funded by China government and with gracious assistance of the Minerals and Geoscience Department of Malaysia, with a 4-day indoor training course and 5 days fieldwork on digital geological mapping on a demonstration zone in a selected area, see figure 13.



Digital geological mapping training in Malaysia,2016



Digital geological mapping training in Peru, 2016

(10) Digital Field Geological Mapping Training in Peru

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 8. 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.

(11) CCOP-CGS Capacity Building on Geophysical and Geochemical Data Processing (IGDP)

The 3rd CCOP-CGS capacity building for geophysical and geochemical data processing (IGDP) was successfully held in Beijing, China in Nov., 2015, see figure 5. 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

(12) ASEAN-China Capacity Building on Geological Data Processing (IGDP)

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.



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

(13) Cross-border Geological Mapping Training for ASEAN

A 14 days Cross-border Geological Mapping Training Course (CGMTC) was completed in Chengdu in June, 2016 for ASEAN Countries by China Geological Survey for 19 geological technicians from Cambodia, Laos, Malaysia, Myanmar, Thailand and Vietnam, see figure 9. Aiming at enhancing friendly neighborhood between China and ASEAN countries, promoting pragmatic cooperation in geology and mining field and improving the geological mapping level of ASEAN countries, this training has established a platform for the geologists of China and ASEAN countries to share geological mapping technology and experience.



Group photo of ASEAN cross-border geological mapping training course in Chengdu in June,2016

(14)China-Mongolia joint Geochemical Mapping

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 10 for reference.

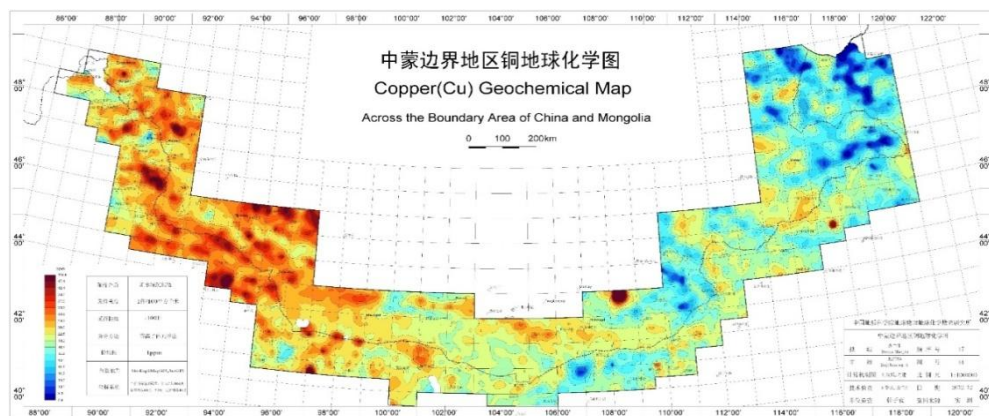


Fig 10. Copper geochemical map in China-Mongolia border region

(15) ASEAN Marine Geoscience Research and Geo-Hazards Reduction and Prevention Training
China-ASEAN marine geoscience research and geo-hazards 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 project. Technical trainings and workshops will be held in the second half of 2016 as planned.

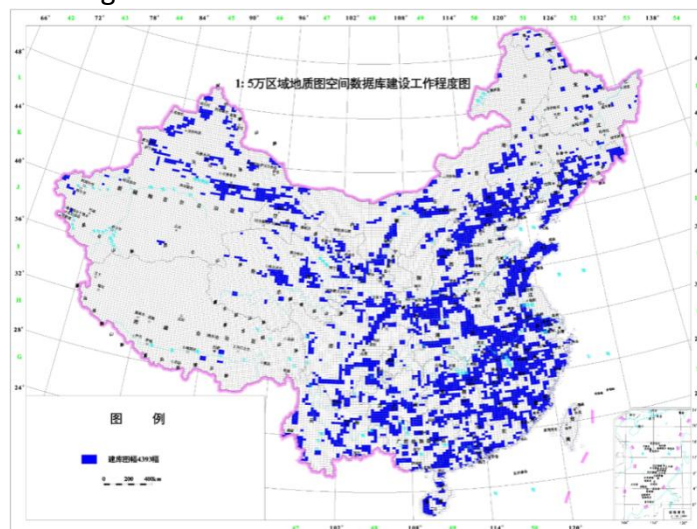
(16) Highlights of Geo-information Activity within China 2016

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.

- **Geo-database Achievements**

With the release of China 1:1 million 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 regarded 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.

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 130000 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.

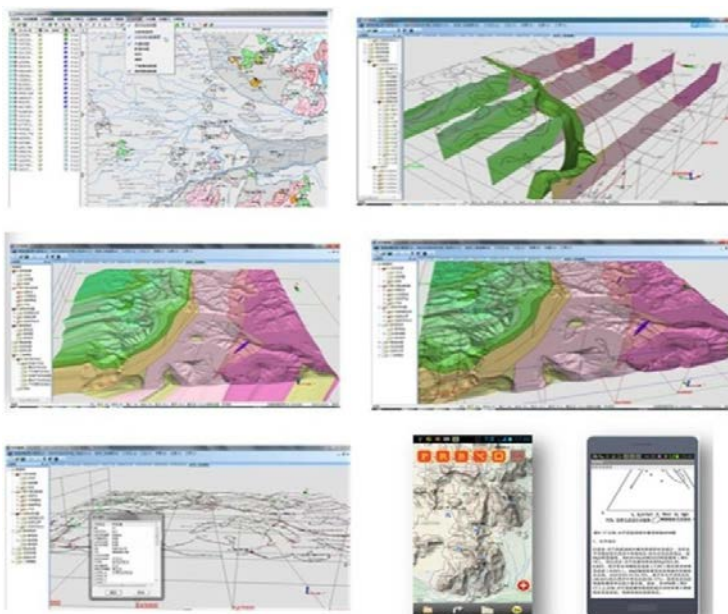
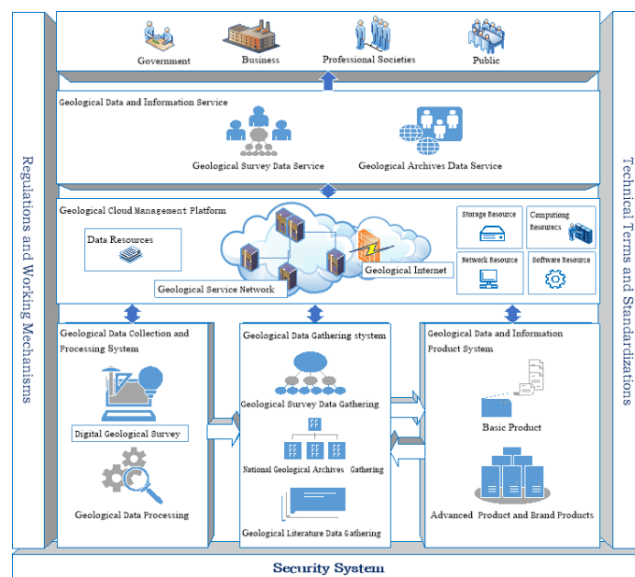


Distribution of 1:50,000 scale geological maps in China

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 (1:10 million) which reproduces the formation and evolution history of the Chinese mainland through ten tectonic epochs is also established.

• **Geo-database Management Platform**

Based on Cloud Computing and Big Data technology, a unified platform was designed to share computing, network and software resources and geological archive resources, so as to realize unified management and service, see figure 2. Using the geological survey web portal, with highlight of Internet+Geology philosophy, it will provide a synchronized management platform as well as a technical support to geological data collection, processing, integration, sharing and thematic services. Platform construction is still underway. Prototype of the infrastructure layer has been successfully accomplished and capacity for data collection, data processing and analysis will be further enhanced based on cloud architecture.



Intelligent 3D Geological Mapping and Modeling Technical System and Process

• **Information Technology development for Geological Survey**

Some new technologies for geological survey including geo-information management have been developed and put into application.

o 3D geological data exchanging standard is released.

o 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.

(17) UNESCO International Center on Global-scale Geochemical Baseline

UNESCO international center on global-scale geochemistry was officially established May 12, 2016, with an agreement signed between Ministry of Land and Resources (MLR) of China and UNESCO. More and larger scale globe geochemical data management and application will be enhanced.



Establishing ceremony of UNESCO center of globe-scale geochemistry on 12 May, 2016 in China

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 role of information technologies in GS activities at decision levels.

Meetings 2016

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

CGI council Gabriel Asatol attended to the Research Data Alliance (RDA) webinar. Simon Cox, former CGI-IUGS Council is member of the Technical Advisory Board of this organization.

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.



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 Ramirez, Maria Fernanda Almanza, Hans DIEDERIX, Fernando Alcarcel Gutierrez, Cesar Augusto Madrid y Alejandra Gomez.

OneGeology, GeoSciML and South America

After a long period of stagnation (SA have no representative in 1G during last time), 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. In the other hand Brasil is the only country in SA that publish its information in GeoSciML format.

Despite of these success stories there are still some challenging difficulties that act as deterrent of the adoption of IUGS-CGI standards:

- (1) Problem of enroll countries as principal members
- (2) Confusion about the aims and legal status of 1G
- (3) Territorial claims
- (4) Training and Skills in Information Technology and Interoperability.

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”.

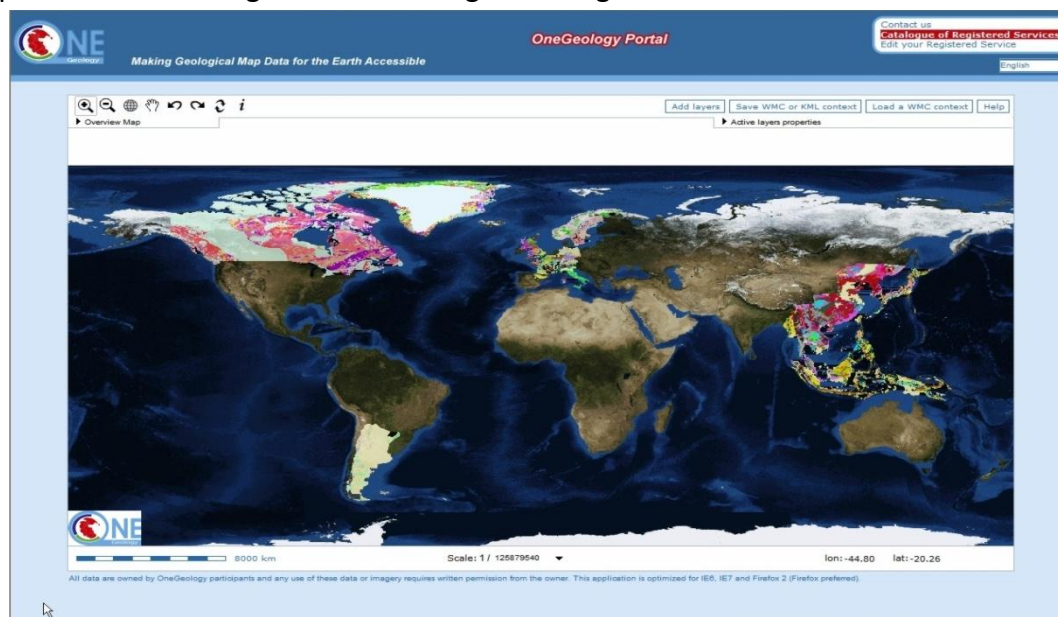
Training and Skills in Information Technology and Interoperability.

Since the beginning of this commission in 2004, SA Geological Surveys develop little by little corporate geoinformation systems like in Chile, BrasilandPerú. At present most of the SA countries understand what Web Mapping Service is thanks of the development of National Spatial Infrastructures in their countries but Web Feature Service (the standard where GeoSciML is based on) is still an issue. In my opinion there are still too much to do in SA in terms of promoting the development of interoperability standards. GeoSciML as IUGS standard only will thrive if ASGMI understand its importance.

Main problems encountered in 2013-2016

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 by a new foreign policy it seems that will be possible to have Argentina on-line again during 2017.



First look of the beginning of OneGeology

CGI in Africa

Geoscience Information and Data in Africa session - 35th International Geological Congress

The "Geoscience Information and Data in Africa" session, one of the six successful sessions in the "Geoscience Information Super-Symposium", was held on the 29th August at the 35th International Geological Congress in Cape Town, South Africa. African projects applying geo-information to better manage natural resources were showcased in this session convened by KombadaMhopjeni, Anna Nguno and Dr. Kristine Asch. Participants were treated to 13 diverse presentations on the handling of geospatial data in Africa.



Geoscience Information in Africa Network (GIRAF) handover at the 26th Colloquium of African Geology

GIRAF coordinator and former CGI Councilor Dr. Kristine Asch attended the 26th Colloquium of African Geology (CAG) in Ibadan, Nigeria in November. She facilitated the successful handing over of GIRAF from Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) to the African Mineral and Geosciences Centre (AMGC) at the transfer ceremony on Friday, 25th November. Since its inception in 2009, GIRAF has served as a platform for African geo-information experts to share information and experiences, and to facilitate the inclusion of African geoscience information experts into international initiatives and projects. GIRAF has more than 400 members from more than 30 African Countries and 12 non-African ones.

The new GIRAF Secretariat will be based in AMGC in Dares Salaam, Tanzania. The new GIRAF Council and Secretariat led by Dr. MesfinWubeshetGebremichael of SEAMIC, will invite new members to the network and continue promoting GIRAF to African member states. Kristine Asch will continue her association with GIRAF as a member of the Advisory board for the next four years.



Dr. Kristine Asch and Dr. MesfinGebremichael with GIRAF committee members



GIRAF handover ceremony delegates

CGI in Oceania

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).

- **Australian Geoscience Information Network and AuScope**

The most significant development in 2016 was 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.

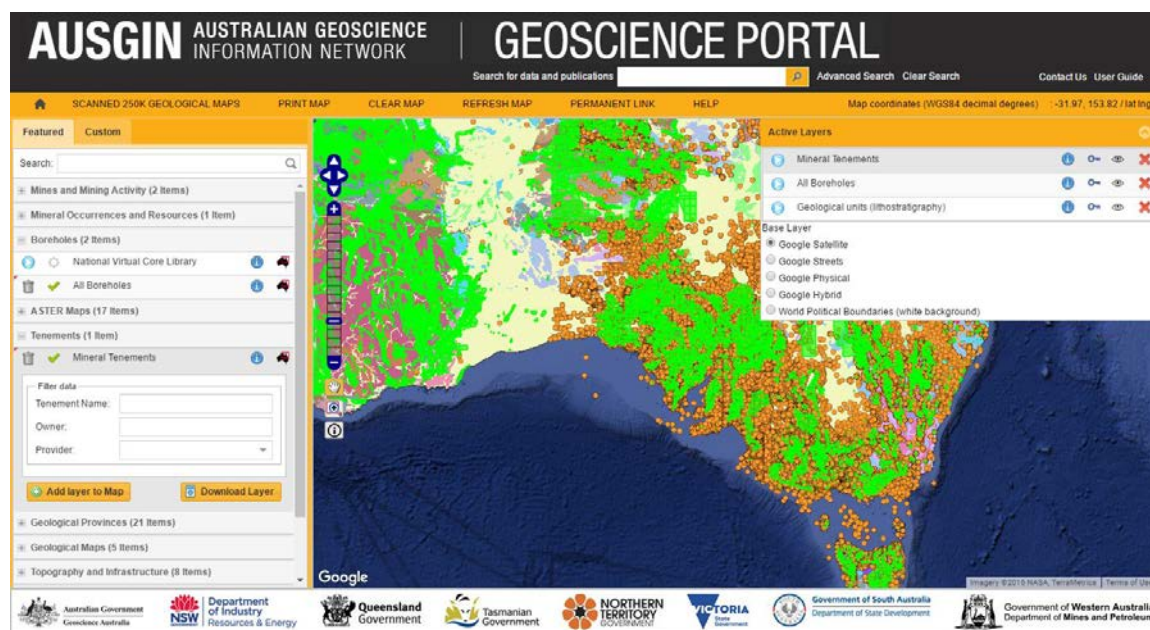
As part of AusGIN, Geoscience Australia will establish a vocabulary service to serve AusGIN-community-agreed geoscience vocabularies. The current CGI vocabulary services, which are hosted by CSIRO, will also be moved to the new Geoscience Australia vocabulary server in 2016-2017 in a move to guarantee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

- **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](#)).

- **GGIC Web Service Standards Development**

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.



The AusGIN Geoscience Portal was released in June 2016.

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.

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 modeling, 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.

International GeoSample Number (IGSN)

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

agencies are evaluating the IGSN system for their samples.

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.

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.

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 - recently retired from CSIRO, Australia (GeoSciML, ERML)
- Michael Sexton - Geoscience Australia (ERML)
- Simon Cox - CSIRO, Australia (GTWG)

CGI in Europe

INSPIRE

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

The implementation of the INSPIRE legal and technical requirements = building the European spatialdata 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 in making GeoSciML, EarthResource ML 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 program, represented a major milestone in the provision of interoperable geoscientific 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 NewDefault 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 OpenData and Government, 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.

8. Main problems encountered

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.

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.

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. 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. Council members acknowledge that these teleconferences may require participation at difficult hours of the night. In this context, the CGI Council endeavours to organise face-to-face meetings conjoined with other events such as conferences and seminars, so that Council members may more easily justify their travel costs to their employers if required.

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 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 former 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.

9. Summary of expenditure

	\$ account		€ account	
	in	out	in	out
october 2002 kickoff "new" CGI	2,172.81		1,113.59	
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		
balance 2002	7,659.89		1,103.59	
2003				
2003 allocation IUGS (5000\$)			4,104.75	
Council meetings				-826.27
MT workinggroup				-426.00
CGI bank account costs				-25.00
Balance 2003	7,659.89		3,931.07	
2004				
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
Balance 2004	7,659.89		4,941.70	
2005				
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
Balance 2005	12,659.89		4,592.40	
2006				
IUGS Grant outreach workshop (10000\$)	10,000.00			
UNESCO Grant outreach workshop leaflet (5000\$) contract 4500027900	5,000.00			
2006 IUGS allocation (5000\$)	5,000.00			
Refund Datamodel workshop Perth dec 2004		-367.68		-27.83
Maputo outreach workshop		-2941.23		-3510.85
Printing and Shipping leaflet		-4690.00		-2390.49
internal transfer \$ => €		-5000.00	3857.73	
Balance 2006	19,660.98		2,520.96	

2007		
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
Balance 2007	27,160.98	2,429.17
2008		
Travel expenses preparation GirafSchutte		-240.00
cost CGI bank account 2008		-30.00
cost transfer accounts Fortis--> LCL		-43.26
Balance 2008	27,160.98	2,115.91
2009		
ACCOUNTS TRANSFERED		
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	
2010		
Payment maintenance of CGI web site (NERC/BGS)	-2300.00	
2010 IUGS allocation	7,500.00	
transfer charges	-23.17	
transfer charges	-21.16	
2011		
2011 IUGS allocation	10000.00	
transfer charges	-23.54	
Payment maintenance of CGI web site (NERC/BGS) 1549.87£		-1779.01
transfer charges		-30.00
transfer charges		-22.00
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 --> €	-8900.00	6610.71
transfer charges		-22.00
Payment to BGS (update cookbooks, schematron rules)		-6600.00
transfer charges		-3.90

	Balance 2011	23,496.96	1,398.81
2012			
<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
Balance November 2012	14,975.26		1,350.69
2013			
Back payment from BGR (balance from Giraf 2011)			4967.79
transfer charges			-3.98
Payment to BGR - Giraf workshop 2013)			-5000
subscription VISA card			-39.96
Balance 31/12/2013	14,975.26		1,274.54
2014			
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
Balance October 25th 2014	18,758.88		1,224.78
2015			
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
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
Balance 07/12/2015	20,720.00		969.42

2016		
2015 IUGS allocation	7,979.00	
transfer charges		-19.53
Payment Cape Town CGI council meeting		-737.89
Bank charges		-4.50
subscription VISA card		-42.60
transfer account USD --> €		3922.58
transfer account USD --> €	-4233.00	
Payment to BGS for CGI website (2500€)		-2500.00
transfer charges		-4.40
Payment Cape Town CGI Workshop		-1482.97
transfer charges		-30.65
Balance 11/05/2016	24,446.47	88.99
	\$ account	€ 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 new CGI Treasurer (Ollie Raymond). A solution has been and will be sought with the support of IUGS Secretariat.

10. Work plan for next year

- Preparation for RFG2018– prepare for the CGI session .
- 3D group of CGI. Continue to push forward to setup a collaborating working group on 3D geosciences data.
- GeosciML implementation after becoming an OGC Standard.
- An introduction of CGI product promotion and marketing plan.
- Continue the development of EarthResourceML
- Update the CGI website
- Publish the CGI newsletter regularly
- Publish more publications of CGI related issues within IUGS “Episodes”
- Represent the IUGS in Geoscience information matters
 - Setup CODATA connection.
 - Enhance relation with RDA
- Councils to issue a 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 June 2017 in Vienna together with GIC.

11. Critical milestones

- Organisation of a Geoinformation Symposium at the 35th International Geological Congress 2016 in South Africa.
- Council election at the 35th IGC in South Africa.
- The GeoSciML version 4.0 becomes an OGC standard.

12. Anticipated results to be achieved next year

See section 10. “Work plan for next year”

13. Budget for 2017 and potential funding sources

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

14. Review chief accomplishments over last five years (2011-2016)

CGI set up overall aims which are listed in section 1 of this report. Evidence indicates that, despite issues of resources and travel constraints, CGI through its Working Groups, members and associated initiatives, has been extremely successful. The Commission has: catalyzed alliances, vide OneGeology (1G), OneGeology-Europe (1G-E), GIC, ICSU, IAMG, INSPIRE, GGIPAC, AUSCOPE, ICS, CGMW, EGS, OGC, USGIS; stimulated progress and standard geological concepts, vide the GeoSciML, EarthResourceML and Geoscience Terminology Working Groups CDTG, MTG and the 1G-E multilingual vocabulary; promoted the use of data exchange standards, vide the above listed working groups, OneG and 1G-E; facilitated outreach, vide the GIRAF (2011, 2013, 2016), South American, European and Asian workshops and OneGeology; and played a full role in the coordination of and participation in regional initiatives. This includes several INSPIRE Working Groups (the Drafting Teams Data Specification and Metadata, the Thematic Working Groups Geology and Mineral Resources), EuroGeoSurveys (within the Spatial Information Expert Group), OneGeology-Europe, CCOP, South American initiatives, and the GIRAF network.

The CGI-GIC Geoscience Information Super-Symposium at the IGC in Brisbane in 2012 has been a full success – and the super symposium at the IGC 2016 in Capetown has also been a big successful event.

In addition parts of the CGI vocabularies are being used for the INSPIRE themes “Geology” and “Mineral Resources”, and so are derived variations of the GeoSciML and EarthResourceML data models. The CGI GeoSciML has been accepted as OGC standard in the fall of 2016.

The GIRAF Network has from its start in 2009 with around 100 members grown to an established African Network on Geoscience Information with about 400 members from 35 African and 14 non-African countries, ready to be handed over into a fully African administration in 2016 at the Colloquium of African Geology in Ibadan, Nigeria.

So the CGI now has a well-recognized established position in the international geoscience information community and represents IUGS well on geoscience information matters.

15. Objectives and work plan for the next 5 years (2014-2019)

- 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 develop interoperability of 3D - 4D geosciences data models.
- Enhance collaboration with other IUGS commissions, e.g. ICS.
- Play a role in coordination of regional initiatives, e.g. by organizing workshop and training courses on geoscience information management, standards and language.
- Organize CGI Symposium/session at RFG2018 in Canada.

16. Suggestions for improvement of IUGS activities, especially in reference to activities of IUGS bodies

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.

17. Conclusion

As a commission of IUGS for geosciences information, CGI has been very successful in the past 2016 for several big events in geoinformation sciences and milestone achievements both in geo-data standards and local organizations. We would like to express our thanks to all members of the CGI and its regional and thematic working groups, and also to the members of the IUGS Executive for their help and encouragement. We are looking forward very much to continued productive cooperation in 2017.

CGI Council. 30 December, 2016.

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