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# Report on the Ad Hoc Review of the IUGS Commission on Global Geochemical Baselines (GGB)

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## Rationale for the Review

This Commission was promoted by the Council of the International Union of Geological Sciences 2016 in Cape Town from a successful Task Group. The aims for the Commission remained to:

1) Prepare a global geochemical database and its representation in map form

2) Document the concentration and distribution of chemical elements and species in the Earth's near-surface environment.

The Task Group TGGGB has been operating successfully since 1998. 2016 it became a Commission and the cooperation with the UNESCO International Centre on Global-scale Geochemistry in Langfang was established and joint endeavours in sampling procedures, sample preparation, analytics and data curation should have been established and continued. Three years after establishment of the Commission the main focus remained promotion and facilitation of geochemical data including harmonization of sampling, preparation and interpretation, a new ARC was due.

As specified in the Statutes and Byelaws of the Union, the IUGS EC is required to undertake a formal review of all Commissions and other bodies funded by the Union on an approximate 4-year cycle. These reports provide accountability for the expenditures incurred by the Union as well as an opportunity for the Union to interact with its constituents. Consequently, during the Annual Meeting of the IUGS Executive Committee in February 2019 a decision was made that the Commission on Global Geochemical Baselines (CGGB) should be reviewed before the advent of the 35<sup>th</sup> IGC in Delhi. As a result, a Review Committee was established comprising two EC members: R. Oberhänsli (as Chair) and K. Asch (as Secretary), plus two external reviewers: M. Gosar and S.P. Kilias. The CGGB officers were duly notified of the forthcoming review requirement and they were provided with all relevant documentation regarding the review process (e.g. ARC guidelines, and so) prior to the review itself.

The ARC Chair compiled as much background information as possible regarding the past activities of the TGGGB and CGGB including copies of recent annual report 2018, and the two ARC Reports 2007 and 2012, and further referred the ARC members to the CGGB website at <http://www.globalgeochemicalbaselines.eu/> This material

proved useful in the evaluation process.

## Information to be Considered

CGGB's new web site compiles the complete archive of the former Task Group and the newly established Commission. Alecos Dimitriadis, David Smith, Wang Xueqiu, Patrice de Caritat and Ariadne Argyraki compiled an extremely detailed presentation on the activities 2012 to 2019. This presentation also reviewed and outlined the group's history and accomplishments to the review committee. It included a review of the former Task Group's work (2012-2016) and a detailed recapitulation of the account of progress in the last three years, particularly with respect to training programs and publication of geochemical atlases and other scholarly work. The relevance of geochemistry especially in surface and near-surface environments to the global population was made clear with the observation that the global influence of chemistry has increased at an alarming rate. This was additionally elucidated by a diagram comparing the Earth's crust chemical composition with the composition of human blood and adds to the facts cited in former reviews.

The Commission reacted to the IUGS review recommendation to the precedent Task Group and compiled a 2<sup>nd</sup> version of the Arthur Darnley memorial DVD including the Geochemical Atlases of Europe, United States of America and Australia. It was involved in the establishment of the UNESCO International Centre on Global-scale Geochemistry in Langfang. The Commission was contributing to IUGS Initiative "Resourcing Future Generations", held numerous workshops and sampling field courses, redesigned the website, collaborated with the UNESCO ICGG Secretariat, acted on the request of the YES Network to the RFG2018 Organising Committee for the organisation of a workshop in collaboration with the Association of Applied Geochemists (AAG). In addition it made first attempts to produce videos on standardized sampling procedures, and is close to completion of the 'International Union of Geological Sciences Manual of Standard Methods for Establishing the Global Geochemical Reference Network', based on the FOREGS/EUROGEOSURVEYS Geochemical Mapping Field Manual which is available from the Commission's website along with other files, and participated in the opening ceremony of the Deep-time

Digital Earth (DDE), works on program support and development of geochemical software and provides links on its website.

The main work of the Commission in 2019 is the completion of the Manual on sampling standards. Furthermore, the Commission is establishing contacts with Algeria, Egypt and Saudi Arabia, all interested in participating in the Desert terrain chapter of the Manual. The plan is, the Manual to be finalised, sent to external reviewers, and submitted in January of 2020 to the IUGS Executive Committee for ratification, and to be published at the beginning of 2020. The manual on "IUGS Standard Geochemical Methods" is planned to be published in 2020 at no cost to IUGS.

## Summary of the Interviews with CGGB Review Participants

Since 2016 the CGGB has been operating under the financial support of the IUGS. During this time the commission used its funds from sponsoring during the Task Group's time to facilitate travel for one of its association members for CGGB events, field schools and workshops. Following the insistence of an EC councillor to use this reserve fund for RFG2018 resulted in not disposing on any significant contingency funds any more.

Funding for the various national based geochemical surveys, amounting to millions of dollars, represents financial support from a variety of locally based sponsors and collaborators. Similarly, the host countries for all of the members (e.g. China and the USA) provide considerable in-kind and ancillary financial support to members of the Commission allowing to deliver their work objectives.

## Issues

A challenge shared by CGGB is the ability to attract additional people, acquiring general assistance, especially in IT and data management, and obtaining sufficient external financial support. Without any reserve funds, it is difficult to plan activities and to make commitments for the following fiscal year, this especially the first six month of a year.

Sponsorship from companies requires an answer from the IUGS Executive Committee: Can companies be promoted on the CGGB's website? Without promotion, companies are not interested to provide sponsorship.

CGGB would require about \$30k to host a special meeting of the CCOP partners to launch a geochemical sampling program in the East Asian region as suggested in previous ARC reviews but never conceded.

While the website was a constant issue for the former Task Group, the Commission has established a well organised, up to date, professional website.

## Ad hoc Review Committee On-Site Comments

During the review the ARC members noted the following positive facts:

- CGGB is very active and on a very good path with an impressive amount of activities despite low funding;
- Detail Report on activities of the IUGS Commission on Global Geochemical Baselines was submitted to ARC;
- Web page was improved and completely renewed since last evaluation. Is good and up to date now;
- Modern methods of communications were adopted (Twitter, Facebook are well organized);
- CGGB lead several workshops all over the world;
- Large efforts went into compilation of the Standard Sampling Manual. It is now in the last stage of preparation;
- A workshop in Africa took place during a YES-Conference

The review group made comments/suggestions aimed at improving CGGB activities. These included:

- Considering improving global visibility and self-promotion; and preparing promotional materials, highlighting activities, accomplishments and future plans.
- Travel grants for students to attend meetings and conferences such as the IGC are an essential aspect for youth recruitment;
- Sampling Manual should be extended to rock sampling (geologic background);
- Black soil standard material from China should be made available in a ring tests to provide new international analytical standard;
- Prepare geochemical data and maps (GEMAS, Geochemical Atlas) as web map service, e.g. for public availability in OneGeology and EGD1;
- Prepare FOREGS data, available on disk and in the book for GIS (wms data base);
- The existing training lectures should be digitally captured as webcasts for further online access;
- Linking with IUGS CGI to standardize terms for the Geochemical baselines
- Linking with CGI-initiated Geoscience Information in Africa network (GIRAF) to encourage more African scientists to participate
- Raw data should be made available globally in cooperation with the new DDE Program for non CGGB geochemists;
- The commission should expand potential sources of financial support by considering corporate sponsors such as geochemical analytical companies;
- Could access up to \$130k through an IUGS sponsored ICS grant application;
- Royalties should be garnered from the publication of books;
- EC in Busan (January 2020) and IGC (March 2020) should be used for IUGS inter-Commission linking;
- Connection to Russia could be enhanced via DDE;
- Big challenges:
  - harmonising global data and analytical methods from USA, Canada, Australia;
  - quality control and standardisation on/for global scale;

## Conclusions and Recommendations

The IUGS ARC for CGGB was extremely pleased in much of the progress made since the 2012 ARC. Especially noteworthy is the refocus-

ing on facilitating geochemical work and the extraordinary success in their training programs for developing countries. The IUGS welcomed the UNESCO International Centre on Global-scale Geochemistry accreditation and CGGB continued cooperation and developing new standards on sampling procedures despite some drawbacks.

Based on this review the ARC Committee recommends the following; in particular that the Commission on Global Geochemical Baselines:

1. Needs to continue to develop their strategy for geochemical mapping and implement an effective technology;
2. Must develop a communication strategy which includes ideas for expanding membership and recruitment;
3. Should make videos showing sampling procedures available on the website;
4. Link stronger with other IUGS commissions/task/working groups more intensively (CGI, COGE, Forensic Initiative, Education, ...);
5. Connect more scientists from Africa to CGGB by linking with the CGI-IUGS initiated Geoscience Information in Africa Network (GIRAF) and the Geological Society of Africa (GSAf);
6. Must demonstrably improve efforts to acquire other sources of funds through ICS grants, book royalties and other options;
7. Should encourage colleagues to submit an IGCP proposal;
8. Submit large grant proposal to IUGS;
9. "Manual" should be published either as the first manual (blue book) by UNESCO or as **open access** (special issue with DOI and possibly in SCOPUS).  
The manual must be very widely disseminated: universities, geochemical conferences, geological congress, ...;
10. Should continue to seek funding in order to host a regional CCOP conference;
11. Is encouraged to pursue their efforts with the UNESCO International Centre on Global-scale Geochemistry in Langfang, China to achieve full standardisation at a global scale as well as additional

support from China government;

12. Is fully supported to continue for another term within the IUGS until the next IGC in 2024;
13. Is congratulated and encouraged to expand their current geochemical training programs for developing countries under the support of governments (such as China) and more intensively involve younger scientists (< 40)

The ARC members acknowledge the productivity and Union support provided by the CGGB for the past three years. They also recognize and appreciate the efforts made by the leadership of the Commission not only for the establishment of and cooperation with the 'International Centre of Global Scale Geochemistry' in Langfang, China, but for the setup and harmonisation of international sampling manuals and preparation procedures. The ARC committee was impressed by the good team spirit amongst the CGGB members and acknowledges and appreciates the logistical assistance and generosity provided by the Mediterranean Information Office / Global Water Partnership – Mediterranean, Athens, Greece.

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