

**ANNUAL REPORT FOR THE
INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)
WORKING GROUP ON
GLOBAL GEOCHEMICAL BASELINES
2000**

1. TITLE OF CONSTITUENT BODY

IUGS/IAGC Working Group on Global Geochemical Baselines

2. OVERALL OBJECTIVES

To prepare a global geochemical database, and its representation in map form, to document the concentration and distribution of chemical elements and species in the Earth's near-surface environment. The database and accompanying maps can then be used to create a geochemical baseline against which future human-induced or natural changes to the chemistry of the land surface may be recognised and measured. In the short to medium term, this involves implementation of the recommendations given by Darnley *et al.* (1995), namely:

- collection and analysis of a series of multi-media geochemical samples - the Global Reference Network (GRN);
- design and publication of a Field Manual detailing sampling methods for collection of the GRN samples;
- design and production of an Analytical Manual detailing methods for analysing the GRN samples.

3. FIT WITHIN IUGS SCIENCE POLICY

Current IUGS scientific policy objectives relate to global earth science issues, such as identification of mineral resources, global change, geological hazards, environmental geology and sustainable development. The work of the Global Geochemical Baselines Working Group relates directly to all of these objectives through the establishment of a land-surface global geochemical reference network, providing multi-media, multi-element baseline data for a wide variety of environmental and resource applications. The project is also consistent with the strategic plan published by the IUGS Strategic Planning Committee (2000).

4. ORGANISATION

The project is led by a Steering Committee which co-ordinates the activities of five Technical Committees and contributions made by individual country representatives.

Steering Committee

Honorary President

Co-Leaders

Scientific Secretary

Treasurer

Dr Arthur Darnley

Prof Jane Plant

Dr David Smith

Mr Shaun Reeder

Dr Tony Reedman

Geological Survey of Canada

British Geological Survey

US Geological Survey

British Geological Survey

British Geological Survey

Analytical Committee

Chair

Mr Harry Sandstrom

Geological Survey of Finland

[Ms Gwendy Hall of the Geological Survey of Canada to chair this committee from 2001.]

Co-ordinates the work plan for the analysis of GRN samples, the activities of the laboratories, and the supervision of analytical quality control data.

Sampling Committee

Chair Prof Reijo Salminen Geological Survey of Finland
Supervises development and co-ordination of sampling protocols in the various climatic and geomorphic provinces throughout the world..

Data Management Committee

Chair Dr Timo Tarvainen Geological Survey of Finland
Supervises sampling strategy, co-ordinates the sampling progress of the participating countries, manages the database of sample information and analytical results.

Regional Co-ordination

Chair Prof Reijo Salminen Geological Survey of Finland
Co-ordinates project activities of groups of neighbouring countries and reports back to Steering Committee.

Public Relations and Finance Committee

Chair Mr Alecos Demetriades IGME, Greece
Advertises and promotes the aims, objectives and achievements of the project world-wide, including by use of the World Wide Web, and takes responsibility for trying to secure funding for the project.

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

The project does not have any other source of direct funding. However, within Europe, National Geological Surveys and associated Institutes have provided staff time and support to the project to complete the preparation of the European GRN as part of the FOREGS programme. A few other countries, including Russia, Colombia and Brazil, have provided funds through their National Geological Surveys or related institutes for pilot studies on establishing the GRN.

6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS

This project is closely associated with the work of the FOREGS Geochemistry Working Group. In addition, the INCO-COPERNICUS project, a laboratory standardisation project involving Western European and former Soviet Block countries, is associated with this project. The project also has links with the IAEA and potential links with GTOS, the Global Terrestrial Observing System. The Working Group has also established closer links with the EuroGeoSurveys "Soils and Land use Policy Sector" and the European Soil Bureau over the past year.

7. CHIEF ACCOMPLISHMENTS IN 2000

A symposium on geochemical baseline activities was organised as part of the 31st International Geological Congress in Rio de Janeiro. Keynote presentations were given by Reijo Salminen, Xie Xuejing of China, Deon de Bruin of South Africa, Carlos Lins of Brazil, Jane Plant and David Smith and others (see Section 9 of this report for a full list of abstracts presented).

The first draft of promotional papers to possible sponsors has been prepared, and the final form should be ready for circulation by February 2001. The sponsorship campaign has already started in Greece.

Sampling had been completed in most FOREGS countries and analytical data are available for most of these samples. Preliminary maps of geochemical data for Europe have been prepared and preliminary interpretation has begun.

Sampling is due to start in Southern India within the next six months. Funding had been secured from the Indian Government for 12 cells – about one tenth of the total. SE Asian countries (members of the CCOP group) are reported as intending to take steps towards establishing geochemical baselines in accordance with the recommendations of Darnley *et al.* (1995).

The Annual Business Meeting of the IUGS Global Geochemical Baselines Working Group was held in Athens, Greece between 14 to 17 November 2000. The meeting was held in conjunction with the FOREGS Geochemistry Working Group Annual Meeting. A joint meeting of the Groups with the EuroGeoSurveys “Soils and Land use Policy Sector” and the European Soil Bureau was also held. The minutes are appended to this report.

8. CHIEF PROBLEMS ENCOUNTERED IN 2000

The main problem encountered by the project was the lack of funding required to achieve the aims and objectives of the project at the global scale. Although the baseline project in Europe was coming to fruition through the participation of the European Geological Surveys involved, it was considered unlikely that the global programme would go ahead without funding. Funds are required for training, transportation, additional analytical services and quality control. Mr Alecos Demetriades of IGME, Greece was elected to chair the Public Relations and Finance Committee with specific responsibility for carrying out marketing initiatives in an effort to secure funding.

9. CHIEF PRODUCTS IN 2000

General

Updated IUGS/IAGC Working Group on Global Geochemical Baselines Web site hosted by the BGS at www.bgs.ac.uk/IUGS.

A new version of the project logo has been designed and approved.

First preliminary maps of European geochemical data have been prepared and circulated for preliminary discussion and interpretation.

Published Papers and Conference Presentations

Plant J A, Smith D, Smith B and Williams L. 2000. Environmental Geochemistry at the Global Scale. *Journal of the Geological Society*, London, **157**, 837-849.

Alexeenko V A and Golovinskiy P L. Regional landscape geochemical investigations. Abstracts Volume, 31st International Geological Congress, Rio de Janeiro, Brazil, 6-17 August 2000.

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Baraboshkina T A. Ecoprogenetic systems (complexes) of geochemical genesis and their cartographic imaging. Abstracts Volume, 31st International Geological Congress, Rio de Janeiro, Brazil, 6-17 August 2000.

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Emelianenko T, Matveev A A and Solovov A P. New geochemical method of estimating the quantity of magnetite deposits. Abstracts Volume, 31st International Geological Congress, Rio de Janeiro, Brazil, 6-17 August 2000.

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Grosz A E and Grossman J N. Geochemical mapping in the United States: Methods, results, and implications. Abstracts Volume, 31st International Geological Congress, Rio de Janeiro, Brazil, 6-17 August 2000.

Koval P V and Romanov V A. Correlation of different sampling data for the testing of the global geochemical reference network approach, eastern Siberia, cell N36E46E. Abstracts Volume, 31st International Geological Congress, Rio de Janeiro, Brazil, 6-17 August 2000.

Licht O A B and Bittencourt A V L. Multielemental surface geochemistry and environmental impacts and risks, state of Parana, Brazil. Abstracts Volume, 31st International Geological Congress, Rio de Janeiro, Brazil, 6-17 August 2000.

Lins C A C, Souza F J C, Oliveira J E and Frizzo S J. International geochemical mapping project - Pilot project in Brazil. (Keynote lecture). Abstracts Volume, 31st International Geological Congress, Rio de Janeiro, Brazil, 6-17 August 2000.

Machado G J, Cunha F G and Cavalcanti E M. Geochemical mapping of the state of Rio de Janeiro, Brazil. Abstracts Volume, 31st International Geological Congress, Rio de Janeiro, Brazil, 6-17 August 2000.

Marini L, Cipolli F, Canepa M, Ottonello G and Zuccolini M V. Use of stream sediment chemistry to predict groundwater chemistry: The Bisagno Valley (Genoa, Italy) case study. Abstracts Volume, 31st International Geological Congress, Rio de Janeiro, Brazil, 6-17 August 2000.

Plant J A, Smith D B, Smith B and Williams L. Global geochemical baselines: The sustainability of the Earth's life support systems and human health. (Keynote lecture). Abstracts Volume, 31st International Geological Congress, Rio de Janeiro, Brazil, 6-17 August 2000.

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Smith D B, Gustavsson N, and Bolviken B. Geochemical maps based on ultra-low-density sampling of the conterminous United States. Abstracts Volume, 31st International Geological Congress, Rio de Janeiro, Brazil, 6-17 August 2000.

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Zhovinsky E and Dmytrenko G. New methods of geochemical mapping mobile forms of chemical elements. Abstracts Volume, 31st International Geological Congress, Rio de Janeiro, Brazil, 6-17 August 2000.

Zuccolini M V, Ottonello G and Marini L. Towards the national geochemical database of Italy: Logical framework and network features. Abstracts Volume, 31st International Geological Congress, Rio de Janeiro, Brazil, 6-17 August 2000.

10. SUMMARY OF EXPENDITURES IN 2000

The Working Group received US\$ 2000 from IAGC this year in support of travelling expenses to help Dr Pradip Govil of India (US\$ 1500) and Dr Arthur Darnley of Canada (US\$ 500) to attend the meeting in Athens. The cost of the FOREGS programme over the past year is estimated to be in excess of US \$0.5M. These funds were provided from the Geological Institutes of the participating countries.

11. WORK PLAN FOR NEXT YEAR

The remaining samples from all countries in Europe that have agreed to participate in the FOREGS programme will be collected by Spring 2001. All analysis will be completed by the end of 2001.

The geochemical database will be populated with all sample location information and geochemical data. Compiled data will be used to prepare provisional maps that will be used to carry out preliminary interpretation. Introductory sections to the Geochemical Atlas of Europe will be drafted.

Countries outside Europe will be encouraged to observe the work done by the FOREGS Geochemistry Working Group, and to try to formulate similar working relationships and sampling programmes.

The next Annual Meeting will take place in Orléans, France either late in 2001 or early in 2002. The meeting will coincide with the 3rd International Conference on Environmental Geochemical Baseline Mapping in Europe.

12. CRITICAL MILESTONES TO BE ACHIEVED NEXT YEAR

- Completion of the collection of GRN samples from all countries participating in the FOREGS programme by Spring 2001.
- Completion of the chemical analysis of all FOREGS GRN samples by December 2001.
- Preparation of various sections and appendices of the Baseline Geochemistry of Europe Atlas according to the schedule agreed in Athens (see attached minutes).

13. ANTICIPATED RESULTS/PRODUCTS NEXT YEAR

- Compiled database of all FOREGS GRN samples, including statistical analysis and preliminary maps.
- Report on GRN analysis quality control and uncertainty of measurement.
- FOREGS Analytical Manual
- Drafts of the introductory sections, preliminary interpretation chapters and appendices of the Baseline Geochemistry of Europe Atlas.
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14. COMMUNICATION PLANS

The next Annual Working Group meeting will take place in Orleans, France and will coincide with the 3rd International Conference on Environmental Geochemical Baseline Mapping in Europe. Technical committees and less formal groups of country representatives will meet throughout the year to ensure that the schedule of work agreed in Athens is maintained.

15. SUMMARY BUDGET FOR NEXT YEAR &

16. POTENTIAL FUNDING SOURCES OUTSIDE IUGS

The European countries that are committed to sampling, analysis and interpretation of the FOREGS GRN data are likely to have to continue to fund this work from internal sources. The combined cost of these efforts is likely to be between US\$ 0.5 and 1M.

Without securing substantial financial contributions from external sources, it will be very difficult for the project to achieve its global objectives. It is hoped that the progress made with the European Atlas will be useful in marketing and helping to secure funds over the next year. The Public Relations and Finance Committee will be taking a proactive role in trying to secure funds for the global project from a wide variety of potential sources. In Athens, DuPont expressed an interest in providing funds to support the establishment of the GRN in countries where they have exploration interests. Representatives of DuPont, the IUGS/IAGC Working Group and the Geological Survey of Brazil will hold discussions in Rio de Janeiro in December 2000 to discuss a possible project in Brazil. Any support from IUGS/IGCP towards the advancement of this project in developing countries would be most welcome.

17. CHIEF ACCOMPLISHMENTS 1996-2000

- 1996 Project Business Meeting held at Keyworth, Nottingham, UK in March 1996.
- 1996 New organisational structure for IGCP 360 and the IUGS-IAGC Working Group was agreed, in addition to the Steering Committee, consisting of a Regional Co-ordinating Committee, an Analytical Committee, a Data Management Committee and a Public Information and Finance Committee.
- 1996 1st Conference on European Geochemical Baseline Mapping held in Slovakia.
- 1997 Publication of the FOREGS Geochemistry Task Group Inventory and recommendations for European Geochemical Maps: Plant J A, Klaver G, Locutura J, Salminen R, Vrana K and Fordyce F M. (1997) *Forum of European Geological Surveys Geochemistry Task Group 1994-1996 Report*. British Geological Survey Technical Report WP/95/14. [Paper published in the Journal of Geochemical Exploration (JGE) in June 1997].
- 1997 Project endorsed by the UN Natural Resources Committee.
- 1997 FOREGS/IGCP 360 meeting held in Portugal.
- 1997 FOREGS Field Workshop held in Slovakia, and involved detailed demonstrations of the field methods to be adopted in Europe.
- 1998 Publication of Salminen R, *et al.* (1998) *FOREGS Geochemical Mapping Field Manual*. Geological Survey of Finland Guide Number 47.
- 1998 Release of the IUGS/IAGC Global Geochemical Baselines website, hosted by the British Geological Survey at www.bgs.ac.uk/IUGS.
- 1998 Annual Meeting was held in Naples, Italy (1-3 October 1998) in conjunction with the FOREGS Geochemistry Working Group Annual Meeting.
- 1998 European GRN sampling programme commenced.
- 1999 European sampling programme ongoing. Preliminary analytical data produced.
- 1999 Completion of pilot study for geochemical mapping carried out in Colombia.
- 1999 The Committee for Coastal and Offshore Geoscience Programmes (CCOP) agreed to act as a Regional Co-ordinator for their member countries (China, Japan,

- Vietnam, Indonesia, Cambodia, Thailand, Malasia, Papua New Guinea, Philippines, and Korea) in SE. Asia.
- 2000 Symposium on geochemical baseline activities was organised as part of the 31st International Geological Congress in Rio de Janeiro.
- 2000 First draft of promotional papers to possible sponsors prepared and sponsorship campaign commenced.
- 2000 Sampling completed in most FOREGS countries and analytical data available. Preliminary maps of geochemical data for Europe prepared and preliminary interpretation begun.
- 2000 Annual Business Meeting held in Athens, Greece (14 to 17 November).

18. ANTICIPATED OBJECTIVES AND WORK PLAN 2001-2005

The work plan for the next year, detailed in section 11 of this report, will culminate in the production of the Geochemical Atlas of Europe, scheduled for release in 2004. Details of the work programme for achieving this is given in the Work Schedule 2000 – 2004 in the attached minutes from the Athens meeting.

In conjunction with this work, ongoing efforts will be made to increase the extent of the participation in the global GRN project for countries outside of Europe.

19. REFERENCES

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