

**ANNUAL REPORT FOR THE
INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)
WORKING GROUP ON
GLOBAL GEOCHEMICAL BASELINES
2002**

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

Dr Arthur Darnley

Geological Survey of Canada

Co-Leaders

Prof Jane Plant

British Geological Survey

Dr David Smith

US Geological Survey

Scientific Secretary

Mr Shaun Reeder

British Geological Survey

Treasurer

Dr Tony Reedman

British Geological Survey

Analytical Committee

Chair

Ms Gwenda Hall

Geological Survey of Canada

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 China, Russia, Colombia, India 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 few years.

7. CHIEF ACCOMPLISHMENTS IN 2002

Scientific Progress: On the global scale, there has been significant progress within a number of countries over the past year. Within Southern India, sampling has been completed on 12 cells – about one tenth of the total for the country as a whole. A floodplain atlas of China was expected to be published later this year. Pilot studies have been partially completed within Colombia and Brazil. In the USA, collection and analysis of stream sediments as part of the National Geochemical Survey was continuing. About 80% of the USA is now covered, based on a grid cell of 17 x 17 km². Geochemical mapping within Japan is expected to be completed within the next two years. Provisional discussions have been held with representatives of the Consejo de Recursos Minerales of Mexico to discuss geochemical mapping issues.

Some of the most significant developments have occurred within the 11 CCOP countries of SE Asia. A geochemical mapping project, to be co-ordinated through the CCOP, has been approved by all member countries through the CCOP Steering Committee. A questionnaire is being issued to all member countries to establish the status of their geochemical mapping. Plans are being made to organise a seminar and training session during which all the lead workers from respective member countries will come together to discuss issues relating to implementation of the program.

Within Europe, work has been continuing on the FOREGS contribution to the project according to the schedule agreed at the business meeting held in Athens in November 2000 and revised at the last business meeting held in Svincice, Czech Republic in April 2002.

Sampling was completed within all countries participating in the FOREGS program last year, and all analyses have been completed over the past year. Data compilation and management processes are well underway, and the first draft maps have been prepared and circulated for provisional interpretation. Significant progress has been made in writing some of the introductory and background texts for the Geochemical Atlas of Europe. The Working Group's Annual Business Meeting was held in Svincice, Czech Republic in April 2002. Meetings of the Analytical Working Group and the Data Management Working Group were subsequently held in Fischerhude, Germany, and Finland respectively in June 2002. Minutes of these meetings and a copy of the FOREGS Geochemistry Working Group's Annual Report to the FOREGS' Directors are given as attachments to this Annual Report.

Public Relations and Finance Committee: A proposed new structure for the Committee was agreed at the 2002 Annual Business Meeting, comprising the Chair (Alecos Demetriades), Deputy Chair (Andrew Grosz), three committee members to be decided upon, and affiliated members from each participating country. The committee will be using the same secretary and treasurer as the Working Group's Steering Committee.

The Committee has been quite active in the procedure to be followed for the promotion of the global programme and in trying to raise funds through discussions with marketing and public relations consultants. Other discussions with marketing experts have been planned. Significant funding (in the order of £75K to £100K) is required just to start making progress with the marketing and fund-raising initiatives. It was suggested by the first marketing consultant that the public image of the fund raising campaign might benefit from having a celebrity figurehead or patron. This suggestion was taken up on the 10 July 2002, during a business breakfast in Athens with the President of Ireland, the Honourable Mrs. Mary McAleese. A proposal was submitted to her, together with project documentation, to become Patron of the IUGS/IAGC "Global Geochemical Baselines" project. On the 21st August 2002 a polite reply was received expressing the President's regret, i.e., "it will not be possible for the President to accept your kind invitation". This line of action will, however, be continued.

DuPont has expressed an interest in funding the CCOP "Global Geochemical Baselines" project. A letter for assistance and promotional material was sent in August 2002 to the Most Reverend Archbishop Gregorios of Thyateira and Great Britain, Distinguished Exarch of Western Europe. This was followed with a personal meeting on the 18 August 2002 in Birmingham, and a promise was extracted for assistance in the promotion of the project for the raising of funds and sponsors from the Greek Orthodox Churches in the United Kingdom. Contact has also been made with a Greek Mining Company, which has shown interest in the project, with a possible sponsorship in 2003.

8. CHIEF PROBLEMS ENCOUNTERED IN 2002

The main problem still facing the project is the lack of funding, which is required to achieve the aims and objectives of the project at the global scale. Although the baseline project in

Europe continues to make significant progress, through funding by the participating European Geological Surveys, it is still considered unlikely that the global programme will go ahead without significant funding from all possible sources, including IUGS. Funds are required for training, transportation, additional analytical services and quality control.

Mr Alecos Demetriades of IGME, Greece, and Andrew Grosz of USGS, in their roles as chair and deputy chair of the Public Relations and Finance Committee, have specific responsibilities for carrying out marketing initiatives in an effort to secure funding. In order to carry out these initiatives more successfully, assistance is requested from the IUGS committee in the form of:

- (i) seed money for promotional purposes, and
- (ii) supply of addresses of all Geological Surveys in the World for the purposes of promoting the global project in these countries, and the development of contact points.

9. CHIEF PRODUCTS IN 2002

Presentations

Alecos Demetriades presented a paper entitled "Global Geochemical Baselines" at the CASPSCIENCE-NET meeting (European Commission financed project) held in Athens on 18-20 January 2002.

Jane Plant gave a Presidential Address entitled "Down to Earth" to the Institute of Mining and Metallurgy in London on 30 January 2002.

Jane Plant presented a paper entitled "Geochemistry and health at the global scale" at a meeting of the Edinburgh Geological Society in Edinburgh on 13 February 2002.

Dave Smith presented a keynote paper entitled "Standardized Geochemical Baselines: The First Step Toward Recognizing, Understanding, and Quantifying Human Interaction with the Earth's Surface Environment" at the Sixth International Symposium on the Geochemistry of the Earth's Surface held in Honolulu, Hawaii on 24 May 2002.

Jane Plant presented a paper entitled "Down to Earth" at the Minerals 2002 Seminar at the Parliamentary opening in London on 28 May 2002.

Timo Tarvainen presented a paper entitled "Heavy metal accumulation in soils and metal mobility: Baltic Soil Survey and FOREGS studies" at an expert meeting on indicators for soil contamination organized by Junta de Andalucia and the European Environment Agency held in Seville, Spain, on 27-29 May 2002.

Jane Plant gave an address entitled "Down to Earth" at the Institute of Materials, Minerals and Mining launch in London on 10 July 2002.

Karol Marsina, Štefan Stupák and Igor Slaninka presented a paper entitled "Natural geochemical risks revealed by environmental geochemical mapping in the Slovak Republic" at a workshop on 'Natural and Anthropogenic Geochemical Risks in Europe' convened by Reijo Salminen to coincide with FOREGS Directors' Meeting in Espoo, Finland, on 3-5 September 2002.

Reijo Salminen presented a paper entitled “Geochemical atlas of Europe – do the new maps reveal risky areas?” at a workshop on ‘Natural and Anthropogenic Geochemical Risks in Europe’ convened by Reijo Salminen to coincide with FOREGS Directors’ Meeting in Espoo, Finland, on 3-5 September 2002.

Timo Tarvainen presented a paper entitled “Policy relevance of geochemical mapping – needs of geochemical data in the European level” at a workshop on ‘Natural and Anthropogenic Geochemical Risks in Europe’ convened by Reijo Salminen to coincide with FOREGS Directors’ Meeting in Espoo, Finland, on 3-5 September 2002.

Jane Plant presented a paper entitled “Geochemistry and health” at the Earth Science Teachers’ Association conference in Nottingham, UK on 14 September 2002.

Jane Plant presented a paper entitled “Environmental geochemistry at the global scale” at Soroptimists International Study Day in Ashbourne, UK, on 21 September 2002.

Alecos Demetriades presented a paper entitled “Global Geochemical Baselines for environmental management in the new millennium: The role of Geological Surveys in producing a state-of-the-art Global Geochemical Database” at an INSPIRE expert group meeting (European Commission financed project) on meta-databases organised by EuroGeoSurveys held in Athens on 29 October 2002.

Papers

Ferreira A, Inacio M M, Morgado P, Batista M J, Ferreira L, Pereira V and Pinto M S. 2001. Low-density geochemical mapping in Portugal: *Applied Geochemistry*, **16**, 1323-1331

Gustavsson N, Bolviken B, Smith D B and Severson R C. 2001. Geochemical landscapes of the conterminous United States: New map presentations for 22 elements: U.S. Geological Survey Professional Paper 1648, 38 p.

Plant J A, Reeder S, Salminen R and Tarvainen T. 2001. The Application of Geochemical Baselines to Environmental and Epidemiological Studies. Metals in the Environment, II International Conference, Lithuania, September 23 – 26, 2001. Book of abstracts, pp. 114 - 115.

Smith D B. 2002. Standardized geochemical baselines: The first step toward recognizing, understanding, and quantifying human interaction with the Earth's surface environment: Abstracts Volume, Sixth International Symposium on the Geochemistry of the Earth's Surface, 20-24 May 2002, Honolulu, Hawaii, p. 382-383.

Reeder S, Ahlsved C, Bidovec M, Demetriades A, Duris M, Grosz A, Jordan G, Klaver G, Lima A, Marsina K, Mazreku A, O'Connor P, Salminen S, Sandström H, Siewers U, Smith D, Tanaka T, Tarvainen T, De Vos W, de Vivo B and Zuccolini M V. 2002. Forum of European Geological Surveys “Geochemistry” Working Group and IUGS/IAGC Working Group on “Global Geochemical Baselines”, Progress Report November 2000 – April 2002: Minutes & Future Plans. BGS Commissioned Report CR/02/164.

Other Deliverables

Preliminary maps of European geochemical data have been prepared and circulated for preliminary discussion and interpretation. First drafts of introductory and background chapters for the ‘Geochemical Atlas of Europe’.

10. SUMMARY OF EXPENDITURES IN 2002

The Working Group has received no funding from IUGS/IAGC this year.

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 within Europe. There has also been considerable expenditure within India, China, Brazil and the CCOP countries.

11. WORK PLAN FOR NEXT YEAR

The few remaining analyses from all countries in Europe that have agreed to participate in the FOREGS programme will be completed early in 2003. The geochemical database will be completely populated with all geochemical data and final maps will be prepared for interpretation. Reports of analytical methods, data quality, and data processing methods will be completed. Introductory sections to the Geochemical Atlas of Europe will be completed and preliminary interpretation of the geochemical maps will continue according to the schedule agreed at the FOREGS Geochemistry Working Group business meeting held in Athens in November 2000 and revised at the last business meeting held in Svincice, Czech Republic in April 2002.

The FOREGS Geochemical Mapping Field Manual (Salminen *et al.*, 1998) will be revised to include new details on sampling in karstic terrains prepared by A Demetriades, S Pirc, M Bidovec and F Sustersic.

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. Particular attention will be paid to supporting the recent developments made by the Asia-Pacific countries.

The Public Relations and Finance Committee will continue in its plan of marketing initiatives in an effort to secure external funding.

12. CRITICAL MILESTONES TO BE ACHIEVED NEXT YEAR

Preparation of various sections and appendices of the Baseline Geochemistry of Europe Atlas according to the schedule agreed at the business meeting held in Athens in November 2000 and revised at the last business meeting held in Svincice, Czech Republic, in April 2002.

13. ANTICIPATED RESULTS/PRODUCTS NEXT YEAR

- Compiled database of all FOREGS GRN samples, including statistical analysis and maps.
- Report on FOREGS analysis methods, quality control and uncertainty of measurement.
- Texts of the introductory sections, preliminary interpretation chapters and appendices of the Baseline Geochemistry of Europe Atlas.
- Revised FOREGS Geochemical Mapping Field Manual.

14. COMMUNICATION PLANS

The next Annual Meeting of the Working Group will take place at the Geological Survey of Ireland in Dublin in March 2003. The FOREGS Working Group also plan to stage the Third Conference on Environmental Geochemical Baseline Mapping in Europe to coincide

with the Sixth International Symposium on Environmental Geochemistry in Edinburgh, Scotland, in September 2003.

Technical committees and less formal groups of country representatives will meet throughout the year to ensure that the schedule of work agreed in Svincice is maintained.

15. SUMMARY BUDGET FOR NEXT YEAR & 16. POTENTIAL FUNDING SOURCES OUTSIDE IUGS

The European countries that are committed to interpretation of the FOREGS data and preparation of the “Geochemical Atlas of Europe” are likely to continue to fund this work from internal sources. The combined cost of these efforts is likely to be about US\$ 0.5M.

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.

Any support from IUGS/IGCP towards the advancement of this project in developing countries would be most welcome. In particular, the Public Relations and Finance Committee is requesting seed money for travel and promotional purposes in the order of 10000 USD. The sum of 5000 USD is also requested to fulfil requests from developing countries to provide assistance for training in the field sampling methods.

17. CHIEF ACCOMPLISHMENTS 1997-2002

- 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 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 Annual Business Meeting held in Athens, Greece (14 to 17 November).
- 2001 Sampling and the majority of analysis completed in FOREGS countries. Preliminary maps of geochemical data for Europe prepared and preliminary interpretation begun.

- 2001 Meeting held with CCOP member countries during the Seminar on Regional Geochemical Exploration, Beijing, China to discuss their participation in the global project.
- 2002 Annual Business Meeting held in Svincice, Czech Republic (22 to 25 April 2002).
- 2002 Sampling and analysis completed in Southern India. Pilot studies partially completed within Colombia and Brazil. A major new campaign under the auspices of the Coordinating Committee for Geoscience Programmes in East and Southeast Asia is currently in the planning stages.

18. ANTICIPATED OBJECTIVES AND WORK PLAN 2003-2007

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.

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

Darnley A G *et al.* 1995. *A Global Geochemical Database for Environmental and Resource Management: Recommendations for International Geochemical Mapping.* Final Report of IGCP Project 259. Earth Sciences 19, UNESCO, Paris.

International Union of Geological Sciences Strategic Planning Committee. 2000. *International Earth Science in the 21st Century. Science and Organisational Strategy for the International Union of Geological Sciences.* Trondheim, Norway, International Union of Geological Sciences, 49p.

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