

**ANNUAL REPORT FOR THE  
INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)  
WORKING GROUP ON  
GLOBAL GEOCHEMICAL BASELINES  
2004**

**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), and the International Year of Planet Earth (2005-2007) of 'Earth Sciences for Society'.

**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*

Dr Arthur Darnley  
Prof Jane Plant  
Dr David Smith

Geological Survey of Canada  
British Geological Survey  
US Geological Survey

*Scientific Secretary*  
*Treasurer*

Mr Shaun Reeder  
Mr Alecos Demetriades

British Geological Survey  
IGME, Greece

**Analytical Committee**

*Chair*

Ms Gwendy 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 as an input to the IUGS/IAGC Global Geochemical Baselines project. 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 Expert Group' and the European Soil Bureau over the past few years, and is actively involved in European Commission's 'Soil Thematic Strategy Group' for the preparation of the EU's Soil Protection Document. The EuroGeoSurveys Secretary General is trying to link the project to other European Commission projects, such as the GMES Forum (Global Monitoring of Environment and Security), and INSPIRE (Infrastructure for Spatial Information in Europe).

**7. CHIEF ACCOMPLISHMENTS IN 2004**

**Scientific Progress:** The minutes of the IUGS/IAGC/FOREGS combined Working Groups' recent Business Meeting, held at the 32<sup>nd</sup> International Geological Conference, Florence, Italy, on the 22<sup>nd</sup> August, are appended. On the global scale, there has been continued progress within a number of countries, including India and the CCOP nations, over the past year. A field training course, which included lectures and two days of fieldwork, was also held at the Geological Survey of Tanzania, Dodoma, on the 27 to 29 July, 2004.

Representatives from the east African countries who are planning to participate in the activities of IUGS/IAGC Task group on Global Geochemical Baselines were invited to attend. Three representatives from Kenya (Moi University), one from Scheyhelles, one from Nigeria, and seven from Tanzania (TGS) participated in the course. A report on the meeting is appended.

Within Europe, significant progress was made on the FOREGS Geochemical Atlas of Europe. In particular, the final introductory and background texts and all distribution maps were finalised ready for publication. Good progress was also made on the interpretation of the geochemical data and a number of interpretation meetings were held throughout the course of the year. The Working Group's Annual progress report to the FOREGS Directors is attached.

Progress was made on harmonising activities of the FOREGS Working Group with the European program INSPIRE (Infrastructure for Spatial Information in Europe). The intention would be to identify five different Working Groups with specific responsibilities: - WG1 INSPIRE; - WG2 spatial harmonisation of the Pan-European River and Catchment Database and the FOREGS data; - WG3 harmonisation of soil monitoring data with JRC IES (the European Soil Bureau, ESB), with a focus on heavy metals; - WG4 hyperspectral analysis of the FOREGS and national sample archives; - WG5 laboratory standardisation for heavy metal analysis, and interpretation of pollution in soils, sediments and water.

**Public Relations and Finance Committee:** The new structure for the Committee agreed at the 2002 Annual Business Meeting (Chair: Alecos Demetriades; Deputy Chair: Andrew Grosz, three committee members, and affiliated members from each participating country) has not yet been activated, because it is important to firstly organise a section in the IUGS Website for the Global Geochemical Baselines project. The intention is for this web page to represent a forum for information exchange and promotional activities with products from the FOREGS and other pilot projects. There is an ongoing discussion of the procedure to be followed for the transfer of FOREGS data to the IUGS Website, especially legal aspects since the data must be publicly released by the Directors' themselves.

The Committee continued its activities for the promotion of the global programme, including the raising of funds through discussions with marketing and public relations consultants, and with senior staff from international mining companies. Other discussions with marketing experts are being planned for 2005 on issue of the FOREGS Geochemical Baselines Atlas of Europe, which is considered as the spearhead of the promotional activities, together with the results of the Chinese Environmental Geochemical Monitoring Network project (EGMON). It is stressed that significant funding (in the order of £75K to £100K) is required just to start making progress with the marketing and fund-raising initiatives. The suggestion of the first marketing consultant to raise the public image of the fund raising campaign by having a celebrity figurehead or patron will be pursued, when the results of the FOREGS and EGMON projects are made public in 2005.

Financing the global project with EU funds, as part of the EU Commission's Global Monitoring of Environment and Security Forum, is still a possible solution. The new EU Commission Officers will be informed by the EuroGeoSurveys' Secretary, and the situation for direct EU funding will be further explored, based on information from the previous Director of DG Environment (June 2003) on the possibility of funding projects of European or global concern from 2005-06.

Discussions with DuPont to fund the CCOP contribution to the Global Geochemical Baselines project are still in progress. Discussions with the Greek Orthodox Churches of Western Europe over potential financial assistance, which started in 2002, will be pursued further; discussions with other Greek and international companies will be pursued in 2005 upon publication of the FOREGS and EGMON results, and the installation of the project's new website. Personal contact with all potential sponsors is essential, hence the necessity for IUGS to provide the required seed money for the fund raising campaign.

## 8. CHIEF PROBLEMS ENCOUNTERED IN 2004

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 geochemical 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. It is hoped that some funding might be supplied through IUGS/IAGC in response to the recent Expression of Interest discussed in the previous section.

Mr Alecos Demetriades of IGME, Greece, and Dr 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,
- (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, and
- (iii) designing an Internet section dedicated to the project within the IUGS Website in collaboration with the IUGS Web Master. In this section, it is proposed that all project material will be stored and all Geological Surveys will have hot links to this page. It is stressed that this is a very important promotional activity, not only for providing information to scientists and the public in general, creating an exchange platform with contact points all over the world, but also for fund raising.

## 9. CHIEF PRODUCTS IN 2004

### *IUGS/IAGC/FOREGS Workshop*

Significant findings from the FOREGS project, and progress reports from project work on the global scale, were presented during the IUGS/IAGC/FOREGS Working Group's workshop (DW016) at the 32<sup>nd</sup> International Geological Conference, Florence, Italy, 20-28 August 2004, which was held on the 22<sup>nd</sup> August. Presentations included the following:

Marsina K and Slaninka I. 2004. Geochemical mapping of Europe from the viewpoint of national Geochemical data – an example from the Slovak Republic. 32<sup>nd</sup> International Geological Congress, Abstracts, Part 2, 1528.

De Vivo B, Bidovec M, Lima A, Plant J A, Pirc S, Reeder S, Siewers U, Smith B, Frizzo P and Sabatini G. 2004. The chemistry of the surface waters of Europe. 32<sup>nd</sup> International Geological Congress, Abstracts, Part 2, 1529.

Smith D B, Plant J A and Reeder S. 2004. The IUGS/IAGC working group on Global geochemical baselines: history and progress. 32<sup>nd</sup> International Geological Congress, Abstracts, Part 2, 1529.

Tarvainen T, Ahlsved C, Albanese S, Reeder S, Salminen R and Sandström H. 2004. Foregs geochemical mapping programme: assessment of analytical and data quality. 32<sup>nd</sup> International Geological Congress, Abstracts, Part 2, 1530.

Plant J A, Salminen R, Bidovec M, de Almeida Farinha M, De Vivo B, Demetriades A, De Vos W, Haugland T, Korre A, Lima A, O'Connor P J, Ottesen R T, Pirc S, Reeder S, Salpeteur I, Siewers U, Smith B, Svecova J and Tarvainen T. 2004. The surface geochemistry of Europe: preliminary findings of the Foregs geochemical baseline study.

32<sup>nd</sup> International Geological Congress, Abstracts, Part 2, 1530.

Batista M J, Ferreira A, Rosa D, Martins L and Serrano Pinto M. 2004. Geochemical mapping in Portugal: a comparison study. 32<sup>nd</sup> International Geological Congress, Abstracts, Part 2, 1531.

Salminen R, Ahlsved C, Batista M J, Bidovec M, Demetriades A, De Vivo B, de Vos W, Duris M, Frizzo P, Gilucis A, Gregorauskiene V, Halamic J, Haugland T, Heitzmann P, Jordan G, Kivisilla J, Klaver G, Klein P, Lima A, Lis J, Locutura J, Marsina K, Mazreku A, Mrnkova J, O'Connor P J, Olsson A A, Ottesen R T, Pasieczna A, Petersell V, Pirc S, Plant J A, Reeder S, Sabatini G, Salpeteur I, Sandström H, Schermann O, Siewers U, Steenfelt A, Tarvainen T and Van der Sluys J. 2004. Foregs Geochemical baseline mapping programme – a new European wide database and geochemical atlas. 32<sup>nd</sup> International Geological Congress, Abstracts, Part 2, 1531-1532.

De Vivo B, Lima A, Albanese S, Cicchella D, Frizzo P, Raccagni L, Sabatini G, Protano G, and Riccobono F. 2004. Foregs Italian Geochemical baseline mapping. 32<sup>nd</sup> International Geological Congress, Abstracts, Part 2, 1532.

De Vos W, Plant J A, Batista M J, Demetriades A and Korre A. 2004. Preliminary interpretation of European soil data from the Foregs geochemical baseline survey. 32<sup>nd</sup> International Geological Congress, Abstracts, Part 2, 1532.

Hall G E M, Ander L, Reeder S, Salminen R, Siewers U and Tarvainen T. 2004. Geochemical baseline surveys of stream waters: How to avoid getting into deep water. 32<sup>nd</sup> International Geological Congress, Abstracts, Part 2, 1532.

#### *Geochemical Atlas of Europe*

The first volume of the 'Geochemical Atlas of Europe', which includes all introductory and background texts as well as a complete set of maps of European geochemical data, is due for publication by the end December 2004.

#### *Other Presentations, Posters, Abstracts and Dissemination of Promotional Material*

FOREGS project results for Total Organic Carbon content in soil were included in a European Commission Soil Thematic Strategy Technical Working Group report on Organic Matter: "*Status and distribution of soil organic matter in Europe*". It can be downloaded from the EU Commission's web site:- <http://forum.europa.eu.int/Public/irc/env/Home/main> and select "Soil Policy".

A FOREGS poster was presented at the 3<sup>rd</sup> meeting of the European Commission's Advisory Forum on the Soil Thematic Strategy, Brussels, 19 April 2004; a two-page promotional flyer was also distributed.

Project material was included in a memorandum entitled "*Expert Meeting of Ministries of Environment of Greece and The Netherlands*", and given to the Dutch representatives at a meeting in Athens on 19 May 2004.

A FOREGS poster was presented at the Joint EGS-FOREGS Expert Meeting in Berlin, 8-9 July 2004, organised by BGR; a two-page promotional flyer was also distributed.

Gyozo Jordan included FOREGS Working Group's material in a publication of the European Commission's Joint Research Centre (Ispra) entitled: "*Mining, mining waste and*

*related environmental issues: Problems and solutions in Central and Eastern European Candidate Countries*” (PECOMINES project).

A bilingual FOREGS poster of the European Geochemical Baselines Atlas was compiled as an input to the IUGS “Global Geochemical Baselines” project, which will be circulated to all Geological Survey representatives for display at national and international conferences, symposia and workshops.

## **10. SUMMARY OF EXPENDITURES IN 2004**

The Working Group has received no IUGS funds in 2004. The fifteen hundred US dollars (1500 USD) received for 2003 was very small for the promotional activities, and even for assistance to developing country participants, it was, therefore, decided to keep it for future promotional activities, and in the hope that IUGS will approve the requested amount.

The cost of the FOREGS programme over the past year is estimated to be in excess of US \$0.2M. 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 FOREGS programme will be completed in the first few months of 2005 with the publication of the second volume of the ‘Geochemical Atlas of Europe’, which will include extended interpretation of the geochemical data published the first volume (published end December 2004). The geochemical database will be completely populated with all geochemical data and, according to the decision of the FOREGS Directors, it will be released at the end of 2005.

The FOREGS Geochemical Mapping Field Manual (Salminen *et al.*, 1998) will be revised in 2005 to include new details on sampling in karstic terrains prepared by A Demetriades, S Pirc, M Bidovec and F Sustersic, and other key terrains, such as tropical, desert and arctic.

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. Significant developments are likely if the Expression of Interest discussed earlier is followed up by a fully funded project.

The Public Relations and Finance Committee will continue in its plan of marketing initiatives in an effort to secure external funding. However, seed money is required from the IUGS to proceed with the fund raising campaign.

## **12. CRITICAL MILESTONES TO BE ACHIEVED NEXT YEAR**

Production of the Geochemical Atlas of Europe.

Continued progress with the global project including, should funding be made available, preparation of a Workshop on geochemical sampling to take place in Bangkok and, subsequently, China.

## **13. ANTICIPATED RESULTS/PRODUCTS NEXT YEAR**

Production of the on-line Geochemical Atlas of Europe.

Revised FOREGS Geochemical Mapping Field Manual with the addition of all the necessary appendices for sampling in different terrains, such as tropical, desert and arctic.

Significant number of oral presentations, posters and promotional materials.

#### 14. COMMUNICATION PLANS

The IUGS/IAGC/FOREGS Working Group plans to participate in national and international symposia, conferences and workshops for the promotion of the project.

Technical committees and less formal groups of country representatives will meet throughout the year to ensure that all national material from the FOREGS project is collected, and added to the existing information database.

#### 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\$ 0.2M.

Without securing substantial financial contributions from external sources, it will be very difficult for the IUGS 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.

As indicated earlier, an Expression of Interest was submitted to the IUGS/IAGC in response to its 2003 call, but no information was received as to whether it was approved or not.

Any other support from IUGS/IAGC 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 **Twenty thousand** US dollars (20,000 USD).

#### 17. CHIEF ACCOMPLISHMENTS 1998-2004

- 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](http://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 of the IUGS/IAGC and FOREGS Working Groups 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 of the IUGS/IAGC and FOREGS Working Groups 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.
- 2003 Annual Business Meeting of the FOREGS Working Group held in Dublin, Ireland (18 to 21 March 2003).
- 2003 Quality control of the analytical results of the FOREGS project completed.
- 2003 FOREGS poster, as the European contribution to IUGS/IAGC Working Group on Global Geochemical Baselines, and a two page flyer prepared for promotional purposes.
- 2003 Annual Business Meeting of the IUGS/IAGC and FOREGS Working Groups held in Edinburgh, Scotland (9 September 2003).
- 2004 IUGS/IAGC/FOREGS Working Groups' workshop (DW016) at the 32<sup>nd</sup> International Geological Conference, Florence, Italy, 20-28 August 2004, held on 22 August 2004.
- 2004 Production of Part 1 of the FOREGS Geochemical Atlas of Europe, including background and introductory texts and geochemical maps for a wide range of sample media and chemical elements.

## 18. ANTICIPATED OBJECTIVES AND WORK PLAN 2005-2009

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 electronic form at the end of 2004, and in printed form in 2005.

The FOREGS Geochemical Mapping Field Manual will be extensively revised to cover all terrain types. Similarly, a FOREGS Analytical Manual will be released in 2005 with details of all the analytical procedures used in the analysis of European samples, including quality control procedures, etc.

A popular, well illustrated, version of the FOREGS atlas will be prepared in 2005. It will be aimed at decision makers, but also the general public and educational institutions.

To aid in the training of field sampling teams, an illustrated version of the Field Manual showing, in picture form, all stages of sampling will be produced as a PowerPoint presentation to be distributed on CD-rom or downloaded from the Working Group's website.

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 21<sup>st</sup> Century. Science and Organisational Strategy for the International Union of Geological Sciences.* Trondheim, Norway, International Union of Geological Sciences, 49p.

Salminen R *et al.* 1998. FOREGS Geochemical Mapping. Field Manual. Geologian tutkimuskeskus - Geological Survey of Finland, Opas - Guide 47. Also available at [www.gsf.fi/foregs/geochem/fieldman.pdf](http://www.gsf.fi/foregs/geochem/fieldman.pdf).

NAME: Mr Shaun Reeder  
POSITION: Scientific Secretary  
DATE: 6 January 2005

ADDRESS: British Geological Survey  
Keyworth, Nottingham, United Kingdom, NG12 5GG

TELEPHONE: +44 (0)115 936 3523  
FACSIMILE: +44 (0)115 936 3261  
E-MAIL: [s.reeder@bgs.ac.uk](mailto:s.reeder@bgs.ac.uk)