

**ANNUAL REPORT FOR THE
INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)
WORKING GROUP ON
GLOBAL GEOCHEMICAL BASELINES
2006**

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

Scientific Secretary

Treasurer

Dr Arthur Darnley (deceased)	Geological Survey of Canada
Prof Jane Plant	Imperial College, UK
Dr David Smith	US Geological Survey
Mr Shaun Reeder	British Geological Survey
Mr Alecos Demetriades	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, Brazil, Canada, Mexico and the United States 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 EuroGeoSurveys Geochemistry Working Group (previously the Forum of European Geological Surveys, 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 International Atomic Energy Agency (IAEA) and potential links with GTOS, the Global Terrestrial Observing System. The Working Group has also established closer links with the European Soil Bureau over the past few years, and was actively involved in the 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). In North America, the project has established links with the tri-national soil geochemical survey involving the Geological Survey of Canada (GSC), the United States Geological Survey (USGS), and the Servicio Geológico Mexicano (SGM).

7. CHIEF ACCOMPLISHMENTS IN 2006

Scientific Progress: There has been continued progress in a number of areas, most notably:

India: Dr. Pradip Govil of the National Geophysical Research Institute (NGRI) in Hyderabad reports that sampling of soils and stream sediments from the 160 x 160 km cells of the Global Reference Network in India has been completed. The samples are currently being processed at the NGRI and will be analysed by XRF, ICP-MS and ICP-AES for major and trace elements. Geochemical maps showing the distribution for selected elements will be prepared during 2007. Higher resolution sampling based on 10 x 10 km cells will begin after the lower density data has been interpreted.

North America: The US Geological Survey and the Geological Survey of Canada completed pilot studies in 2006 in preparation for a soil geochemical survey of North America. Similar studies in Mexico by the Servicio Geológico Mexicano will be completed in early 2007. In July 2006, a symposium to present the results of the US and Canada portions of the pilot studies was convened at the 18th World Congress of Soil Science in Philadelphia, Pennsylvania (USA). In addition, Dr. David Smith presented a Goldschmidt Lecture at the Geological Survey of Norway in which he discussed these studies. The complete results of the pilot studies will be published in a special issue of Applied Geochemistry. Manuscripts will be prepared during early 2007 with a projected publication date of late 2008. Final sampling protocols will be published and the initial continental sampling phase for North America will begin in 2007. This multi-year project will involve collection of soil samples at 13,215 sites throughout the North American continent. These sites, representing an approximate density of one sample per 1,600 square km, were selected by a Generalized Random Tessellation Stratified (GRTS) design with the assistance of the US Environmental Protection Agency. This design results in a spatially balanced array of points throughout the continent without being tied to a fixed grid. Each of the GRTS sites represents the centre of a 1 km x 1 km area within which the actual sampling site will be chosen. The actual sampling site within the 1 square km area will be selected based on the most representative landscape within the dominant soil type in the area. Initial sampling during 2007 will focus on the provinces of Nova Scotia and New Brunswick in Canada and the states of Maine, Vermont, and New Hampshire in the US.

Mexico: Jorge Chipres from Universidad Autonoma de San Luis Potosi, has reported that his group have mapped some Central Mexican cells and have asked GTK in Finland for help with map production.

Cyprus: The floodplain sediment samples collected, during the geochemical baseline mapping in 2005, in the part of Cyprus controlled by the Republic of Cyprus, have been prepared, according to the specifications of the IUGS/IAGC/FOREGS project (Salminen *et al.*, 1998, 2005), by the Cyprus Geological Survey Department (GSD). It is noted that this is the first project that has been carried out through a private sponsorship, GeoInvest Ltd, a Cypriot based company (<http://www.geoinvest-cy.com>). Following consultation with Manfred Birke from the German Geological Survey (BGR), and exchange of letters

between the Working Group Co-Chair David Smith and the President of BGR, Professor Dr. B. Stribny, it has been agreed to analyse the floodplain sediment samples by XRF on a *free gratis* basis; it should be considered that BGR is in a sense another sponsor. An aliquot of the sample suite has been sent by GSD to the Institute of Geology and Mineral Exploration (Athens, Greece), where the samples will be homogenised and sub-sampled before despatch to BGR. The XRF analytical data should be ready in the first quarter of 2007. Besides the XRF analyses to be performed at BGR, the Cyprus Geological Survey Department has started the aqua regia analysis on the samples, and all results will be available and published in 2007.

Europe: Within Europe, the FOREGS Geochemical Atlas of Europe was completed. Following on from Part 1: Background Information, Methodology and Maps, published in summer 2005, Part 2: Interpretation of Geochemical Maps, Additional Tables, Figures, Maps and Related Publications, was published in both printed and electronic forms in Autumn 2006. Both volumes are available from <http://www.gsf.fi/publ/foregsatlas/>. The complete European database of all field and geochemical data collected as part of this project and the related digital photo archive are also freely available at this website. The FOREGS/EuroGeoSurveys Geochemical Atlas of Europe was officially launched to European Commission officers and other interested parties at the DG Environment headquarters in Brussels on the 21 September.

Progress was made on harmonising activities of the FOREGS Working Group with the European programme 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. Meetings are planned at JRC in Ispra, Italy, early next year to move this initiative forward.

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. With the publication of Part 2 of the Geochemical Atlas of Europe in 2006, this work should be finalised during 2007. To begin with, a hotlink should be established between the IUGS website and <http://www.gsf.fi/publ/foregsatlas/>. The intention is for this web page to represent a forum for information exchange and promotional activities with products from the EuroGeoSurveys (past FOREGS) and other pilot projects. Following the publication of Part 2 of the Geochemical Atlas of Europe, all data have become public and may be freely downloaded from the above URL. Therefore, there are no longer any legal aspects concerning the public release of the data, as noted in the 2005 annual report. The IUGS Webmaster needs to decide whether to upload all the data and information on the IUGS website or keep a link to the existing website, managed by Timo Tarvainen of the Geological Survey of Finland.

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. With the publication of the two-volume FOREGS/EuroGeoSurveys Geochemical Atlas of Europe, which is considered the spearhead of promotional activities, together with the results of the Chinese Environmental Geochemical Monitoring Network project (EGMON), the raising of funds should be easier, since most people contacted in the past for sponsorship have wanted to see results. 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 now that the results of the FOREGS/EuroGeoSurveys and EGMON projects have been made public.

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. A presentation of the FOREGS/EuroGeoSurveys Geochemical Atlas of Europe to European Commission officers and other interested parties was made on the 21 September in Brussels. European Union Commission Officers were informed of the results and the significance of the global project. Therefore, 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 2005-6.

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 2007 now that the FOREGS/EGS data and the Chinese EGMON results are publicly available, following installation of hot links from IUGS and Geological Surveys 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.

After the Cyprus experience, the Public Relations and Finance Committee will be looking for local companies, such as the Cypriot GeoInvest Ltd to finance the sampling, and if possible the analysis, and to collaborate with the national Geological Surveys. We will also pursue international companies that have investment interest in certain countries.

The Hellenic Institute of Geology and Mineral Exploration has purchased 100 copies of Parts 1 and 2 of the FOREGS/EuroGeoSurveys Geochemical Atlas of Europe for promotional purposes. It has already donated 50 copies to University libraries, Ministries, Institutional libraries, Chamber libraries, etc. Also, different international working groups have been informed about the publication of Parts 1 and 2, as well as the website address from which the atlas can be viewed, downloaded or purchased.

8. CHIEF PROBLEMS ENCOUNTERED IN 2006

The main problem still facing the project is the lack of funding that is required to achieve the aims and objectives of the project at the global scale. Although the geochemical baseline project in Europe has now been completed, 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 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, but also to create an exchange platform with contact points all over the world, and for fund raising.

9. CHIEF PRODUCTS IN 2006

FOREGS Geochemical Atlas of Europe

The second volume of the 'FOREGS/EuroGeoSurveys Geochemical Atlas of Europe', Part 2: Interpretation of Geochemical Maps, Additional Tables, Figures, Maps and Related Publications' was published in August 2006 in both printed and electronic forms. The electronic versions of both part 1 and 2 of the Atlas, as well as the complete digital geochemical data and the digital photo archive are available at <http://www.gsf.fi/publ/foregsatlas/>.

Papers

Demetriades A, Batista M J, Bidovec M, De Vivo B, De Vos W, Duris M, Gilucis A, Gregorauskiene V, Halamic J, Heitzmann P, Lima A, Jordan G, Klaver G, Klein P, Lis J, Locutura J, Marsina K, Mazreku A, O'Connor P J, Olsson S Å, Ottesen R T, Petersell V, Pirc S, Plant J A, Reeder S, Salminen R, Salpeteur I, Sandström H, Siewers U, Steenfelt A and Tarvainen T. 2006. FOREGS Geochemical Atlas of Europe. INTERFACE, Newsletter of the Association of Environmental Geochemistry and Health.

Gough L P, Wang B, Smith D B and Gustavsson Nils. 2005. Geochemical landscapes of Alaska - New map presentations and interpretations for 23 elements in surficial materials: U.S. Geological Survey Professional Paper 1716, 36 p. [<http://pubs.usgs.gov/pp/2005/1716/>]

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Smith D B, Woodruff L G, Cannon W F, Kilburn J E, Garrett R G, Klassen R, Eilers R G, Goldhaber M B, Horton J D and Morrison J M. 2006. A proposed soil geochemical and microbiological survey of North America: Continental-scale pilot study in Canada and the United States: Abstracts of the 18th World Congress of Soil Science, July 9-15, 2006, Philadelphia, PA (CD-ROM).

Other Presentations, Posters, Abstracts and Dissemination of Promotional Material

Oral: *The FOREGS Geochemical Atlas of Europe: A contribution to IUGS/IAGC Global Geochemical Baselines*. Presented by Alecos Demetriades at the Geology Department of the University of Athens, Greece, 2 February 2006.

Oral: *The FOREGS Geochemical Atlas of Europe: A contribution to IUGS/IAGC Global Geochemical Baselines*. Presented by Alecos Demetriades at the Geology Department of the University of Thessaloniki, Greece, 10 March 2006.

Oral: *Geochemical Atlas of Europe on-line: articles, databases, maps & photos - an ArcView and ArcIMS application. The EuroGeoSurveys' contribution to IUGS/IAGC Global Geochemical Baselines*. Presented by Alecos Demetriades at the 21st European Conference for ESRI Users, Athens, Greece, 8 November 2006.

Oral: *Spatial Patterns in Soil Geochemistry of the United States: Results from a Pilot Study for a Soil Geochemical Survey of North America*. Presented by David Smith as a contribution to the Goldschmidt Lecture Series at the Geological Survey of Norway, Trondheim, Norway, 14 November 2006.

Presentations at the launch of the Geochemical Atlas of Europe to the European Commission in Brussels on 21st September 2006:

- (1) Oral: *The Geochemical Atlas of Europe – A voluntary initiative of the European Geological Surveys*. Presented by Patrice Christmann, EuroGeoSurveys' Secretary General.
- (2) Oral: *Geochemical Atlas of Europe – General overview*. Presented by Reijo Salminen, Geological Survey of Finland, and EGS-FOREGS Geochemistry Working Group Chairman.
- (3) Oral: *Geochemical Atlas of Europe: Application of Geochemical Data to Health Related Issues*. Presented by Patrick O'Connor, Geological Survey of Ireland.
- (4) Oral: *Geochemical Atlas of Europe: Benefits and Utilisation*. Presented by Clemens Reimann, Geological Survey of Norway, and new Chairman of the EuroGeoSurveys Geochemistry Working Group.
- (5) Oral: *Geochemical Atlas of Europe: Wider Perspectives and Future Activities*. Presented by Alecos Demetriades, Institute of Geology and Mineral Exploration, Greece.
- (6) Oral: *The new EuroGeoSurveys Geochemical Data Base: the French Example*. Presented by Ignace Salpeteur, Geological Survey of France (BRGM).

- (7) Poster: *European Geochemistry and Natural Background Values in Soil*. Prepared on behalf of the EGS Geochemistry Working Group by Alecos Demetriades, with contributions by other members.
- (8) Poster: *European Geochemistry and Health*. Prepared on behalf of the EGS Geochemistry Working Group by Alecos Demetriades with the assistance of Olle Selinus, with contributions by other members.
- (9) Four page leaflet of the Geochemical Atlas of Europe.

Various oral presentations of results of the Geochemical Atlas of Europe by Olle Selinus (Geological Survey of Sweden):

- Two presentations at the European Environment Agency, Copenhagen, Denmark
- Geological Survey of Sweden
- Geological Survey of Denmark
- University of Uppsala, Sweden
- University of Lund, Sweden
- Royal University of Technology, Stockholm,
- University of Gothenburg
- In local Municipalities in Sweden
- Royal Academy of Sciences, Stockholm
- 9th Annual Health Force Protection Conference, Albuquerque, New Mexico
- Three lectures at 7th International Symposium on Environmental Geochemistry and Health in Beijing, one of them a plenary lecture covering geochemical databases.
- Presentation in Monaco to Prince Rainier
- Bangladesh

Poster: *Geochemical Baseline Mapping of European Soils: A FOREGS project as an input to IUGS/IAGC Global Geochemical Baselines*. By R Salminen, M J Batista, M Bidovec, A Demetriades, B De Vivo, W De Vos, M Duris, A Gilucis, V Gregorauskiene, J Halamic, P Heitzmann, A Lima, G Jordan, G Klaver, P Klein, J Lis, J Locutura, K Marsina, A Mazreku, J Mrnkova, P J O'Connor, S Å Olsson, R T Ottesen, V Petersell, S Pirc, J A Plant, S Reeder, C Reimann, I Salpeteur, H Sandström, U Siewers, D Smith, A Steenfelt and T Tarvainen. Presented at the 18th World Congress of Soil Science, July 9-15, 2006 - Philadelphia, Pennsylvania, USA.

Posters: Three posters entitled *European Geochemistry and Natural Background Values in Soil*, *European Geochemistry and Health*, and *Geochemical Atlas of Europe for citizens, decision- and policy-makers*, prepared on behalf of the EGS Geochemistry Working Group by Alecos Demetriades. 21st European Conference for ESRI Users, Athens, Greece, 8 November 2006.

Meeting: 3rd Plenary Meeting of the Group on Earth Observation, the governance body of the Global Earth Observation System of Systems (GEOSS) Programme (www.earthobservations.org), of which EGS is a Participating Organisation. Bonn, Germany, 28-29 November 2006.

10. SUMMARY OF EXPENDITURES IN 2006

The Working Group has received 1500 USD from IUGS in 2006. This amount is very small for the planned promotional activities, and even for assistance to developing country

participants. It was decided, therefore, to keep it for future small 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 \$0.1M. These funds were provided from the Geological Institutes of the participating countries within Europe. The cost of pilot studies in the US and Canada for the proposed soil geochemical survey of North America is estimated to have been approximately US \$0.5M. There has also been considerable expenditure within India, China and Brazil.

11. WORK PLAN FOR NEXT YEAR

The FOREGS Geochemical Mapping Field Manual (Salminen *et al.*, 1998) will be revised in 2007 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. 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.

The newly formed EuroGeoSurveys Geochemistry Working Group, under the chairmanship of Clemens Reimann, is planning many activities for next year, the details of which will be agreed at the inaugural meeting of the WG in the spring of 2007.

Collaboration with the Joint Research Centre, Ispra, Italy, is planned following a kick-off meeting on 19-20 April 2007. The collaboration concerns a two-year research project to utilise the results of the Geochemical Atlas of Europe in relation to datasets held by the European Soil Bureau. For this purpose a Memorandum of Understanding has been signed between EuroGeoSurveys and the European Commission;

Seminars will be arranged for young geochemists in collaboration with Geological Departments of Universities, since it is very important for the methodology that has been developed over the years to be transferred.

Reactivation of contact points in all countries is a significant that will be pursued by circulating the Newsletter that has been prepared by the EuroGeoSurveys Geochemistry Working Group.

12. 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, including the "Soil Geochemical Patterns at International, National, and Regional Scales" symposium to be convened at the 18th World Congress of Soil Science in Philadelphia, PA (USA), July 2006.

Communication will also be achieved through continued output of oral presentations, posters and promotional materials.

13. SUMMARY BUDGET FOR NEXT YEAR AND POTENTIAL FUNDING SOURCES OUTSIDE IUGS

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 publication of 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 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). We understand the financial problems of IUGS, but we strongly believe that this is an important project, which must be given the priority it deserves.

14. CHIEF ACCOMPLISHMENTS 1998-2006

- 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 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 32nd International Geological Conference, Florence, Italy, 20-28 August 2004, held on 22 August 2004.
- 2005 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.
- 2006 Production of Part 2 of the EuroGeoSurveys/FOREGS Geochemical Atlas of Europe, including interpretation, papers on specialised data treatment, and supplementary tables, and figures and maps.
- 2006 Launch presentation of the Geochemical Atlas of Europe to the European Commission in Brussels on 21 September 2006.

15. ANTICIPATED OBJECTIVES AND WORK PLAN 2006-2010

The FOREGS Geochemical Mapping Field Manual will be extensively revised to cover all terrain types. Similarly, a FOREGS Analytical Manual will be released 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 2007-8. 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 21st 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 <http://www.gsf.fi/foregs/geochem/fieldman.pdf>.

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NAME: Mr Shaun Reeder
POSITION: Scientific Secretary
DATE: 22 November 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