

**ANNUAL REPORT FOR THE
INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)/
INTERNATIONAL ASSOCIATION OF GEOCHEMISTRY (IAGC)
TASK GROUP ON
GLOBAL GEOCHEMICAL BASELINES
2007**

1. TITLE OF CONSTITUENT BODY

IUGS/IAGC Task 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 Task 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 (2005-2008) 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

Dr David Smith US Geological Survey

Prof Jane Plant (resigned) Imperial College, UK

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 [<http://www.gtk.fi/publ/foregsatlas>]. A very conservative estimate of the cost for the production of the *Geochemical Atlas of Europe* is in the order of 5 million Euro (approx. 3.6 million USD). 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 Expert 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 EGS Geochemistry Expert Group has also established closer links with the European Soil Bureau over the past few years (a Memorandum of Co-operation has been recently signed), and was actively involved in the European Commission's 'Soil Thematic

Strategy Group' for the preparation of the EU's Soil Protection Document, and the final draft of the pending Soil Protection Directive. 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), since the Geochemical Atlas of Europe has been produced in a harmonised manner, according to IGCP 259 specifications (Darnley et al., 1995) and, therefore, according to INSPIRE specifications. He is also attempting to link the project with GEOSS (Global Earth Observation system of Systems). In North America, the project has established links with the North American Soil Geochemical Landscapes Project involving the Geological Survey of Canada (GSC), the United States Geological Survey (USGS), and the Servicio Geológico Mexicano (SGM).

7. CHIEF ACCOMPLISHMENTS IN 2007

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

India: Dr Pradip Govil and Dr VP Dimri of the National Geophysical Research Institute (NGRI) in Hyderabad report that sampling of top and bottom soils has been completed in all the states of India during 2007. All 160 x 160 km GRN cells were sampled, except where samples could not be collected from cell numbers 119, 120 and 121 in the state of Jammu & Kashmir, cell number 122 from Andaman & Nicobar Islands and two cells on the Chinese border. Sampling was carried out according to the recommendations given by Salminen *et al.* (1998, 2005). All the soil samples were processed at NGRI, Hyderabad. The samples have been analysed at NGRI by XRFs for major, minor and trace elements. International reference samples were used to prepare the calibration curves and to check the reliability of the analytical data. Geochemical maps showing the distribution of twenty selected elements (Ba, Co, Cr, Cu, Ni, Pb, Sr, V, Y, Zn, Zr, Mn, Al, Fe, Ca, Mg, Na, K, Ti and P) have been prepared for the entire country. Interpretation of the data based on distribution maps for soil is in progress and will be completed by March 2008. High-resolution sampling using a grid of 10 x 10 km cells will be initiated from January 2008. A map showing the distribution of lead in soils throughout India is given in Appendix 1. An abstract based on the work carried out at NGRI has been submitted to the International Geological Congress to be held at Oslo, Norway, in 2008.

North America: North American Soil Geochemical Landscapes Project (NASGLP): The pilot phase of the project in Canada, US, and Mexico has been completed and results will be published in a special volume of *Applied Geochemistry* in late 2008 or 2009. For the full continental program, a total of 13,215 sites have been identified (6183 in Canada, 5813 in the US and 1219 in Mexico) and the first continental-scale sampling began in 2007. A field workshop was held in Fredericton, New Brunswick in June 2007 to officially launch the sampling program. Agencies represented included the Geological Survey of Canada, Agriculture and Agri-Food Canada, US Geological Survey, New Brunswick Department of Natural Resources, and Environment Canada. During the summer of 2007, Canada completed the Maritime Provinces of New Brunswick, Nova Scotia, and Prince Edward Island, and the US completed the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, and Nebraska. Mexico will begin their sampling effort in 2008. The entire continental-scale survey will likely take 10 years to complete. In November 2007, project representatives met in San Luis Potosí, Mexico to discuss progress, sampling and analytical protocols, and future plans.

The decade-long project to complete the stream-sediment geochemical database for the United States is nearing completion. The database currently contains data for more than 72000 samples. Sampling and chemical analysis will be complete and all data should be available by 2009. All current data from this project are available for download at <http://tin.er.usgs.gov/geochem/doc/home.htm>.

Europe: The two volumes of the FOREGS-EuroGeoSurveys Geochemical Atlas of Europe (Salminen *et al.*, 2005; De Vos *et al.* 2006) are proving to be very popular. Both volumes are available for free download 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 2006. Since then it has become very popular in different circles with in excess of 20000 visits to the website since its launch in August 2005.

The publication of the Geochemical Atlas of Europe was the final act of the FOREGS Geochemistry Working Group, which has now been superseded by the formation of the EuroGeoSurveys Geochemistry Expert Group (EGS GEG), under the chairmanship of Clemens Reimann of the Geological Survey of Norway. The EGS GEG held its first business meeting at the EGS headquarters in Brussels in September 2007. Representatives from 15 countries were able to participate, including some welcome new colleagues. The EGS GEG aims to build on the good work of the recently published Atlas, including promoting the use of the dataset and encouraging access to the sample archive to provide additional data for determinands not tested as part of the original study.

The EGS GEG also aims to develop new scientific initiatives throughout the European geochemical community. One of the proposals raised at the inaugural meeting, for which funding from Industry has subsequently been obtained, was for a geochemical survey of agricultural soils of Europe. Sampling will take place during 2008. The study will provide complimentary data to that already collected in support of the Global Geochemical Baselines Project. Laboratory standard reference materials will be exchanged with the North American Soil Geochemical Landscapes Project to ensure that soil geochemical data from these two international projects are consistent and comparable.

More details of the EGS GEG's aims, objectives and proposed activities are summarised in Section 11 of this Annual Report and in the Minutes of the Group's inaugural meeting (Appendix 2).

Public Relations and Finance Committee: The current priority for this committee is to organise a section in the IUGS Website for the Task Group on Global Geochemical Baselines.. This is still under construction, and should be in full operation during 2008 to coincide with Year of Planet Earth. During the October 2007 meeting of the EuroGeoSurveys Directors in Athens, the Director of the Geological Survey of Finland (GTK) approved the continued maintenance of the Geochemical Atlas of Europe Website by GTK, and its updating with new information and data. Hotlinks have been established to the Atlas site [<http://www.gtk.fi/publ/foregsatlas/>] from the sites of EuroGeoSurveys, many European Geological Surveys, and also professional organisations, e.g. the Association of

Applied Geochemists, International Medical Geology Association, the Society of Environmental Geochemistry and Health.

In addition, educational material in support of the Year of Planet Earth is being prepared and shall be uploaded on the IUGS Website. The intention is for this website to represent a forum for the dissemination of information, and to make people aware of the significance that geochemical information and data have on our daily lives, and the quality of the environment in which we live.

The FOREGS/EuroGeoSurveys Geochemical Atlas of Europe has been presented to European Commission officers and other interested parties, who have been informed of the significance of the global project. The situation for direct EU funding continues to be explored. As part of the EGS GEG business meeting in Brussels in September, for example, discussions were held with various European representatives, including Catherine Bouland (Environmental Department of the Brussels Regions), Eva Baños de Guisasaola (EUROCITIES Policy Officer for the Environment) and Karen Fabrice (Unit for Natural Resources Management at DGU Research).

Apart from the printed version of the Geochemical Atlas of Europe, a CD-version has been compiled, which includes the two volumes of the Atlas, the analytical data, the field manual, the IGCP 259 Report "A global geochemical database for environmental and resources management" (Darnley *et al.* 1995), and other useful information. EuroGeoSurveys has disseminated up to now 1000 copies of the Atlas CD, and the Public Relations Committee more than 300 copies. EuroGeoSurveys has made an additional 300 copies to disseminate during the two-day GEOSS Ministerial Summit Meeting at Cape Town on the 28 and 29 November 2007.

8. CHIEF PROBLEMS ENCOUNTERED IN 2007

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. The geochemical baseline project in Europe has now been completed with funding by the participating European Geological Surveys. Ongoing work in North America and India are similarly funded by national geological surveys or other national scientific institutions. Some proposed activities, such as the international geochemical mapping project by the member countries of the Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP), have been delayed because of a lack of available funding by the individual countries. Funds are required for training, transportation, additional analytical services and quality control. In addition, the Task Group is almost entirely dependent on funds from participating agencies for marketing activities such as web site development and workshops.

9. CHIEF PRODUCTS IN 2007

Geochemical Atlases and Data

The electronic versions of both part 1 and 2 of the Geochemical Atlas of Europe, as well as the complete digital geochemical data and the digital photo archive have been made available at <http://www.gsf.fi/publ/foregsatlas/>. In addition, almost 2000 copies of the CD-

version of the Geochemical Atlas of Europe have been produced by EuroGeoSurveys and the Public Relations Committee.

The draft Geochemical Atlas of Regions of India is in preparation by the National Geophysical Research Institute (NGRI), India (see example map in Appendix 1).

Stream sediment data for the United States consisting of analyses for 72,709 samples has been published. Complete information, including data available for downloading, can be found at: <http://tin.er.usgs.gov/geochem/doc/home.htm>

Articles and Papers

Global Geochemical Baselines. *Episodes*, 30(1), March 2007, 69-72.

Demetriades A. 2007. Baseline Geochemical Mapping in Europe and Hellas with the aim to develop environmental strategy. Seminar of the IGME Employees Syndicate, Hotel President, 8 May 2007, Vol. 1, 13 pp. (oral presentation and paper in Greek – Examples of the Geochemical Atlas of Europe are given in one of the sections).

Demetriades A, Mazreku A, Klein, P., De Vos, W., Halamic, J., Duris, M., Steenfelt, A., Gravesen, P., Kivisilla, J., Petersell, V., Salminen, R., Tarvainen, T., Sandstrom, H., Salpeteur, I., Birke, M., Siewers, U., Jordan, G., O'Connor, P.J., De Vivo, B., Lima, A., Gilucis, A., Gregorauskiene, V., Klaver, G., Ottesen, R.T., Reimann, C., Lis, J., Pasieczna, A., Batista, M.J., Marsina, K., Slaninka, I., Bidovec, M., Pirc, S., Bel-Ian, A., Locutura, J., Olsson, S.A., Heitzmann, P., Ander, E.L., Breward, N., Reeder, S., Smith, B. & Taylor, H., 2007. The Geochemical Atlas of Europe – A synoptic presentation. Eion, Newsletter, Hellenic Sedimentological Association, No. 4, 11-12 (in Greek).

EuroGeoSurveys – The Association of Geological Surveys of the European Union, 2007. Geochemical Atlas of Europe. ESRI Map Book, 22, 30.

EuroGeoSurveys Geochemistry Working Group, 2007. The Geochemical Atlas of Europe. Hellenic Geosphaera, An Institute of Geology and Mineral Exploration periodic publication, Athena, Hellas, Vol. 1 (1), 22-27 (in Greek).

Kaminari, M. & Vergou, K., 2007. Review of the Geochemical Atlas of Europe. Eion, Newsletter, Hellenic Sedimentological Association, No. 4, 24 (in Greek).

Smith D B and Rencz A. 2007. Short contribution concerning the IUGS/IAGC Task Group on Global Geochemical Baselines. *Elements*, Volume 3, Number 5, page 341, October 2007.

Other Presentations, Posters, Abstracts and Dissemination of Promotional Material

Keynote presentation: Demetriades, A., Mazreku, A., Klein, P., De Vos, W., Halamic, J., Duris, M., Steenfelt, A., Gravesen, P., Kivisilla, J., Petersell, V., Salminen, R., Tarvainen, T., Sandstrom, H., Salpeteur, I., Birke, M., Siewers, U., Jordan, G., O'Connor, P.J., De Vivo, B., Lima, A., Gilucis, A., Gregorauskiene, V., Klaver, G., Ottesen, R.T., Reimann, C., Lis, J., Pasieczna, A., Batista, M.J., Marsina, K., Slaninka, I., Bidovec, M., Pirc, S., Bel-Ian, A., Locutura, J., Olsson, S.A., Heitzmann, P., Ander, E.L., Breward, N., Reeder, S., Smith, B. & Taylor, H., 2007. The Geochemical Atlas of Europe: A base for the development of

environmental policy in the 21st century. (Presented by Alecos Demetriades on behalf of the Geochemistry Working Group). 11th International Conference of the Geological Society of Hellas – "Geoenvironment: past, present, future" - Economic Geology and Geochemistry Session, 24th – 26th May, 2007, Athena, Hellas. [<http://conferences.geol.uoa.gr/2007ege/>].

Keynote presentation: Locutura, J., Bel-lan, J., De Vivo, B., Batista, M.J., Bidovec, M., Demetriades, A., De Vos, W., Gregorauskiene, V., Lima, A., Marsina, K., O'Connor, P.J., Ottesen, R.T., Pirc, S., Reeder, S., Salminen, R., Salpeteur, I., Siewers, U., Tarvainen, T., Birke, M., Ander, E.L., Breward, N., Duris, M., Gilucis, A., Gravesen, P., Halamic, J., Heitzmann, P., Jordan, G., Klaver, G., Klein, P., Lax, K., Lis, J., Mazreku, A., Pasieczna, A., Petersell, V., Reimann, C., Shaw, R., Slaninka, I., Smith, B. & Taylor, H., 2007. *Geochemical Atlas of Europe: A multi-media sampling survey for the establishment of geochemical baselines*. (Presented by Clemens Reimann on behalf of the Geochemistry Working Group). 23rd International Applied Geochemistry Symposium (IAGS). 14th – 19th June, 2007, Universidad de Oviedo, Oviedo (Asturias), Spain. [<http://www.uniovi.es/IAGS2007/>].

Keynote presentation: Salminen, R., 2007. *The Geochemical Atlas of Europe –continent-wide distribution patterns of elements*. Goldschmidt 2007 Conference, Continental Scale Earth Surface Geochemical Mapping Session. 19th – 24th August 2007, Cologne, Germany. [<http://www.goldschmidt2007.org/>]

Oral presentation: 'Geochemical Atlas of Europe'. Presented by Simon Pirc at the 35th Session of the IGCP Scientific Board, UNESCO Headquarters, Paris, 16 February 2007.

Oral presentations: First public presentation of the Geochemical Atlas of Europe, Institute of Geology and Mineral Exploration, Amphitheatre of the Ministry of Development, 23rd April 2007, Athens, Hellas:

- The Geochemical Atlas of Europe (Alecos Demetriades, in Greek)
- Benefits & Utilisation (Clemens Reimann)
- Internet version of the Geochemical Atlas of Europe (Alecos Demetriades, in Greek)
- Geochemical Mapping – Future plans (Alecos Demetriades, in Greek)

Oral presentation: Eberl, D.D., and Smith, D.B., 2007. Relations among mineralogy, chemistry, and annual precipitation for soils from two continental-scale transects of North America. Presentation at the 44th Annual Meeting of the Clay Minerals Society, Santa Fe, New Mexico, June 2-7, 2007.

Oral presentation: Reeder, S., Ander, E.L., Demetriades, A., De Vivo, B., Batista, M.J., Bel-lan, A., Bidovec, M., De Vos, W., Gregorauskiene, V., Hayoz, P., Lima, A., Marsina, K., O'Connor, P.J., Ottesen, R.T., Pirc, S., Salminen, R., Salpeteur, I., Siewers, U., Tarvainen, T., Birke, M., Breward, N., Duris, M., Gilucis, A., Gravesen, P., Halamic, J., Heitzmann, P., Jordan, G., Klaver, G., Klein, P., Lax, K., Lis, J., Locutura, J., Mazreku, A., Pasieczna, A., Petersell, V., Reimann, C., Selinus, O., Shaw, R., Slaninka, I., Smith, B. & Taylor, H., 2007. *Geochemical Atlas of Europe for the study of relationships between geochemistry and health*. (Presented by E.L. Ander on behalf of the Geochemistry Working Group). 25th European Conference of the Society of Environmental Geochemistry and Health: Understanding Environmental Contributions to the Burden of Disease, 4th – 5th June, 2007, Health Protection Agency, Liverpool, United Kingdom [<http://seghconferences.co.uk>].

Oral presentation: De Vos, W., Batista, M.J., Demetriades, A., Pirc, S., Albanese, S., De Vivo, B., Bidovec, M., Martins, L., 2007. *Factor analysis interpretation of Geochemical Atlas of Europe data*. (Presented by Walter De Vos). Goldschmidt 2007 Conference, Session: Continental Scale Earth Surface Geochemical Mapping, 19th – 24th August 2007, Cologne, Germany. Abstract p.A222 [<http://www.goldschmidt2007.org/>].

Oral presentation: Goldhaber, M.B., Smith, D.B., Morrison, J.M., Wanty, R.B., and Holloway, J.M., 2007. A coordinated continental and regional soil geochemical survey of North America. Presentation at the Goldschmidt 2007 Conference, Cologne, Germany, August 19-24, 2007.

Oral presentation: Smith, D.B., 2007. North American Soil Geochemical Landscapes Project. Presentation to U.S. Department of Agriculture, Washington, DC, September 18, 2007.

Oral presentation: A. Demetriades, T. Tarvainen, H. Savolainen, E.L. Ander, M.J. Batista, A. Bel-Ian, M. Bidovec, M. Birke, N. Breward, B. De Vivo, W. De Vos, M. Duris, A. Gilucis, V. Gregorauskiene, P. Gravesen, J. Halamic, P. Heitzmann, G. Jordan, J. Kivisilla, G. Klaver, P. Klein, A. Lima, J. Lis, J. Locutura, K. Marsina, A. Mazreku, P.J. O'Connor, S.Å. Olsson, R.T. Ottesen, A. Pasieczna, V. Petersell, S. Pirc, J. Plant, S. Reeder, C. Reimann, R. Salminen, I. Salpeteur, H. Sandstrom, U. Siewers, I. Slaninka, B. Smith, A. Steenfelt, and H. Taylor. The electronic version of the EuroGeoSurveys Geochemical Atlas of Europe. (Presented by Alecos Demetriades on behalf of the Geochemistry Working Group). 17th Panhellenic Meeting of ArcGIS software users (ArcInfo – ArcView – ArcGIS Server), 8-9 November 2007, Holiday Inn, Athena, Hellas. Organised by Marathon Data Systems.

Oral presentation: Rencz, Andy, and Smith, D.B., 2007. North American Soil Geochemical Landscapes Project. Presentation at the Society of Environmental Toxicology and Chemistry (SETAC) North America 28th Annual Meeting, Milwaukee, Wisconsin, Nov. 11-15, 2007.

Oral presentation: Smith, D.B., 2007. Global-scale geochemical baselines: A strategic program for assessing and monitoring the composition of the Earth's land surface. Presented at the National Autonomous University of San Luis Potosí, San Luis Potosí, Mexico, November 12, 2007.

Posters: Meeting of project partners “*Novel techniques and tools for the characterisation and assessment of contaminated soils towards sustainable remediation*” (NeoSoil), European 7th Programme on Research, Technological Development and Demonstration, 29 March 2007, Institute of Geology and Mineral Exploration, Athens, Hellas: (1) The EuroGeoSurveys Geochemical Atlas of Europe, and (2) Geochemical Mapping (*presented* by Alecos Demetriades).

Posters: Three posters of the Geochemical Atlas of Europe were presented at the NATO /CCMS Pilot Study meeting: “*Prevention and Remediation in Selected Industrial Sectors: Sediments*”. Ministry of Higher Education, Science and Technology, City Hotel, Ljubljana, Slovenia, 17-22 June, 2007. (1) The EuroGeoSurveys Geochemical Atlas of Europe; (2)

Geochemical Mapping; (3) The EuroGeoSurveys Geochemical Atlas of Europe: Stream and Floodplain Sediments (*presented* by Alecos Demetriades).

Poster: O'Connor, P., Demetriades, A., Mazreku, A., Klein, P., De Vos, W., Halamic, J., Duris, M., Svecova, J., Gravesen, P., Steenfelt, A., Petersell, V., Kivisilla, J., Salminen, R., Tarvainen, T., Sandström, H., Salpeteur, I., U. Siewers, U., Birke, M., Jordan, G., De Vivo, B., Lima, A., Albanese, S., Gilucis, A., Gregorauskiene, V., Ottesen, R.T., Reimann, C., Lis, J., Pasieczna, A., Batista, M.J., Martins, L., Marsina, K., Slaninka, I., Bidovec, M., Pirc, S., Locutura, J. Bel-Ian, A., Lax, K., Olsson, S.Å., Selinus, O., Heitzmann, P., Hayoz, P., Klaver, G., Reeder, S., Ander, E.L., Shaw, R., Smith, B. & Taylor, H., 2007. The EuroGeoSurveys “*Geochemical Atlas of Europe*”. (Presented by Patrick O'Connor on behalf of the Geochemistry Working Group). 9th Biennial SGA Meeting, 20–24 August, 2007, Trinity College, Dublin, Ireland. [<http://www.conferencepartners.ie/sga2007>].

Poster: “EuroGeoSurveys Geochemical Atlas of Europe”. Presented by the EuroGeoSurveys Secretary General at the GEOSS Ministerial Summit Meeting, Cape Town, 28-29 November 2007.

It is stressed that the posters and presentations prepared on behalf of the EuroGeosurveys Geochemistry Expert Group all bear the IUGS, IAGC and Planet Earth logos in addition to the logo of EuroGeoSurveys and any national logos.

10. SUMMARY OF EXPENDITURES IN 2007

The Task Group has received 1500 USD from IUGS in 2007. 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 EuroGeoSurveys programme over the past year is estimated to be in excess of US \$45,000. The overall cost of the FOREGS/EGS activities over the past decade or so is difficult to estimate as the work has been funded independently from each of the participating countries, but is thought to be in excess of US \$10M. These funds were provided from the Geological Surveys 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 in 2007 and approximately US \$1.6M over the 3-year pilot phase of the project. Total costs for carrying out the soil geochemical survey of North America are estimated to be US \$15-20M over the next ten years. There has also been considerable expenditure within India, China and Brazil.

It should be mentioned that for promotional activities the cost for the production of 1600 CD-ROMs of the Geochemical Atlas of Europe was approximately US \$5,600. The cost for the first public presentation of the Geochemical Atlas of Europe in Athena, Hellas, on the 23rd April 2007 was in the order of US \$ 4500 (US \$3200 organisational expenses, and US \$1,300, Clemen Reimann's travel and accommodation expenses).

11. WORK PLAN FOR NEXT YEAR

The FOREGS Geochemical Mapping Field Manual (Salminen *et al.*, 1998) will be revised in 2008 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 have been agreed during the Brussels meeting of the Group in September 2007, and approved by the EuroGeoSurveys Directors in October 2007. The minutes of the Group's inaugural meeting are given in Appendix 2.

Amongst the proposed activities is a pan-European project covering the continent of Europe from the Atlantic to the Urals called "*Geochemical Mapping of Agricultural and Grazing Land Soils in Europe (GEMAS)*" at a density to 1 sampling site/2500 km². The European Association of Metals (Eurometaux) is financing this project with 400,000 Euros (100,000 Euros/year), the Geological Survey of Germany (BGR) is analysing for free all soil samples, and also taking responsibility for production of the printed version of the geochemical atlas. Representatives from all participating countries will be meeting in Berlin from the 5th to 7th March 2008 to harmonise the field sampling procedures and finalise the Field Handbook.

Another proposed activity is a Pan-European project called "*European Groundwater Geochemistry (EGG)*". Since money is not available to carry out such a project, the free analysis of all water samples has been secured (BGR). The samples that will be used are bottled mineral waters, which come from springs. The sampling, or rather the purchase of bottled mineral waters, is planned to take place from December 2007 to February 2008, and the results will be published under the title "*Geochemical Atlas of European Groundwater Resources, Part I: Mineral Waters*".

Collaboration with the Joint Research Centre, Ispra, Italy, has essentially started from 2006, and results of the geostatistical processing of the Geochemical Atlas of Europe data were presented to the EGS GEG at the September 2007 meeting. 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. It appears that the duration of this memorandum will be extended, because the European Soil Bureau is very interested in the results of the new Pan-European project, GEMAS.

As part of the promotional activities, and Year of Planet Earth, 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 activity that will be pursued by circulating the Newsletter that has been prepared by the EuroGeoSurveys Geochemistry Working Group.

Sampling of soils will continue in North America as funding from the three national geological surveys permits. It is currently planned to sample at least 500 sites throughout the continent during 2008 and analyse the approximately 1500 samples collected for about 50 major and trace elements. In addition, samples of surficial soil (0-5 cm) at each site will be analysed for the presence or absence of *Bacillus anthracis* (anthrax).

The IUGS/IAGC Task Group will sponsor a symposium at the 33rd International Geological Congress in Oslo titled "Geochemical Mapping from the Global to the Local Scale" and will hold a business meeting during the IGC. The North American Soil Geochemical Landscapes Project has submitted a proposal to hold a topical session at the 2008 Annual Meeting of the Geological Society of America

12. COMMUNICATION AND DISSEMINATION PLANS

The IUGS/IAGC Task Group and the EuroGeoSurveys Geochemistry Expert Group plan to continue active participation in national and international symposia, conferences and workshops for the promotion of the project. Communication will also be achieved through continued output of oral presentations, posters and promotional materials.

As part of the promotional activities of the IUGS/IAGC Task Group, and in order to commemorate the Group's honorary president, the late Dr. Arthur Darnley, a special issue on "Multiscale Geochemical Baselines" will be published next year by the journal "*Geochemistry: Exploration-Environment-Analysis*". The following papers have been submitted to the Journal's Editor, Dr Gwendy Hall, by the two guest editors, David Smith and Clemens Reimann:

1. M. Cornelius et al. "*Geochemical mapping of the deeply weathered western Yilgarn Craton of Western Australia, using laterite geochemistry*"
2. A. Demetriades "*Development of the floodplain or overbank sediment sampling procedure for the Global Geochemical Baselines project: examples from Hellenic case studies*"
3. R.G.Garrett et al. "*From geochemical prospecting to international geochemical mapping: a historical overview*"
4. B. De Vivo et al. "*Environmental geochemical maps of Italy from FOREGS database*"
5. R. Salminen et al. "*Indications of deposits of gold and Platinum group elements from a regional stream sediment survey in north western Tansania*"
6. P. de Caritat et al. "*Geochemical mapping 'down under': selected results from pilot projects and strategy outline for the National Geochemical Survey of Australia*"
7. A. Pasieczna and J. Lis "*Detailed geochemical mapping of Silesian-Cracowian Region (southern Poland)*"
8. C. Zhang et al. "*GIS mapping in national soil database of Ireland*"
9. S. Rapant et al. "*Environmental risk assessment map of Europe based on FOREGS data*"

10. D. Smith and C. Reimann "*Low density geochemical mapping and the robustness of geochemical patterns*"
11. Xie et al. "*Geochemical mapping in China: National and International*"
12. Chipres et al. "*Geochemical mapping of major and trace elements in soils from the Altiplano Potosino, Mexico: A multiscale comparison*"

The editors hope that this special issue can be published by the time of the 33rd International Geological Congress that will be held in Oslo, Norway, from the 5th to 9th August 2008.

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

The success of the IUGS/IAGC Task Group on Global Geochemical Baselines is entirely dependent on funding from sources outside IUGS. To date, this funding has come primarily from national geological surveys and other scientific institutions in participating countries. The North American Soil Geochemical Landscapes Project plans on spending in excess of US \$1M in 2008 to collect and analyse soil samples from about 500 sites in North America. Anticipated expenditures in Europe for the GEMAS project are estimated to be in excess of US \$1.2M over 4 years, approximately half of which will be provided from industry.

The publication of the European Geochemical Atlas has already proved useful in marketing and helping to secure funds over the past 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.

The money used for the promotion of the project, participation in conferences and meetings come from funds from other projects. The development of the Task Group's website is being done on our time, and free of charge, because we strongly believe in this project. One of the main reasons for the delay for the uploading of the website is that this work is being done by the webmaster of the Hellenic Institute of Geology and Mineral Exploration at her own time, since the Task Group does not have the financial means to pay for professional services (US \$3000 to \$5000).

14. CHIEF ACCOMPLISHMENTS 1998-2007

- 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, Malaysia, 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).
- 2003 Launch of North American Soil Geochemical Landscapes Project.
- 2003 Launch of geochemical baseline mapping programme in India.
- 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.
- 2006 Completion of pilot studies for the North American Soil Geochemical Landscapes Project.
- 2007 Launch of the Geochemical Atlas of Europe in Athena, Hellas, on the 23rd April 2007
- 2007 Distribution of more than 1300 copies of the CD-version of the Geochemical Atlas of Europe.
- 2007 921 copies of Part 1 and 740 copies of Part 2 of the Geochemical Atlas of Europe have been sold to date, and more than 100 copies of the two-volume set have been donated to libraries of educational establishments and institutions.
- 2007 Data downloads from the website as of September 2007: 255 for the stream water data set, and 239 for the topsoil.

- 2007 Initiation of soil sampling for the soil geochemical survey of North America, under the North American Soil Geochemical Landscapes Project.
- 2007 Completion of provisional soil geochemical mapping in India.
- 2007 National Geochemical Survey of Australia approved for funding by the Australian Government's "Onshore Energy Security Initiative".

15. 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.

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Appendix 1

Geochemical map of the distribution of Pb (mg/kg) in top soils throughout India based on studies completed in 2007

