

**2008 ANNUAL REPORT FOR THE  
INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)/  
INTERNATIONAL ASSOCIATION OF GEOCHEMISTRY (IAGC)  
TASK GROUP ON  
GLOBAL GEOCHEMICAL BASELINES**

**1. TITLE OF CONSTITUENT BODY**

IUGS/IAGC Task Group on Global Geochemical Baselines.

**2. OVERALL OBJECTIVES**

The mission of the IUGS/IAGC Task Group on Global Geochemical Baselines is 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. This database is urgently needed by environmental and resource managers throughout the world. To reach this goal, the Task Group promotes and facilitates the implementation of harmonized sampling, sample preparation, quality control, and analytical protocols in geochemical mapping programs. Task Group activities include the following:

- Developing partnerships with countries conducting broad-scale geochemical mapping studies;
- Providing consultation and training in the form of workshops and short courses;
- Organising periodic international symposia and conferences to foster communication among the geochemical mapping community;
- Developing criteria for certifying those projects that are acceptable for inclusion in a global database;
- Acting as a repository for data collected by projects meeting the standards of harmonization;
- Preparing complete metadata for the various certified projects; and ultimately
- Preparing a global geochemical database and atlas.

**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 (2005-2009) 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. Dr Xueqiu Wang, Chief Geochemist and Director of the Applied Geochemistry Division of the Institute of Geophysical and Geochemical Exploration, China, has recently accepted the position of co-leader of the Task Group. Dr Wang replaces Prof Jane Plant.

**Steering Committee**

<i>Co-Leaders</i>	Dr David Smith	US Geological Survey
	Dr Xueqiu Wang	IGGE, China
<i>Scientific Secretary</i>	Mr Shaun Reeder	British Geological Survey
<i>Treasurer</i>	Mr Alecos Demetriades	IGME, Greece

**Analytical Committee**

*Chair* Ms Wendy 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/EGS 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, Nigeria and the United States have provided funds through their National Geological Surveys or related institutes for pilot studies on establishing the GRN or for national- to continental-scale geochemical mapping projects.

**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). 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 Working 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 2008

### **Organisational Accomplishments:**

A Business Meeting of the IUGS/IAGC Task Group on Global Geochemical Baselines was held at the International Geological Congress, Oslo, Norway on 8 August 2008. The minutes of the meeting are attached as Appendix 1. The contact details of all those present are given in Appendix 2.

The meeting was highly successful, enabling the Task Group to propose a new mission and discuss plans for delivering this mission and making continued progress with the project. A new organisational structure was agreed, and is in the process of being established. It takes into account one of the key recommendations of the recent IUGS Ad Hoc Review of the Task Group's activities: that the Task Group's Steering Committee should include members from outside North America and Europe. Dr Xueqiu Wang, Chief Geochemist and Director of the Applied Geochemistry Division of the Institute of Geophysical and Geochemical Exploration, China, has already accepted the position of co-leader of the Task Group, replacing Prof Jane Plant. New Continent Representatives are in the process of being appointed.

### **Scientific Accomplishments:**

There has been continued and significant progress in a number of areas during 2008, most notably:

*North America:* North American Soil Geochemical Landscapes Project (NASGLP): This collaborative project between the US Geological Survey, the Geological Survey of Canada, and the Mexican Geological Survey has as its long term goals: (i) establishing a soil geochemical database and its representation in map form for the continent of North America (21 million km<sup>2</sup>); (ii) interpreting the delineated geochemical patterns in terms of processes that caused the observed spatial distribution of the elements; and (iii) establishing an archive of samples for future investigators. In 2008, the second year of field work, about 1,800 sites were sampled. The primary samples collected at each site include a sample from

0-5 cm depth, a composite of the soil A-horizon, and a sample from the soil C-horizon. In Canada, sampling in 2008 focused on a transect extending the entire width of the country from Vancouver Island in the west to the eastern coast of Newfoundland. In the US, sampling was completed in the states of Nevada, Utah, Colorado, Wyoming, Kansas, Missouri, Arkansas, Mississippi, Louisiana, Maryland, West Virginia, Delaware, and New Jersey. In Mexico, sampling was conducted in the northern parts of the states of Baja California, Sonora, Chihuahua, and Coahuila. Details of progress with sampling on the project to date are given in Figure 1. The project convened a session at the Geological Survey of America annual meetings in Houston, Texas during October 5-9. The title of the session was "Soil Geochemistry: Databases and applications at regional to continental scales". Plans are going forward to convene a session devoted to the project at the 24th International Applied Geochemistry Symposium in Fredericton, New Brunswick, Canada in June 2009.

The decade-long project to complete the stream-sediment geochemical database for the United States is nearing completion. The database was updated in September 2008 and now contains data for more than 74000 samples. All current data from this project are available for download at <http://tin.er.usgs.gov/geochem/doc/home.htm>.

*Asia:* China and Mongolia Geochemical Mapping Project. China is cooperating with Mongolia in geochemical mapping at a scale of 1:1M covering an area of approximately one million km<sup>2</sup> across two countries. Agreement for this cooperative project was issued by the China Geological Survey and Mineral Resources and Petroleum Authority of Mongolia. The Institute of Geophysical and Geochemical Exploration, China, will offer help with sampling training and free chemical analysis for the samples from Mongolia. One sample per 1:25 000 map sheet (approx. 1 sample per 100 km<sup>2</sup>) will be collected and 54 elements will be determined. Orientation mapping covering an area of 150 000 km<sup>2</sup> has been completed in 2008 and a manual for desert material sampling has been written based on the orientation survey. It is expected that an area of 700 000 km<sup>2</sup> will be finished by 2010. The preliminary results will be presented at the 24th International Applied Geochemistry Symposium in Fredericton, New Brunswick, Canada in June 2009.

China also plans to launch a very large programme named The Earth Crust Probe Programme (Sinoprobe). This includes a Geochemical Probe Project, which is an Earth science programme to explore the geochemical baselines, distribution and evolution of all elements in China's continental crust. Different kinds of typical samples, including igneous rocks, sedimentary and metamorphic rocks, soils and stream, overbank and floodplain sediments will be collected at each reference grid of 80 × 80 km. This 5-year-term project is being led by Dr Xueqiu Wang, the newly appointed co-leader of the IUGS/IAGC Task Group on Global Geochemical Baselines.

*India:* A low-density stream sediment geochemical survey of the Garhwal and Kumaon Himalayan region had just been completed following the recommendations of the 'Blue Book' with minor deviations arising owing to terrain condition and accessibility. Preliminary discussions for carrying out a higher density survey of India have been undertaken, and funding for a joint project with Bangladesh, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka under the aegis of SAARC (South Asian Association of Regional Cooperation) are being explored. Dr Xueqiu Wang has volunteered to carry out additional analysis on the Indian low-density samples for free at his laboratories in China.

*Australia:* Sampling for the National Geochemical Survey of Australia has been initiated. This low-density survey, funded by the Australian Government's Onshore Energy Security Initiative, involves sampling catchment outlet sediments at ~1400 sites throughout the country. This represents a density of about 1 site per 5500 km<sup>2</sup>. As of 30 September 2008, 1032 catchments (or 74%) have been sampled (see Figure 2) with sampling scheduled to be completed by June 2009. Approximately 25% of the samples have been submitted to the laboratories for total concentration analyses (by XRF and ICP-MS), partial concentration analyses (aqua regia digestion then ICP-MS), as well as some specialised analyses (F, Se, infrared spectroscopy, pH 1:5, EC 1:5, laser particle size analysis). The next tranche of 25% of the samples is being prepared at the moment (drying, disaggregating, sieving and milling) and will be submitted to the labs in January 2009. The URL for the project web site is: <http://www.ga.gov.au/minerals/research/national/geochemical/index.jsp>.

*Brazil:* The CRPM (Serviço Geológico do Brasil) has received funding to begin a national-scale geochemical mapping project. This project will involve a multi-media approach including rocks, soils, stream sediments, and ground and surface water. When possible, samples from the CRPM archives will be analysed and new samples will be collected in those parts of the country that have not been previously sampled. Sampling and analytical protocols are planned to be consistent with those recommended by the Blue Book (Darnley *et al.*, 1995), with ICP-MS being the primary technique. The goal is to have one sampling station for each hydrographic basin between 1000 and 2000 km<sup>2</sup> in area within the Amazon region and one station in basins between 100 and 200 km<sup>2</sup> in area within the remainder of the country. The project is expected to begin in 2009 and sampling is planned to extend through 2012.

*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 EuroGeoSurveys Geochemistry Working Group, under the chairmanship of Clemens Reimann of the Geological Survey of Norway has been active in developing new scientific initiatives throughout the European geochemical community. A business meeting of the Working Group was held in Berlin on 5-7 March 2008. Minutes of this meeting are attached at Appendix 3. One of the main aims of the meeting was to finalise plans and carry out field training in the collection of samples for the GEMAS project (Geochemical mapping of agricultural and grazing land soil). This project, for which funding from Industry has been obtained, is to carry out a geochemical survey of agricultural and grazing land soils of Europe. Sampling across Europe has been largely completed 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.

Other related projects being undertaken within Europe by the EGS Geochemistry Working Group include preparation of an atlas of mineral water chemistry throughout Europe (as a first approximation of groundwater composition); and a study of the urban geochemistry of major European cities using a common approach. A textbook on urban geochemical sampling is also in preparation.

### **Public Relations Accomplishments:**

The main priority of the Public Relations and Finance committee is to promote the project for the purpose of attracting sponsors that may be interested to finance the Global Geochemical Baselines project in different parts of the World.

One of the main priorities this year has been to reorganise the Task Group's website. A contract has now been signed with a service provider in Hellas and a website name registered (<http://www.globalgeochemicalbaselines.eu/>). The material for the website has been prepared, and is at the final stage of editing. It is anticipated that the material will be uploaded on the website by the end of 2008. Apart from links to and from the IUGS and IAGC Websites, one of the aims is for all National Geological Surveys to have a hotlink to the Task Group's Website. It should be appreciated by the IUGS/IAGC Committees that most of the promotional work, material preparation and website design is being carried out on a voluntary basis during our personal time.

Educational material in support of the Year of Planet Earth has been prepared and we are in the process of obtaining permission from publishers to use illustrations taken from different books. The intention is for the 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 Website hosting the Geochemical Atlas of Europe [<http://www.gtk.fi/publ/foregsatlas/>] is very important for the promotion of the Global Geochemical Baselines project. During the 2007 EuroGeoSurveys Directors' meeting 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 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.

The FOREGS/EuroGeoSurveys Geochemical Atlas of Europe is still being presented at international conferences and congresses. An important promotional activity is the CD-version of the Geochemical Atlas of Europe, 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 and national representatives have now disseminated approximately 1900 copies of the Atlas CD (1300 copies by EuroGeoSurveys office), 600 copies by the Public Relations and Finance Committee.

Another significant promotional activity undertaken in 2008 was the compilation of a memorial issue DVD to honour Arthur G. Darnley (1930-2006). The DVD included all the material from the Geochemical Atlas of Europe CD, all publications of the two IGCP programmes 259 'International Geochemical Mapping' and 360 'Global Geochemical Baselines', and copies of all papers from the *Arthur Darnley Symposium - Geochemical Mapping from the Global to the Local Scale* – held at the 32<sup>nd</sup> IGC, Oslo, Norway. About 1500 copies of the DVD were made. The first distribution was made during the Arthur G. Darnley Symposium at the 32<sup>nd</sup> IGC in Oslo. More than hundred copies were given to

participants, and about four hundred copies were divided among members of the Task Group for distribution in their countries.

## 8. CHIEF PROBLEMS ENCOUNTERED IN 2008

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, Australia and India, for example, 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 2008

### *General*

The major products of the Task Group during 2008 were:

- (i) a special issue of the Journal *Geochemistry: Exploration, Environment, Analysis* [Vol. 8, Nos. 3/4] dedicated to the memory of the Task Group's original leader, Arthur G. Darnley (1930-2006);
- (ii) the Arthur G. Darnley Memorial DVD. Approximately 1500 copies of the DVD have been produced and about 500 copies distributed up to now.
- (iii) preparation of material to be uploaded on the Task Group's new website.

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, and more than 1900 copies have been distributed.

### *Articles and Papers*

Papers published in the special issue of *Geochemistry: Exploration, Environment, Analysis*, **8** (3-4):

Reimann C and Smith DB. 2008. Introduction. *Geochemistry: Exploration-Environment-Analysis*, 8(3-4), 203-204.

Garrett RG; Reimann C; Smith DB and Xie X. 2008. From geochemical prospecting to international geochemical mapping: a historical overview. *Geochemistry: Exploration-Environment-Analysis*, 8(3-4), 205-217.

Smith DB and Reimann C. 2008. Low-density geochemical mapping and the robustness of geochemical patterns. *Geochemistry: Exploration-Environment-Analysis*, 8(3-4), 219-227.

Demetriades A. 2008. Overbank sediment sampling in Greece: a contribution to the evaluation of methods for the 'Global Geochemical Baselines' mapping project. *Geochemistry: Exploration-Environment-Analysis*, 8(3-4), 229-239.

Cornelius M, Robertson IDM, Cornelius AJ and Morris PA. 2008. Geochemical mapping of the deeply weathered western Yilgarn Craton of Western Australia, using laterite geochemistry. *Geochemistry: Exploration-Environment-Analysis*, 8(3-4), 241-254.

Zhang C, Fay D, McGrath D, Grennan E and Carton OT. 2008. Use of trans-Gaussian kriging for national soil geochemical mapping in Ireland. *Geochemistry: Exploration-Environment-Analysis*, 8(3-4), 255-265.

De Vivo B, Lima A, Bove MA, Albanese S, Cicchella D, Sabatini G, Di Lella LA, Protano G, Riccobono F, Frizzo P and Raccagni L. 2008. Environmental geochemical maps of Italy from the FOREGS database. *Geochemistry: Exploration-Environment-Analysis*, 8(3-4), 267-277.

Chiprés JA, Salinas JC, Castro-Larragoitia J and Monroy MG. 2008. Geochemical mapping of major and trace elements in soils from the Altiplano Potosino, Mexico: a multi-scale comparison. *Geochemistry: Exploration-Environment-Analysis*, 8(3-4), 279-290.

Rapant S, Salminen R, Tarvainen T, Krčmová K and Cvečková V. 2008. Application of a risk assessment method to Europe-wide geochemical baseline data. *Geochemistry: Exploration-Environment-Analysis*, 8(3-4), 291-299.

de Caritat P, Lech Megan E and McPherson AA. 2008. Geochemical mapping 'down under': selected results from pilot projects and strategy outline for the National Geochemical Survey of Australia. *Geochemistry: Exploration-Environment-Analysis*, 8(3-4), 301-312.

Salminen R, Kashabano J, Myumbilwa Y, Nyanda PF and Partanen M. 2008. Indications of deposits of gold and platinum group elements from a regional geochemical stream sediment survey in NW Tanzania. *Geochemistry: Exploration-Environment-Analysis*, 8(3-4), 313-322.

Pasieczna A and Lis J. 2008. Environmental geochemical mapping of the Olkusz 1:25000 scale map sheet, Silesia-Cracow region, southern Poland. *Geochemistry: Exploration-Environment-Analysis*, 8(3-4), 323-331.

Xie X, Wang X, Zhang Q, Zhou G, Cheng H, Liu D, Cheng Z and Xu S. 2008. Multi-scale geochemical mapping in China. *Geochemistry: Exploration-Environment-Analysis*, 8(3-4), 333-341.

### ***Other papers***

Demetriades A, De Vivo B, Bidovec M, Lima A, Pirc S, Reeder S, Siewers U, Smith B, Albanese S, Batista MJ, Bel-Ian A, Birke M, Breward N, De Vos W, Duris M, Gravesen P, Gregorauskiene V, Halamic J, Jordan G, Lax K, Locutura J, O'Connor PJ, Pasieczna A,

Slaninka I, Tarvainen T, Gilucis A, Hayoz P, Heitzmann P, Kivisilla J, Klaver G, Klein P, Lis J, Mazreku A, Marsina K, Olsson SA, Ottesen RT, Petersell V, Reimann C, Salminen R, Salpeteur I, Sandstrom H, Selinus O, Steenfelt A, Svecova J and Taylor H. 2008. Monitoring water quality: The EuroGeoSurveys' Geochemical Atlas of Europe approach. *European Geologist*, 25: 5 (abstract only) [Oral presentation].

Demetriades A, De Vivo B, Ander EL, Bidovec M, Lima A, Pirc S, Reeder S, Siewers U, Smith B, Albanese S, Batista MJ, Bel-lan M, Birke M, Breward N, De Vos W, Duris M, Gravesen P, Gregorauskiene V, Halamic J, Jordan G, Lax K, Locutura J, O'Connor PJ, Pasieczna A, Slaninka I, Tarvainen T, Gilucis A, Heitzmann P, Klaver G, Klein P, Lis J, Marsina K, Mazreku A, Ottesen RT, Petersell V, Salminen R, Salpeteur I, Sandstrom H, Shaw R, Steenfelt A and Taylor H. 2008. The EuroGeoSurveys Geochemical Atlas of Europe: Stream water geochemistry. In: G Migiros, G Stamatis and G Stournaras (Editors), *Proceedings 8th International Hydrogeological Congress of Greece – 3rd MEM Workshop on Fissured Rocks Hydrology*. Geological Society of Greece, Athens, 1, 237-250 [Keynote presentation].

Smith DB, Goldhaber MB, and Rencz, A. 2008. Mapping the background soil geochemistry of North America. In: Sass, BM (Conference Chair), *Remediation of chlorinated and recalcitrant compounds* (Monterey, California, May 2008), Abstract H-001, CD-ROM. [Oral Presentation]

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

Abstracts of oral and poster presentations from session titled “Geochemical mapping from the global to the local scale: The Arthur Darnley Symposium” at the 33rd International Geological Congress, 6-14 August 2008, Oslo, Norway:

#### ***Posters:***

Chekushin V, Selenok L, Bogatyrev I, Glavatskikh S, Salminen R, Lax K, Reimann C, Gregorauskiene V, Petersell V, Gilucis A, Golovin A and Krinochkin L. 2008. Northern Europe Geochemistry (NEG) Project—Map of ore-related anomalous geochemical fields of Fennoscandian Shield and its eastern frame at the scale of 1:5 000 000.

Cosenza A, Albanese S, Civitillo D, De Vivo B, Lima A, Macaione E and Messina A. 2008. The environmental geochemical atlas of the Natural Park of Nebrodi (Sicily, Italy).

Gordanic V, Ciric A and Jovanovic D. 2008. Geochemical investigation of radon in soil within the igneous-sedimentary complex of southern Serbia—ecological significance.

Kumar ST. 2008. Biogeochemical prospecting at Khetri Copper Deposit of Rajasthan, India.

Lech M and Caritat P de. 2008. Recent results from a geochemical survey in the New South Wales part of the Thomson Orogen in Australia: Implications for mineral exploration.

Rapant S, Salminen R, Tarvainen T, Krcmova K and Cveckova V. 2008. Application of a risk assessment method on European wide geochemical baseline data.

Salminen R, Kashabano J, Myumbilwa Y, Petro FN and Partanen, M. 2008. Indications of deposits of gold and platinum group elements from a regional geochemical stream sediment survey in north-western Tanzania.

Tomilina O, Chekushin V, Salminen R, Lax K, Reimann C, Gregorauskiene V, Petersell V, Gilucis A and Guljaeva N. 2008. Northern Europe Geochemistry (NEG) Project— Assessment of environmental status.

***Oral presentations:***

Bogatyrev I, Chekushin V, Salminen R, Lax K, Glavatskikh S, Reimann C, Gregorauskiene V, Petersell, V and Gilucis A. 2008. Integrated Database of Northern Europe Geochemistry (NEG) Project.

Caritat P de and Lambert I. 2008. The National Geochemical Survey of Australia: Outline and update.

Chiprés J, Salinas JC, Castro-Larragoitia J, Diaz-Barriga F, Razo I, Gamino S and Monroy M. 2008. Multi-scale geochemical mapping of soils: Natural and anthropogenic patterns from the national to the local scale.

De Vivo B, Lima A, Bove MA, Sabatini G and Frizzo P. 2008. Environmental geochemical atlas of Italy.

Joseph M and Rout D. 2008. Geochemical mapping in the type area for laterite, Malappuram district, Kerala, India.

Morozov A, Burenkov E, Golovin A, Kremenetskiy A and Chepkasova T. 2008. Multipurpose geochemical mapping of Russia: The technology and the results.

Ogedengbe O, Arisekola T, Ayoade E, Malomo S and Abimbola A. 2008. Geochemical baseline project: A preliminary result from cell N06E04, southwestern Nigeria.

Paolo V, Marcello A. and Pretti S. 2008. Geochemical environment characterisation of Sardinia.

Prieto G, Gonzalez LM, Vargas O and Garcia GI. 2008. Geochemical atlas of Colombia, exploring the Colombian territory.

Reimann C, Garrett R, Smith D and Xie X. 2008. From geochemical prospecting to international geochemical mapping: A historical overview.

Reimann C and Salminen R. 2008. Geochemistry of Europe - the importance of sample material and scale.

Salminen R, Chekushin V, Bogatyrev I, Gilucis A, Glavatskikh SP, Golovin A, Gregorauskiene V, Mäkinen J, Petersell V, Lax K, Reimann C, Selenok L and Tomilina O. 2008. Northern Europe Geochemistry (NEG) - a metadata-base for 21 international and national regional geochemical databases.

Smith DB, Goldhaber MB, Rencz A and Salinas JC. 2008. The North American Soil Geochemical Landscapes Project.

Smith DB and Reimann C. 2008. Low-density, continental-scale geochemical mapping: Are the resulting geochemical patterns robust?

Spijker J, Van Der Veer G and Mol G. 2008. Spatial patterns of natural variation, anthropogenic impact, and chemical reactivity in Dutch soils.

Dantu S. 2008. Regional geochemical baseline mapping in Medak district, Andhra Pradesh, India.

Wang X. 2008. Multi-scale geochemical mapping in China.

Abstracts of oral and poster presentations from session titled “Soil Geochemistry: Databases and Applications at Regional to Continental Scales” at the 2008 Joint Annual Meeting of the Geological Society of America, American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, and Gulf Coast Association of Geological Societies, 5-9 October 2008, Houston, Texas (USA):

***Posters:***

Adcock SW, Laframboise RR, Spirito WA and Grunsky EC. 2008. Managing geochemical data—Development of an appropriate database and delivery mechanism.

Calleja A. 2008. Soil geochemistry along a transect from Cedral, San Luis Potosi, to Tecpán, Guerrero, Mexico.

Ford K and Chen J. 2008. Studies of natural radioactivity related to the North American Soil Geochemical Landscapes Project.

Friske PWB, Kettles IM, Garrett RG and Grunsky EC. 2008. Sampling, analytical and data handling protocols for the North American Soil Geochemical Landscapes Project.

Garrett RG. 2008. Establishing background values in geochemical data: Open source R language tools.

Garrett RG, Grunsky EC and Friske PWB. 2008. Comparison of soil data obtained using aqua regia variants on 8 standard reference materials.

McNeil RJ, Friske PWB and McCurdy MW. 2008. Applications of tri-national project data: Comparing tri-national data for soils with data for stream waters and sediments in the Maritimes, Canada.

Morman SA and Smith DB. 2008. Application of physiologically based extraction tests to evaluate metal bioaccessibility in a continental-scale soil geochemical survey.

Tellez JI. 2008. Proposal to evaluate bioaccessibility and mobility of elements of environmental concern in collected samples from the North American Soil Geochemical Landscapes Project.

***Oral presentations:***

Chiprés JA, Monroy MA, Jiménez F, Hernández MC, Tellez JI, Cruz O and Salinas JC. 2008. Characterization of regional geochemical anomalies within the continental-scale pilot transect in Mexico.

Goldhaber MB, Morrison JM, Holloway JM, Wanty RB and Smith DB. 2008. A regional soil and sediment geochemical study in northern California.

Goodwin TA, Parkhill MA, Pronk AG, Desrosiers M and Boldon R. 2008. Variation in soil geochemistry across the Maritime Provinces, Eastern Canada.

Grunsky EC and Garrett RG. 2008. Establishing background values in geochemical data.

Hernández MC, Chiprés JA, Castro GJ and Monroy MG. 2008. Soil geochemical mapping with environmental and health perspectives in the region of San Luis de al Paz, Mexico.

Kettles IM, Friske PWB, Hall GEM, Garrett RG, Smith DB and Woodruff LG. 2008. Importance of consistent protocols for national and international projects.

Klassen RA. 2008. What's in a number? Interpretation of geochemical analyses for environmental and human health protection.

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***Others:***

The EuroGeoSurveys Geochemical Atlas of Europe CD was distributed to participants of the 26<sup>th</sup> European Conference of the Society for Environmental Geochemistry and Health, which was co-organised in Athens (31 March to 3 April 2008) by the Institute of Geology and Mineral Exploration and the University of Athens.

The Arthur G. Darnley memorial DVD and copies of the special Issue of *Geochemistry: Exploration-Environment-Analysis* (Vol. 8, Nos. 3-4) were distributed to participants of the Arthur Darnley Symposium (9 August 2008).

*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 2008**

The Task Group has received 1500 USD from IUGS in 2008. 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, Australia and Brazil.

It should be mentioned that for promotional activities, the cost for the production of 1500 copies of the Arthur Darnley Memorial DVD was 1300 Euro (approx. 2000 USD), and the hosting of the Task Group's Website was 100 Euro (approx. 150 USD).

## **11. WORK PLAN FOR NEXT YEAR**

The next business meeting of the Task Group will take place in 2009. It will either be timed to coincide with the EuroGeoSurveys business meeting scheduled for spring of 2009 or an international geochemical baselines mapping conference due to be hosted by Prof Xie Xuejing in Beijing next May. The next meeting of the Task Group will consider details of issues raised at the 2007 business meeting arising from the agreed change in direction, including establishment of the Continent Representatives, database management,

stipulations for the Task Group being able to award the ‘seal of approval’, etc.

The Task Group’s Data Management Committee is planning a workshop in Athens (Hellas) to organise the structure of a geochemical metadatabase similar to the North European metadatabase, which is located at [www.noreurgeoch.net](http://www.noreurgeoch.net).

The immediate priority for the Task Group for 2009 will be to pursue opportunities within Africa and the CCOP countries. This will be very much dependant on securing appropriate funds from IUGS (see section 13).

The revision of the FOREGS Geochemical Mapping Field Manual (Salminen *et al.*, 1998) has started, and will be completed at the beginning of 2009. It will 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.

The Task Group’s Analytical committee will consider a proposal for the exchange of laboratory standard reference materials and a small number of samples from some large national and international projects to ensure that geochemical data from these projects are consistent and comparable.

The activities of the EuroGeoSurveys Geochemistry Working Group, under the chairmanship of Clemens Reimann, will continue with the preparation of the soil samples collected for the “*Geochemical Mapping of Agricultural and Grazing Land Soil*” project and the start of chemical analyses. The chemical analysis of the bottled mineral water samples for the EuroGeoSurveys “*European Groundwater Chemistry*” will be completed in 2009, and processing of the data will start.

## **12. COMMUNICATION AND DISSEMINATION PLANS**

The IUGS/IAGC Task Group and all the national- and international-scale geochemical mapping projects being carried out in many countries plan to continue active participation in national and international symposia, conferences and workshops for the promotion of the global-scale project. Communication will also be achieved through continued output of peer-reviewed scientific papers, oral presentations, posters and promotional materials.

In addition, a new version of the Task Group’s website is in the late stages of development and will be the key forum for communication and dissemination.

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

The success of the IUGS/IAGC Task Group on Global Geochemical Baselines has been, to date, almost entirely dependent on funding from sources outside IUGS. This funding has come primarily from national geological surveys and other scientific institutions in participating countries. For example, the North American Soil Geochemical Landscapes Project, funded primarily by the U.S. Geological Survey, the Geological Survey of Canada, and the Mexican Geological Survey, spent well over US \$1M in 2008 to collect and analyse soil samples from about 1800 sites in North America. A similar expenditure is expected in 2009 and for several years beyond. 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. Ongoing national-scale geochemical surveys in Australia, Brazil, China, and India are funded in a similar manner. We conservatively estimate that over the past ten years, US \$30M has been spent on broad-scale geochemical surveys conducted according to recommendations from the IUGS/IAGC Task Group and its predecessors.

Funding from IUGS has consisted of US\$ 1500 per year for 2003 and 2004-2008. This funding has been used for promotional purposes such as the DVDs distributed at the 33rd IGC. IAGC has provided sporadic funding of US\$2000 on three occasions (2000, 2003, and 2004) over the past ten years to assist with travel expenses of Task Group members from developing countries to attend our business meetings. While this funding is greatly appreciated, it is barely enough for the Task Group to function as a viable entity within IUGS and IAGC. The IUGS ad-hoc review committee, led by Prof. Ryo Matsumoto of the University of Tokyo, recommended in their 2008 report that funding from IUGS to the Task Group be increased to US\$5000 per year for routine operations of the Task Group such as maintenance of the web site and preparation of educational materials. This review committee also recommended that IUGS provide occasionally an influx of about US\$25000 to the Task Group for the purpose of holding workshops in African and Asian countries to promote the establishment of international-scale geochemical mapping projects similar to that conducted from 1995-2005 by the Forum of European Geological Surveys.

The Task Group appreciates the recognition by the review committee for the need of this additional funding and we have plans to use this increased amount to hold training workshops in south-east Asia, India, or Africa in 2009 or 2010. With this report, we formally ask the IUGS Executive Committee to consider the review committee's recommendation for this increased funding and officially request US\$30000 in 2009. A similar request was turned down in 2008 because of IUGS commitments to IGC. We ask for reconsideration in 2009. Our Public Relations and Finance Committee will continue to seek funding from other sources, but this has proven to be most difficult.

#### **14. CHIEF ACCOMPLISHMENTS 1998-2008**

- 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.
- 1999 Launch of the south-western China Geochemical Atlas of 76 Elements Project.
- 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 32<sup>nd</sup> 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.
- 2006 Launch of the Geochemical Mapping Project across China and Mongolia.
- 2007 Launch of the Geochemical Atlas of Europe in Athena, Hellas, on the 23<sup>rd</sup> 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".
- 2007 Publication of Geochemical Atlas of 76 Elements in south-western China.
- 2008 Distribution of more than 500 copies of the CD-version of the Geochemical Atlas of Europe.
- 2008 Compilation of the Arthur G. Darnley memorial DVD with published material of the "Global Geochemical Baselines" project.
- 2008 Publication of a special issue of the journal *Geochemistry: Exploration, Environment, Analysis* [Vol. 8, Nos 3/4] with the title "*Thematic set in honour of Arthur G. Darnley (1930-2006)*".
- 2008 Organisation of the Arthur Darnley Symposium entitled "*Geochemical Mapping from the Global to the Local Scale*" at the 32<sup>nd</sup> IGC, Oslo, Saturday 9 August 2008.
- 2008 Organisation of session entitled "*Soil Geochemistry: Databases and Applications at Regional to Continental Scales*" for the joint meeting of the Geological Society of America, American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, and Gulf Coast Association of Geological Societies, 5-9 October 2008, Houston, Texas (USA).
- 2008 Launch of the China Geochemical Probe Project (China All-Elements Scope Project).

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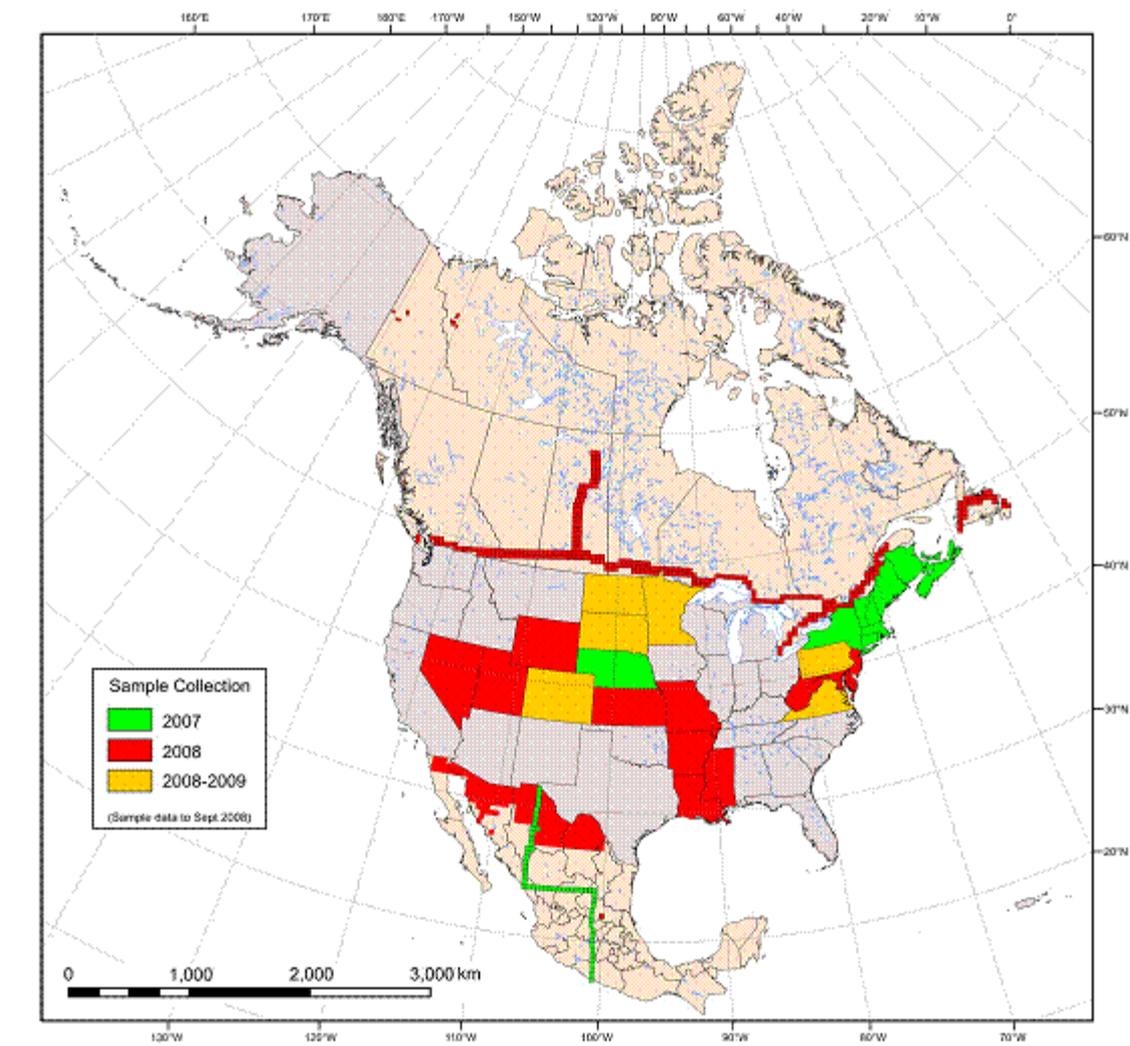


Figure 1 Progress to date and projected for 2008-09 on the North American Soil Geochemical Landscapes Project (NASGLP).

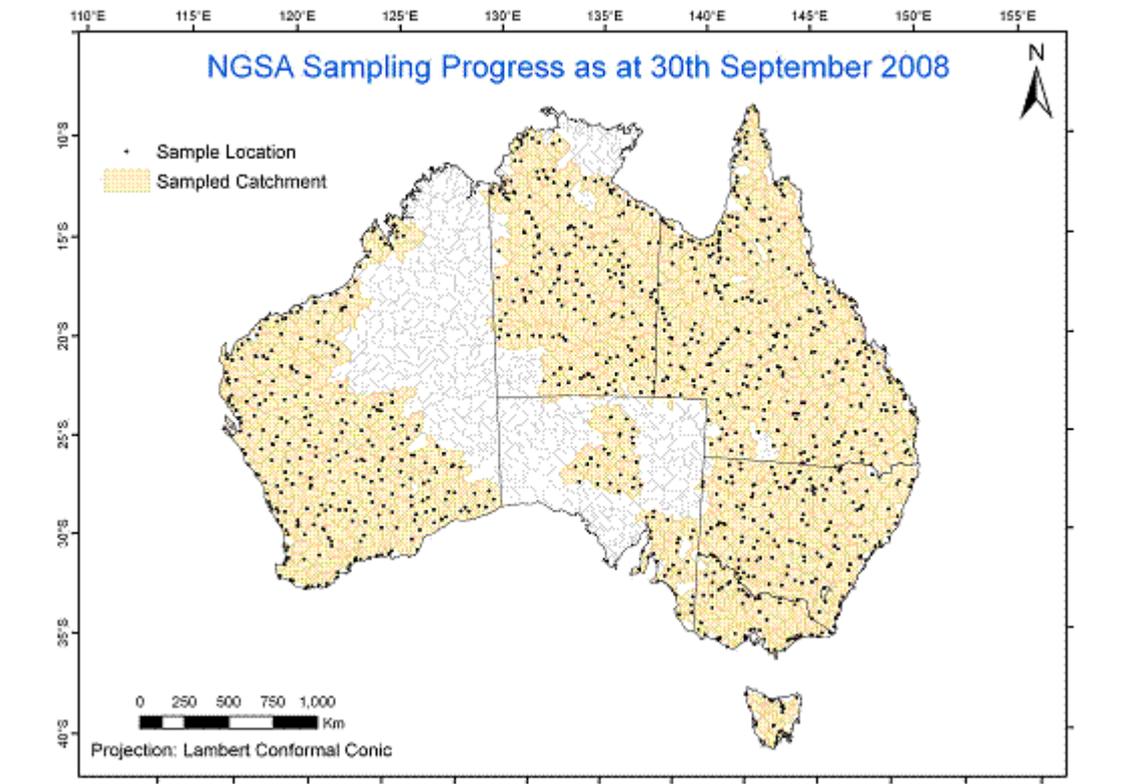


Figure 2 Progress to date on the National Geochemical Survey of Australia

## **APPENDIX 1**

### **MINUTES of the BUSINESS MEETING of the IUGS/IAGC TASK GROUP ON GLOBAL GEOCHEMICAL BASELINES**

**8 August 2008  
International Geological Congress, Oslo, Norway**

Chair            David B Smith  
Secretary       Shaun Reeder

#### *I        Welcome*

Dave Smith welcomed participants to the Business Meeting and gave a brief introduction of the history, role, aims and objectives of the Global Geochemical Baselines Task Group. All participants were given the opportunity to introduce themselves. A full list of participants, including all contact details, is given in Appendix 2.

#### *II       Summary of the Arthur Darnley Symposium*

Dave Smith reminded participants that a special symposium entitled “Geochemical mapping from the global to the local scale”, in memory of Arthur Darnley, was to be held on the 9 August. Alecos Demetriades (AD) distributed copies of a DVD containing the papers of a GEEA Special Issue arising from the Arthur Darnley Symposium, the EuroGeoSurveys/FOREGS Geochemical Atlas of Europe and other related articles, papers and publications relevant to the Group’s activities. AD acknowledged Elsevier, Springer, the Geological Society of London and Maney Publishing for giving permission to distribute various papers on the DVD, and reminded everyone that the papers are for personal use only.

#### *III      IUGS Ad Hoc Review*

Dave Smith reported on the findings of an ad hoc review of the Task Group conducted on 15 December 2007 by IUGS auditors Ryo Matsumoto (University of Tokyo, Japan), Mikhail Fedonkin (Paleontological Institute, Russia) and James Hein (US Geological Survey). The main recommendations were that the Task Group should:

- Develop better links with national and local contacts in Asia and Africa;
- Invite representatives of Asian and African countries to join the Task Group’s Steering Committee;
- Improve publicity of the Task Group’s activities, including through periodic newsletters, articles in Episodes, etc; and

- Promote the preparation and distribution of geochemical standards relevant to the Group's aims and objectives.

In addition, the review recommended that the IUGS increase its annual 'maintenance' funding to the Task Group to 5000 USD per annum, and provide further funds of up to 25000 USD for other project activities, including field workshops and seminars for young geochemists.

#### *IV Task Group's New Website*

Alecos Demetriades reported that the Task Group's new website ([www.globalgeochemicalbaselines.eu](http://www.globalgeochemicalbaselines.eu)) had been registered. The site is due to be operational soon.

AD made a call for all participants to let him have any information of relevance to include on the website as part of regular updates. Information such as progress on geochemical mapping within countries, including hyperlinks to projects, data and maps, etc, would all be most welcome

#### *V New Task Group Steering Committee and Co-Leader*

Dave Smith informed the meeting that he would like to expand the Task Group's Steering Committee (currently comprising the two co-leaders, secretary and treasurer), which has always comprised representatives only from Europe and North America. DS proposed expanding this Committee to include one or more representatives from each continent (with the exception of Antarctica) in order to update and re-energise the network of applied geochemists who represent the Task Group. The duties of these Continent Representatives would be:

- (i) to keep informed on all the regional-, national-, and international-scale geochemical mapping activities occurring within their area of responsibility;
- (ii) where appropriate, to coordinate international-scale geochemical mapping activities within their countries;
- (iii) to develop contacts in the various countries under their domain with whom the Task Group should maintain communications on a regular basis;
- (iv) to participate in workshops and give advice on best practice in implementing and ensuring compatibility with the 'Blue Book'; and
- (v) to provide periodic updates to the Task Group for inclusion in the annual report to IUGS and IAGC. It may be advantageous to seek linkages to existing international associations similar to EuroGeoSurveys and CCOP.

Dave Smith asked for nominations for Continent Representatives to be sent directly to him. He would also welcome ideas on how best to break up continents into manageable groupings or regions.

Dave Smith also informed the meeting that Professor Jane Plant had stood down as co-chair to the Task Group. He expressed his thanks for her work on behalf of the Task Group over the past ten years. DS put out a call for nominations for the vacant co-chair position, welcoming in particular the opportunity for the new co-chair to represent an African or Asian nation. [Secretary's note: Dave Smith was

subsequently most pleased to announce at the following day's Arthur Darnley Symposium that Dr Xueqiu Wang, Chief Geochemist and Director of the Applied Geochemistry Division of the Institute of Geophysical and Geochemical Exploration, China, had graciously accepted the offer to become the Task Group's new co-chair.]

## *VI 'Case History' File*

Dave Smith proposed the establishment of a 'Case History' file in which examples of how low-density geochemical data, such as proposed by the 'Blue Book', have been used by environmental regulators, mining and exploration countries, public health specialists, academia, etc. The Case History file will help provide demonstrable evidence of the impact that low-density geochemical mapping can achieve. DS asked that any such examples should be sent directly to him.

## *VII Status and Future of Standing Committees*

The chairs of the Standing Committees present at the Business Meeting gave brief reports, summarised below. Dave Smith asked that all standing committee chairs provide written submissions with recommendations on the way forward on key issues relevant to their areas of responsibility.

Reijo Salminen (RS) reported on behalf of the Sampling Committee that the 'Green Book' (FOREGS Geochemical Mapping Field Manual), which is still available for download, needs some modification and revision to include additional terrains, e.g. tropical and karstic landscapes. Some of these texts have already been prepared. RS is uncertain if the Sampling Committee is required on an ongoing basis. Expertise may be brought in at any time to propose sampling strategies for new environments, which could then be approved by the Steering Committee.

Timo Tarvainen (TT) reported on behalf of the Data Management Committee, which was established initially to manage the FOREGS data and provide advice on GTN cells world-wide. TT reported that a major policy rethink is required to cope with the demands of managing data at the global scale.

Reijo Salminen reported on behalf of the Regional Co-ordination Committee, which was essential to the success of work in Europe, but has not extended to non-European countries. RS thought that the concept of Continent Representatives, proposed earlier in the meeting by DS, was the appropriate means for taking this role forward, and that the Regional Co-ordination Committee in its current form could be disbanded.

Alecos Demetriades, reporting on behalf of the Public Relations and Finance Committee, stated that effort to date had concentrated mainly within Europe. It was important to focus effort now on promotion of global activities through the website, field training courses and workshops. AD stated that, in his opinion, the Sampling, Data Management, Analytical and Public Relations and Finance Committees were necessary for taking the project forward.

Gwendy Hall was not present, so there was no update from the Analytical Committee.

### VIII *Mission Statement for the Task Group*

Dave Smith explained that there is a need for the Task Group to reevaluate its aims and objectives, and to clearly articulate these in a formal mission statement. DS produced a ‘straw man’ mission statement for discussion. Based on these discussions, a revised draft mission statement has been written and is attached as Appendix 2. Please provide comments and suggestions directly to Dave Smith.

There was a lengthy discussion about what the Task Group can realistically achieve, and it was agreed that, without substantial external funding, the ambitious aims for a uniform global geochemical baseline set out in the ‘Blue Book’ are probably unattainable. More realistically, it was thought that a piecemeal approach at (in order of preference) a continental, regional or (preferably large) individual country scale should be pursued – similar to the successful FOREGS project in Europe. Importantly, the Task Group should take responsibility for pursuing opportunities for such initiatives, giving guidance on sample collection, data handling, analysis, etc, and providing support through workshops and field training exercises. The Task Group would also take responsibility for giving a ‘seal of approval’ to projects that they considered were compliant with the ‘Blue Book’ recommendations, effectively meaning that the data could then be regarded as being of suitable quality to go towards populating the global geochemical database. Dr Xueqiu Wang pointed out that the Task Group should enforce a *modified* implementation of the ‘Blue Book’, as discussed above; this also needs to be articulated in the mission statement.

Dr Marivic Pulvera Uzarraga asked for clarification on database management. It was considered important that only data from those projects that gain a ‘seal of approval’ from the Task Group ought to be included in the database to ensure consistency. There would be a need for the Task Group to negotiate access to the data for inclusion into the global database. Harmonisation of metadata would be important. Timo Tarvainen pointed out that there are significant logistical and financial implications that need to be resolved.

In general, there was a very positive feeling amongst participants that this new ‘pragmatic’ approach to the Task Group’s aims and objectives was a very good thing. Alecos Demetriades expressed some reservations about whether or not this approach could guarantee ‘harmonised’ data of sufficient quality to produce a meaningful map at the global scale. He suggested that, at the very least, the Task Group should insist as part of its ‘seal of approval’ that a sub-sample of all samples collected should be acquired by the Task Group for additional analysis using common, verified techniques at some point in the future. AD also suggested that the Task Group should take responsibility for preparation of global reference materials for the project.

Reijo Salminen suggested that the finalised mission statement should be publicised in *Episodes*. Shaun Reeder suggested that the new Steering Committee structure and membership should be communicated at the same time.

*IX International Association of Hydrological Sciences/International Commission on Continental Erosion Project: Global Geochemical Mapping and Sediment-Associated Flux of Major World Rivers*

Rolf Torre Ottesen gave an overview of this project, which is designed to use overbank and delta sediments from about 1500 sites throughout the world to provide an estimate of the global-scale spatial heterogeneity of the Earth's surface and to estimate the flux of sediment-bound elements from land to the marine environment. Current work has focused on the Arctic regions. The web site for this project is: <http://www.globalgeochemistry.org/>.

Alecos Demetriades asked if this project could cover the 5000 GTN cells for overbank and floodplain sediments, according to the 'Blue Book' procedure. Rolf Torre Ottesen replied that unfortunately this was not possible because of limited financial resources.

*X Update on Activities World-wide*

Dave Smith gave participants an opportunity to update the group on progress with low-density geochemical mapping projects within their countries. More details of some of these initiatives are captured in the presentations given in the Arthur Darnley Symposium and in the special edition of the journal *Geochemistry: Exploration, Environment, Analysis* (GEEA, vol. 8, Part 3/4) published in memory of Arthur Darnley. The following summarises the key progress discussed:

Alecos Demetriades gave an update on progress within Europe on behalf of Clemens Reimann, the chairman of the EuroGeoSurveys Geochemistry Expert Group. Three major projects are underway post completion of the Geochemical Atlas of Europe: (i) preparation of an atlas of the geochemistry of agricultural and grazing land soils of Europe, due for completion 2010; (ii) preparation of an atlas of mineral water chemistry throughout Europe (as a first approximation of groundwater composition); and (iii) a study of the urban geochemistry of major European cities using a common approach. A textbook on urban geochemical sampling is also in preparation.

Dr Xueqiu Wang, Dr Jorge Chiprés, and Dr Arkadiy Golovin briefly spoke about progress in China, Mexico and Russia respectively. Dave Smith spoke about the Soil Geochemical Survey of North America. All four are giving presentations at tomorrow's Arthur Darnley symposium. Dr Golovin mentioned that although Russia has the expertise and desire to contribute to the global project, funding is a significant barrier.

Prof Theo Davies talked about three problems facing Africa: (i) poor organisation and lack of co-ordination between the many African countries; (ii) lack of expertise and infrastructure within Africa; and (iii) poor communication between and even within African countries, which means that he is frequently not even aware that work is proceeding.

Dr Pulok Mukherjee was pleased to report that a low-density stream sediment geochemical survey of Garhwal and Kumaon Himalayan region had just been completed nearly following the recommendations of the 'Blue Book' with minor

deviations arising owing to terrain condition and accessibility.. He reported that there were preliminary discussions for carrying out a higher density survey of India, and suggested to explore funding for a joint project with Bangladesh, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka under the aegis of SAARC (South Asian Association of Regional Cooperation) secretariat.. Dr Xuequi Wang volunteered to carry out additional analysis on the Indian low-density samples for free at his laboratories in China. Dave Smith will discuss this kind offer with Dr Pradip Govil.

Mr Ashvin Wickramasooriya reported that there had been little work undertaken in Sri Lanka to date, except on surface and groundwater samples, but that he was keen to pursue opportunities.

Dr Hee-Young Chun and Dr Nguyen Hong Minh reported that little progress had been made in the CCOP countries of east and south-east Asia since the seminar in Beijing in 2001. Funding from individual countries still needs to be identified. The sampling workshop is still required. Dave Smith agreed to pursue this as a priority for funding with IUGS. Dr Xuequi Wang reiterated his promise that all samples collected as part of the low density global project within the CCOP countries will be analysed for free in his laboratories in China.

#### *XI Future Meetings of the Task Group*

It was agreed that the next meeting of the Task Group would consider details of issues raised at this business meeting arising from the agreed change in direction, including establishment of the Continent Representatives, database management, stipulations for the Task Group being able to award the ‘seal of approval’, etc.

The immediate priority for the Task Group was to pursue opportunities within Africa and the CCOP countries. Dave Smith will approach IUGS for funding to run workshops on both continents.

The next business meeting will take place in 2009. One option is for the meeting to coincide with the EuroGeoSurveys business meeting scheduled for spring of 2009. Alternatively, Dr Xuequi Wang stated that Prof Xie Xuejing is keen to organise an international geochemical baselines mapping conference in Beijing next May, and the Business Meeting could be planned to coincide with this event.

#### *XII Close*

Dave Smith thanked all participants for attending and contributing to such a successful meeting and declared the meeting adjourned.

Shaun Reeder  
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## **APPENDIX 2**

### **NAMES OF PARTICIPANTS AND CONTACT INFORMATION**

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### APPENDIX 3

#### **Minutes of EuroGeoSurveys Geochemistry Working Group Meeting held at BGR, Spandau, Germany. March 5-7, 2008.**

##### **Present:**

Clemens Reimann	NGU, Norway	(Chair)
Dee Flight	BGS, UK	(Secretary)
Shaun Reeder	BGS, UK	(outgoing Secretary)
Josip Halamic	HGI-CGS, Croatia	
Miroslav Duris	CGS, Czech Republic	
Valter Petersell	EGK, Estonia	
Ignace Salpeteur	BRGM, France	
Manfred Birke	BGR, Germany	
Alecos Demetriades	IGME, Hellas	
Gyözö Jordan	MAFI, Hungary	
Patrick O'Connor	GSI, Ireland	
Aleksandra Dusza-Dobek	PGI, Poland	
Rolf Tore Ottesen	NGU, Norway	
Mateja Gosar	GEO ZS, Slovenia	
Alejandro Bel-lan	IGME, Spain	
Stefan Albanese	University of Napoli, Italy	
Madelen Anderson	Geological Survey of Sweden	
Maria Joao Batista	Geological Survey of Portugal	
Walter De Vos	Geological Survey of Belgium	
Enrico Dinelli	University of Bologna, Italy	
Mikael Eklund	Geological Survey of Finland	
Vibeke Ernsten	Geological Survey of Denmark and Greenland	
Virgilija Gregorauskiene	Lithuanian Geological Survey	
Aleksandra Gulan	Geological Institute of Serbia	
Edith Haslinger	Geological Survey of Austria	
Peter Hayoz	Geological Information Centre, Federal Office of Topography, Switzerland	
Rainer Hoffmann	Federal Institute for Geosciences and Natural Resources, Germany	
Volodymyr Klos	SNRGC 'Pivnichgeologiya', Ukraine	
Katarina Krcmova	Geological Survey of Slovak Republic	
Pawel Kwecko	Polish Geological Institute	
Ilse Schoeters	European Copper Institute, Brussels	
Peter Sefcik	Geological Survey of Slovak Republic	
Tamara Tersic	Geological Survey of Slovenia	
Jens Utermann	Federal Institute for Geosciences and Natural Resources, Germany	
Maryna Vladymyrova	SNRGC 'Pivnichgeologiya', Ukraine	
Tore Volden	NGU, Norway	
Benedetto De Vivo	University of Napoli, Italy	

*Please note: For ease of comprehension, some related issues that were discussed separately throughout the meeting have been recorded under the most*

*relevant agenda item. Thus, the minutes do not necessarily reflect the order in which items were discussed during the meeting.*

## **1. Welcome and introduction**

1.1 Manfred Birke (**MB**), BGR, welcomed everyone to the meeting and to the BGR facilities at Spandau. A brief history of the BGR building in Spandau was presented.

1.2 Clemens Reimann (**CR**), Chairman of the EuroGeoSurveys Geochemistry Expert Group welcomed all present to the meeting and gave a brief introduction of current group activities. All participants introduced themselves.

## **2. Minutes of last meeting, held 4-5 September 2007, Brussels.**

Actions resulting from the last meeting were reviewed.

**Action 4.2.1** *is still outstanding* (Shaun Reeder & Timo Tarvainen to produce paper/report on lessons learnt from the FOREGS analytical exercise. It is still hoped to achieve this before the IGC in Oslo)

**Action 4.2.2** (Release of FOREGS QC data by Shaun Reeder/Timo Tarvainen) *is still outstanding*. Shaun Reeder reported some difficulties with this exercise and it may not be possible to complete it because of the problems of obtaining and assembling historical QC data from disparate sources. Alecos Demetriades commented that the QC data are essential for the validation of Atlas data, and that he has been asking for this information to be released. SR and TT to reach resolution on this before IGC in OSLO.

**Action 4.3** (Updating of the FOREGS Field Manual – co-ordination by Alecos Demetriades) This *is still outstanding*. Alecos to complete and publish on CD-ROM by Oslo IGC.

**Action 5.1** (Obtaining funds for distributed FOREGS sample splits to be returned to the central storage archive at GSSR, Clemens Reimann). Action completed – funds were obtained from Patrice Christmann.

**Action 5.2** (New analysis of FOREGS samples – agreement with Prof Xie) CR has reached agreement whereby other parties analysing FOREGS samples will have exclusive access to data they generate for 1 year under the condition that any publications cite the source of samples. After 1 year the data will go into the FOREGS database together with the QC data (condition set by GTK Director at the Autumn EGS Director's meeting in Athens, October 2007).

Action completed.

**Walter De Vos** stated his concern about the lack of information available to the group on these matters and requested that CR communicates any such arrangements by e-mail. CR points out that this information is provided in the group strategy document and in the reports to the Directors and that usually more than 2/3 of the group do not answer to his e-mails. The question may rather be whether always the whole group should agree on any such use of the samples or whether this decision is left to the Executive Committee (or should be taken at the Directors meeting, which could mean a major delay and possibly lost chances for free analyses). **To be further discussed and decided at the next meeting.**

**Action 6.6** (Possible re-preparation/submission of GeoLabNet proposal, Shaun Reeder). This is ongoing though with little enthusiasm. SR to discuss possible

opportunities with Patrice Christmann. The topic will only be taken up again if Patrice identifies a real chance for such a proposal.

**Actions under point 8** (marketing of the FOREGS Atlas)

Popular version of the FOREGS atlas (Alecoss Demetriades) has been held up by difficulties with diagrams but should be completed by end of year. Information Leaflets on various themes from the FOREGS atlas have originally been produced for the planned EuroGeoSurveys Newsletter and further leaflets on more topics would be needed - CR is asking everyone having an idea to take the time (1 or 2 days) to prepare such leaflets (e.g. one on agriculture (W. De Vos?) or mineral exploration).

**Action 9.3.1** (updating of IUGS Global Geochem Baselines website, Alecoss Demetriades). The updated website should be available for viewing through the IUGS website by May/June 2008. Action ongoing

**Action 9.3.2** (provision of FOREGS atlas CD-ROM in Oslo IGC conference bags – *supported by IUGS funding?*, Alecoss Demetriades). Shaun Reeder reported that the auditors of the IUGS Global Geochemical Baselines Group had indicated that they thought that funding the provision of a CD-ROM containing the FOREGS atlas and all papers from the Arthur Darnley issue of GEEA in the Oslo conference bags may not be justified. Therefore this action needs careful thought. Due to the time constraints the final decision will be taken by Alecoss Demetriades and David Smith in consultation with Clemens Reimann.

**Action 10.** (seek funds for representative of Geochemistry Expert Group to attend EUROCITIES meeting(s), CR).

Action ongoing – CR has sought funding from EGS Directors for Rolf Tore Ottesen to attend Eurocities meetings and to be able to visit European cities to encourage them to participate in the planned urban geochemistry project.

### **3. European Groundwater Geochemistry (EGG-Project).**

CR gave a brief introduction to this project noting that it arose from the absence of groundwater chemistry information in the FOREGS Atlas. The sampling of groundwater presents many logistical problems and the use of bottled mineral waters as an alternative sampling medium will give valuable information as a first pass.

MB presented a summary of bottled waters received so far and noted that some countries had not contributed by the designated deadline of Feb 29<sup>th</sup>. The deadline for receipt of bottled waters has been extended to **April 30<sup>th</sup> and all are urged to contribute.** Methods of analysis will include ICP-QMS, ICP-AES, IC and titration. MB then gave a very interesting presentation on work undertaken by BGR concerning chemistry of bottled waters and stream waters in Germany, with particular emphasis on possible health effects of consumption of mineral waters/groundwaters containing elevated U concentrations. Of a total of 257 brands of commercially available mineral water from different geological regions of Germany, 22.6 % (58 brands) exceed the upper limit of 2 µg U/L which is used for preparation of baby food. Such bottles are presently not marked. These 257 brands represent only 30 % of the 810 brands that are officially recognized. The median value of 0.21 µg U/L for mineral water is slightly lower than the median for surface water ( 0.33 µg U/L) in Germany. The distribution of elevated uranium values in mineral water shows a clear correlation with the elevated values in surface water and the geology of those

locations. Elevated median concentration values in the analysed mineral water are observed especially in Bavaria, the Black Forest, Weserbergland, and in the eastern foreland area of the Harz Mts.

The consumption of mineral water increased in Germany between 1972 and 2003 from about 15 litres to 130 litres per person per year. This is nearly a ten-fold increase. About 11.8 billion litres of mineral water were sold in 2003 in Germany. The intake of uranium via solid foods amounts to only 2 – 4 µg U per day. The amount of uranium taken up into the human body is determined mainly by the U-concentration in drinking water. The uranium intake from solid foods is largely constant. The increase of bottled mineral water consumption correlates with an increase in the frequency of chronic kidney disease as shown by the evaluation of medicals. The available data are sufficient to demonstrate a cause and effect relationship, although uranium intake is only one of many possible environmental factors.

**CR** indicated that the initial concept is to produce a geochemical atlas from the results of the bottled mineral water analysis (working title: "Geochemical Atlas of European Ground Water Quality Part I: Mineral Water") and that brand names and company names will not be published. Some of the data may show contaminants from the bottles rather than the water eg Sb from plastics, Pb from glass and Cr from green glass and that this is an important aspect of the work.

**CR** urged all to contribute. A lively discussion followed including questioning of inferred relationships between U in water and health effects such as kidney problems. **CR** suggested that this project should restrict itself to presenting chemical data (above mentioned atlas) to allow others to use the data in studies such as those investigating relationships between drinking water quality and health.

Concerns were raised by some members over the publication of geochemical maps of element distribution in the waters. Point source maps could actually be used to deduce the brand of the bottled water. Some people were afraid that this could lead to problems with companies, even litigation if the data shows anything that Mineral water companies perceive as damaging. It was also suggested that because no sample preservation has taken place, eg acidification, these bottled mineral waters could not really reflect the groundwater source for many trace elements. Further discussion ensued over our rights as scientists to freely undertake research and publish results. **CR** pointed out that we, as Geological Surveys, can certainly map the quality of European groundwater. To use mineral water is a first easy and cheap approach to get an idea about element variation in groundwater at the European scale ("as drunk"). The important point about the project is the European scale comparability of the data. Experience with earlier projects has demonstrated that the named problems can be overcome. With regards to being able to identify single wells in the maps **CR** pointed out that this will be only possible if too few samples are submitted. With enough samples submitted it may be possible to produce smoothed surface maps. In any case the data will not be published as a test of "mineral water quality" but as a geochemical atlas providing a first overview of one aspect of European Groundwater Geochemistry. For data interpretation it is hoped to cooperate with the EuroGeoSurveys Hydrogeology working group. It is hoped that these data will prove so interesting that our directors can be convinced to

support a joint groundwater geochemistry project using more sophisticated sampling techniques.

#### **4 Urban Geochemistry Book Project**

In the absence of Chris Johnson, BGS, Dee Flight (**DF**) presented a detailed progress report prepared by Chris (see Appendix 1). Substantial progress has been made with 19 proposed contributions received so far. Although the formal closing date has passed, the team would welcome any further proposed contributions. It was noted that Poland, who has substantial expertise in urban geochemistry has not contributed and is encouraged to do so. The editorial team (Chris Johnson, Rolf Tore Otteson, Alecos Demetriades, Juan Locutura) have substantial work to do in a number of areas:

- Agreeing on a title of the book.
- Finding a publisher – Springer remains a good possibility and this needs follow-up.
- Defining the structure of the book – should it include methodology as well as case studies.
- Selecting the appropriate contributions from the suggested titles.

Potential contributors should expect to hear from the editorial team if they would like a manuscript to be prepared for inclusion rather soon. (**End of April, 2008**)

A useful debate followed: Gyozo Jordan (**GJ**) suggested, on the basis of his experience with Springer, that it would be useful to ask contributors to write their manuscript directly into the Springer template, rather than the editors trying to reformat all manuscripts later. The template needs to be passed on to all authors as soon as agreement with Springer is reached (the editorial team, Manfred Birke can help with his contacts to Springer).

It was agreed that colour printing would be useful but consequently expensive – this requires to find out what kind of minimum print run Springer would require and then whether each Geological Survey would commit to purchasing enough copies to make it financially viable. **ACTION on editorial team to follow this up.**

**GJ** suggested that the book might be a) problem-oriented b) methods-oriented or c) results oriented. **Benedetto De Vivo (BDV)** suggested that the book should contain a combination of methods, recommendations and results. Pat O'Connor (**PO'C**) pointed out the importance of work in populated areas and thus the importance of this book – especially to non-holders of data.

#### **5. Urban geochemistry Project (start-up)**

**5.1 CR** informed the group that the IAGC has just established an Urban Geochemistry Working Group, and that using this opportunity would enhance the potential value of the EGS Urban Geochemistry Project. He implored the group that someone should take this up with the IAGC so that EGS remains

central to any IAGC developments in this direction. Any individual willing to take this on would need to be a member of the IAGC.

## **5.2 Discussion regarding the proposed urban geochemistry project commenced on 5<sup>th</sup> March and continued on Fri 7<sup>th</sup> March.**

**RTO** presented a summary of the responses to his urban geochemistry questionnaire. Of the 21 countries that responded 19 currently undertake urban geochemistry and one has plans to start. There was general agreement that the aims of these surveys were to establish a baseline in relation to human health. The term 'urban' in relation to urban geochemistry is poorly defined. Soil is the most common sample type with sample depths of 0-5 cm & 5-15 cm commonly collected. Stream sediments and stream waters have also been collected in some surveys and other media such as dust (road, house, attic). Soil samples are collected as both composites and single samples, typically at densities of between 1 and 4 per km<sup>2</sup>. Many surveys have included organic and inorganic determinants. Size fractions selected for analysis of soils include -2 mm, -1 mm, -77 µm and -63µm.

**RTO** presented information on urban geochemistry undertaken in Norway. Here the surveys are undertaken as partnerships with Politicians and Local Authorities including those responsible for Environmental Health, waste management and public health. Thus the surveys are very much focussed on practical use to society of such data. Norway has an action plan for children's environment.

**RTO** proposed that we must get politicians involved in urban geochemical projects. There are two possible options for our European collaboration either a) a targeted survey of children's environments or b) systematic surveys of entire urban areas. **RTO** described his experiences of working in Norway and the approach that NGU has taken in urban geochemistry. He particularly emphasised the importance of collecting samples for organic analyses as well as inorganic.

There was a vigorous discussion as to whether single point samples or composite samples should be used. **RTO** proposed that a pilot study should be undertaken to address this issue. **RTO** also indicated that NGU would be able to undertake analysis of samples for 32 metals.

There was much enthusiasm within the group to take the proposed work on urban geochemistry forward. Seventeen (17) participants at the meeting indicated that they would like to be part of the proposed collaborative urban geochemistry project. **GJ** suggested that we approach the EGS director's meeting for funding in September. **ACTION: All wanting to participate: contact RTO by e-mail and inform him about the proposed city.**

In order to progress this work it is essential that agreement is reached on a field sampling and sample preparation protocol. **ACTION on RTO to produce first version of urban field handbook by middle of May 2008.** It may be possible to hold a workshop in Oslo in August in connection with the IGC to further discuss these issues. **RTO** indicated that there would be a field excursion for those attending the urban geochemistry workshop at the IGC later this summer.

## **6 Surface water geochemistry (Manfred Birke)**

**MB** proposed that the group should consider a project to re-sample and analyse the FOREGS surface water samples. There are two reasons why: firstly, there were serious problems with iodine data and the maps show artefacts; secondly, it would be valuable to see if after 10 years there have been any changes in the concentrations of elements. This should be considered as a possible project for 2010. BGR would be able to undertake the analyses but the EuroGeoSurveys Directors would need to finance the equipment and sampling in their countries. **ACTION: Prepare proposal for next Directors meeting (MB and CR).**

## **7 Mining Sites Inventory (Gyozo Jordan (GJ) and Maria Joao Batista (MJB))**

**GJ** explained that the EC Mine Waste Directive requires a risk-based inventory to be prepared in each country by 2012. A Mining Inventory Task Group has been set up to harmonise the methods. All surveys have reported the methods they use.

**MJB** outlined some funding options for a possible collaborative project to develop a geochemical inventory of environmental risk including FP7 and INTERREG IVC. After discussion it was decided that INTERREG IVC seems to be highly appropriate for our needs and the most likely possible source of funding. **MJB** suggested preparing a document in the format of a proposal to take to stakeholders.

## **8 Use of FOREGS atlas data and publicity (Gyozo Jordan)**

**GJ** gave a very interesting presentation showing how the FOREGS atlas data had been used in the Danube River Project, a UN award-winning project. **GJ** has proposed to the ICPDR that the FOREGS data for the Danube River catchment should be available on the ICPDR website with a link to the metadata on the EuroGeoSurveys site. The EuroGeoSurveys Expert Group supports the initiative and asks Gyozo Jordan to co-ordinate this activity. **ACTION: GJ will keep the group updated on the development of the Geochemical Mapping of the Danube Basin and inform if there is a need for assistance from the Expert Group or the Chairperson. He will report on the progress until 30 May 2008.**”

## **9 GEMAS project Discussions (Wed 5<sup>th</sup> March/Thurs 6<sup>th</sup> March/Fri 7<sup>th</sup> March)**

### **9.1 Project administration (CR)**

A yearly project meeting will be held to keep all parties informed of progress.

### **9.2 Publication and authorship policy (CR)**

Data will be owned by EuroGeoSurveys but all will be encouraged to publish their own country data as soon as is possible. **CR** proposed that rather than having a long list of authors for the final publication, we move to a bibliographic reference of ‘EuroGeoSurveys’ and a separate page on which contributors are listed, in the style that BGS uses for geochemical atlases. **This was agreed by the group.** **CR** envisages that small sub-groups will write-up specific topics for

publication as papers, e.g. comparison between FOREGS/GEMAS soils and comparisons between grazing and arable soils.

**There should be no 'secret' publications.** All proposed publications using the complete European dataset should be first agreed on by the whole group. **CR** suggests that possible titles of publications are discussed in future meetings and that for each title subsequently small working groups of authors are agreed on as well as a set date when the publication has to be ready.

### 9.3 Sample preparation & storage

Plans for sample storage and preparation have not yet been finalised. The Slovak Survey has offered to undertake sample preparation and it is hoped that the contract can go there but due to EU rules this contract needs to be put out for tender due to size and expected total price (over 50,000 Euro).

Six splits of 100ml are required for analysis and 4 further splits for storage. According to plan sample preparation will be completed by May 2009.

Storage has been offered by the Slovak Survey but further possibilities for the long term storage of the samples will be investigated.

### 9.4 Analysis and QC (CR)

Samples will be collected in numerical order and randomised before analysis. Project standards will be exchanged with the Australian and US continental mapping projects. Some international CRCs will be bought for the project BGR will undertake XRF analyses, NGU may undertake Pb-isotope analyses. An Analytical Steering Group of Manfred Birke, Clemens Reimann, Shaun Reeder, Alecos Demetriades and Ilse Schoeters will be set up to take all final decisions on analytical questions on short notice. Aqua-regia digestion results are needed, MIR is planned to be used and industry wants to get K-d values for a selection of samples. Details can only be agreed on early 2009 when we know the exact financial situation of the project.

### 9.5 Participation in the Project(CR)

Some countries involved with EGS have not yet sent a letter of intent – please could they do so. We would like to see Belarus participation, MB will use his contacts in Belarus. If they are unable to collect new samples the "old" Baltic Soil Survey samples could be used for the "agricultural soils". There are some further countries that still need to be contacted. **ACTION CR, AD, MB try to establish contact with remaining countries that have not yet agreed to participate with the help of other group members.**

### 9.6 Funding/collaboration (CR)

Clemens has talked to IAEA in Vienna re: radioisotopes and also to UN-FAO regarding funding possibilities. UN-FAO may fund a meeting/conference. **CR** would also like to contact representatives from e.g. fertiliser, oil, energy industries, especially with a view to getting money for more types of analyses. Industry needs data by 2010 to report to EU. **CR** has committed to giving industry the data as soon as possible.

### 9.7 Sampling miscellanea (CR)

CR communicated a number of points relating to sampling protocols:

- The soil samples will be collected in high-strength, gas-tight Rilsan bags which cost approximately €1 each. Each country has been provided only with a limited number (about 10% above of what is really needed) so please be careful with these bags. In case some additional bags are needed please send an e-mail to Manfred Birke.
- The sample number should be written on a card which is placed inside the bag. Only black, permanent marker pen should be used to write sample numbers.
- Arable and pasture sample sites should be as close to each other as practically possible.
- If you wish to collect extra samples then please contact Clemens Reimann
- Anything the sampler considers to be of potential value for data interpretation should be recorded in the field sheets and where appropriate photographed.
- Spades, knives, etc. should be unpainted carbon steel. FISKARS spades are recommended, but the paint needs to be removed.
- Shipping details for samples will be provided to all in due course when the destination labs have been identified. In the meantime samples should be stored in a cool, dark place.
- CR will send an Excel spreadsheet to each participant, into which the field sheet information should be entered. When this has been sent to CR and verified, the original fieldsheets can be retained by each country participant.
- The Field Manual will be published before the end of April as an NGU technical report.
- Most importantly, commonsense should be used when undertaking the sampling exercise!

#### 9.8 Points clarified during open discussion.

- The number of sample bags provided is size of territory per country divided by 2500. The task is to spread that number of samples as evenly over each country's territory as possible. The grid is only a help construction to provide an impression of the desired density and SHOULD NOT STEER site selection – it is only there to provide an idea of "even coverage". With this approach there should be no problems in the border areas – everybody spreads his/her number of samples as evenly over his/her country as practically possible. It is allowed to take some additional samples if needed due to coastlines or many islands but less samples should never be taken.
- Specific sampling locations should be decided by each country following the overall guidance in the field manual.
- Countries should collect new samples in accordance with the Field Manual rather than contributing existing samples collected under previous sampling exercises.
- It is essential that no jewellery is worn during sampling.
- QC work will be undertaken by NGU.
- **Walter De Vos (WDV)** pointed out that samples should not be taken from fields where fertilizer had recently been applied.
- Maximum depths of samples should be 10 cm in grassland/pasture and 20cm in ploughed land. This is to allow the data to be directly relevant to the REACH initiative.

- The terms ‘grazing land’ and ‘permanent grassland’ have been interchanged and assumed to mean the same type of site. Likewise ‘ploughed land’ and ‘arable’ are taken to mean the same thing.
- ‘Permanent grassland’ is assumed to mean 10 years or more under grass.
- **Jens Utermann (JU)** pointed out that in many environments permanent grasslands will often/only be present in river valleys and thus the choice of sampling location may well be geochemically biased and variably contaminated. **CR** responded that known contamination should be avoided where possible but that if river valleys represented the only permanent grassland then they should be sampled.
- **GJ** suggested that the use of the CORINE land-use map would allow consistent terminology to be established and used in the project.
- **Ignace Salpeteur (IS)** suggested that soil colour should be referenced to the Munsell colour chart. **CR** stated that this was not appropriate as the system was complex and not everybody would have the necessary experience to be able to use it properly. For this project the best record of colour would be photographs taken using the EGS scale bar. Every country is of course allowed to collect additional data if deemed necessary.
- **MD** asked over what timescale was sample collection acceptable. **CR** indicated that he would prefer an as short timescale as practically possible.
- **WDV** queried the precision to which sample locations should be recorded. **CR** suggested that a very precise measurement, to the nearest second, should be made in the field using GPS set to WGS 84. This could be rounded at a later date if necessary. It is very important to record the site on a 1:50k map as well.
- **IS** asked for clarification as to whether hills or depressions should be selected/avoided as sample sites. **CR** indicated that relatively flat sites should be selected for preference and steep slopes should be avoided. Samples should whenever possible not be taken in local depressions.
- **AD** pointed out that there is no ‘permanent grassland’ in many Mediterranean countries only grazing land. **A suitable addition will be made to the field handbook.**
- **WDV** asked whether it was a safe assumption that grasslands are more organic-rich than arable lands. **CR** indicated that even if they prove not to be then the two categories will at least represent two different food chains ie through crops/grain and meat/milk.
- **Ilse Schoeters, European Copper Institute,** indicated that the ECI would prefer fruit or vine growing areas to be avoided if at all possible.
- **Valter Petersell (VP)** asked whether parent rock type should be determined at site. **CR** replied that for ease of sampling it could be taken from published geological maps.
- **WDV** asked if problems were anticipated with Slovakian Customs- Slovakia is the anticipated receptor of samples. **CR** thinks it is unlikely but that all consignments should be marked ‘geological samples of no commercial value’ or something similar. If a value has to be declared then give a low value e.g. €10.
- **Ilse Schoeters** pointed out that **it is extremely important that samplers retain the ‘O’ Horizon in the sample.** Do not cut off the top. It is better to retain surface vegetation than to lose any O horizon through trimming.
- **RTO** pointed out that it is very important to try and get funding for analysis of organic species in the GEMAS soil samples. He further suggested that a sub-

group should be formed to take this forward. Contacting oil industry would be a way forward but needs immediate action. **ACTION on CR to take this forward. ACTION on CR to contact all by email seeking possible oil industry contacts that could be approached. Action on RTO to help in Norway via Director, NGU.** CR stated that Patrice Christmann, EuroGeoSurveys, has indicated that he could help with this. EEA has been suggested as an organisation that might be approached for support.

- **Shaun Reeder (SR)** asked if the Eurometaux money is ring-fenced for k-d analysis. CR replied that it could be used to pay for other analyses. SR asked if therefore it could help pay for organic analyses while other funds were found, and the k-d analysis could be left until later. CR replied that while k-d analysis would not suffer from being held back, there was pressure from industry to provide this information rapidly and so they are of high priority.

#### 9.9 Presentation by Jens Utermann (JU)

JU gave a very useful presentation describing the approach to GEMAS sample site selection in Germany, where 148 samples are required. He envisaged 3 main problems: land ownership and access issues, representivity of sample site and the problem of contaminated sites e.g. contaminated floodplain. He proposed to use some of the 800 soil monitoring sites in Germany to give easy access and will use Google Earth to help with site selection. This will allow some forms of contamination to be avoided.

### **10. Other Business**

#### 10.1 EuroGeoSurveys website

Anyone who is unable to access the password protected section of the website should contact **Alecos Demetriades**.

#### 10.2 FOREGS samples

CR informed the group that FOREGS atlas samples are presently re-analysed in China (wide range of elements including Au and PGE); USA (perchlorate), Australia (Midt Infra-Red) and England (Sr (and some other)-isotopes). For the latter the FOREGS sample set at Gerard Klaver's lab in The Netherlands was supposed to be used, however, Gerard was not yet able to find the samples.

#### 10.3 Location of next annual meeting of EGS Geochemistry Expert Group

CR informed the group that the location of the next meeting is as yet undecided. **Aleksandra Gulan** indicated that all would be welcome in Serbia

#### 10.4 Dissemination of FOREGS atlas data

**Ignace Salpeteur** stated that the BRGM website has a link to the FOREGS atlas data; CR added that the JRC-Ispra website also has a link to it.

#### 10.5 Arthur Darnley Special Issue of GEEA

CR informed the group that the Special Issue of GEEA dedicated to commemorate the life and work of Arthur Darnley will be out before the IGC in Oslo. It will be a double issue containing 12 or 13 papers.

#### 10.6 IUGS Audit of Global Geochemical Baselines Project

Shaun Reeder (SR) reported on the preliminary results of the audit that was undertaken in Denver in December at which Dave Smith and SR represented the project. The auditors recognised that clear progress had been made, despite the lack of funding. The auditors have not formally reported back yet but are likely to recommend continued funding for the project as well as seed funding for workshops. They are also likely to recommend the need for an improved website. Overall, the review seems to have been positive.

#### **11. Scientific presentation by Clemens Reimann**

CR gave an extremely interesting presentation on the origin/source of extensive metal anomalies in pristine environments in Norway which had previously been attributed, by other workers, to long-range-transport (LRT) and deposition of atmospheric material from elsewhere in Europe, especially UK. Evidence was presented which supported the development of these anomalies in-situ through biogeochemical cycling of trace elements. Further, his work suggests that Pb-isotopes are not 'stable' through such process and show considerable fractionation through biochemical/biological processes. Thus they cannot be used in a simple way to identify sources of Pb pollution in soils, especially those where extensive cycling of organic matter has occurred. Part of this work has been published in the most recent issue of Applied Geochemistry.