1. TITLE OF CONSTITUENT BODY

IUGS/IAGC Task Group on Global Geochemical Baselines.

2. OVERALL OBJECTIVES

To prepare a global geochemical database, and its representation in map form, to document the concentration and distribution of chemical elements and species in the Earth’s near-surface environment. The database and accompanying maps can then be used to create a geochemical baseline against which future human-induced or natural changes to the chemistry of the land surface may be recognised and measured. In the short to medium term, this involves implementation of the recommendations given by Darnley et al. (1995), namely:

- collection and analysis of a series of multi-media geochemical samples - the Global Reference Network (GRN);
- design and publication of a Field Manual detailing sampling methods for collection of the GRN samples;
- design and production of an Analytical Manual detailing methods for analysing the GRN samples.

3. FIT WITHIN IUGS SCIENCE POLICY

Current IUGS scientific policy objectives relate to global earth science issues, such as identification of mineral resources, global change, geological hazards, environmental geology and sustainable development. The work of the Global Geochemical Baselines Task Group relates directly to all of these objectives through the establishment of a land-surface global geochemical reference network, providing multi-media, multi-element baseline data for a wide variety of environmental and resource applications. The project is also consistent with the strategic plan published by the IUGS Strategic Planning Committee (2000), and the International Year of Planet Earth (2005-2008) of ‘Earth Sciences for Society’.

4. ORGANISATION

The project is led by a Steering Committee which co-ordinates the activities of five Technical Committees and contributions made by individual country representatives.

**Steering Committee**

*Honorary President*  
Dr Arthur Darnley (deceased)  
Geological Survey of Canada

*Co-Leaders*  
Dr David Smith  
US Geological Survey

Prof Jane Plant (resigned)  
Imperial College, UK

*Scientific Secretary*  
Mr Shaun Reeder  
British Geological Survey

*Treasurer*  
Mr Alecos Demetriades  
IGME, Greece
Analytical Committee
Chair Ms Gwendy Hall Geological Survey of Canada
Co-ordinates the work plan for the analysis of GRN samples, the activities of the laboratories, and the supervision of analytical quality control data.

Sampling Committee
Chair Prof Reijo Salminen Geological Survey of Finland
Supervises development and co-ordination of sampling protocols in the various climatic and geomorphic provinces throughout the world.

Data Management Committee
Chair Dr Timo Tarvainen Geological Survey of Finland
Supervises sampling strategy, co-ordinates the sampling progress of the participating countries, manages the database of sample information and analytical results.

Regional Co-ordination
Chair Prof Reijo Salminen Geological Survey of Finland
Co-ordinates project activities of groups of neighbouring countries and reports back to Steering Committee.

Public Relations and Finance Committee
Chair Mr Alecos Demetriades IGME, Greece
Advertises and promotes the aims, objectives and achievements of the project world-wide, including by use of the World Wide Web, and takes responsibility for trying to secure funding for the project.

5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS

The project does not have any other source of direct funding. However, within Europe, National Geological Surveys, and associated Institutes, have provided staff time and support to the project to complete the preparation of the European GRN as part of the FOREGS programme as an input to the IUGS/IAGC Global Geochemical Baselines project [http://www.gtk.fi/publ/foregsatlas]. A very conservative estimate of the cost for the production of the Geochemical Atlas of Europe is in the order of 5 million Euro (approx. 3.6 million USD). A few other countries, including China, Russia, Colombia, India, Brazil, Canada, Mexico and the United States have provided funds through their National Geological Surveys or related institutes for pilot studies on establishing the GRN.

6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS

This project is closely associated with the work of the EuroGeoSurveys Geochemistry Expert Group (previously the Forum of European Geological Surveys, FOREGS Geochemistry Working Group). In addition, the INCO-COPERNICUS project, a laboratory standardisation project involving Western European and former Soviet Block countries, is associated with this project. The project also has links with the International Atomic Energy Agency (IAEA) and potential links with GTOS, the Global Terrestrial Observing System. The EGS Geochemistry Expert Group has also established closer links with the European Soil Bureau over the past few years (a Memorandum of Co-operation has been recently signed), and was actively involved in the European Commission’s ‘Soil Thematic
Strategy Group’ for the preparation of the EU’s Soil Protection Document, and the final draft of the pending Soil Protection Directive. The EuroGeoSurveys Secretary General is trying to link the project to other European Commission projects, such as the GMES Forum (Global Monitoring of Environment and Security), and INSPIRE (Infrastructure for Spatial Information in Europe), since the Geochemical Atlas of Europe has been produced in a harmonised manner, according to IGCp 259 specifications (Darnley et al., 1995) and, therefore, according to INSPIRE specifications. He is also attempting to link the project with GEOSS (Global Earth Observation system of Systems). In North America, the project has established links with the North American Soil Geochemical Landscapes Project involving the Geological Survey of Canada (GSC), the United States Geological Survey (USGS), and the Servicio Geológico Mexicano (SGM).

7. CHIEF ACCOMPLISHMENTS IN 2007

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

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

North America: North American Soil Geochemical Landscapes Project (NASGLP): The pilot phase of the project in Canada, US, and Mexico has been completed and results will be published in a special volume of Applied Geochemistry in late 2008 or 2009. For the full continental program, a total of 13,215 sites have been identified (6183 in Canada, 5813 in the US and 1219 in Mexico) and the first continental-scale sampling began in 2007. A field workshop was held in Fredericton, New Brunswick in June 2007 to officially launch the sampling program. Agencies represented included the Geological Survey of Canada, Agriculture and Agri-Food Canada, US Geological Survey, New Brunswick Department of Natural Resources, and Environment Canada. During the summer of 2007, Canada completed the Maritime Provinces of New Brunswick, Nova Scotia, and Prince Edward Island, and the US completed the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, and Nebraska. Mexico will begin their sampling effort in 2008. The entire continental-scale survey will likely take 10 years to complete. In November 2007, project representatives met in San Luis Potosí, Mexico to discuss progress, sampling and analytical protocols, and future plans.
The decade-long project to complete the stream-sediment geochemical database for the United States is nearing completion. The database currently contains data for more than 72000 samples. Sampling and chemical analysis will be complete and all data should be available by 2009. All current data from this project are available for download at http://tin.er.usgs.gov/geochem/doc/home.htm.

Europe: The two volumes of the FOREGS-EuroGeoSurveys Geochemical Atlas of Europe (Salminen et al., 2005; De Vos et al. 2006) are proving to be very popular. Both volumes are available for free download from http://www.gsf.fi/publ/foregsatlas/. The complete European database of all field and geochemical data collected as part of this project and the related digital photo archive are also freely available at this website. The FOREGS/EuroGeoSurveys Geochemical Atlas of Europe was officially launched to European Commission officers and other interested parties at the DG Environment headquarters in Brussels on the 21 September 2006. Since then it has become very popular in different circles with in excess of 20000 visits to the website since its launch in August 2005.

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

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

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

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

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

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

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

8. CHIEF PROBLEMS ENCOUNTERED IN 2007

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

9. CHIEF PRODUCTS IN 2007

Geochemical Atlases and Data

The electronic versions of both part 1 and 2 of the Geochemical Atlas of Europe, as well as the complete digital geochemical data and the digital photo archive have been made available at [http://www.gsf.fi/publ/foregsatlas/](http://www.gsf.fi/publ/foregsatlas/). In addition, almost 2000 copies of the CD-
version of the Geochemical Atlas of Europe have been produced by EuroGeoSurveys and the Public Relations Committee.

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

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

Articles and Papers


Other Presentations, Posters, Abstracts and Dissemination of Promotional Material


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


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

10. SUMMARY OF EXPENDITURES IN 2007

The Task Group has received 1500 USD from IUGS in 2007. This amount is very small for the planned promotional activities, and even for assistance to developing country participants. It was decided, therefore, to keep it for future small promotional activities, and in the hope that IUGS will approve the requested amount.

The cost of the EuroGeoSurveys programme over the past year is estimated to be in excess of US $45,000. The overall cost of the FOREGS/EGS activities over the past decade or so is difficult to estimate as the work has been funded independently from each of the participating countries, but is thought to be in excess of US $10M. These funds were provided from the Geological Surveys of the participating countries within Europe. The cost of pilot studies in the US and Canada for the proposed soil geochemical survey of North America is estimated to have been approximately US $0.5M in 2007 and approximately US $1.6M over the 3-year pilot phase of the project. Total costs for carrying out the soil geochemical survey of North America are estimated to be US $15-20M over the next ten years. There has also been considerable expenditure within India, China and Brazil.

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

11. WORK PLAN FOR NEXT YEAR
The FOREGS Geochemical Mapping Field Manual (Salminen et al., 1998) will be revised in 2008 to include new details on sampling in karstic terrains prepared by A. Demetriades, S. Pirc, M. Bidovec and F. Sustersic, and other key terrains, such as tropical, desert and arctic.

Countries outside Europe will be encouraged to observe the work done by the FOREGS Geochemistry Working Group, and to try to formulate similar working relationships and sampling programmes. The Public Relations and Finance Committee will continue in its plan of marketing initiatives in an effort to secure external funding. However, seed money is required from the IUGS to proceed with the fund raising campaign.

The newly formed EuroGeoSurveys Geochemistry Working Group, under the chairmanship of Clemens Reimann, is planning many activities for next year, the details of which have been agreed during the Brussels meeting of the Group in September 2007, and approved by the EuroGeoSurveys Directors in October 2007. The minutes of the Group’s inaugural meeting are given in Appendix 2.

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

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

Collaboration with the Joint Research Centre, Ispra, Italy, has essentially started from 2006, and results of the geostatistical processing of the Geochemical Atlas of Europe data were presented to the EGS GEG at the September 2007 meeting. The collaboration concerns a two-year research project to utilise the results of the Geochemical Atlas of Europe in relation to datasets held by the European Soil Bureau. For this purpose a Memorandum of Understanding has been signed between EuroGeoSurveys and the European Commission. It appears that the duration of this memorandum will be extended, because the European Soil Bureau is very interested in the results of the new Pan-European project, GEMAS.

As part of the promotional activities, and Year of Planet Earth, seminars will be arranged for young geochemists in collaboration with Geological Departments of Universities, since it is very important for the methodology that has been developed over the years to be transferred.
Reactivation of contact points in all countries is a significant activity that will be pursued by circulating the Newsletter that has been prepared by the EuroGeoSurveys Geochemistry Working Group.

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

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

12. COMMUNICATION AND DISSEMINATION PLANS

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

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

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


12. Chipres et al. "Geochemical mapping of major and trace elements in soils from the Altiplano Potosino, Mexico: A multiscale comparison"

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

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

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

The publication of the European Geochemical Atlas has already proved useful in marketing and helping to secure funds over the past year. The Public Relations and Finance Committee will be taking a proactive role in trying to secure funds for the global project from a wide variety of potential sources.

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


1998 Release of the IUGS/IAGC Global Geochemical Baselines website, hosted by the British Geological Survey at www.bgs.ac.uk/IUGS.

1998 Annual Meeting was held in Naples, Italy (1-3 October 1998) in conjunction with the FOREGS Geochemistry Working Group Annual Meeting.

1998 European GRN sampling programme commenced.

1999 Completion of pilot study for geochemical mapping carried out in Colombia.

1999 The Committee for Coastal and Offshore Geoscience Programmes (CCOP) agreed to act as a Regional Co-ordinator for their member countries (China, Japan, Vietnam, Indonesia, Cambodia, Thailand, Malasia, Papua New Guinea, Philippines, and Korea) in SE Asia.
2000 Symposium on geochemical baseline activities was organised as part of the 31st International Geological Congress in Rio de Janeiro.

2000 First draft of promotional papers to possible sponsors prepared and sponsorship campaign commenced.

2000 Annual Business Meeting of the IUGS/IAGC and FOREGS Working Groups held in Athens, Greece (14 to 17 November).


2001 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 Svinice, 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 geochemical baseline mapping programme in India.


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 Completion of pilot studies for the North American Soil Geochemical Landscapes Project.


2007 Distribution of more than 1300 copies of the CD-version of the Geochemical Atlas of Europe.

2007 921 copies of Part 1 and 740 copies of Part 2 of the Geochemical Atlas of Europe have been sold to date, and more than 100 copies of the two-volume set have been donated to libraries of educational establishments and institutions.

2007 Data downloads from the website as of September 2007: 255 for the stream water data set, and 239 for the topsoil.
2007 Initiation of soil sampling for the soil geochemical survey of North America, under the North American Soil Geochemical Landscapes Project.
2007 Completion of provisional soil geochemical mapping in India.
2007 National Geochemical Survey of Australia approved for funding by the Australian Government’s “Onshore Energy Security Initiative”.

15. REFERENCES


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Appendix 1

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

Clemens Reimann NGU, Norway  (Chair)
Shaun Reeder BGS, United Kingdom  (Secretary)
Josip Halamic HGI-CGS, Croatia
Miroslav Duris CGS, Czech Republic
Valter Petersell EGK, Estonia
Timo Tarvainen GTK, Finland  (5 September only)
Ignace Salpeteur BRGM, France
Manfred Birke BGR, Germany
Alecos Demetriades IGME, Greece
Gyözö Jordan MAFI, Hungary
Patrick O'Connor GSI, Ireland  (4 September only)
Tomasz Gliwicz PGI, Poland
Aleksandra Dusza PGI, Poland
Rolf Ottesen NGU, Norway
Robert Sajn GEO ZS, Slovenia
Mateja Gosar GEO ZS, Slovenia
Juan Locutura IGME, Spain
Alejandro Bel-lan IGME, Spain
Kaj Lax SGU, Sweden
Christopher Johnson BGS, United Kingdom
Patrice Christmann EuroGeoSurveys  (parts of both days)
Maciej Klonowski EuroGeoSurveys  (parts of both days)

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 Introductions

1.1 Chairman’s introduction

Clemens Reimann welcomed everyone to the inaugural meeting of the newly formed EGS Geochemistry Expert Group.

1.2 Presentation by Patrice Christmann

Patrice Christmann gave an overview of the current status of FP7, and advised that the time was right to influence the development of policies (especially since geochemistry is not mentioned specifically) rather than just responding to calls for funding. He reinforced that project concept drafts should include: definition of issues (using
economic data for reinforcement), reference to EU policies of relevance, quantifiable objectives and how these will be attained, resources required (human, technological and financial) and performance indicators for monitoring success.

Patrice advised that the Geochemistry Expert Group requires a clearly defined strategy to be approved by the EGS Directors (next meeting scheduled for 3-5 October 2007). The draft strategy prepared by the Geohazards Expert Group could be used as a model. The strategy should link the Group’s proposed activities to EU policies and legislation, the most relevant of which include: health, water framework and groundwater directives; common agriculture policy; raw material and soil protection directives (in draft); and the mineral resources directive (under discussion). Patrice also advised liaising with other EGS expert groups (water, soils, geohazards, etc) who are already familiar with EU policies and legislation.

Patrice briefly demonstrated the new EGS website, which is still in the final stages of development. Alecos Demetriades agreed to act as key contact for the Group with responsibility for posting details of forthcoming events, latest news, etc. Access privileges need to be granted (Action: Patrice Christmann).

Patrice then demonstrated the EGS Intranet site available at http://81.188.3.226:8080/. User IDs are of the form ‘country name geochem1’ (no spaces, not case sensitive), e.g. czechrepublicgeochem1. Different representatives within country may be assigned different user numbers (geochem2, geochem3,…). The password is Egs.2007 (case-sensitive). The site may be used for downloading and editing documents, arranging meetings, holding forums, etc. Patrice encouraged all participants to actively use the site. It was agreed that the minutes of the meeting and relevant documents will be made available on the site, assuming that there are no technical difficulties

2. American Continental Geochemistry Project

Gyözö Jordan gave an overview of this new collaborative project between the USA, Canada and Mexico, led by Dave Smith of the USGS, which involves the geochemical mapping of soils of North America. Over 14,000 upper horizon soils are expected to be collected and analysed for majors, trace metals, organic material and pH. Sampling is based on ‘soil science’ protocols, rather than methods specified in the ‘green book’. Funding is through the USGS, soil surveys and stakeholders, e.g. US EPA. Preliminary NS and EW sections have already been undertaken. Andrew Grosz continues to lead the stream sediment geochemistry survey of North America as a separate project.

Gyözö went on to briefly describe the status of a project funded by the ICPDR International Commission for the Protection of the Danube River that intends to use the Atlas data, along with other relevant country-based data, to provide a geochemical database of the Danube catchment.

Clemens Reimann stated that geochemical mapping of Australia has just been commenced.
3. **Exchange of information**

There was an opportunity for all participants to give brief presentations on the current status of geochemical activities within their surveys. In general, interest in mineral exploration continues to thrive throughout Europe. Studies on urban geochemistry are also on the increase, and there is now much experience in this area.

Rolf Ottesen drew the group’s attention to the IAHS/AISH project on global geochemical mapping of sediment and associated flux of major world rivers (see website at [http://www.globalgeochemistry.org](http://www.globalgeochemistry.org)). Suitable samples may be submitted to the project for free analysis of a range of organic pollutants.

Timo Tarvainen reported that a recent change in Finnish law now requires geochemical background data to be taken into consideration when determining threshold values of potentially ‘contaminated’ land that exceeds guidance limits.

4. **FOREGS/EGS Geochemical Atlas of Europe: Follow-up activities**

4.1 New initiatives since publication of the Atlas

There was some discussion of follow-up work being carried out throughout Europe since publication of the Atlas. Highlights included: plans to correlate Atlas soils data with a recently completed soil geochemical survey in Croatia; recent use of Atlas water data by a group at BRGM; anticipated publication of data for lower floodplain and overbank sediments in Greece; a new geochemical atlas to be published in Germany, to include some organic compounds; ongoing collaboration between NGU and universities in Russia to prepare an atlas of overbank sediments; and a new geochemical atlas of Spain based on FOREGS methodology and including stream sediment, overbank sediment, soil and surface waters.

4.2 Analytical Manual and QC data

Shaun Reeder reported that there was no intention to produce an Analytical Manual equivalent to the ‘green book’, mainly because it isn’t possible to recommend a single range of analytical methodologies that could be applied at the global scale. It was considered that the proposed paper on ‘lesson’s learnt’ from the FOREGS exercise was a more useful deliverable. Timo Tarvainen has already made good progress with part of this paper, but it requires more input from Shaun. **ACTION: Shaun Reeder and Timo Tarvainen** to complete this paper in advance of the IGC in Oslo.

There was a discussion on the release of QC data, which had not been issued so far because of inconsistencies in the way the data were produced by the participating laboratories that make it difficult to present in a consistent manner. **ACTION: Shaun Reeder and Timo Tarvainen** to investigate the status of the QC data and release it in a suitable form to the Group members in advance of the IGC in Oslo.

Manfred Birke reported that he had identified some potential problems with the published map of iodide in waters, which contains anomalies throughout Germany that he has not been able to validate as part of his more detailed recent survey. He now considers that the original BGR data are erroneous. It was agreed that this map
should be withdrawn from the website, or attention drawn to the erroneous data if this is not practical (ACTION: Timo Tarvainen). Chris Johnson suggested that an ‘issues log’ should be created on the website where potential problems could be registered. ACTION: Timo Tarvainen to consider.

4.3 Field Manual

Progress was reported to be ongoing, with some new texts (on karst and tropical terrains) already prepared, but others outstanding. There are also some errors in the current manual that require correction. ACTION: Alecos Demetriades to coordinate the update with Reijo Salminen and Timo Tarvainen in advance of the IGC in Oslo.

5. FOREGS sample archive and new analysis

5.1 Maintenance of archive materials

There was a discussion on the status of the sample archive, currently maintained at GSSR in Spišská Nová Ves, Slovak Republic, but with many of the sample splits still held by individual laboratories throughout Europe. It was agreed that these samples should be returned to GSSR so that they become the primary materials for additional analyses, enabling the archive to be maintained untouched. Alecos Demetriades has information on which samples are held in which laboratories, but this needs to be checked. It was agreed that an inventory of materials, including mass of sample, needs to be established. GSSR need to be contacted to establish that they are happy and able to maintain the additional material, and to ascertain if there will be any cost implications (ACTION: Clemens Reimann). There will also be cost implications for transportation of the materials from present locations to GSSR. ACTION: Clemens Reimann to approach Patrice Christmann to see if EGS could cover the costs. Once arrangements have been made, it will be the responsibility of individual labs to check their holdings and organise transportation.

5.2 New analysis

Clemens Reimann reported a number of initiatives that are using the FOREGS sample archive to conduct additional analyses. The USGS are currently overseeing the determination of perchlorate content in top soils. TRACE – an EU funded project studying isotope chemistry of soil and food products for forensics purposes (see http://www.trace.eu.org/) – is determining Sr (and other) isotopes in top soils. NIR spectra of surface soils are also being characterised in Australia. Prof Xie has recently volunteered to re-analyse two sample types from the FOREGS archive in China using his analytical methodologies, which will result in better limits of quantification for some elements, and new data for Pd, Au, etc. Final agreement with Prof. Xie needs still to be reached (Action: Clemens Reimann).

It was acknowledged that it is disappointing that most additional analysis is being undertaken externally rather than by the original participating organisations. Nonetheless, it was agreed that requests for additional analysis should be encouraged. It was agreed that control to the archive needs to rest with the Expert Group, and that
the Group’s Executive Committee (see item 9.2) should take responsibility for approving future access for additional analysis and testing.

In all cases, it will be a condition of access that the new analytical data will become publicly available, that the Group will be notified of any publications, and that the publication should reference the Atlas.

5.3 Implications for data management

Timo Tarvainen stated that GTK has no commitment to maintain the FOREGS database for any new data generated as part of the initiatives discussed in 5.2. It would be difficult to incorporate new data, and there would be significant cost implications. **ACTION: Timo Tarvainen** to discuss options for ongoing maintenance of the database with management at GTK. He suggested that any new data should be stored in a EuroGeoSurveys database. This needs to be considered when GTK refuses to maintain and extend the database on the GTK server (Action: Timo Tarvainen to discuss possibilities with Patrice Christmann and report to the group).

6. New project proposals

As part of the development of an ongoing strategy for the Group, a number of proposals for potential future work (tabbed in advance) were discussed. In addition to the six proposals detailed below, it was agreed that further proposals should be encouraged.

6.1 Urban Geochemistry

Alecos Demetriades gave a presentation on the status of urban geochemical surveys throughout Europe, based on all information provided during the compilation of the project proposal. A number of participants stated that the information in the presentation did not reflect the current status of activities.

The proposal on assessment of urban environmental quality assessment was discussed and received strong and wide support. It was thought that the time was right to submit this proposal because of the importance of this activity to the health of society, particularly children. There was a need for a common protocol at the European scale. The project is also relatively cheap to fund (hopefully with support of the EGS Directors), rather than requiring EU FP7 funds.

There was some discussion about the problems associated with this work, e.g. potential negative publicity where problems are identified, and issues with some local authorities preferring not to know about contamination. It was agreed that a multidisciplinary approach – getting local authorities, health agencies, planners, etc on board from the start – was essential. Also, it was agreed that just identifying anomalies is not good enough, and that remediation policy, including identification and removal of pollution sources, also needs to be taken into consideration. Ongoing monitoring was also considered to be important.
Two initiatives were agreed to be taken forward for presentation to the EGS Directors: (i) publication of a book on the topic of urban geochemistry, to include case studies throughout Europe, and (ii) a proposal to carry out a trial Europe-wide baseline survey of approximately 12 cities, with the objective to derive a harmonised methodology and recommended best practice.

With respect to (i), an editorial team led by Chris Johnson, Rolf Ottesen, Alecos Demetriades and Juan Locutura was agreed. The team agreed to establish a timescale for publication, find a suitable publisher, organise outline contents and arrange and secure contributions, including best example case studies throughout Europe (ACTION: editorial team to present proposal to Clemens Reimann for presentation to the EGS Directors by 28 September). As well as case studies, it was agreed that the book should compare and contrast different approaches, help clarify and define terminology, and conclude with recommendations. All participants were encouraged to contribute to the book. Manfred Birke stated that he had previously agreed on such a book with Springer press.

With respect to (ii), it was agreed that a Working Group would be established to take the initiative forward; the WG to comprise: Rolf Ottesen (chair), Alecos Demetriades, Pat O’Connor, Kaj Lax, Valter Petersell, Manfred Birke and Robert Sajn. It was proposed that all inorganic analysis should be carried out at NGU. The approach to the survey – ‘footprint’ or ‘risk mapping’ – needs to be established. ACTION: work group to present proposal to Clemens Reimann for presentation to the EGS Directors by 28 September).

On a related matter, Clemens Reimann informed the Group that an Urban Geochemistry Working Group had been proposed to the IAGC (of which Clemens is currently Vice President). To be approved, the proposal needs backing from at least 20 IAGC members, and Clemens asked those in the Group being IAGC members supported the proposal. Funding would be obtained to run workshops, etc.

Timo Tarvainen informed the group that there has been an urban geochemistry project funded in an earlier framework programme and that the group should look at that work and the results.

6.2 Agricultural Soils and Grazing Land

Clemens Reimann stated that the intention of this proposal would be to extend the Baltic soil survey throughout Europe. Agricultural soils, based on land-use, and thus reflecting food chain sources, would be collected at a density of 1 in 500 to 1 in 2500 km², depending on funding. Part of the funding would likely be required from national surveys, but Clemens is also in contact with Eurometaux to obtain their backing for such a project and possibly funding.

Pat O’Connor raised some concerns with respect to likely political conflicts within the EU (European Soil Bureau) and individual countries (national agricultural and soil agencies) about methodology and ‘ownership’ of the survey. It was agreed that cooperation with the European Soil Bureau or the Union of soil scientists might need to be established for the project to be supported. We would also need to see how the proposal fits in with the strategy of the EGS Soils Working Group.
The proposal received general support. It was agreed that this work was important and needed to be done; and that the Group were best placed to do this type of geochemical survey, and on a reasonable timescale. However, it was agreed that the proposal should have low priority unless the political and funding problems can be overcome.

Gyözö Jordan mentioned that the European Soil Bureau had been critical of interpolation methods used for the Atlas. Although there was no ‘right answer’, it might be worth pursuing a joint collaboration with the Soil Bureau to carry out research into interpolation methods.

6.3 Groundwater Chemistry

Patrice Christmann reminded the Group that a FP6 project, BRIDGE, has recently completed an evaluation of threshold values for groundwater.

The paper on a survey of European groundwater geochemistry was discussed. The proposal received some support, but was thought to need more clearly defined purpose and objectives. Kaj Lax suggested that drinking water as well as groundwater should be included. Given that it was agreed that the sampling was best led by geochemists, Shaun Reeder questioned why the scope of the study had been restricted, e.g. omission of Hg and Au, on the basis that it was difficult to guarantee good collection and preservation of these samples. Careful thought needs to be given to how the analysis is organised – the FOREGS approach did not work successfully for water analysis.

There was sufficient interest to take the initiative forward, but it was suggested that this might be best achieved in conjunction with the EGS Groundwater Expert Group, particularly with respect to selection of sampling sites and interpretation of data. ACTION: Clemens Reimann to pursue.

6.4 Inventory of Mining Sites

Gyözö Jordan spoke to the paper prepared by Maria João Batista of IGM, Portugal. The proposal received good support. It was agreed that a Working Group should be established to take this initiative forward; the WG to comprise: Maria João Batista, Gyözö Jordan, Pat O’Connor, Ignance Salpeter, Mateja Gosar and Juan Locutura. An updated paper for presentation at the EGS Directors’ meeting in October is required. ACTION: All WG members to submit revised paper to Clemens Reimann by 28 September 2007.

6.5 Revised Geochemical Atlas of Europe at Higher Sample Density

This initiative, to repeat the previous mapping exercise at the higher sample density as suggested by the WEGS working group (1 site per 500 km²), was briefly discussed but thought to be a non-starter due to cost considerations. It was thought highly unlikely that the EGS Directors would provide funding for this activity, although, at ten times the density used for the FOREGS atlas it would certainly provide new and important information.
6.6 GeoLabNet

Shaun Reeder discussed the GeoLabNet proposal (concerning networking and harmonisation of activities within the geological survey laboratory community), which had been submitted to the EU FP6 call in 2003 and again in 2005. On both occasions the proposal had received very good markings, but had not been commissioned because of lack of funds. Shaun was sceptical about resubmitting again for a number of reasons including: the repeated failure of the bid to date; the GTK labs have recently been privatised (GTK were co-ordinators of the previous bids); the labs were very actively collaborating at the time of submission of the earlier bids, but have not had the opportunity to do so since; there are many changes to personnel in the laboratories.

After discussion with Patrice Christmann, who is supportive of the initiative, Shaun agreed to contact laboratory managers throughout the whole of the EGS community (not just those involved in the previous proposals) to establish if there is a willingness to pursue this opportunity again. **ACTION: Shaun Reeder.**

6.7 Surface water

It was agreed that new surface water data for Europe are needed. A proposal to resample the surface waters in 2008/2009 as part of a monitoring exercise (the FOREGS data will be 10 years old by then) will be prepared before the directors meeting (**Action: Clemens Reimann**). This project should get a very high priority.

7. Publication policy

The existing Atlas data are now accessible to all parties and free for publication. Reference and acknowledgement to the source of the data should be mandatory as a condition of their use, although it was agreed that there was no need for the Group’s participants to be named as co-authors, or even acknowledged in person, on any future publications using the data. As a matter of courtesy, however, it was agreed that if any of the Group plan to publish a paper utilising the data, they should inform all members so that they are aware of the intended publication and may volunteer to contribute to the paper if they have specialist knowledge of relevance.

Alecos Demetriades reported that he holds a list of all publications (including conference presentations and posters) relevant to the Group’s activities. All participants were reminded that they should inform Alecos of any future publications, and that copies should also be sent to him. **ACTION: Alecos Demetriades** to prepare a list of all publications for presentation at the EGS Directors’ meeting by 28 September.

Clemens Reimann reported that there will be a special session on continental scale mapping at the IGS in Oslo in August 2008. Papers will be published in a special publication of GEEA dedicated to the memory of Arthur Darnley. Clemens encouraged everyone to contribute to the volume and conference.

8. Marketing and public relations activities
8.1 Marketing possibilities for the Atlas

Marketing of the Atlas was discussed at length. It was agreed that the marketing strategy needs to be documented and agreed by the Group. The strategy needs to consider: target audience; objectives and expectations; and proposed methods for marketing. It was thought necessary to extend the target audience beyond the geoscience community, e.g. to medical, food scientists, EU/EC. **ACTION: Alecos Demetriades** to prepare marketing strategy. It was considered that professional expertise might be brought in to help, not just for the Atlas, but for EGS activities as a whole. **ACTION: Clemens Reimann** to raise at the EGS Directors’ meeting.

An article for *Nature* or *Science* was considered, but not thought to be feasible. *National Geographic* is thought to be a better option. Alecos Demetriades is still pursuing approval from *Metro* for an article to coincide with ‘Environment Day’ (6 June 2008), although there is no guarantee that the article could be published in all versions of the paper on the same day. The article would have to be translated into all the languages in which the paper is published.

Timo Tarvainen commented that everything being freely available on the internet makes for very good marketing, and there are many examples of how the data are being accessed and used by other disciplines. Timo agreed to obtain information on hits and downloads to the website, which Clemens will mention at the EGS Directors’ meeting. **ACTION: Timo Tarvainen** by 28 September.

8.2 Popular version of the Atlas

Alecos Demetriades stated that he had started this initiative and made good work on the introduction, but has made limited progress of late. He is trying to source other relevant popular texts so that the style and language is appropriately focussed on its target audience of children. **ACTION: Alecos Demetriades** to complete the document by end 2008.

Gyöző Jordan suggested that a related interactive website would be a good idea. Alejandro Bel-lan suggested the possibility of approaching a TV company to produce a documentary. **ACTION: Alecos Demetriades** to pursue these ideas.

8.3 Information leaflets

A few leaflets had been produced for the intended EuroGeoSurveys Newsletter; others had been promised but not delivered. **ACTION: all** to think of ideas suitable for information leaflets (especially covering agriculture and exploration).

8.4 Newsletter

The proposed newsletter was never taken forward as intended. It was agreed that newsworthy items should now be promoted via the new EGS website (see item 1).

8.5 Education initiatives
It was agreed that a short course in regional and/or urban geochemistry – possibly a summer school – would be likely to generate interest.

Gyözö Jordan suggested that this might be linked to the Marie Curie scheme for young researchers, which had received a positive response from the EGS in terms of potential provision of funds for training and development, but requires a core group of 4 or 5 active participants to take it forward.

9. **Any Other Business**

9.1 **EGS Directors’ report**

Clemens Reimann will produce the Group’s report and give a presentation to the EGS Directors at their meeting on 4 October 2007. Information is required from all participants at latest by 28 September 2007 (ACTION: all). As part of the presentation, Clemens will ask the Directors to consider funding one or two of the new proposals discussed at item 6 (urban geochemistry and one other).

9.2 **EGS Geochemistry Expert Group Executive Committee**

It was confirmed that the Executive Committee of the Geochemistry Expert Group would comprise: Clemens Reimann (chair), Shaun Reeder (secretary), Igor Slaninka (GSSR sample preparation and storage, replacing Karol Marsina), Timo Tarvainen (data management), Alecos Demetriades (publication relations and marketing). Further additions and changes to the Committee may need to be made in due course.

9.3 **Global Geochemistry Baselines**

Shaun Reeder raised the issue of the Global Geochemical Baselines project. Although much work was being undertaken worldwide (see for example item 2), there has been little co-ordinated effort of late through this Working Group. It is known that Jane Plant wishes to stand down from the co-chair position. There are plans for the IUGS to review the Group’s activities this FY, with the possibility of providing additional funds. The IUGS have recently approached the Group to inquire about the status of the Group’s website (currently hosted by BGS and woefully out of date). Alecos Demetriades has agreed to update the website and arrange for it to be hosted by the IUGS by November 2007 (ACTION: Alecos Demetriades). It was agreed that the session at the IGC in Oslo was an important occasion for taking forward the global initiative, as well as for promoting the Group’s activities throughout Europe. The intention is for a CD-Rom of the Atlas to be issued with all conference promotion material (ACTION: Alecos Demetriades).

10. **Meeting with the European Municipalities**

Following on from the business meeting, the group were joined by Catherine Bouland (Environmental Department of the Brussels Regions), Eva Baños de Guisasola (EUROCITIES Policy Officer for the Environment) and Karen Fabrice (Unit for Natural Resources Management at DGU Research).
Rolf Ottesen gave a presentation on the application of urban geochemistry, with specific reference to the excellent ongoing work carried out in Norway.

Eva Baños de Guisasola described the role of EUROCITIES (http://www.eurocities.org/) - a network responsible for lobbying and best practice exchange covering major European cities with a population greater than 0.25m. There are currently 8 working groups: quality and climate change; waste; noise; health and environment; water management; clean cities; green areas; and greening local economies. The working groups on waste and health are due to meet within the next few months, and Eva welcomed a member of the Group to attend and give a presentation. ACTION: Clemens Reimann to pursue.

There was a discussion about how the Group might best lobby the EU for funding for work on the urban environment. It was re-enforced that the Group needs to be influencing the direction of new research priorities in time for the FP call late in 2009, and that it is important to get backing from other lobbying groups, EU Parliament, etc. Catherine Bouland enforced that it was necessary for the Group to ‘operationalise’ – demonstrate the physical and practical benefits of undertaken proposed studies – rather than just undertaking research for the sake of it.

11. Concluding remarks

Clemens Reimann formally closed the meeting by thanking all participants for their presence and valued contributions. Special thanks were given to Patrice Christmann for hosting the meeting and for his excellent hospitality.

APPENDIX

I. Meeting with Luis-Lado Rodrigues, JRC ISPRA, Thursday Sept. 6

Part of the group had a meeting with Luis-Lado Rodrigues, JRC ISPRA, IES, who presented results of his work with our data. Luis has used our topsoil and overbank sediment data to use a number of new maps using advanced interpolation and data analysis methods. The group invited him to take contact with whomever he needed from within the group to interpret his data or write a publication with his results. He was made aware of the Baltic Soil Survey data, which could also be used in his work. It was recognised, that higher density data would be helpful to produce more reliable and detailed maps. Further plans for cooperation will need to be discussed at the management level, but the group indicated that we would certainly be interested in pursuing future joint projects.

II. Meeting with Eurometaux, Friday, Sept. 7

Clemens Reimann had a meeting with representatives of Eurometaux (the European Metals Industry association) and of the different commodities (Cu, Zn, Mn, precious metals etc.) on the following day (Friday, Sept. 7). He presented the groups work and discussed the possibility of industry co-funding a future geochemical survey, of, e.g., agricultural soils. The participants were very interested in our results and agreed that the results are highly relevant for the metals industry. They will discuss possibilities
for funding or backing our projects in other ways during the coming weeks and inform Clemens about the outcome.