International Association of
Geochemistry and Cosmochemistry

Newsletter

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NEW OFFER FOR IAGC MEMBERS

The IAGC would like to get new institutional subscribers to *Applied Geochemistry* (universities, companies, government bodies, etc.) and as an incentive to our members, we are offering a free subscription to *Applied Geochemistry* plus IAGC membership for one year (value $54 (US) +) for any current IAGC member who is able to sign up a new institutional subscriber (a letter indicating the name of the new subscriber is needed as authentication). This offer will expire May 31, 1999.

IAGC Activities

Biannual Newsletters

The IAGC wants to improve communications with its membership and National Member countries. This year we are producing a second newsletter, in the summer (winter for our southern hemisphere members!) and here is the product of our efforts. The format is more relaxed than our annual (late autumn) newsletter and contains more newsy items. It leaves most of the general reporting of IAGC business to the autumn newsletter. We hope you like it and find it useful.

Report from the President (G. Faure)

When I assumed the Presidency of the IAGC in August of 1996, I pledged to support our Working Groups, to increase the membership in the Association, and to help *Applied Geochemistry* to grow into the leading journal of Environmental Geochemistry. Now that the first half of my tenure is approaching, I am pleased to report that we have made progress in all three areas. However, we have not yet reached our goals.

The activities of our Working Groups are impressive and constitute a significant contribution to research in geochemistry on a global scale. Without attempting to repeat information provided elsewhere in this Newsletter, I point out that our Working Group on Meteoritics and Cosmochemistry has been reconstituted under the leadership of Professor Herbert Palme of the University of Cologne who plans to schedule symposia on selected topic and to integrate them with the Annual Meetings of the Meteoritical Society. In addition, work is in progress to continue the activities of our Working Group on the Geochemistry of Health and Disease formerly chaired by Professor Iain Thornton who has stepped down.

Our membership is growing as the Association is becoming more visible in the geochemical community and in response to the efforts of our members who are recruiting their faculty colleagues and graduate students to join the IAGC. The membership and subscription renewals for 1998 had a slow start because of the globalization of the administration of Elsevier Science. However, we have established lines of communication among the various administrative entities and I expect that the process of renewals of membership in IAGC and subscription of *Applied Geochemistry* will work smoothly in the future. If anyone has a problem, please contact the Secretary, Mel Gascoyne, for help. I urge each one of you to recruit at least one new member for 1999 and thereby to help the IAGC to double its membership.

The growth of *Applied Geochemistry* both in quality and in quantity is unmistakable. We want *Applied Geochemistry* to continue to evolve into the premier journal of environmental geochemistry in the broadest sense of the term. Professor Ron Fuge, our able Executive Editor, has indicated that the number of manuscripts being submitted is rising, which indicates that we are on the right track. There is, however, something that we can all do to strengthen our journal: 1) Submit your best manuscripts to our Editor, and 2) Urge your institutional librarians to subscribe to *Applied Geochemistry* (please see the offer of a free subscription to APPLIED GEOCHEMISTRY on the front cover).

A wide distribution and ready availability of our journal in University Libraries will enhance its effectiveness as a medium of communication and will benefit the IAGC because we receive an annual royalty payment from Elsevier based on the net income from institutional subscriptions.

In conclusion, I want to let you know that the Officers and Council Members are making plans to increase the tangible benefits to members of the IAGC. To start with, we will issue two Newsletters each year and expect to include a variety of items dealing not only with the business of the Association, but will also provide information about other matters of potential interest to our members.

Membership

Our membership numbers have rebounded since last year's decline, probably due to the better co-ordination of invoicing now in use by Elsevier Science Ltd. As of July 29th, we were at 553 members. It is a prime objective of the IAGC to become a leading voice for applied geochemists in the world and increasing our membership is one of the best ways to do this. Many of you may recall the special offer announced in the last newsletter whereby existing IAGC members could get their membership dues reimbursed if they signed up a new member. Despite receiving numerous new-member application forms back, only **8** of these contained the name of the referring member. Presumably this means that most of our members are willing to actively promote the IAGC without requiring financial gain!

Membership Dues

Membership dues for the IAGC have been stable at $10 (US) for at least the last 6 years and the President, Gunter Faure, has proposed that **fees be increased to $15** to meet the increasing costs the Assocation has to bear. In particular, because we are an international organization whose Council Members are drawn from all over the world, it has proved difficult to get any more than two or three Members together at any one time so that a Council Meeting can be held.

Gunter has proposed, therefore, that Council Members be allowed financial assistance to attend the annual Council Meeting. Assistance is also offered to IAGC Working Group Chairmen whose work in organizing sponsored meetings is one of the most important activities of the IAGC (as anyone who attended the successful Water-Rock Interaction Symposium (WRI-9) in Taupo, New Zealand would testify). In addition, the cost of typing, printing and mailing the newsletters, plus meeting the increased demands of conference sponsorships, office operations, etc. limits our effectiveness at the moment. We would appreciate your comments on this increase in dues which is proposed for 1999.

An IAGC Secretariat?

The IAGC Executive, Council Members and Working Group Chairpersons reside in many different countries because of our mandate to represent geochemists worldwide. As a result, it is sometimes difficult to maintain continuity and consistency in the administration of the Association.

For this reason, we propose to establish **a permanent Secretariat** in Canada charged with responsibility for the day-to-day operation of the Association. The Secretariat will process applications for membership, respond to questions by members, pay routine bills, prepare two issues of the Newsletter annually, and submit periodic reports to the IUGS and other scientific societies. The existence of a permanent secretariat will provide continuity when a new slate of officers is elected by the General Assembly of Member Nations that takes place every four years. The next Assembly will occur in August of 2000 in Rio de Janeiro during the 31st International Geological Congress. In addition, the financial resources of the IAGC would be resident in one location to ensure the long-term stabilility of the IAGC. The Executive Officers of the Assocation (President, Treasurer, Secretary) would retain the overall decision-making capabilities for the IAGC (for instance, financial support of conferences would still be authorized by the Treasurer on approval of Council) but routine operations would be run by a Secretariat under the direction of the Executive.

This proposal is to be presented formally at the next Council meeting (see below) for approval but, because it is a fundamental change in the way IAGC operates, it must be ratified by voting National Member countries at the next General Assembly in 2000. If you have any comments on this proposal, please send them to either the President or Secretary (addresses on pages 9 and 10).

1997 GSA Session - An Omission!

The last Newsletter (#30, December 1997) omitted to include a summary of the **second** IAGC-sponsored session at the Annual Meeting of the Geological Society of America held in Salt Lake City, Utah. This session was convened by Dr. Don Runnells and entitled "Natural Background Chemistry and Environmental Decision-Making". It was very successful and featured 16 abstracts which have been reprinted here in a loose-leaf insert for your interest.

Next Council Meeting - Toronto, October 1998

The Annual IAGC Council Meeting will be held in Toronto, Canada, this year on October 25, 1998. The meeting is to be held in conjunction with the Annual Meeting of the Geological Society of America and attendance of the Council Meeting is open to all IAGC members. Check the information pages of the GSA registration booklet or contact the Secretary for details.

The 1998 Ingerson Distinguished Lecture

This year the Ingerson Distinguished Lecture is to be presented by Dr. Denis M. Shaw, Professor Emeritus, Department of Geology, McMaster University, Hamilton, Ontario, Canada. The Lecture is to be given at IMA '98, the 17th International Mineralogical Association Meeting, to be held in Toronto, Canada, August 9-16, 1998.

The Lecture is entitled "Fractionation Processes for Trace Elements" and will be delivered at 12:15 p.m. on August 12, in the Convocation Hall, University of Toronto.

Isotope Geochemists - Web Site

Those of you who are interested in the use of stable isotopes in geochemistry may not be aware of a web site server ISOGEOCHEM (address is http://geology.uvm.edu/isogeochem.html). It is a useful way of getting information on any isotopic problem through its 'chat-line' and also provides information on conferences, positions vacant, short courses, student opportunities, suppliers and stable isotope laboratories. A particularly useful aspect is the 'archive' link which allows you to search for discussion on any previous item. ISOGEOCHEM has over 1100 subscribers in some 40 countries. There are probably other list server sites on the web which are useful for geochemists. If you know of any, please inform the Secretary for the next Newsletter.

News from the Solar System

(Gunter Faure)

The exploration of the Solar System by automated probes is providing new information about the planets and their satellites. In addition, telescopic observations have revealed that several stars in our galactic neighborhood have planetary companions some of which are larger than Jupiter. The exploration of the Solar System is the new frontier in geochemistry. For this reason, I propose to assemble news items worthy of note from the popular literature, including the journals ASTRONOMY (A), THE PLANETARY REPORT (TPR), AND SCIENCE NEWS (SN).

News from Mars: Global Surveyor

The Global Surveyor space craft was launched on November 7, 1996, and went into orbit around Mars on September 11, 1997. However, one of the two solar panels did not deploy properly after launch and therefore did not permit the orbit to be circularized by aerobraking as rapidly as planned. After a detailed analysis of the problem, a new plan was devised and aerobraking resumed on November 8, 1997.

The objective of the Global Surveyor mission is to map the topography and magnetic field of Mars. Even though the start of the scientific program has been delayed, the laser altimeter has already recorded many high-resolution topographic profiles. In addition, the preliminary results indicate the existence of small but intense magnetic anomalies that formed in the crust of Mars at a time in the past when it had a global magnetic field. Plans call for mapping of the surface of Mars to start in the middle of March in 1999 (TPR, 18(1,2) 1998).

Pathfinder: a Postscript

The chemical analyses of rocks on the surface of Mars by the Pathfinder mission are affected by presence of dust that coats the boulders. Some investigators suggest that only one type of volcanic rock is present at the landing site and that the observed variations in composition reflect the presence of dust (TPR, 18(3), 1998).

Small Worlds: NEAR Mission to Eros

A spacecraft called NEAR (Near-Earth Asteroid Rendezvous) is on its way to observe the asteroid 433 Eros from orbit. The objectives of this mission are to determine the physical properties and the chemical composition of this object. The spacecraft is scheduled to arrive at its destination on December 20, 1998, or about 34 months after launch on February 17, 1996. During 1999, the orbit of NEAR around Eros will be lowered from 500 to less than 15 kilometers. On February 6 of the year 2000, NEAR will attempt a soft landing on the surface of Eros.

While the spacecraft was on its way to its rendezvous with Eros, it flew by another asteroid known as 253 Mathilde discovered on November 12, 1885 by Johann Palisa in Vienna. The spacecraft Galileo, which is presently investigating the Galilean satellites of Jupiter, previously had brief encounters with the asteroids 951 Gaspra (October, 1991) and 243 Ida (August, 1993). Both are s-types objects and are believed to be similar in composition to stony meteorites. Mathilde, however, is a carbonaceous asteroid (c-type) with an albedo of only 4% making it one of the blackest objects in the Solar System (TPR, 17(2), 1997).

The flyby of Mathilde by NEAR in June of 1997 yielded photographs showing that the asteroid is heavily cratered. Measurements of its mass and volume indicate a density of only 1.3 g/cm^3, leading to speculation that it is highly porous and may be a pile of carbonaceous rubble (TPR, 18(3), 1998).

Additional encounters with asteroids are planned by the mission of DS-1 (Deep Space 1) due to lift off this summer. The spacecraft will provide information about the asteroid 3352 McAuliffe and about the comet Kohoutek-Ikemura. However, the principal objective is to test a new propulsion system known as SEP (Solar Electric Propulsion) consisting of a high-velocity beam of ionized xenon gas (TPR, 18(3), 1998).

The Galileo Europa Mission (GEM)

The spacecraft Galileo originally arrived in the vicinity of Jupiter on December 7, 1995, after a six-year journey since launch from Earth. After making eleven orbits of Jupiter in two years, the Galileo mission was scheduled to be terminated at the end of December 1997. However, the evidence Galileo had acquired indicated that water may exist under the ice crust on Europa, leading to speculation that Alien Life Forms (ALF) may exist there. The motto of the space biologist is: "Ubi aqua, ibi vita".

In any case, the Galileo mission was extended by NASA and the Congress of the USA for another two years to permit additional observations of the Galilean satellites, especially Europa, Io, and Ganymede.

Initial GEM results show that the ice crust of Europa is fractured in places and that the fragments (icebergs) have been displaced relative to each other. Studies are presently underway to identify impurities in or on the ice that may have

originated by impact of meteorites and comets, or may have been brought to the surface by ice volcanoes (TPR, 18(1), 1998).

The latest word is that President Clinton has included funds for a Europa orbiter in his proposed budget for NASA. The orbiter, to be launched in 2003, will use ground-penetrating radar to determine the thickness of the ice and depth of the presumed underlying ocean. If the results warrant further exploration, the follow-up mission may include remote-controlled hydrobots or submarines (A, (6), 1998).

IAGC Working Group Reports

Water-Rock Interaction (Mike Edmunds)

The ninth Water-Rock Interaction Meeting (WRI-9) was held at Taupo, New Zealand, earlier this year (30 March - 3 April) and by all accounts, was one of the largest and most successful to date. In all, 287 delegates attended, many from Australia and New Zealand. We hope to feature some of the sessions and abstracts in the next IAGC Newsletter.

Two meetings were held in conjunction with WRI-9 1) a WRI Committee Meeting in which the structure and organization of WRI-9 was discussed, and 2) a WRI Business Meeting in which proposals and a venue for the next meeting (to be held in 2001) were discussed. Cagliari, Italy was selected as the next location.

In keeping with the tradition initiated at the last GSA Meeting in Salt Lake City, the IAGC offered prizes ($100 cash plus IAGC membership) to the best student presentation and the best student poster. The winners, respectively, were Tobias Fisher (Arizona State University) and Peter McGoldrick (University of Tasmania).

For those unfortunate enough not to have been able to attend WRI-9, a few photographs taken by Hitoshi Sakai showing the gathering of Secretary-General organizers of previous WRI meetings are included here as consolation!

Geochemical Training in Developing Countries (Uppugunduri Aswathanarayana)

Dr. Uppugunduri Aswathanarayana (Chairman, IAGC Working Group on Geochemical Training in Developing Countries) has submitted two interesting items for publication.

Centre for Technology Transfer, Maputo, Mozambique

Under the leadership of Dr. Bernardo Ferraz, Minister, and Eng. Francisco Mabjaia, Permanent Secretary, Ministry for the Coordination of Environmental Affairs, Mozambique is building a Centre for Technology Transfer in Maputo, for the environmentally-sound, people -participatory management of the natural resources of the country.

Mozambique is rich in natural resources. For a population of about 17 million, it has plenty of arable land of 37 million hectares, adequate rainfall with mean of 800 mm. a long coastline of 2700 km, and extensive reserves of coal of about 9 billion tonnes, and natural gas of about 160 billion cubic metres, and so on. But still, Mozambique has the second lowest income in the world. Sixteen years of civil war, which preceded the Peace Agreement in 1994, has caused immense destruction of human life and property in the country. No wonder that about 60% of the people of Mozambique live below the Absolute Poverty Line, as defined by the World Bank.

At the heart of the Centre for Technology Transfer, is the Central Technical Facility, which is being equipped with ICP - AES, GC-MS, GC-ECD, and supporting services. It will have the capability to analyze waters, soils, minerals, sediments, biota, food, etc. and monitoring of the industrial and climate-relevant emissions. It will be networked with the field stations (equipped with portable Hach kits) and the Mercure satellite station. It will build databases to facilitate decision-making by the Government.

Three themes have been identified as the priority areas:

1) Drinking water, sanitation and hygiene education: to develop low-cost, people-participatory methods for control of epidemics or diseases arising from the deficiency or excess of some trace elements,

2) Industry and health: ecologically-sustainable industrial development through no/low-waste, energy-efficient process technologies; monitoring of environmental pollution and the endemicity of diseases arising from industrial and agricultural pollution; and,

3) Nutrition and health: certification of food, including seafood meant for export, nutritional approaches for the improvement of general health and spastic paraparesis arising from the consumption of cassava.

Secretary-Generals of WRI



Hitoshi Sakai (L), Secretary-General of WRI-4 in Misasa, Japan, shown with Mrs. Sakai and Brian Robinson, Secretary-General of WRI-9.



Halldor Armannsson (L) of the National Energy Authority, Island organised WRI-5 in Reykjavik in 1986.



WRI-9 is supported by the Water-Rock Interaction Working Group. The Chairman of the Working Group is Dr. Mike Edmunds, shown here with his wife Kathleen. Mike organised WRI-6 in Malvern, England in 1989.



Yousif Kharaka, USGS (3rd from right) was Secretary-General of WRI-7 held in Park City, Utah, in 1992. Pamela Kharaka with Brian, our Secretary-General of WRI-9 cheers for what ? She is as helpful as Yousif in every WRI meeting and makes people happy. Brian, in this photo, looks relaxed but still has 3 more days to go to close the symposium.



Tom Paces of the Czech Geological Survey (L) organised the WRI-1 in Praha in 1974. He is the father of the WRI symposium and also designed the logo of the symposium. Together with him is Lucas Fanfani, University of Cagliari, who is Secretary-General of WRI-10 in Sardegna, Italy in 2001.

WRI-2 and WRI-3 were held, respectively, in Strasbourg in 1977 by Yve Tardy and in Edmonton in 1980 by Brian Hitchon. Their photos are not available at this time as both were not able to attend



WRI-8 (1995) in Vladivostok was organised by Oleg Chudaev of the Russian Academy of Geological Sciences.

Geoenviroment: An Introduction

This book is written by Dr. Aswathanarayana and was published by A.A. Balkema, The Netherlands, in 1995 (cost $90; ISBN 90-54106085). It is reviewed in the February 1998 copy of EOS and the reviewer (Fred Kofi Boadu) concludes that "the book is a good resource for environmental scientists and policy makers".

Environmental Geochemistry - A Recent Emphasis

In the last issue of "Episodes", the journal produced by the International Union of Geological Sciences (IUGS), there was a paper describing the important role of geochemistry in environmental and epidemiological studies in developing countries (Plant et al. 1998). The abstract of the paper is reproduced here (with permission):

The effects of chemicals in the environment on the health of man and animals are a matter of increasing public concern. Many developing countries are particularly liable to trace-element toxicities and deficiencies because of local geological, climatic and socio-economic conditions, and these problems are now compounded by the consequences of land degradation, pollution, urbanisation and industrialism resulting from rapid economic and population growth.

Recent work by the British Geological Survey illustrates the value of geochemistry in identifying environmental and health problems resulting from trace-element imbalances or contamination and in formulating strategies to reduce their impact.

An integrated and effective approach to these problems requires (1) the availability worldwide of regional geochemical data to the standards recommended by the IUGS Working Group on Global Geochemical Baselines; and,.(2) a thorough understanding of the behaviour of the chemical elements in the environment and their pathways from rocks and soils to crops, animals and man.

The paper relates the need for environmental geochemical studies to the effects of socio-economic pressures (such as industrialization, urbanization, fossil-fuel burning, deforestation and use of chemicals) that cause degradation and pollution of the environment, particularly in developing countries. In order to determine effects on the environment, geochemical mapping to obtain baseline data has been used as an integral part of systematic geoscience surveys in a number of countries. In this respect, the IUGS and IAGC have played a key role through the Working Group on Global Geochemical Mapping led by Arthur Darnley, Jane Plant and Dave Smith. The authors recommend that the preparation of high-quality baseline geochemical data, such as those presented by Darnley et al. (1995) should be continued under the standards set out by the International Geochemical Mapping Project coordinated by IUGS/IAGC Working Groups.

Copies of the paper by Plant et al. (1998) can be obtained either from the first author (at the British Geological Survey, Keyworth, Nottingham, UK NG12 5GG) or from the IAGC Secretary.

References:

Darnley, A.G., Bjorklund, A., Bølviken, B., Gustavsson, N., Koval, P., Plant, J., Steenfelt, A., Tauchid, M. and Xuejing Xie. 1995. A Global Geochemical Database, Recommendations for International Geochemical Mapping. Final Report of ICGP Project 259, Paris, UNESCO.

Plant, J., Baldock, J., Haslam H. and Smith. B. 1998. The Role of Geochemistry in Environmental and Epidemiological Studies in Developing Countries. Episodes, v. 21, No. 1, p. 19-27.

Russian Academy of Sciences (Erik Galimov)

The Director of the Russian Academy of Sciences (Erik Galimov) is also the IAGC Vice-President. In March this year he addressed the Annual General Meeting of the Academy in a speech describing some of the achievements of the institution and some of its deficiencies. Among the latter were unacceptably low funding, destructive trends in the infrastructure, recession of young scientists and the impossibility of maintaining high quality science even in the fields where Russia previously enjoyed a leading position. However, his speech included a plea for new research projects, both pure and applied, on the Moon. A portion of the speech is included below:

I would like to speak about concrete values which one needs to save. This is about our space research program. Once it was the pride of our science. Achievements in the research of the Moon, Venus are well known. There has been accumulated a unique experience, which neither Japan, France, nor Germany possess, countries which outclass us in many other aspects. However, now we are in front of the entire destruction of our program of planetary research.

After a lull during the eighties, many developed countries started again to be active in planetary research. The USA are conducting their Mars program and projects of exploration of the Moon. The European Space Agency, uniting France,

Germany, Italy, and some other countries, suggests the "Euromoon" project for 2001. Projects for Moon study in 1998-2001 were announced by Japan.

The Moon projects are to be accentuated, because some fundamental questions of the natural philosophy are related to the Moon study: origin of Earth, its early history, creation of the atmosphere, ocean, continents and life. We don't know the answers. And we will not get them, if we confine ourselves with study of the Earth. All traces of the processes occurring on the Earth during first 600-700 million years of its history are obliterated. In contrast, the Moon preserved traces of the most ancient events. With knowledge of the internal chemical structure of the Moon - that is the objective of the project which we have proposed - one would be able to understand the mechanism of the Moon formation, and hence of the Earth, since these two bodies are genetically coupled.

Alternatively, take energy resources problems. By the middle of the next century resources of oil, gas, and even uranium will be essentially exhausted and cannot support a further increase of the energy consumption. There exist two visible possibilities: thermonuclear power with use of the only ecologically acceptable fusion of ^{3}He and concentration of solar energy. Realization of both of these possibilities is tightly related to utilization of the Moon. I leave apart the obvious possibility to use the Moon as a testbed, use its farside, protected from the Earth noise, as a platform for the deep space research and so on. These are just what we see now. It is impossible to forecast all the discoveries which will come during further exploration and utilization of the Moon.

It might be said without any exaggeration that after the geographic discoveries in the 17th to 19th centuries and after exploration of the world ocean and its bottom in the 20^{th} century, the Moon is the next object of the human expansion, and hence the next attractive target for intellectual efforts and adventurous enterprises. The countries which invent technologies related to the utilization of the Moon will be leaders in the next century.

But, maybe what I am talking about is an unrealistic dream, something which is impossible to afford under conditions of our economy? Not at all. On the contrary, the planetary projects are the most economic. They may be actualized with use of relatively inexpensive carriers. They are based, as I mentioned, on the unique experience which our space industry has in the Moon and planetary research by automatic spacecrafts that also reduces the required expenses. Even the rather complex experiment, which would provide information on the internal structure of the Moon (this would be a great contribution to science) and simultaneously determine the composition of volatiles at the polar region, costs only about 250-280 million rubles. This includes design of the new generation spacecraft, adapted to the rockets of the "Molnia" and "Souz" class. Further use of this spacecraft could facilitate a sample return mission from Phobos, the Mars satellite. This would cost an additional 220-250 million rubles and give results complementary and comparable in value to the American program of the sample return from Mars whose costs are immeasurably higher.

The annual expenses of the planetary program would amount to 70-100 million rubles which is just 15-20% of the funds allotted by the Russian Space Agency for basic research and this in turn is only 15-16% of the RSA budget. Therefore, I want to say that the expense of the lunar-planetary program is a quite affordable even in the scale of the present moderate finance.

I appeal to you, distinguished members of the Academy: "Let us save this value - our lunar-planetary program". It is promising and prospective, it meets our national interests, and it is affordable!

Upcoming Papers in Applied Geochemistry

Ron Fuge, The Executive Editor of IAGC's journal, *Applied Geochemistry*, is finding 1998 to be a busy and exciting year. He is on schedule with issues of AG; the June issue (No. 4) was delivered just recently. With *Applied Geochemistry* expanding to 8 issues per year in 1998, many more papers are passing through Ron's hands than ever before. A selection of some of the upcoming papers in *Applied Geochemistry* that readers might be interested in are:

- ^{137}Cs and ^{90}Sr mobility in soils and transfer in soil-plant systems in the Novozyybkov district affected by the Chernobyl accident, by Korobova Elena, Ermakov Alexander and Linnik Vitaly;

- Cl-37 in the Dead Sea system - preliminary results, by Mariana Stiller, Arie Nissenbaum, Ronald S. Kaufmann and Austin Long;

- Hydrothermal hydrocarbon gases: 1, Genesis and geothermometry, by W.G. Darling;

- Distribution of rare earth elements in crystalline bedrock groundwaters: Oslo and Bergen Regions, Norway, by D. Banks, G. Hall, C. Reimann and U. Siewers;

- The shallow ground water chemistry of arsenic, fluorine, and major elements: Eastern Owens Lake, California, by D.B. Levy, J.A. Schramke, K.J. Esposito, T.A. Erickson and J.C. Moore;

- Experimental study of acidity-consuming processes in mining waste rock: some influences of mineralogy and particle size, by Bo Strömberg and Steven A. Banwart;

- Kinetic studies of the homogeneous abiotic reactions of several chlorinated aliphatic compounds in aqueous solution, by Marie Pagan, William J. Cooper and Jeffrey A. Joens;

- Field tracer test for dentification in a pyrite-bearing schist acquifer, by Hélène Pauwels, Wolfram Kloppmann, Jean-Claude Foucher, Anne Martelat and Valérie Fritsche;

- Application of *in-situ* and on-line measurements to environmental studies in Lake Müritz, northern Germany, by D. Stüben, S. Braun, P. Jeroschewski and P. Haushahn;

- Geochemistry of ash leachates during the 1994-1996 activity of Popocatépetl volcano, by Ma Aurora Armienta, A.L. Martin-Del-Pozzo, R. Espinasa, O. Cruz, N. Ceniceros, A. Aguayo and M.A. Butron;

- Kaolinite as an *in situ* dosimeter for past radionuclide migration at the earth's surface, by Thierry Allard and Jean-Pierre Muller;

- Processes affecting groundwater chemistry in a zone of saline intrusion into an urban sandstone aquifer, by Andrew P. Barker, Robert J. Newton, Simon H. Bottrell and J.H. Tellam;

- Geochemical, mineralogical and microbiological characterization of a sulphide-bearing carbonate-rich gold-mine tailings impoundment, Joutel, Québec, by David W. Blowes, Lyne Lortie, W. Douglas Gould, John L. Jambor and Christine J. Hanton-Fong;

- Corrosion of brass in a marine environment: mineral products and their relationship to variable oxidation and reduction conditions, by Patricia Stoffyn-Egli, Dale E. Buckley and Jason A.C. Clyburne;

- Soil CO_2 flux measurements in volcanic and geothermal areas, by G. Chiodini, R. Cioni, M. Guidi, B. Raco and L. Marini;

- Experimental investigation of cement, Topopah Spring tuff, and water interactions at 200°C, by Susan A. Carroll, Maureen Alai and Carol J. Bruton;

- Flow of river water into a Karstic limestone aquifer, 1. Tracing the young fraction in groundwater mixtures in the Upper Floridan Aquifer near Valdosta, Georgia, by L.N. Plummer, J.B. McConnell, E. Busenberg, S. Drenkard, P. Schlosser and R.L. Michel;

- Isotopic identification of the source of methane in subsurface sediments of an area surrounded by waste disposal facilities, by Keith C. Hachley, C.L. Liu and David Trainor;

- Chemistry of rainwater in the Massif Central (France): a strontium isotope and major element study, by Philippe Négrel and Stéphane Roy; and,

- Exfoliation and diffusion following helium ion implantation in fluorapatite: implications for radiochronology and radioactive waste disposal, by S. Ouchani, J.-C. Dran and J. Chaumont.

A point worth noting: If you find *Applied Geochemistry* good value, try to persuade your institution to subscribe to it. The annual institutional subscription ($499 US) is low by comparison to many other journals. Also, the IAGC benefits from this type of subscription as it provides an annual royalty which we use for supporting meetings, awards, newsletters, etc. See the 'New Offer for IAGC Members' on the front page.

Upcoming IAGC-Sponsored Meetings

◊ ***IAGC Symposium: Sources, Transport, Fate and Toxicology of Trace Elements in the Environment***
At the GSA Meeting, Toronto
1998, October 27, (provisionally)
Toronto, Canada
Contact: G. Faure
Dept. of Geological Sciences
Ohio State University
Columbus, Ohio 43210-1398 U.S.A.
FAX: 1-614-292-7688
e-mail: heath.18@osu.edu

◊ ***The Exploration of the Moon***
1998, October
Contact: E.M. Galimov
Director, Vernadsky Institute of Geochemistry and Analytical Chemistry
Russian Academy of Sciences
Moscow, Russia
FAX: 7-095-938-20-54
e-mail: galimov@geokhi.msk.su

◊ ***SEG-5, 5th Int. Symp. on Environmental Geochemistry***
2000, April
Contact: M. Fey
Department of Geological Sciences
University of Cape Town
Rondebosch 7701, South Africa
FAX: 27-21-650-3783

◊ ***ICOG-9, Ninth International Conference on Geochronology, Cosmochronology and Isotope Geology***
1998, August 20-26
Beijing, China
Contact: Dr. Tiping Ding
Secretary-General, ICOG-9
e-mail: tding@cags.cn.net

◊ ***GES-5, Fifth International Symposium on Geochemistry of the Earth's Surface***
1999, August 15-20
Reykjavik, Iceland
Contact: Dr. S.R. Gislason
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Other Meetings of Interest

◊ ***Int. Symp. History of Mineralogy, Mineralogical Museums, Gemology, Crystal Chemistry and Classification of Minerals***
1998, June 23-27
St. Petersburg, Russia
Contact: G.G. Anastasenko
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e-mail: mm_98@mineral.geol.pu.ru

◊ ***IEP'98, Issues in Environmental Pollution***
1998, August 23-26
Denver, Colorado, U.S.A.
Contact: L. Quirke
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◊ ***8th Ann. V.M. Goldschmidt Conference***
1998, August 30-September 3
Toulouse, France
Contact: Conference Organizer
8th Ann. Goldschmidt Conf.
Laboratoire de Géochimie
38, rue des 36 Ponts
31400 Toulouse
France
FAX: 33-561-52-05-44
e-mail: goldconf@lucid.ups-tlse.fr

◊ ***8th Congr. of Int. Assoc. of Engineering Geology and the Environment***
1998, September 21-25
Vancouver, Canada
Contact: 8th Congress IAEG
c/o Venue West Conferences Services Ltd.
#645-375 Water Street
Vancouver, British Columbia
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FAX: 1-604-681-2503
e-mail: congress@venuewest.com

◊ ***The Origin of the Earth and Moon***
1998, December 1-3
Monterey, California
Contact: Lunar and Planetary Institute
3600 Bay Area Boulevard
Houston, Texas
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Environmental Geochemistry and Health

To be announced