International Association of Geochemistry and Cosmochemistry

Newsletter

number 30: December 1997

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SPECIAL OFFER FOR IAGC MEMBERS

The IAGC is beginning a membership drive for 1998 and you can both help and benefit.

SIGN UP <u>ONE</u> COLLEAGUE OR FRIEND FOR NEW MEMBERSHIP OF IAGC IN 1998* AND YOU WILL GET A FULL REFUND (\$US CHEQUE) OF YOUR 1998 MEMBERSHIP DUES. PLEASE USE THE SPECIALLY MARKED APPLICATION FORM ENCLOSED IN THIS NEWSLETTER.

* the new member must not have been an IAGC member in 1997 and must pay their dues for 1998, in full, by July 31. 1998 for you to receive a refund. Limited to one refund per member.



IAGC Business Activities

Council Meeting (October 19, 1997)

The 1997 Council Meeting was held in the Marriott Hotel, Salt Lake City, Utah, USA on Sunday 19 October in conjunction with the 1997 Annual Meeting of the Geological Society of America. Seven Council Members (Faure. Fuge, Gascoyne, Harmon, Hoefs, Long and Sobolev) were in attendance (quorum requirement is five) and so all motions could be voted on. Highlights of the meeting include:

- a description by the President, Gunter Faure, on efforts of the Executive to support the IAGC Working Groups.
- a description by the Treasurer, David Long, of how the financial strength of the IAGC has been improved over the last year,
- the Executive Editor of IAGC's journal, Applied Geochemistry, was voted in as a member of Council,
- discussions on the problems experienced during the year with Elsevier Science regarding the IAGC's journal, Applied Geochemistry,
- a summary of how the difficulties of producing a Vernadsky Medal have been resolved by the creation of certificates of Honourary Membership and Appreciation.

Message from the President (G. Faure)

The International Association of Geochemistry and Cosmochemistry (IAGC) is making its presence felt in the world by the activities of its Working Groups and by the continuing growth of our journal APPLIED GEOCHEMISTRY (AG). Thanks to the excellent leadership of Ron Fuge, the Executive Editor of our journal, the page budget for 1998 has been raised to 1000 pages, permitting the publication of eight issues for the first time in its history. In addition, the scope of the journal has been modified to emphasize environmental geochemistry in the broadest sense of that term, including both natural and anthropogenic phenomena. However, all applications of chemical and isotopic techniques to mineralogical, aqueous, and atmospheric phenomena, continue to be included in the scope of our journal.

The success of AG has strengthened the financial stature of IAGC because Elsevier Science Ltd. is now paying us an annual royalty based on the sale of AG to institutional libraries around the world. As a result, we will continue to be able to support the activities of our Working Groups. The international meetings they organize provide opportunities for the advancement of geochemistry and cosmochemistry. For this reason, I call upon the chairpersons of our Working Groups to keep in touch with the Officers of the Association to permit them to allocate our financial resources in a timely manner.

In order to stimulate research in the subject area of environmental geochemistry, the IAGC sponsored two technical sessions at the recently held annual meeting of the Geological Society of America in Salt Lake City. These sessions (organized by Don Runnells and by David Long and myself) attracted excellent presentations in front of large audiences. The latter session honoured Dr. Ernest Angino for his pioneering research in environmental geochemistry and his service to IAGC as its long-time Treasurer. This session also featured an award for the best student paper in order to recognize excellence in the content and manner of presentation. We plan to sponsor another technical session at the GSA Meeting in Toronto in 1998, including a best student-paper award. The theme of our session will be: Trace Elements in the Environment: Sources, Transport, Fate, and Toxicology. Please join us for this occasion.

The future strength of the IAGC depends not only on the quality of our journal and on the activities of our Working Groups, but also on the participation of a large and international membership. For this reason, I now call on every member of the IAGC to recruit at least one new member for 1998. Please use the application form that is included in your copy of the Newsletter for this purpose. Membership in the IAGC costs only \$10.00 (US) per year and permits us to offer you a subscription to AG for only \$44.00 (US). Student members pay only \$33.00 (US). Although members are not required to subscribe to our journal, I hope that many of the new members will elect to do so.

Let's go out and organize the geochemists of the world! The first step is to double the membership of the IAGC in 1998.



Treasurer's Report (D. Long)

The financial statement for the IAGC for 1996 is as follows:

◊ Statement of Income and Expenses January 1, 1996 to December 31, 1996

Beginning Balance, January 1, 1996	\$58,511.82
Income: \$ 6,255.00 National Dues 3,155.60 Other \$25.00 Interest \$71.77	<u>10.806.77</u> \$69,318.59
Expenses:	
Newsletter \$ 1,310.90	
Council Travel 1,000.00	
General Office Expenses 398.00	
Membership Fee - IUPAC 50.00	
4th Environmental Geochemistry	
Conference 2,000.00	
GES IV: Ilkley 2,000.00	
WRI - 9 3,000.00	
Bank Fees12.00	9.770.90
Cash Balance, December 30, 1996	\$59,547.90
Total Excess Income Over Expenditures 1996	\$ 1,035.87
Chequing Account #047031 Douglas Co. \$27,182.25 Chequing Account #566064 Citizens Bank 32,365.44	<u>\$59,547.69</u>

The previous five years of income and expenses of IAGC operations have been summarized for comparison to 1996. These are shown below:

	1991	1992	1993	1994	1995	1996
INCOME						
National Members	5.167	2.584	4.283	2.360	3,180	3,155
Individual Members	5,214	5.760	7,187	4,280	7.5-10	6.255
Interest		2070	1684	1614	673	572
IUGS						
UNESCO		2.000				
Other	4.688		1,586			825
	15,069	12,414	14,740	8,255	11.393	10.807
EXPENSES						
S symposia, newsletter, etc.	7,385	9.004	7.995	13.425	5.415	9,361
General office	567	523	856	602	490	398
Journal		6.000	67			
Bank		75	101	118		12
	7,952	15,602	9,009	14,145	5,905	9,771
Excess Income over	7.117	- 3.188	5.731	-5,890	5,488	1.036
Expenses			1			
Cash balance	56,369	53,182	58,914	53.024	58.512	59.548

After the discussions and recommendations made at the 1996 General Assembly in Beijing to improve the financial strength of the Association, the following has been accomplished this year:

• IAGC funds in the checking account in Kansas and Michigan were consolidated into one account in East Lansing, Michigan.

- All funds in the checking account were transferred to an interest bearing account. The checking accounts will earn at approximately 1%.
- \$10,000 of IAGC funds were invested in a 60-month Certificate of Deposit (CD) with an interest rate of 5.79% and APY of 5.95%. Annual interest yield from this CD will be approximately \$600 and will be used to support the Ingerson Lectures.
- \$20,000 of IAGC funds were invested in a 16-month CD with an interest rate of 5.85% and APY of 6.01%. This CD will yield \$1,618 at maturity.
- \$10,000 of IAGC funds were invested in a 25-month CD with an interest rate of 5.65% and APY of 5.8%. This CD will yield \$1, 246 at maturity.

Conferences Supported

Several international meetings have been planned through the IAGC Working Groups and have received financial support for their activities, where requested. These include:

- the 5th International Symposium on Hydrothermal Reactions, July 20-24, 1997, at Gatlinburg, USA.
- the 2nd International Symposium on Applied Isotope Geochemistry, Sept. 30-Oct. 4, 1997, at Lake Louise, Alberta, Canada.
- the 4th International Symposium on Environmental Geochemistry, Oct. 5-10, 1997, Vail, Colorado, USA.
- the first IAGC Symposium: Trace Metals in the Environment: Sources, Transport and Fate - A Tribute to Ernest E. Angino. at the Geological Society of America Annual Meeting, Oct. 20-23, 1997, Salt Lake City, Utah, USA.

Although it appears that all these meetings are convened in North America. most of them actually alternate between European or other countries and North America on an annual basis. Upcoming IAGC-sponsored meetings are more internationally distributed and include the 9th International Symposium on Water-Rock Interaction, March 30-April 3, 1998, in Taupo, New Zealand, the 7th International Kimberlite Conference, April 13-17, 1998, in Cape Town, South Africa. and the 17th International Mineralogical Association Meeting. August 9-16, 1998, in Toronto, Canada (for a fuller description and names and addresses of the organizers, see pages 8 and 9).

Ingerson Lecturer

The Ingerson Distinguished Lecturer Award consists of an award made to a distinguished geochemist approximately every two years in the form of a Certificate of Appreciation and an honorarium plus expenses, for presenting the Lecture at an appropriate international meeting. The funding for this award was made possible by a bequest from Earl Ingerson and is now controlled through a separate account (see Treasurer's Report).

The next Ingerson Lecture will be given by Denis Shaw at the IMA Meeting in Toronto, Canada, August 9-16, 1998.

The Geochemical Society (USA) also convenes Ingerson Lectures in response to a similar bequest but these are largely confined to the USA. The IAGC is presently exploring the possibility of renaming the series as the International Ingerson Lectures to distinguish between the two events.

<u>Membership</u>

Membership in the IAGC has fallen dramatically in 1997 to only 501 and, in part, is likely due to an administrative error by Elsevier Science who failed to include a request for IAGC dues in their invoicing for subscriptions to Applied Geochemistry, early in the year. To try and recoup these losses, this Newsletter will be circulated to all 1996 members (as well as new 1997 members) with a request for them to rejoin the Association. In addition, we are offering a refund on member's 1998 dues if they can sign up a new member who pays his/her dues in full by July 31, 1998 (see details on front cover).

The Executive has considered handling the dues collection itself but the resulting confusion to members (caused by two separate invoices instead of one) and the high financial cost of administering the process make it an unattractive option at present. However, if further problems arise in dues collection or if members are not satisfied with Elsevier's performance, the option will be reconsidered.

One other method of increasing membership has been tested this year and is showing some success. It is the inclusion of a combined information sheet and membership application form in the registration packages received by delegates at IAGC-sponsored meetings. For instance, the recent Symposium on Environmental Geochemistry at Vail, Colorado (October 1997) has so far yielded nine new-member applications.

National Membership

Applications for National Membership have been received from Vietnam and Slovakia and were approved at the Council Meeting in Salt Lake City.

Vietnam is represented by the Research Institute of Geology and Mineral Resources in Hanoi (Dr. Ho Vuong Binh, delegate). Dr. Binh has indicated that 82 geochemists in Vietnam are represented and these are drawn principally from RIGMR, the Hanoi Natural Science University, Hanoi Mining and Geological University, the Petroleum and Gas Institute, Hochiminh University and the Marine Institute. Dr. Binh looks forward to strengthening the application of geochemical science for exploration of mineral resources and environmental protection in Vietnam by establishing cooperative agreements with scientists of other nations. He may be contacted at RIGMR, Thanhxuan, Hanoi, Vietnam, FAX: 844 8542125.

Slovakia is represented by the Geochemical and Mineralogical Section (GMS) of the Slovak Geological Society (SGS, current President is Dr. Peter Reichwalder). Dr. Martin Chovan of Comenius University is President of the GMS and all geochemical-related correspondence and events are dealt with by Dr. Thomas Lanczos. His address is Dept. of Geochemistry, Comenius University, Mlynska dolina G-224, 842 15 Bratislava, Slovak Republic (FAX: 421-7-728-867, e-mail: lanczos@fns.uniba.sk. The GMS has approximately 60 members specializing in most areas of geochemistry and are drawn from the Faculty of Natural Sciences, Comenius University, the Slovak Academy of Sciences and the Geological Survey of the Slovak Republic. The Dept. of Geochemistry at the Comenius University has an active graduate program with seven postgraduates currently enrolled.

Beginning with this Newsletter, each National Member country will receive five copies of the Newsletter instead of one. This will allow National Member delegates to distribute information on IAGC events more efficiently than before to their member organizations.

Activities of Working Groups

The Activities of IAGC's Working Groups have come under scrutiny this year. One group, on Natural Waters, Protection from Pollution (A.M. Nikanarov, Chairman) was formally disbanded in 1996 owing to inactivity for several eceding years. The current status of other Working oups is summarized below.

embers wanting further information on the activities a specific Working Group or who wish to articipate are encouraged to contact the Chairman at le address given on page 11, or the IAGC Secretary, Iel Gascoyne.

. <u>Extraterrestrial Geochemistry</u> (H. Palme, Germany)

No report has been received. However, this Working Group is undergoing a resurgence of activity by attempting to forge a collaboration with the Meteoritical Society through convening one or more sessions at the Society's annual meeting.

2. <u>Applied Isotope Geochemistry</u> (A. Raheim, Norway)

No report has been received. A second meeting sponsored by this Working Group (AIG-2, held in Lake Louise, Alberta, Canada in September/October 1997) was successful. The third AIG symposium is to be held in Orleans, France in 1999, and will be organized by Dr. Jean-Pierre Girard.

3. <u>Geochemical Training in Developing Countries</u> (U. Aswathanarayana, Mozambique)

No report has been received. However, the Chairman has indicated he would like to hold a workshop on methods of improving and orienting geochemical training in developing countries. Council, while supporting the need to improve geochemical training and promoting research techniques, does not wish to attempt to influence the curricula used in geochemical training as this is a responsibility of a country's educational policy. A requirement for improving the level of geochemical training in all countries (not just developing countries) was voiced by Council at the 1997 Council Meeting and Councillors R.S. Harmon and D.T. Long have been actioned to prepare and submit a proposal to Council on methods of improving IAGC's role and effectiveness in geochemical education and how to better promote research techniques. IAGC members are asked to provide suggestions to either David Long or Russell Harmon (addresses on page 10) on these topics.

4. <u>Health and Disease</u> (I. Thornton, U.K.)

No report has been received. This Working Group is inactive and will likely be disbanded or reformed into a Working Group on Environmental Geochemistry. IAGC Council is seeking expressions of interest in organizing this Working Group from the membership at large.

5. <u>Thermodynamics of Natural Processes</u> (G. Kolonin, Russia)

This Working Group is very active and recently supported the Fifth International Symposium on Hydrothermal Reactions at Gatlinburg, Tennessee, USA, July 1997. The Chairman reports that over 120 scientists and engineers attended from 13 countries and half of the attendees came from outside North America. Discussions on specific aspects of Thermodynamics of Natural Processes took place between members from Russia, China, Switzerland, USA and the Ukraine. Four decisions and recommendations were made:

- the next meeting of the Working Group would be in Dubna, Russia in 1998;
- the next Symposium, TNP-3, was proposed for Germany, the date and location to be decided;
- A. Kalinichev and V. Tauson were proposed as additional officers of the Working Group; and,
- Working Group members are contributing to the fourth volume of Advanced Mineralogy. Processes of Mineral Formation: Frontiers in Experimental Research and Evolution in Geological History.

6. <u>Geochemistry of the Earth's Surface</u> (R. Berner, USA)

No report has been received. This Working Group appears to be relatively inactive and somewhat dissociated from the IAGC. Action is being taken to resolve this situation.

7. <u>Global Geochemical Mapping</u> (A. Darnley, Canada)

This Working Group continues to be active and centres on a joint project with the IUGS on global geochemical baselines. The Chairman reports that three business meetings have been held in 1997, and individual committee members have spoken about the project in symposia and/or workshops elsewhere, e.g. Canada, Brazil, Israel, Russia, USA. These meetings were:

- ten European countries plus Canada were represented at a meeting in Aveiro, Portugal (January 21-24), mainly concerned with planning arrangements for the next item below, but also to discuss future analytical requirements and sources of funding;
- a field course was held in Limbach, Slovakia (June 16-19). This was attended by representatives of 18 European countries to test expanded field sampling instructions and ascertain if any amendments were required. The finalized instructions will be published by the Geological Survey of Finland as the FOREGS Field Manual early in 1998. (FOREGS = Forum of European Geological Surveys; it includes ED and some former East Bloc countries.); and,
- meeting in Vail, Colorado (October 5 and 8), in conjunction with the 6th Symposium on Environmental Geochemistry and Health.

Reports describing current work relating to baseline geochemical mapping were presented by participants representing Europe, Russia, China, India, Indonesia, Korea, Australia, Colombia, Brazil, USA, Canada and Southern Africa. Twenty five people from 16 countries attended. The Field Manual prepared by the Forum of European Geological Surveys task force was adopted as the current standard for geochemical sampling of temperate regions. This field manual will be expanded in the future to include methods for sampling in nontemperate climates and arrangements for the co-ordination of this process were agreed. The Analytical Manual was discussed, with the aim of completion prior to the geochemical sampling commencing in Europe and parts of Russia in 1998. Within Europe it is planned to sample about 900 sites in about 180 cells of the Global Reference Network (see 1995 UNESCO report for more information).

Some project management changes took place. After 10 years as project leader and subsequently a co-leader Arthur Darnley of the Geological Survey of Canada has been succeeded by Dr. David Smith of the US Geological Survey. Arrangements are being made to hold a meeting in Italy in Spring 1998. This will include a field demonstration of sampling methods prior to the main phase of sampling in FOREGS countries. All countries are welcome to send representatives. Information has been received that the UN Committee on Natural Resources, which in May 1996 passed a resolution proposing the establishment of a global land monitoring programme based on the project's principal publication (UNESCO 1995), is meeting again in early 1998 to receive responses from FAO, WHO and UNEP concerning implementation of the project. The project's original supporters, IAEA and UNESCO have also been invited to participate in discussion of the proposal in the context of sustainable development. The proposal has been put forward in order to fill a large gap in the existing Global Environmental Monitoring Programme. Without comprehensive and standardized data to describe the current situation, the recognition of change and assessment of possible consequences is guesswork.

8. <u>Water-Rock Interaction</u> (W.M. Edmunds, UK)

This Working Group continues to be active. The Chairman reports that the Ninth International Symposium on Water-Rock Interaction (WRI-9) is to be held from March 30 to April 3, 1998 at Taupo, New Zealand. The Secretary General for this meeting is Brian Robinson supported by an able committee of geochemists. Taupo is an excellent venue being on the shores of Lake Taupo, a 60 km² caldera lake with views to the sacred Maori volcanic peaks of the Tongariro Massif.

It is anticipated that the symposium will welcome some 300 delegates plus 50 accompanying members. The planned sessions will include:

Surficial systems. Processes involving organic matter. Groundwater, Basins: Diagenesis, fluid evolution and hydrocarbons, Metamorphism, Weathering, Magma-water interaction, Ore deposits, Geothermal: Fluids, gases. rocks and exploitation, Ocean floor processes, Fluids and tectonics, Experimental, Modelling. Minerals. surfaces, Waste storage and disposal.

The symposium contains something for everyone and follows in the successful formula for WRI meetings where specialists in one field can have their horizons enlarged by feeding on WRI themes from many other disciplines. A number of New Zealand specialists are on hand to start many of the sessions and to bring some insight into the fascinating systems in New Zealand which are not wellknown to the majority of participants.

Strong emphasis is being placed on poster sessions. Not least, the peer reviewed, short abstracts for WRI-9 have already been passed on to the Editor, Greg Arehart. The final 850 page volume will provide a veritable state of the art on Water Rock Interaction.

IAGC MEMBERS

Is your country registered as a <u>National</u> <u>Member</u> of the IAGC? Currently only the following are fully paid-up, voting National Members: Australia, Canada, China, Czech Republic, Finland, Germany, Hungary, Italy, Japan, Norway, Russia, Switzerland, United Kingdom. However, our ordinary members are derived from as many as 45 different countries!

A National Member is an organization such as a committee, society or academy of a country that is designated by the IAGC as the official representative of geochemists in that country. Annual dues to be paid by that organization depend on the number of geochemists represented but start at \$60 per year.

Fully paid-up National Members have the final authority and decision-making power of the IAGC and vote on all business activities at the General Assembly held every four years.

If you would like your country to have international representation in geochemistry by becoming a National Member of the IAGC, contact the Secretary, Mel Gascoyne (e-mail: gascoynem@aecl.ca or see address on P. 10) for further details.

Applied Geochemistry

Subscriptions

The subscription rate for Applied Geochemistry in 1998 will be \$44. Students are eligible for a 25% discount. This rate is only available to paid-up members of the IAGC. The rate was reduced from Elsevier Science's initial request (of \$46) by negotiations with the President, Gunter Faure. A new contract must be negotiated with Elsevier in 1998, for ensuing years. Note that the subscription rate for non-IAGC members is \$430 !

Options for renewal are therefore:

- 1. Membership (10.00) plus AG (44.00) = 54.00,
- Membership plus student subscription (\$33.00) = \$43.00; and,
- 3. Membership without the journal = 10.00.

Any questions about renewals of subscriptions to Applied Geochemistry should be directed to Elsevier through Joan Caccente in New York (ph +1-212-633-3753).

Editor's Report

During the 12 months October 1st, 1996 to September 30th, 1997, a total of 133 manuscripts were received. This was about the same number as in the previous 12 months. In view of the continuing high flow of manuscripts the journal is set to increase in size for volume 13 (1998) with 8 issues being published with an annual page budget of 1000 pages.

In the Denver meeting of the Editorial Board of Applied Geochemistry it was agreed that in view of the increasing importance of the topic of environmental geochemistry within the general subject of applied geochemistry, there was a need for the journal to encourage submission of papers on this topic. To this end it was decided to revise the aims and scope of the journal. A copy of this revision is included below.

Applied Geochemistry is an international journal devoted to publication of original research papers, rapid research communications and selected review papers in geochemistry and cosmochemistry which have some practical application to an aspect of human endeavour, such as the preservation of the environment, environmental monitoring, agriculture, health, waste disposal and the search for resources. Papers on applications of inorganic, organic and isotope geochemistry are therefore welcome provided they meet the main criterion. Topics covered include: (1) environmental geochemistry (including natural and anthropogenic aspects, and protection and remediation strategies); (2) hydrogeochemistry, surface and groundwater; (3) medical geochemistry: (4) agricultural geochemistry; (5) the search for energy resources (oil, gas, coal, uranium and geothermal energy); (6) the search for mineral deposits (metalliferous and non metalliferous); (7) upgrading of energy and mineral resources where there is a direct geochemical application; (8) waste disposal including the specific topic of nuclear waste disposal.

Despite this change in the aims and scope of the journal it must be stressed that *Applied Geochemistry* will continue to be true to its title and will continue to publish papers on ALL aspects of applied geochemistry.

With regard to production of *Applied Geochemistry* there are some continuing problems caused by Elsevier's frequent changes in their production staff. This has increased the workload of the editor considerably over the last few years. Nevertheless, recent discussions with Elsevier suggest that these problems should soon be resolved.

IAGC Symposium

The first IAGC-convened symposium was held at the Annual Meeting of the Geological Society of America in Salt Lake City. Utah, on October 21. 1997. The topic was 'Trace Metals in the Environment: Sources, Transport and Fate - A Tribute to Ernest E. Angino'. The symposium was very successful with 15 papers presented over the 4-hour period. The abstracts are included in a loose-leaf insert for the interest of IAGC members.

A new policy approved at the Council Meeting and initiated at this Symposium was to award a cash prize (\$100), plus IAGC membership for one year, to the presenting author of the best student paper. This award would be made at the IAGC-convened symposium at each annual GSA Meeting and a similar award would be made available in a suitable international meeting.

For the 1997 GSA Meeting, two presentations were judged to be equally the best (those by Icopini and by Ellis, see abstracts) and so each was awarded the full prize. The next IAGC Symposium will be at the GSA Annual Meeting, to be held in Toronto, Canada, October 26-29, 1998. The theme will again be 'Sources, Transport, Fate and Toxicology of Trace Elements in the Environment'. An award is planned for the best student presentation. Further information can be obtained from Gunter Faure or David Long (see addresses on page 10).

A similar award is planned for the best student presentation at WRI-9 in New Zealand, in March, 1998. Further details can be obtained from the Secretary, Mel Gascoyne.

Other News

The Proceedings of the 6th International Kimberlite Conference (eds. N.V. Sobolev and R.H. Mitchell) have been published (Allerton Press Inc., 150 5th Avenue, New York, NY 10011, price \$95.00). This work is from papers presented at 6IKC held in Novosibirsk, Russia on July 30-August 18, 1995. The Proceedings consists of two volumes containing about 50 papers on all aspects of kimberlites, related rocks and the characterization, genesis and exploration of diamonds. Further information can be obtained from N.V. Sobolev (see address on page 11).

Upcoming IAGC-Sponsored Meetings

WRI-9, 9th Int. Symp. on Water-Rock Interactions
1998. March 30-April 3
Taupo, New Zealand
Contact: B. Robinson
Wairakei Research Centre
PB 2000 Taupo, New Zealand
FAX: 64-7-374-8199
e-mail: wri-9@gns.cri.nz

71KC, 7th International Kimberlite Conference
 1998, April 13-17
 Cape Town, South Africa
 Contact: J.J. Gurney
 Dept. of Geological Sciences
 University of Cape Town
 Private Bag
 Rondebosch 7700, South Africa
 FAX: 27-21-650-3783
 e-mail: 7ikc@geology.uct.ac.za

IAGC-Sponsored Symposium, **GSA** Annual Meeting, Salt Lake City

SESSION 65, 8:00 AM

Tuesday, October 21, 1997

T05. International Association of Geochemistry and Cosmochemistry: Trace Metals in the Environment: Sources, Transport, and Fate--A **Tribute to Ernest E. Angino**

SPCC 151 A-G

8:15 AM Lyons, W. Berry

THE GEOCHEMISTRY AND CHEMICAL EVOLUTION OF LAKES BONNEY AND FRYXELL ANTARCTICA: THE ANGINO LEGACY LYONS, W. Berry, WELCH, K.A., and GRAHAM, E.Y., Dept. of Geology, The University of Alabama, Box 870338, Tuscaloosa, AL 35487, biyons 6wgs, geo.ua.edu; PRISCU, J.C., Moniana Siate Univ., Bozeman, MT 59717; BENSON, L.V., USGS-WRD, Boulder, CO 80303; BULLEN, T.D., USGS-WRD, Menio Park, CA 34025; GREEN, W.J., Miami Univ., Oxford, OH 45056.

1.1. Ostord, OH 45056. Control Park, OK 99025. On 2011. On 2011. On 2011. Control OH 45056. Control Park, OK 99025. On 2011. Control Park, OK 99025. On 2011. Control Park, OK 99025. On 2011. Control Park, OK 99025. Control Park, Control Park, OK 99025. Contel Park, OK 99025. Control Park, O data demonstrate that at least three sources of solutes have existed. The sources include marine aerosol, weathening products from the stream channels and floodplains, and ancient manne sait. The trace metal profiles reflect the importance of redox processes within the lakes, while nutrient profiles have been greatly influenced by the previous evapo-concentration episodes. These nutrient profiles determine the current primary production rates within the lakes. Our data confirm many of the initial conclusions drawn by Angino and others thirty-five years ago. These include the importance of changing climatic regimes on the physical and chemical development of these unusual lakes.

8:30 AM Nezat, Carmen A.

CHEMICAL WEATHERING IN STREAMS FROM TAYLOR VALLEY, ANTARCTICA NEZAT, Carmen A., cnezzi3@uaivm.ua.edu, LYONS, W. Berry, GRAVAM, Elizabeth Y., and WELCH, Kattleen A., Dept. of Geology, Box 870338. Univ. of Alabama, Tuscaboosa, AL 34567; LECHLER, Paul J., Nevada Buresu of Mines and Geology, MS 718, University of Nevada, Reno, NV 89557; MCNIGHT, Diane M., INSTAAR, 1560 30th St., Campus Box 450, University of Colorado, Boulder, CD 80309.

Neverada, Reno, NV 99557; MCKNIGHT, Diane M, INSTAAR, 1560 30th St., Campus Box 450, University of Colorado, Boulder, CD 80309. Taylor Valley (TV), Antarctuca is one of the coldest and direst regions in the world. The surrounding hals are composed of grante, gness, schist, marble, dolerite, and basath. The valley floor contains glacial bit composed of these rock types, as well as old late deposts. During the austral summer, streams flow from alone glacers through this til to closed-basin lakes. Previous studies have indicated that til solution of sales of the austral summer, streams flow from alone glacers through this til to closed-basin lakes. Previous and the soluties that situation to stream chemistry, but that chemical weathering of slicate rocks gas to plays a role. The goal of this study is to determine how each of the skicate rock types and the soluties in the streams that drain them are evaluated. Babos of ablail (K. R. O. C.) and alkaline earth (Ca, St. Ba) elements were compared among weathered rock, unweathered rock, and streams. Ratios are used since the bipter cations within each lamp year abundani in common minerals and the heaver cabions substitute for the more common ones. Stream and weathered rock samples from monokihologic watersheds and the polythologic VI were analyzed. Additional cation ratios of average commanial crust, seawatter and other monolithologic watersheds were colicide from previous studies. From the K/NB and S/R/R datal, weathered rock have have indures thered rock, and are depleted relative to seawater values. Also, IV streams are more enched in lighter coins than the streams in monokihologic watershed rock and are none and unweathered rock, and are depleted relative to seawater values. Also, IV streams are more enched in lighter coins than the streams in monokihologic watershed, suggesting both manne and slices rock weathering influences. In addition, the RivC's data indicate that TV streams include solutes from weathering influences. In addition, the RivC

8:45 AM Angino, Ernest E.

LEACHABLE TRACE ELEMENTS IN NON-DAIRY COFFEE CREAMERS

LACHABLE TRACE ELEMENTS IN NON-DAIRY COFFEE CREAMERS ANGINO, Ernest E., Dept. of Geology, 120 Lindley Hall, Univ. of Kansas, Lawrence KS 66045, MACPHERSON, G. L., Dept. of Geology, 120 Lindley Hall, Univ. of Kansas, Lawrence KS 66045 One of the commonest daily actions is that of dinking a cup of coffee (5-10 cups per day is not unusual). Non-dainy creamers are frequently added to the coffee. These powders contain disodrum phosphate and sodrum sincoaliumate (plagnociase feldspar). We selected 10 common creamers for determination of Li, Ca. Sc. T. V. Cr, Mn. Fe. Co. Ni, 2n. Ga. Se Rb, Sr. Mn. Sn, Ba, Pb, Th, and U content. EPA drinking water standards are established for meet of these elements. The experimental method was designed to simulate the strong-acid environment of the stomach west dissolved in 2% intric and and heated gently on a hot plate in a clean environment. Samples were filtered through 0.45 micron membrane filters to remove all of the suspended and most of the collectal material. Metals in the resulting solutions thus represent the leachable fraction of metals in the non-dairy creamers. Samples were analyzed for the metals by UCPMS and data were differed using the results of multiple neadings of the same solutions. Or the elements analyzed, dissolved Ca and Ti would be present at concentrations everaging about 800 and 200 ppb, respectively, in coffee flavored with creamer. Cr, Mn, and Fe would be present at concentrations much less than the EPA drinking water standards, with the exception of Pb, present at levels of about 0.5 epyh. Although the amount of Cr in ensumerts analyzed would be present at concentrations much less than the EPA drinking water standards, with the exception of Pb, present at levels of about 0.5 epyh. Although the amount of Cr in creamerts avoind coffee is small, ingestion of 10 cups per day of coffies flavored with non-dairy creamer would supply about 30% of the dairy recommended intake of Cr.

9:00 AM Faure, Gunter

SOURCES OF THE NATURAL STRONTIUM ANOMALY IN THE RIVERS OF OHIO ESSENBURG, Cheryl L. and FAURE, Gunter, The Ohio State University, Dept. of Geolo Sciences, 125 South Oval Mall, Columbus, OH 43210

Sciences, 125 South Oval Mall, Columbus, OH 43210 The Sr/Ca ratics of rivers draining marine carbonate rocks of Paleozoic age in western Ohio are 25 times higher than the crustal average of about 5, when the concentrations of Sr are expressed in parts per billion and those of Ca in parts per million. The principal rivers in Ohio with elevand average Sr/Ca ratios greater than 20 are the Maumee River and its tributaries, the Sandusty River, the Scioto River, and the Great Miami River. The resulting strontium anomaly affects an area of about 20,000 km² in western Ohio and eastern Indiana. The Sr/Ca ratios of rivers in western Indiana, southern Michigan, West Virginia, and Kennecky are everywhere less than 10. The strontium enrichment of rivers in western Ohio has been attributed to the dissolution of celestite (Sr50, j) in the Silurian dolomites of that region. The Hocking River and its tributaries in eastern Ohio that drain Carboniferous sandstone, shale, and some limestone, have normal Sr/Ca ratios close to the crustal average. Although the

shale, and some limestone, have normal Sr/Ca ratios close to the crustal average. Although the Little Miami River in southwestern Ohio drains marine carbonate rocks of Ordovician age, its average Sr/Ca ratio is also close to the crustal average, suggesting that these rocks contain less celestite than the Silurian carbonates.

celestite than the Silurian carbonates. Contrary to our expectation, the Sr/Ca ratios of the Maumee and Sandusky rivers in porthwestern Ohio vary seasonally by up to a factor of 10, whereas the Sr/Ca ratio of the Muskingum River remains virtually constant throughout the seasons. An analysis of seasonal discharge records and chemical compositions of these rivers indicates that the seasonal variation of Sr/Ca ratios of the Maumee and Sandusky rivers is caused by increases in the abundance of Sr-rich bedrock water during periods of low flow. The Str/Ca ratio of the Muskingum River remains constant because the bedrock water does not contain unusually high strontium concentrations.

These results demonstrate that the Sr/Ca ratios of the rivers of Ohio are controlled by the mineral composition of the bedrock underlying the drainage basins. The existence of this bedrock-related strontium anomaly of western Ohio may have beneficial medical implications for the human population by reducing its susceptibility to tooth decay and to osteop

9:15 AM Gascoyne, Mel _

THE MOBILIZATION OF URANIUM IN A FRACTURE ZONE BY OXYGENATED GROUNDWATER

GASCOVINE, Mel, gascovnem @aeci.ca: FROST, Laurie H., STROES-GASCOVINE, Simcha, VILVS, Peter, and GRIFFAUTT, Lise Y. Atomic Energy of Canada Limited, Whiteshell Laboratories, Pinawa, Manthoba ROE 1LO, Canada.

VILKS, Peter, and GRIFFAULT, Lise Y. Atomic Energy of Canada Limited, Whiteshell Laboratories. Pinawa, Manitoba ROE 110, Canada. Uranium present in alteration minerals lining a highly permeable fincture zone in the granitic rock at Canada's Underground Research Laboratory (URL) in southeastern Mantoba has been mobilized during a chernical tracer test by hijecting oxygenated water into the fracture zone from a near-surface source. The test was performed by Atomic Energy of Canada Limited (AECL) in a portion of Fracture Zone 2 (FZ2) accessed from the URL at depth of 250 min the granitic Lac du Borniet Batholdh. In his test, oxygen- and bicaborate-rich groundwater from the upper versitation rases was injected continuously using nector/wint/drawal tracer-eventiation rases was injected outpress of test sources or the test involved of U. The Er and concentrations of disaborde uranum (-0.1 mg/L) using AECL's EXPURRT uranum filter. Subsequently, the groundwater was nijected at the same rate without prior removal and colloids (added tracers) were monitored in the windrawal water. Breakthough of dissolved oxygen and increase in Eh occurred within the first 10 hours of the test. Uranum concentrations began to increase in the occurred within the first 10 hours and the test. Uranum concentrations began to increase and part of the test. Micro-organism contern increased to be levels of the injected viater and no fitration by the geologic media was abserved. However, njected sitial colloids (size 20 min) showed sight retardation and lower recovery when overgan ware identified by sameling an adjacent beholio. The alteration and lower recovery when overgan ware identified by sameling an adjacent borholio. These tests demonstrate the ease of removal of U from the alteration minerals

9-30 AM Icopini, G. A.

CHROMIUM SPECIATION IN SOILS: IMPLICATIONS FOR BIOSTABILIZATION

Internition of ECUA ION IN SOILS: IMPLICATIONS FOR BIOSTABILIZATION Icopining Gai, Long, D.T., and Elis, R.J., Dept. Geol. Sci., Mich. St. Univ., icopining Optiot.msu.edu; Forney, L.J. Center for Microbial Ecol., Mich. St. Univ., E. Lansing, MI 48224.

topping@priot.mssu.edu; Forney, L.J., Center for Microbial Ecol., Mich. St. Univ., E. Lansing, Mi 48624. Here we report preimmany data from studies to understand the fate and transport of Cr at a form leather tammery site. The studies are being done to assess the potential use of biogeochemical processes to limit Cr mobility (biostabilization). High Cr levels (up to 200,000 mg/kg) are found in surface soils at the site that range from sandy and toxic to pesty and anoxic. Despite the high concentrations of Cr in the soils, there appears to be times or no leaching of Cr to the shallow groundwater. Sequenial chemical extractions (SCEs) were used to identify substrates that sequester Cr in six operabonally defined phases of the soils. In both anoxic and oxic polis, Cr was primarly associated with an acidic, moderately-net use also associated with an acidic, essally reducible phase (ER). A positive linear correlation was observed between the concentration of Cr in the BOX phases. In anoxic cold organic matter: These data suggest there are multiple sequester modely and the solution organic matter. These data suggest there are multiple sequester to Fo snythyrdroxides in the MR phase and Alm oxides and labels Fe oxides (ER) soft or in anoxic soils, the existence of oxide substrates under reducing conditions is debitable. An interesting beservision is that Fe as similar to Cr, in that it also occurs in the ER and MR phases of anoxic solds. However, it is unknown whether Cr and Fe as sorbed to the same substate and are therefore extracted simultaneously, or whether the co-extraction of thes and and are therefore extracted simultaneously.

9:45 AM Ellis, Robert J.

HEAVY METAL PARTITIONING IN SOILS AT A FORMER LEATHER TANNERY Elia, Robert J., eliarot 6 pilott mau.edu; icopini, Cary A., and Long, David T., Department of Geological Sciences, Michigan State University, East Lansing, MI, 48824-1115; Formey, Larry J.; Marah, Termoce L.; Merkin, Christophe, and Roberts, Michael. S., Center for Microbial Ecology, Michigan State University, East Lansing, MI, 48824-1115.

Ecoopy, microgan outsi Orthersny, East Lateng, M, Hocket 112. At a former leader tarney, soils and sediments have metal concentrations ranging from background to elevated, alfording the opportunity to study the biogeochemical late of heav metals under diverse sediment types and microbiological processes. Sedimental vary ind saturation, coolation, and organic matter content. It appears that over the 40 years anno to operation coeseed, mattals have become immobilized and to not appear to be entaining the ecosystem

operators ceases, metals neve become immoviate and on on septer in the entering metals, the fate of accession. As part of the effort to investigate the bogsochemical processes immobilizing metals, the fate of selected metals (e.g., Cr. (2, 2, 7)) is being studied in this system using selective chemical extractors and porewater samplers to determine metal partitioning within sediments, and between solid and liquid phases. Graphical techniques, R- and Q-mode factor analysis and GIS are used to evaluate biogeochemical pattems in partitioning. Selected results are 1) methogenesis and suitate reduction appear to be important microbial processes in the saturated sediments; 2) easily reducible (ER: FAMn codes), metroplate reducible (MR: Fe oxides), and basic coviduable (BCX: organic matter) are the most important sequestering phases under all sediment conditions; 3) relative partitioning among phases varies among the metals studied (e.g. Cr is primarily associated with MR and BOX, Zn is primarily among phases, especially for Zn, differs between unsaturated and saturatif; and 4) partitioning to preliminary conclusion is that the nature of metal partitioning in the sediments while varied concentrations is similar to that of uncontaminated admetals. However, substrates comparing the ER and MR phases in the anotic samples are unclear because the existence of oxides under these conditions is debitable, Microbial processes my play a key role in determing the nature of substrates is mobilizing the metals under anotic conditions. of substrates immobilizing the metals under anoxic cond

10:00 AM Bonzongo, Jean-Claude

10:00 AM Bonzongo, Jean-Claude INVERSISTEM (ICRS), NEVAD. BONZONGO JEAN Claude & LIONIS W. Berry. Dpt. of Geology. Univ. of Alabama Tuccaloos. AL 35437-0334. bonzongo@wgs.geosu.adu: HINES. E. Mark. Dpt of Biological Sciences, Univ. of Alaska. Anchonze, AK 99508-1014. BARKAY Tumar. Dpt. of Molecular Biology & Bionchoology. Tel Aviv Univ. Ramas Aviv 69978: WARWICK J. John. Program of Hydrologic Sciences/175. Univ. of Neavad. Reno. NV 8971. The biological Sciences (Internet of the State of the State of the Internet of Internet o

10:15 AM Boulet, Michelle P.

10:15 AM Boulel, Michelle P. GEOCHEMISTRY OF TALLINGS, PORE WATERS AND ACIDIC DRAINAGE AT THE CLEVELAND MINE SUPPERFUND SITE IN NEW MEXICO, USA BOULET, Michelle P., and LAROCQUE, Adrienne C.L., Dept. of Geological Sciences, University of Manitoba, 240 Wallace Bidg., 125 Dynart Road, Wannipeg, Manitoba, Canada, RST 2478, ad LarecoucgGumanitobacta.
The Cleveland deposit is a Za-akarn located in the Grant County mining district, north of Sitver City, New Mezica. The Cleveland mino-tailings (CMT) were deposited in a valley at the beadvater of an ephemeral stream. Primary sufficie include pyrite, sphalerite, chalcopyrite, galean and arreenopyrite; gangue minerals include quarta, calcie, and magnetize. The tailings have undergone numerous weldry cycles, resulting in extensive oxidation and differential emmentation. Secondary minerals predominate, and consist of jarosite, spechite, gypsum, and various Fe oxybydrazidet and oxybydrossifiates. The pH of the stream octain ing the CMT is as low as 21.5. Maximum dissolved metal concentrations in the stream octain gore water within the tailings: 3322 ppm Za, 604 ppm Cu, 4.16 ppm Pb, 46.33 ppm Cd, and 16.65 ppm Az. These concentration decrease downstream away from the tailings; 3 km from the tailings, most metals are below detection and the pH is 7. ection and the pH is 7.

are below detection and the pH is 7. Average Pb concentrations in tailings are 12 times higher than sverage Cd concentrations, but average dissolved Pb concentrations in the stream are up to 12 times lower than dissolved Cd concentrations. This relationship indicates that while Pb is relatively immobile. Cd is easily mobilized out of the tailings indicates that while Pb is relatively immobile. Cd is easily mobilized out of the tailings indicates that this element may be less of a threat to the environment than other, more mobile, toxic elements (e.g., Cd) that are present in lower concentrations in tailings. Zo is bigbly mobile, toxic elements (e.g., Cd) that are present in lower concentrations in tailings. Zo is bigbly mobile, due to relatively high solubility of Zo sulfate. Result of mechanical transport of sediment downstream is an important mechanism in mobilizing As from the tailings, while chemical transport appears minimal. Thus, an understanding of mineralogy of sulfide minewastes.

10:30 AM Macpherson, G. L.

TRACE ELEMENTS IN RECENT ALGAL CARBONATE AT THE KONZA LTER SITE, NORTHEASTERN KANSAS, DETERMINATION BY LASER ABLATION MICROPROBE (LAM)

MACPHERSON, G. L., Dept. of Geology, 120 Lindley Hall, Univ. of Kansaa, Lawrence KS 88045, gimac@kuhub.cc.ukars.ecu; JACKSON, Simon E., Dept. of Earth Sciences, Merr Univ., SI John's A1B 3XS NF. Canada.

BB045, gimse@kuhub.cc.ukara.aou: .ACKSON, Simon E., Dept. of Earth Sciences, Merrinonal Univ., SJ. John's AH B 305 NF, Canada. Layers of algae and carbonate penodically cover rock outcrops in stream beds at the Konza Pravia Long-Term Ecological Research Site on northeastern Kanasa, in cross section, this mathrid is agentized crudely into dark (organic-rich) layers and layit (attrobute-nch) layers. Both dark and light layers are porous and consist of motions of the algae and carbonate as well as entrapped alit. This istneam lagid carbonate is being studied in order to undentand the sensa to the algae and carbonate as well as entrapped alit. This istneam lagid carbonate is being studied in order to undentata the sensa to distorn orthorphobe (LAM) (EVRMS vs. used to analyze the metal chemistry of the layers and a spill of the sample was also dissolved and analyzed by tractional University of the sample was also dissolved and analyzed by tractional (CPMS at the University of the carbonate had to be calculated using an empirical lactinque that approximated the best fit of all the trace-metal data to a number of parameter assumed to be constant, such as the S context of the and the carbonate is applied to the sample was an empirical lactinque that approximated the best fit of all the trace-metal data to a number of parameters assumed to be constant, such as the S context of the earbonate is layers are about 500 rocession of east out 49% organic matter, the parts of the layers are there is the organic-rich layers than in the carbonate layers are about 50 to times higher in the organic-rich layers than in the carbonate. This Work demonstrates that layer about 50 or distant on the organic-rich layers than in the carbonate. This work demonstrates that layer about 50 or of matching of metab between organic matter and carbonate. This work demonstrates that layer about 50 or of matching and the organic-rich layers than in the carbonate. The swork demonstrates that layers are about 50 or of matching and the organic-rich laye

10:45 AM Shiller, Alan M.

SEASONAL VARIABILITY OF DISSOLVED TRACE ELEMENTS IN RIVERS AND STREAMS SHILLER, Alan M. and HEBERT, Tracey, Inst. Marine Sci., Univ. Southern M. Spece Ctr MS 39529, ashiller@whale.st.usm.edu

Spece Cir MS 39529, schiller@whale.st.usm.edu Time series of dissolved trace elements in vers an important for flux calculations, for understanding the mechanisms controlling the fluvial concentrations of these elements, and for the design and implementation of research and monitoring programs. We have obtained monthly trace element time series for a variety of nevrs and streams. The samples were obtained by voluntace users and the series of the stress and streams. The samples were obtained by colocidal concentrations. Elements determined include Min, U. Mo, Rb, Cu, and Ba. Revers and streams sampled range from the Missessipp River to a small alpine stream. Trace element concentrations generally show seasonal variability, flough the type and cause of the variability is a function of the system. In some cases for some elements in-stream processes (e.g., biological activity, photochemistry appear to be moortant. In other cases hydrologic factors (e.g., dubtion, flushing of soils) or source variability (e.g., seasonal reducing cycles) are important. Factors that determine what type of behavior is observed probably include organic content, water clarity and depth, and reducing sources.

11:00 AM Forseh, John M.

11:00 AM FORSEM, JOHN M. CONTEXENTION OF METALS TO SUBJACE WATERS FROM BLACE SHALES IN EANSAS CTTY John M. Forsch, (Jforsub @ccst. multic.edu) and Raymond M. Coveney, Jr., Department of Geosciences, University of Missouri-Kansas City, MO 64110-2499, U.S.A. At least a dozen thin Pennsylvanian black shales of the U.S. Midwest are very enriched in heavy metals compared to most black shales. To determine the potential of these thales to leach heavy metals to surface waters, samples were collected from sorps near K.C. for analysis, and experimentally leached samples were prepared from both the Stark and Husbuckney shales of K.C. and also from Mecca Quarry Shale (MQSB-1) from Indiana. Samples were collected in acid-washed low density polypropylene bothes then filtered and stabilized with redistilled metal grade nitic acid. Samples were analyzed with a Varian UltraMass inductively coupled plasma-mass spectrometer (ICP-MS). Two types of samples were analyzed statural seens and experimental locahase prepared with redistilled water or nitric acid.

natural sceps and experimental	leachates	prepared	with either	distilled wa	uer or nit	ic acid.	
Typical results are:	pН	Cđ	Za	Fe	Mn	Pb	U
MQSB-I Expension	4.1	1104	13230	5096	3017	0.4	233.9
Stark Experiment	6.5	2.6	2.9	709.7	0.00	0.2	0.00
Hushpuckney Experiment	6.9	119	3.8	7331	36.1	6.3	176.4
Stark Shale Seep	6.9	10.3	10.7	2676	4.1	0.4	3.0
Hushpuckney Shale Seep	7.5	0.6	0.12	1752	0.02	0.00	2.7
USEPA MCL		5	5000	300	50	15	20

The above results show surprising differences in releases of metal am ong the three black Inc above results snow surprising differences in relative or meal among use three places water which contribute metals to groundwater in amounts exceeding MCLs for docard dirinking water in some cases. Natural sceps contain Fe in quantities >MCL in all cases and the Stark Shale produces Cd in quantities >MCL in some cases. Experiments indicate that concentrations of metals greatly >MCL in most cases. Hence the potential for natural "pollution" by black shales is considerable and should be evaluated whenever such shales are present.

11:15 AM Abraham, J.

NATURAL AND ANTHROPOGENIC INPUTS OF METALS IN RESERVOIR SEDIMENTS: A FIELD-VALIDATION FOR ALUMINUM-NORMALIZATION APPROACH

ABRAHAM, J., Geology Dept; Baylor University, Waco, TX 76798, abraham@earthlogic.baylor.edu; ALLEN, P.M., DUNBAR, J.A.

abraham@earthloga.cbsylor.cdu; ALLEN, P.M., DUNBAR, J.A., and DWORKIN, S.J., Geology Depa, Baylor University, Weoo, TX 76798 Normalization of metal concentrations to Al discriminates natural from anthropogenic sources and thereby helps to identify areas prote to anthropogenic influence. The normalization approach is based on a linear mixing model that involves aluminosilicates and quartz as the mixing end members. Reservoir sodiments are ideal to test the many inherent assumptions because near-points typically up ap>50% of soliment jourgas, and the sources of sodiment inputs and potential anthropogenic sources are easily identified. In this study, we assessed the spatial distribution of earths in a measure in the mixing interaction the spatial and potential anthropogenic sources are easily identified. In this study, we assessed the spatial distribution of metals in a reservoir that receives textually contrasting adments (60% class and 70% stand) at the two ends and whose drainage area is characterized by rocks with contrasting mineralogy (50%-55% clays and < 20% clays) in the two respective basins. Sixty surface and core samples along a 21 km transact within the reservoir an well as 13 overbank adments and 7 rock types in the waterahed were sampled, and chemically analyzed. Baseline models for Ba, Cr, Cu, Fe, Ma, Ni, Pb, V, and Zn were established by linear regressions with Al as the dependent variable. A strong relationship is noted between metals and Al concentrations as indicated by \mathbb{R}^2 > 0.70, except for Cr (0.49), Pb (0.38), and Ma (0.32). Of the 34 sites, 6 to 8 sites indicate metaled using cf C: Cu. 5 and Ma (2). Thes accided zites are been interactivity. > 0.70, except for Cr (0.49), F0 (0.39), and Mn (0.22). Or me 34 strest, 6 to 8 strest manage enched levels of Cr, Cu, Fe, Mn, Ni, and Cn. These enched strests to located immediately downstream of an outlet for stormwater runoff from an urban area and an adjacent marina. The enached zone, located in intermediate water depths, is characterized by the greatest accumulation of clay-sized sodiments. Within 4 km downstream of the marina, physical mixing with carbonate-rich sandy mud from the northern basin dilutes the enrichment plume. Thus, using AI as a normalizer it is possible to identify subtle enrichment of metals from discrete information of the marine. anthropogenic inputs to the reacomparable to regional shales. innuts to the reservoir sediments which otherwise contain metals at levels

11:30 AM Macfarlane, Andrew W.

LATERAL AND VERTICAL VARIABILITY OF HG AND P IN EVERGLADES SOUTHERN WCA-3A PEAT SOILS

ARFSTROM, Cleone, CH2M Hill, 4350 W. Cypress SL, Tampa, FL, 33622, cartistro @ch2m.com; MACFARLANE, Andrew W., Depl. of Geology, Florida Interr University, Marni, FL 33199, macfarla@servms.flu.edu.

University, Maim, FL 33199, machane@servms.flu.edu. The discovery of up to 3 point M gin Everglades fauna has made it imperative to understand the sources and movements of this toxic metal. Proposed explanations for elevated mercury in animals have included contamination from agnostitural trunch, contamination from industrial plents and incinerators, and enhanced methylation of resident soil mercury. We measured high end P in peat soils from the contral Everglades trough to examine correlations between the two elements to compare the mercury content of tryocal Everglades pace with other organic-nch soids, and to look for vertical and lateral concentration gradients that might offer clues to the sources of both elements.

elements. Soils in the southern half of Water Conservation Area 3A are mostly peats with some organic-rich marts. Mercury contents of 64 surface samples over a 500 square km area average 28.7 ng/cc (209 ng/g dry sediment), which are not enriched relative to other organic-rich soils. High 1g contents in Everylades fish are therefore not caused by snomaously high soil Hg. Hg contents a surface soils show no systematic lateral vanation, and suggest deposition from well-mozed

surface solds show no systematic lateral vanation, and support deposition from well-mased atmospheric sources rather than nearby point sources or canal unceft. P content of durface samples range from 350 to 850 microgramm/gram dry escimat runnel recenter to durface interior areas of water conservation areas not affected by egricultural runnif from canals. Hig and P samples each form single statistically logonomal populations. Corres from 9 sites contain more Hig and P at or near the surface than at 20-30 cm depth. Hig and P contents of individual corres correlates and other plasmost background and anomalous populations. The Everylades are naturally nutrient-poor, and subsurface P distributions are probably determined by upside by savgress and other plasmits. The correlation between P and Hig suggests that, although atmosphere Hig deposition has undoubtedly increased in recent decades, findings, together with recent direct measurements of atmospheric Hig deposition, indicate that Hig is immobile in pest after deposition, have yielded large overestimates.

11:45 AM Keith, Karan S.

MAJOR AND TRACE ELEMENT CONCENTRATIONS IN VIRGIN INDIANA SOILS AND ADJACENT FARMED SOILS

KITH, Kanni S., Dept. of Geological Sciences, Indiana University, Bioomington, IN 47405, Istatistive Bindiana.edu; ONESTI, Lawrence J., Dept. of Geological Sciences, Indiana University, Bioomington, IN 47405; SHAFFER, Neison R., Indiana Geological Survey, Bioomington, IN 47405.

Description, in eresus; SHAFFEH, Nelson R., Indiana Geological Survey, Bloomington, IN 47405. Geology plays an important role in soil development, but man modifies soils through uses such as famming. Therefore what role, if any, has intensive appliculture in this century played in attempt the chemical composition of our soils? Cereal grains incorporate metals and other elements runing growth. Some of these elements make-up the vegetative plant mass that is returned to the soil, but considerable amounts are concentrated in seeds that man harvests to robot or as leed for domestic animals. Every seed crop subsequently removes substantial amounts of trace elements. In 1982 more than 358 ment tons of major grains were produced from about 320 million acres in the United States. Long term removes of trace elements might well impede plant growth and result in decreasing production and quality of grains. This study examined major and trace element concentrations in 5 planed sets of samples, consisting of twing inon-fameo) Indiana sempled using a hand auger and each soil horizon designated and tested for element concentrations. Supravised and tested for borzon designated and tested for element concentrations. Supravisely, concentrations of the major designated and tested for element concentrations. Surparingly, concentrations of the major designated and tested for element values for Zn, Ni, Co, Mn were higher in farmed soils. We balleve that trace amounts of minor elements plays mays relements are actually added to the soil from farbitizers and other agricultural products. Our data indicates that important elements are not being removed from farmed anses.

 ◊ IMA'98, 17th Int. Mineralogical Assoc. Meeting 1998, August 9-16
 Toronto, Canada
 Contact: A.J. Naldrett
 IMA'98
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(Variabul) 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 Geology Ohio State University Columbus, Ohio 43210-1398 U.S.A. FAX: 1-614-292-7688

\\$ 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

Other Meetings of Interest

Conf. on Hazardous Waste Research
 1998, May 19-21
 Salt Lake City, Utah, U.S.A.
 Contact: website www.engg.ksu.edu/HSRC/home.html
 phone: 1-913-532-0780

◊ 35th Ann. Mtg. Clay Minerals Society 1998, June 6-11 Cleveland, Ohio, U.S.A. Contact: P.J. Eberl CMS, P.O. Box 4416 Boulder, Colorado 80306, U.S.A. FAX: 1-303-444-2260 e-mail: peberl@clays.org

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 Faculty of Geology

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\$\& 4^th\$ Int. Symp. on Environmental Geotechnology and Global Sustainable Development
1998, August 9-12
Boston, U.S.A.
Contact: V.O. Ogunro
CEEST
University of Massachusetts
Lowell, MA 01854, U.S.A.
FAX: 1-978-934-4014
e-mail: ogunrov@woods.uml.edu

IEP'98, Issues in Environmental Pollution 1998, August 23-26 Denver, Colorado, U.S.A. Contact: L. Ouirke

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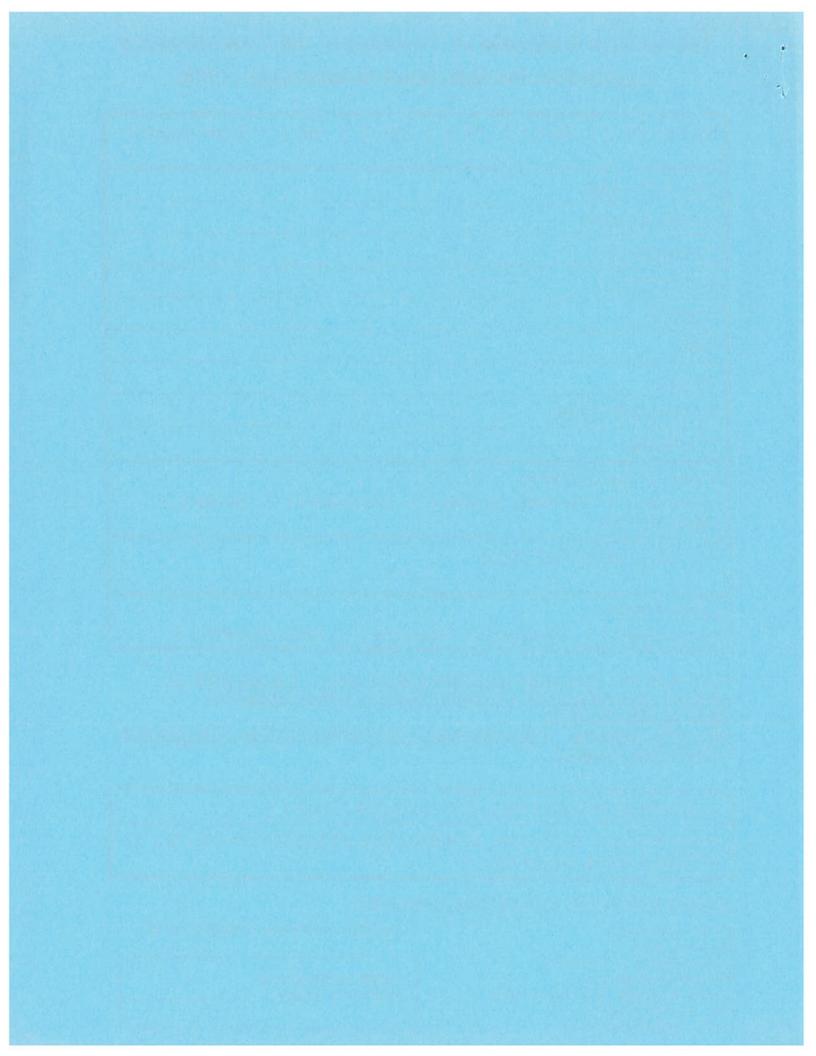
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