

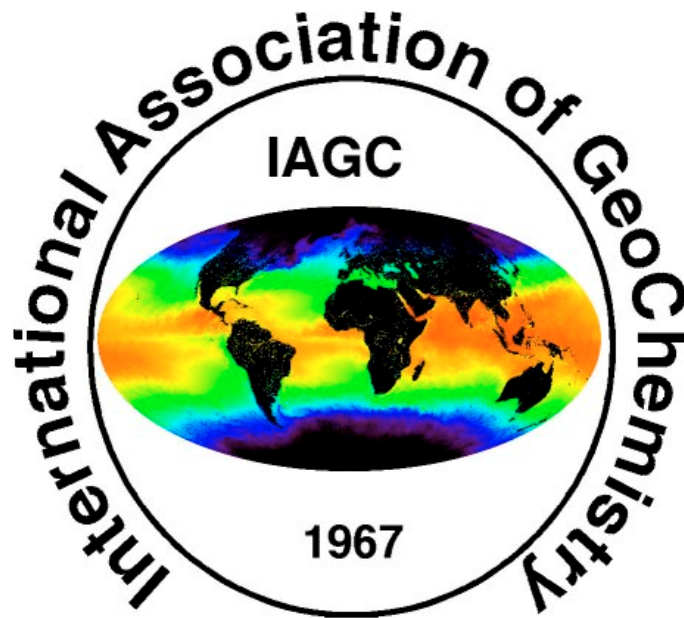
Newsletter

of the

International Association of GeoChemistry

Number 42, April 2005

Mel Gascoyne, Newsletter Editor



NEWS FROM THE ASSOCIATION

- **Goldschmidt**
- **"Elements"**
- **Geophysical Education Award**
- **AIG-6, GES-7**
- **Spotlight on WRI**
- **Upcoming meetings**

***Have you forgotten to renew your membership in IAGC ?!
See p. 3 for details***

NEWS FROM THE ASSOCIATION

Do you like "Elements"?

Issues 1 and 2 (January and March 2005) have now been published and distributed to all IAGC members. Let the Business Office know if you are missing an issue.

Comments I have received so far are very favourable and the Managing Editor, Pierrette Tremblay

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would love to hear if you have any comments or words of praise!. Issue 3 is due out in June and features papers on the genesis of rocks and minerals and the origin of life.

So far, all members of the IAGC that were paid up for 2004 have been mailed issues 1 & 2. **However**, for the June issue, this will change and **only those paid up for dues in 2005 will receive this issue**. So, if you have not yet renewed your IAGC membership for 2005, please do so quickly so your supply of "Elements" issues is not interrupted. Because the print run of an issue is close to the membership demand for all participating societies, it will be difficult to get back-issues.

Website: Have you visited the IAGC website yet? IAGC's website was initiated last year through the Business Office and the "Granite" internet server in Pinawa, Manitoba. Check it out and send us your comments: <http://www.iagc.ca>. The site is being updated regularly with new information.

***Applied Geochemistry* -Are you missing any issues?**

There have been very few reports of lack of receipt of *Applied Geochemistry* issues for 2003 or 2004. If you are missing any issues, contact the Business Office with your needs. The

Business Office is willing to mail out missing issues of volumes 17, 18 & 19 to fill in the gaps of members' collections, free of charge! Let us know if you are missing an issue. Note that we cannot replace large numbers of missing issues - members should contact the Business Office separately to arrange this.

Conferences supported by IAGC

One of the main aims of the IAGC is to sponsor symposia and international meetings on various aspects of geochemistry, primarily through its Working Groups but also through an IAGC conference grants program. In 2005, IAGC will also sponsor a special session on Archaeological Geochemistry at the April EGU Meeting in Vienna, and will join in the sponsorship of the 15th Goldschmidt Conference in Moscow, Idaho in May. IAGC will also be a sponsor of the 6th International Symposium on Applied Isotope Geochemistry in Prague, in September 2005.

Working Groups

At present, IAGC has seven Working Groups:

Water-Rock Interaction,
Global Geochemical Baselines,
Geochemistry of the Earth's Surface,
Applied Isotope Geochemistry,
Thermodynamics of Natural Processes,
Geochemical Training in Developing Countries
Geochemistry of Health and Disease

The activities of each of these will be featured in upcoming issues of "Elements". Issue #3 of Elements describes the very successful Working Group, Water-Rock Interaction (WRI) and in the following pages you will be able to read more about WRI that could not be included in the Elements page allocation to IAGC.

Congratulations to IAGC's Working Group Chairman, Dr. U. Aswathanarayana: Recipient of the Excellence in Geophysical Education Award of AGU for 2005.



The President of the American Geophysical Union, Professor John A. Orcutt, recently announced that Dr. Uppugunduri Aswathanarayana has been selected for the Excellence in Geophysical Education Award of AGU for 2005. The Award recognizes Dr. Aswathanarayana's meritorious services in the cause of geoscience education in different parts of

the world. He is the first Indian and the first from the Developing countries, to get this Award, which will be presented to him in the Awards ceremony on May 25 at the time of the Joint Assembly of the AGU, New Orleans, May 23 - 27, 2005.

Dr. Aswathanarayana has been a very active Chairman of the IAGC Working Group "Geochemical Training in Developing Countries" for almost 15 years. During this time he has helped organise a number of meetings, workshops and training courses in several developing countries.

Dr. Aswathanarayana recently published a letter in the American Geophysical Union's magazine, Eos, vol. 86, (11), 15 March, 2005, in which he recommended a strategy for improving preparedness and mitigation of tsunami-type events, particularly applicable to developing countries.

The Asian Tsunami: Statement by the INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)

The IUGS has issued a statement regarding the Asian tsunami, its geological and risk perspectives.

In it, the IUGS defines how tsunamis are caused and the need for better understanding of them, and makes several recommendations particularly in the areas of early warning, public awareness, education, evacuation routes, and shelters with locations based on appropriate geological information.

The full text can be found at:

http://www.iugs.org/iugs/news/iugs_hazards_state ment.htm

The IAGC has recently revised its web-site and now contains information on the Association, its history, details of sponsored meetings, the biannual Newsletter, how to join, and the Working Group activities. The site address is <http://www.iagc.ca>.

Working Group Reports

Global Geochemical Baselines (David Smith, USGS)

Scientific Progress: The minutes of the IUGS/IAGC/FOREGS combined Working Groups' recent Business Meeting, held at the 32nd International Geological Conference, Florence Italy, on the 22nd August, are available on the IAGC website (www.iagc.ca). On the global scale, there has been continued progress within a number of countries, including India and the CCOP nations, over the past year. A field training course, which included lectures and two days of fieldwork, was also held at the Geological Survey of Tanzania, Dodoma, on the 27 to 29 July, 2004. Representatives from the east African countries who are planning to participate in the activities of IUGS/IAGC Task group on Global Geochemical Baselines were invited to attend. Three representatives from Kenya (Moi University), one from Seychelles, one from Nigeria, and seven from Tanzania (TGS) participated in the course. A report on the meeting is on the IAGC web site.

Within Europe, significant progress was made on the FOREGS Geochemical Atlas of Europe. In particular, the introductory and background texts and all distribution maps were finalised ready for publication. Good progress was also made on the interpretation of the geochemical data and a number of interpretation meetings were held throughout the course of the year. The Working Group's Annual progress report to the FOREGS Directors is on the IAGC web site.

Progress was made on harmonising activities of the FOREGS Working Group with the European program INSPIRE (Infrastructure for Spatial Information in Europe). The intention would be to identify five different Working Groups with specific responsibilities: - WG1 INSPIRE; - WG2 spatial harmonisation of the Pan-European River and Catchment Database and the FOREGS

data; - WG3 harmonisation of soil monitoring data with JRC IES (the European Soil Bureau, ESB), with a focus on heavy metals; - WG4 hyperspectral analysis of the FOREGS and national sample archives; - WG5 laboratory standardisation for heavy metal analysis, and interpretation of pollution in soils, sediments and water. More details of this comprehensive report can be found on the IAGC web site : www.iagc.ca

How to contact us:

**To join or renew your membership in the IAGC, subscribe to or track down errant issues of *Applied Geochemistry*, or to send in comments, etc., contact:
IAGC Business Office, Box 501, Pinawa,
Manitoba R0E 1L0, Canada.**

COMING EVENTS

IAGC-Sponsored Meetings

**EGU conference: Vienna 24-29 April 2005,
Symposium on Archaeological Geochemistry**

This meeting is the first foray by IAGC (Council member Andrew Parker) into archeological geochemistry. Examples of papers are:

Bocherens, H.: Stable isotopes of bone collagen and the subsistence strategies of European hunter-gatherers, from Neanderthals to Mesolithics
Robertson, I.; Loader, N.J.; McCarroll, D.; Gagen, M.H.: Recent advances in isotope dendroclimatology

Pearson, C.L.; Manning, S.W.; Coleman, M.L.; Jarvis, K.E.: Tree rings, volcanic eruptions and multi-elemental chemistry: The potential of dendrochemical techniques for the absolute dating of past volcanism.

Evans, J.; Montgomery, J.

Mapping biosphere ⁸⁷Sr/⁸⁶Sr variation for archaeological and environmental purposes.

More details can be found on IAGC's website.

The 15th Annual Goldschmidt Conference 2005, Moscow, Idaho, USA, 20-25 May, 2005

IAGC is collaborating with the Geochemical Society, the European Association of Geochemistry, and the Mineralogical Society of America to sponsor the 15th annual Goldschmidt Conference. This premier international geochemistry conference (www.the-conference.com/2005/gold2005/index.php) will be held in Moscow, Idaho (USA) from 20-25 May 2005.

7th International Symposium on the Geochemistry of the Earth's Surface (GES-7); Aix-en-Provence, France, Aug. 23-27, 2005.

This symposium is organised by the IAGC Working Group of the same name. The principal focus of past GES meetings has been on processes happening at the earth's surface. GES-7 continues that overall theme with greater emphasis on the multiscale environmental biogeochemistry of the Earth's surface. For further details go to the web site <http://www.cerege.fr/GES7/ges7/second.htm>

6th International Symposium on Applied Isotope Geochemistry (AIG-6), Prague, Czech Republic, 11-16 September, 2005.

The Symposium is organized by the International Association of Geochemistry (IAGC). The registration fee (440 Euro) includes also two guided sight-seeing tours of Prague, a field trip to the spa of Carlsbad, lunches and dinners at Brevnov Abbey, the Icebreaker Reception, a concert, the Conference Dinner, and public transport for 7 days. Further details (including information about financial assistance) can be found at the following web-page: <http://www.aig6.cz>

Environmental Issues Related to Oil and Gas Exploration and Production, symposium at the GSA Annual Mtg, Salt Lake City, Oct. 2005.

Yousif Kharaka (Chairman of the Water/Rock Interaction Working Group) and Jim Otton are convening the GSA session "Environmental Issues Related to Oil and Gas Exploration and Production" planned for the Salt Lake City meeting in October, 2005. The Hydrogeology Division of GSA is the primary sponsor of this session. The IAGC will cosponsor the event.

Sources, transport, fate and toxicology of trace elements in the environment, symposium at the GSA Annual Mtg, Salt Lake City, Oct. 2005.

This topical session is an ongoing forum for research on trace elements in the environment. These sessions were started 9 years ago and have been sponsored by the IAGC. They have attracted large audiences and this session has become an important outlet for researchers in trace metal cycling. The scope of the session has grown and now includes the toxicology of trace elements in addition to fate and transport studies. IAGC will again present an award for the best student paper given during the session.

Other Meetings of Interest

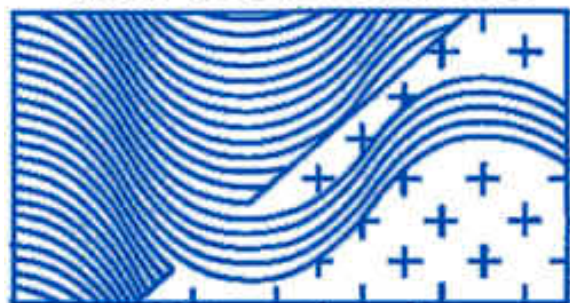
The International Conference on Acid Deposition, Acid Rain 2005, Prague, 12-17 June, 2005

This meeting will be the seventh in a series on the effects of air pollution and acidification of ecosystems. These conferences have been held every five years since 1975.

22nd International Meeting on Organic Geochemistry (22nd IMOG), Seville, Spain, 12-16 September 2005

All the information about the event is available at the conference web page (<http://www.imog05.org>) Contact person: Francisco J. Gonzalez-Vila 22nd IMOG Chairman.

Water-Rock Interaction



International

30 + Years of Water-Rock-Human Interactions

Yousif K. Kharaka

Chairman, Working Group on Water-Rock Interaction

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More than 30 years ago, the First International Symposium on Water Rock Interaction (WRI-1) was convened (9-14 September, 1974) in Prague (Czech Republic), with Dr. Tomas Paces as Secretary General. Nearly 150 participants, including many students from 21 countries attended the four days of technical sessions and close to 100 also visited thermal and mineral springs on a three-days field trip to northwestern Bohemia. The combination of excellent technical sessions, printed proceedings, and interesting and well-organized field trips lasting several days,

together with enjoyable social and cultural programs for the scientists and the accompanying members created an atmosphere of informality and easy communication among the participants. As pointed out by Brian Hitchon (the WRI Working Group Chairman, 1974-1986), the “spirit of WRI”—encouraging scientific communications and human interactions among the international participants – “was born in Prague and has ensured the continuation and expansion of WRI” (Hitchon, 1989).

The last symposium, WRI-11, was held June 27-July 2, 2004, in the historic resort city of Saratoga Springs, New York, USA. WRI-11, ably led by its Secretary General (Prof. Susan Brantley of Penn State University) attracted 324 of the leading geochemists, hydrologists and geologists from 34 countries and 17 registered accompanying members. At registration, participants received two hard cover proceeding volumes, edited by Wanty and Seal, II (2004) and published by A. A. Balkema, that include 334 papers and a record total of 1684 pages.

Vision of Water-Rock Interaction

The idea for a Working Group on Water-Rock Interaction (WRI) within the International Association of Geochemistry and Cosmochemistry (IAGC) originated with the late Prof. Mikhail G. Valyashko, who held the Chair of Geochemistry at Lomonsov State University, Moscow (USSR). During the International Symposium on Hydrogeochemistry and Biogeochemistry (Tokyo, Japan, September 1970), he organized a small group of interested geochemists and proposed setting up six working groups, including WRI to “study water-rock interaction under various temperature and pressure conditions, compile key programs, develop methods, and determine transportation forms of components.” The late Donald E. White (USA) was appointed the first Chairman of the Working Group on WRI. He initiated a worldwide mailing campaign that resulted in the creation of nine Interest Groups that served WRI well for more than a decade. During the 24th IGC

Table 1- Pertinent data on the completed WRI Symposia.

Symposium	Year	Participants	Venue	Secretary General
WRI-1	1974	148	Prague (Czechoslovakia)	Tomas Paces
WRI-2	1977	236	Strasbourg (France)	Yves Tardy
WRI-3	1980	145	Edmonton (Canada)	Brian Hitchon
WRI-4	1983	210	Misasa (Japan)	Hitoshi Sakai
WRI-5	1986	250	Reykjavik (Iceland)	Halldor Armannsson
WRI-6	1989	350	Malvern (United Kingdom)	Mike Edmunds
WRI-7	1992	576	Park City (USA)	Yousif Kharaka
WRI-8	1995	260	Vladivostock (Russia)	Oleg Chudaev
WRI-9	1998	287	Taupo (New Zealand)	Brian Robinson
WRI-10	2001	480	Cagliari, Sardinia (Italy)	Luca Fanfani
WRI-11	2004	341	Saratoga Springs (USA)	Susan Brantley

(Montreal, Canada), Drs. White and Hitchon convened an informal meeting of WRI (known as WRI-0) on 23 August 1972, and 16 people met to discuss the future of WRI, including Earl Ingerson (President, IAGC), Ken Sugawara (Secretary, IAGC) and Valyashko. There was no agenda, and this informality has been characteristic of WRI ever since. Discussions were held on the future directions of WRI, and on the desirability of a publication and the need for specialized meetings on hydrogeochemistry. Josef Cadek (Czech Republic) presented a proposal suggested by Tomas Paces to hold an international symposium on WRI in Prague. WRI-1 would set the focus needed for the next three decades by launching a series of triennial WRI Symposia, which became the main function of this Working Group.

WRI-1 through WRI-11

The WRI Symposia are generally held in different countries and are co-sponsored by various national earth-science associations, universities, academies of sciences, private and governmental agencies, as well as the IAGC, the parent organization that is affiliated with the International Union of Geological Sciences (IUGS). The symposia are organized by National WRI Organizing Committees, headed by the Secretary General, who is nominated by the

Working Group, but selected by the vote of all the members present at the general business meeting of WRI. The names of the Secretary Generals for the past Symposia, venues, etc., are listed in Table 1. These scientists, together with Prof. Yanxing Wang (China U. of Geosciences, Wuhan, China) comprise the current Executive Members of the Working Group on WRI, with the author as the present Chairman (Fig. 1). For more details about our Working Group, please visit WRI web site at: <http://www.rcamnl.wr.usgs.gov/wri/index.html>

Our Group strives to increase participation of attendees at WRI Symposia, especially students and earth scientists from developing countries. Brian Hitchon in particular was instrumental in increasing WRI membership, which reached registrants from about 50 countries in 1983. The attendees of the general business meeting of WRI-4 in Misasa (Japan), however, voted to discontinue the registration rosters, as well as the Interest Groups and the National Contacts – members wanted the Group to remain informal and to concentrate its efforts on the WRI Symposia. After Misasa (1983), the number of participants at WRI Symposia continued its general upward trend (Table 1). This increase, undoubtedly, results from the tremendous efforts of the Secretary Generals and their National

Organizing Committees. Every Secretary General has been able to raise funds, at times substantial amounts, from private and governmental sources to offer complete or partial scholarships to students and participants from developing countries. I believe we are making progress on these issues, judging from attendance at WRI



Fig. 1. So many Secretary Generals at WRI-10 ! Photo taken on 15 July 2001 at Tanka Village, Sardinia, Italy. From left to right Robinson, Tardy, Armannsson, Brantley, Paces, Fanfani, Kharaka (current Group Chairman), Edmunds, and Chudaev. We are missing Hitchon and Sakai, who did not attend WRI-10, and Wang had not been elected yet.

Symposia, but more effort is needed, especially with regard to attracting more participants from Africa, South America and the Arab countries.

Each WRI has had its highlights and its national flavor, but as the Secretary General, WRI-7 held in 1992 at Park City, USA, will always be my favorite Symposium. Of the remaining eight that I have attended, WRI-4, held at Misasa, Japan, in 1983, with Hitoshi Sakai as Secretary General, was probably the most memorable Symposium. Science, scenery, sake, sushi, sashimi and the sincerity of our hosts set the scene. There was a large-format daily newspaper, the Misasa Messenger, a mid-session field trip to the Daisen Volcano, and a post-session field trip that included visits to the

Ningyo-toge uranium mine, the Hakone and Fuji Volcanoes and a host of temples, shrines and spas.

WRI-8, held September 1995 in Vladivostok, Siberia, with Oleg Chudaev as Secretary General, was the most challenging to organize as it happened at the same time that the Soviet Union was unraveling. Chudaev and his Organizing Committee, with some support from members of the Working Group, however, managed to stage one of the most satisfying WRIs for 260 attendees from 30 countries. For me the highlights were the field trips to the magical Lake Baikal, Siberia and the breathtaking scenery and hydrothermal features of Uzon Caldera and Geyser Valley Kamchatka.

WRI-12 and Beyond

During the General Assembly of WRI-11, the attendees voted to hold WRI-12 in the beautiful city of Kunming (The Spring City), Yunnan Province, China, in August 2007, with Prof. Yanxing Wang (China University of Geosciences, Wuhan, China) as the Secretary General. The timelines and final plans for WRI-12 have been finalized and are reported in the WRI-12 First Circular that may be requested by e-mail to: wri12@cug.edu.cn. For additional information, visit WRI-12 web site at: <http://www.wri12.cug.edu.cn>

Beyond WRI-12, future venues must start with Israel, which was a strong contender to host WRI-11, but security issues arising from the serious conflicts in the region persuaded us to move to Saratoga Springs (USA). Strong future contenders now include Switzerland, Mexico, Germany, Norway and ultimately South America and North Africa.

The Evolving Field of Water-Rock Interaction

Comparison of topics and themes covered during WRI-1 with those for WRI-11 clearly shows the vastly expanded tools, methodologies and scientific disciplines now used to investigate water-rock interaction. Thirty years ago an investigator would have been satisfied to obtain 10-20 water samples from his/her research site

and subject these to time consuming chemical analysis for major cations and anions and use the results to indicate the one or two major processes controlling the chemistry of water. At WRI-11 a similar study would have required 10 to 100 times more water samples, with a gridded spatial and temporal distribution together with an equal number of rock samples. The water samples would have been subjected to detailed organic and inorganic chemical analyses, and an array of stable and radioactive isotopes of water and solutes. An equally detailed data set would be collected on the solid phases before water-rock interactions are examined using sophisticated geochemical modeling. We now realize that natural systems are both heterogeneous and complex and require multidisciplinary teams and multi-tracer and -phase approaches to understand the details processes involved (Kharaka, 2003).

Over the last 20 years, new methodologies for laboratory analysis of cations and metals include the use of inductively coupled plasma emission spectrometry (ICP/ES) or the combination of ICP with mass spectrometry (ICP/MS) (e.g., Ivahnenko et al., 2001). The advantages of plasma techniques include: (1) they have a wide and linear dynamic concentration range, (2) they have multi-element capability, and (3) they are relatively free from matrix interferences. The use of ion chromatography (IC), gas chromatography (GC) and GC/MS has greatly improved the analysis of anions and dissolved organics (Ivahnenko et al., 2001; Kharaka and Hanor, 2003). Two sessions at WRI-11 highlighted advances in techniques: one session addressed new spectroscopic techniques including the use of synchrotron radiation, and the second discussed the use of multi-collector ICPMS to investigate new isotope systems.

These latter dramatic advances in isotope analytical techniques over the last decade have greatly expanded our knowledge of the isotopic composition of natural waters and solutes (Bullen et al., 2001). Not only is high precision information available for H, O, C, and S isotopic compositions, but there is now a large body of

data available for Sr, B, and noble gas isotopes as well. More recent has been the development of Li, Fe, Ca, Cl, Br, and I isotope systematics for natural waters. Applications of isotope geochemistry have included identifying sources of solutes and of H₂O, quantifying the degree of rock-water exchange, tracing fluid flow paths, determining paleotemperatures, and calculating ages and residence times of fluids. The systematics of many isotopic systems, such as those of Sr, have been well worked out for natural waters. Some systems, such as Br, are in their infancy, and others, such as the stable isotopes of Cl, have unresolved questions regarding their interpretation.

Studies investigating the role of bacteria on water-rock interactions and the field of microbiology, including geomicrobiology have increased dramatically, especially in the last 5 years (Shock, 2001). This topic was only marginally mentioned before WRI-9, but three sessions related to microbiology were run during WRI-11, indicating its importance not only at low temperature and salinity conditions, but also in brines and high TP environments. Other themes proposed for WRI-11 that would have been unthinkable for the early WRIs, include CO₂ sequestration, reactive organic species and possibly environmental geochemistry.

Final Perspective

For more than 30 years the Working Group on Water-Rock Interaction has continued to organize successful triennial WRI Symposia. I believe we are successful because we have developed an informal format that attracts students and the leading geochemists, geologists, hydrologists and other earth scientists from many developed and developing countries to commune on a broad field of science. The field trips, the social and cultural programs for the scientists and the accompanying members result in creating an atmosphere of informality and easy communication among the participants. Cooperative projects and deep friendships have developed between scientists from many countries. I invite you all to attend

WRI-12 in beautiful Kunming, Yunan Province, China, in the summer of 2007. Be warned, however that if you attend you will be hooked, because WRI has a very contagious spirit. The best definition of that spirit is that articulated by Yasue Oki (Japan) as “water-rock-human interaction”.

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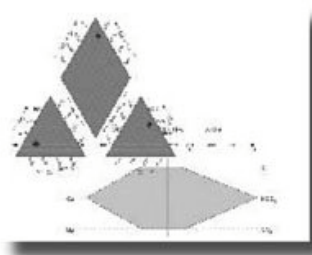
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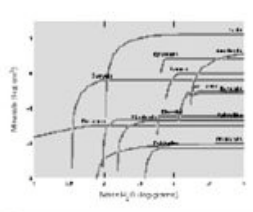
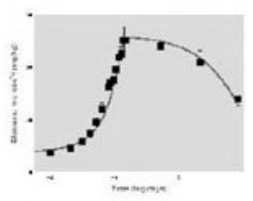
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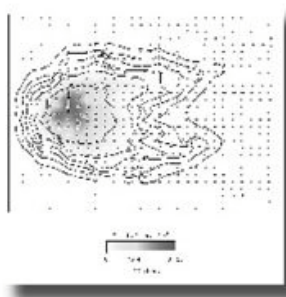
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