



THE GEOCHEMICAL NEWS

Newsletter of The Geochemical Society

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GCA as flea market and gossip sheet (6)

NOTE: The June issue of *GSA TODAY*, which contains housing and registration information for the GSA annual meetings, **will no longer be mailed** by The Geochemical Society to its members. All such information is available on the GSA Homepage, which is readily accessible from our web site at http://www.ciw.edu/geochemical_society/

*Ed Stolper delivers Ingerson Lecture at 1996 GSA Annual Meeting (article, page 7)



8th V.M. Goldschmidt Conference

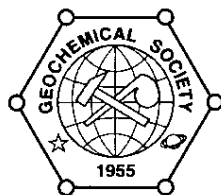
Toulouse, France
August 30-September 3, 1998

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The Geochemical Society is a nonprofit scientific society founded to encourage the application of chemistry to the solution of geological and cosmological problems. Membership is international and diverse in background, encompassing such fields as organic geochemistry, high and low-temperature geochemistry, petrology, meteoritics, fluid-rock interaction, and isotope geochemistry. The Society: produces a **Special Publications Series**, this biannual **Newsletter**, and (jointly with the Meteoritical Society) the journal *Geochimica et Cosmochimica Acta*; grants the **V.M. Goldschmidt** and **F.W. Clarke Awards**, and, jointly with the European Association of Geochemistry, the **Geochemistry Fellows** title; sponsors the **V.M. Goldschmidt Conferences**, held in North America in odd years and elsewhere in even years, jointly with the European Association of Geochemistry; and co-sponsors the Geological Society of America annual meeting (also the Geochemical Society's annual meeting) and the spring meeting of the American Geophysical Union. The Society honors the memory of our first President, F. Earl Ingerson, and our first Goldschmidt Medalist, Paul W. Gast, with the **Ingerson** and **Gast Lectures**. The Geochemical Society is affiliated with the American Association for the Advancement of Science and the International Union of Geological Sciences.

Members of the **Organic Geochemistry Division** are individuals with interests in studies on the origin, nature, geochemical significance, and behavior during diagenesis and catagenesis of naturally occurring organic substances in the Earth, and of extraterrestrial organic matter. GS members may choose to be affiliated with the OGD without any additional dues. The OGD presents the **Alfred E. Treibs Award** for major achievements in organic geochemistry, and **Best Paper** awards (student and professional) in organic geochemistry.

Editor's Corner

Lori Warneke and I have had a lot of fun putting together the last three issues of *The Geochemical News*, so it is with sadness that we run the add on page 4. However, the interests of the Geochemical Society and its members will be better served by individuals who can devote their full measure of "discretionary" time to this activity. Also, the Society's daily business has suffered as a result of our journalistic endeavors.

We sincerely hope that potential volunteers will recognize the many benefits and rewards of doing something like this. The international exposure is most enjoyable, and the effort to improve communications is exciting and challenging. I can think of no better way to serve the geochemical community. This newsletter could become very influential in the geochemical sciences, with the right mix of news, commentary, articles, announcements, and advertisements. We would like to see it approach the level of impact of *EOS* and other Society-sponsored newsletters, although recognizing that a voluntary effort may not have the polish that a full-time staff can provide. However, this also gives the editor(s) full and complete control of the product.

In the meantime, we will continue to do our best. Please keep sending us suggestions and material for future issues.

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Letter from Alex Halliday
President of the Geochemical Society

Dear colleagues,

There have been some important changes within the organization of the Geochemical Society over the past year. The Society has always thrived under the team efforts of a variety of players who give of their time so selflessly. As the Society's activities are expanding we are now considering the hiring of a full time, paid, Director, responsible for all the "business", the coordinating of all the activities of the Society and its personnel and the further development of the Web page and possibly the Newsletter.

Our publications are changing. Karl Turekian is now the Executive Editor of *Geochimica et Cosmochimica Acta*. He is introducing significant modifications to the journal and some of his plans are outlined elsewhere in this issue. The newsletter has always been a useful source of information on GS activities. We are encouraging its expanded use as a valuable vehicle for topical discussion as well as an informative source of news and information. We are planning on stepping up production to four issues per year in the near future. We are searching for a new editor since the job has become too large for the Secretary of the Society. Let us know if you are interested! At the same time, our other publications are coming under scrutiny. We will be discussing Special Publications, conference proceedings and workshop handbooks at the next Board of Directors meeting.

The Goldschmidt Conference has become a primary focus of our efforts meeting-wise and the Board of Directors meetings that were scheduled for every GSA and Spring AGU will now take place at every Goldschmidt Conference instead. Preparations are well underway for the next Goldschmidt Conference in Tucson, Arizona. The preliminary indications are that this will be an excellent meeting. As well as having a number of exciting sessions, we will be bestowing awards upon some truly outstanding scientists, as is announced elsewhere in this issue. The Society has strengthened its liaison with the European Association for Geochemistry further, with the development of the Gast Lecture series. This new lecture will be given once a year at the Goldschmidt Conference and the first Gast Lecturer will be Eduoard Bard from Marseilles. Goldschmidt Conferences are planned for Toulouse in '98, Boston in '99, Oxford in 2000. Let us know if you are interested in hosting Goldschmidt 2001. Suggestions for that meeting already have included Virginia, Florida, New Orleans, Tucson (again) and Monterey, California.

We are planning new meetings. The development of Geochemical Society short courses and workshops is of great interest and preliminary plans have been laid out for the first of these in the near future. We are making plans to hold a major conference on The Origin of the Earth and Moon, within about 2 years.

Finally, we are considering a new medal, the Patterson

Medal, in honor of the late Clair Patterson. Details will appear in the next issue.

Keep us informed of your views on any of the above or other issues. I am afraid that, given the amount that is going on, I do not reply to all the queries we receive. Nonetheless, we do try and take note of them.

Here's to a good meeting in Tucson!

Alex

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**European Association of
Geochemistry
1997 Medalists**

Urey Medal: The 1997 Urey Medal for lifetime achievement is shared by **Dr. John M. Hayes**, Woods Hole Oceanographic Institute, and **Dr. Geoffrey Eglinton**, University of Bristol. Dr. Hayes is recognized for his outstanding contributions to biogeochemistry, including the application of light stable isotope studies and innovative mass spectrometry developments. Dr. Eglinton is recognized for his pioneering work in organic geochemistry and the development of a method to determine paleotemperature.

Houtermans Medal: The 1997 Houtermans Medal for early-career achievements will be presented at this year's Goldschmidt Conference to **Dr. Kenneth A. Farley** of the California Institute of Technology, in recognition of his application of noble gas studies to mantle/atmosphere evolution and temporal variations in the delivery rate of extraterrestrial debris to the Earth.

Volunteers Sought for Newsletter Editor



The Board of Directors of the Geochemical Society solicit volunteers for a new position as Newsletter Editor, in recognition of the importance of *The Geochemical News* to its members and the geochemical community at large. Heretofore, this activity has been one of the responsibilities of the Secretary of the Society. However, it has become clear that a dedicated individual, free of the other duties associated with that office, is needed in order to make further improvements.

The Geochemical News is presently distributed to over 1700 members in 47 countries, representing all aspects of the geochemical sciences. The Editor of this publication will find the effort extremely rewarding, in terms of creative expression, community service, and career benefits. Membership in the Society is not a prerequisite, so please help us to better serve you by sharing this add with your colleagues, and actively encouraging those you think would do a good job to apply.

We seek an individual or team with sufficient scientific background, connections with the geochemical community, and computational, journalistic, and artistic skills to efficiently and effectively produce the newsletter, at least at the current frequency and level of quality and content, but with the ability and willingness to make improvements in all three areas. Currently, the Editor generates or solicits all text and artwork, and prepares a camera-ready product or electronic equivalent that is ready to go to press, receiving no compensation. The Society bears all printing and distribution costs, and mailing labels are provided by our Business Manager. A modest honorarium and expense account to be associated with the Editorship are also being considered. Further information will be provided to serious candidates.

We would like to see the newsletter evolve from a biannual to a quarterly issue with formal publication status, which includes more than just Society business, meeting announcements, obituaries, and so on. Short papers, a letters section, editorials, scientific and "political" news items might be included. Classified and commercial advertisements of an appropriate nature might be considered, which would be of interest to geochemists and also help defray the cost of publication. A future goal is to offer the newsletter in an electronic format.

Interested individuals should submit a vita and statement including their views on how the newsletter might evolve, and specific details concerning their expertise, access to computational, graphical, and journalistic resources, and institutional support. Letters of reference from appropriate individuals would be beneficial. Send inquiries and applications to:

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Notes from the Business Manager

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New Members

The Geochemical Society has 54 new members for 1997. Thank you for joining the Geochemical Society. We hope your association with the society is long-lived and profitable. Please remember that if you need a change of address (or phone, fax, e-mail) it should be sent to this office. If your copy of the 1996 membership directory, newsletter, or an issue of *GCA* did not arrive or was damaged, I am the person to contact. E-mail (geochsoc@pop.service.ohio-state.edu) is preferred.

Renewals

As of January 24, 1997, 60% of our members have renewed. A bright yellow renewal notice went out to members in October, if you misplaced yours, do not worry. You can use the membership form in this newsletter, but please clearly mark renewal on the top of the page. Our WWW page, http://www.ciw.edu/geochemical_society/, is now updated with the 1997 form as well. If you have any questions about your renewal status, please contact me. A final notice will be sent out to those who have not renewed.

Back issues of GCA

If you are having problems with delivery of *GCA*, please do not wait 6 months to bring it to my attention. I have a few issues from recent volumes of *GCA* in the office to send as replacement copies. In addition, I am responsible for ordering back issues from Elsevier (6-8 weeks for delivery). Back issues for the most current volume (61) can be ordered without charge. If you act quickly, I may be able to get some issues of volume 60 as well. All other volumes or issues can be ordered through this office to receive a discount as a Geochemical Society member. Send your request by e-mail, fax, or postal mail to receive an estimate.

1996 Membership Directory

The membership directory for 1996 was sent with *GCA* to subscribers and mailed individually to all the other members. If you did not receive your copy, please let me know. Addresses are always changing and mistakes are made, but hopefully this directory will still be useful to you in your work. We cannot publish all address changes or corrections, but here are a few changes for the membership directory.

David J. Walker should read **David R. Walker**. James R. Thompson should read **James B. Thompson**

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Note important changes:

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Johnson Space Center- area code 703 to 281

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*Geochimica et
Cosmochimica
Acta* as a flea
market and a
gossip sheet

Karl K.
Turekian,
Editor

Geochimica et Cosmochimica Acta deems itself as the premier journal of geochemistry. Whether, indeed, it is so obviously depends mainly on the perception of its readership and contributors, but it also depends on the Editor and the community of reviewers that certify the quality and relevance of the published material. In the new world of Internet and search engines, a journal's visibility is not of great importance of itself since all journals in principle are now visible and all articles are easily read in whatever journal they occur. What is unique then about *Geochimica et Cosmochimica Acta*? It provides a unique gathering place for a range of geochemists, a sort of social mixer and flea market combined. We display our wares to prospective users hoping that we will not only address our usual customers but also the walk-in crowd. That is exactly what we do when we scan a hard copy of *Geochimica et Cosmochimica Acta* held in our hands. We learn about the commonality of element distribution problems, the broad utility of stable and radioactive isotopes and the application of kinetics to surface reactions whether on a mineral or at the earth-fluid interface wherever it may be found.

There are papers of quality that speak to a narrow group of specialists. Some of these papers have broader significance than those identified by the specialists. The role of the Editor and his helpers is to try to distinguish the special properties of the paper so far as the readership of the journal is concerned. There are some papers that are so innovative and potentially have such broad impacts that they transcend all rules of traditional editorial protocols. The Editor must try to associate himself with these papers as well as the traditional papers.

Some papers belong to a ripe area of research to which other journals are dedicated. We would like the best of these in *Geochimica et Cosmochimica Acta* but realize that many of those that might have been sent to *Geochimica et Cosmochimica Acta* in the past might better be sent elsewhere. Likewise, papers that are fundamentally chemical or geological in nature should appropriately be sent to quality chemical or geological journals. This category includes descriptive papers and extensions of

chemical experiments only remotely tied to geochemical research. It is incumbent on the author of a paper submitted to *Geochimica et Cosmochimica Acta* to address the importance of the results directly in the manuscript so that a reader unfamiliar with the area can see immediately why the paper is in *Geochimica et Cosmochimica Acta*. An author following the spirit of these comments will find *Geochimica et Cosmochimica Acta* an excellent vehicle for influencing a range of geochemists.

Geochimica et Cosmochimica Acta should publish more papers in the environmental areas. In particular atmospheric geochemistry should be brought into the fold as well as a new emphasis on marine geochemistry. These were areas of significance in the past and should be again. The area of high pressure mineralogy is a very lively one these days. Many of the breakthroughs in these areas were first displayed in *Geochimica et Cosmochimica Acta*.

As editor, I would like to imagine geochemists anxiously awaiting each issue of *Geochimica et Cosmochimica Acta* to scan the articles in their own fields but also in adjacent ones. The newsy aspects of our discipline will then come through. We will become educated gossipers about the novelties in geochemistry. Who knows, this might even influence what we do in our own private geochemical lives!

CALL FOR NOMINATIONS

OGD BEST STUDENT PAPER in ORGANIC GEOCHEMISTRY for 1997

This award will be for the best STUDENT PAPER published in 1996. Criteria for this award will be as follows:

- 1) The paper must be published in the year prior to the award (for this award the paper must bear a 1996 publication date).
- 2) The paper can be submitted by the faculty advisor, a student, or other reader.
- 3) The nomination must be received by the OGD secretary by July 1 of the year in which the presentation is to be made (1997).
- 4) The student MUST be first author on the publication, and MUST be enrolled as a student AT THE TIME OF SUBMISSION (not publication).

If the student has graduated, the date of graduation should be included in the nomination letter. The Members-at-Large on the Executive Committee will serve as judges. The award will be a one-year membership in the Geochemical Society with all rights and privileges, including a GCA subscription. Send nominations to Stephen A. Macko (Secretary, OGD), Dept. Environmental Science, University of Virginia, Charlottesville, VA 22903 USA, fax: 804-982-2137, email: sam8f@uva.pcmail.virginia.edu

A brief extract from the 1996 Ingerson Lecture by Edward M. Stolper, October 30, 1996

Adiabatic Melting of the Mantle

Generations of geology students have struggled through the rite of passage of learning how to read phase diagrams and apply them to understanding igneous processes. Although it may have seemed at times to many students that this was some kind of senseless torture, there was a sound reason for their struggles. Although 1-, 2- and 3-component systems are incomplete models of actual magmatic systems, many of the processes that occur in natural systems can be understood by analogy with them, and most importantly, phase diagrams make it possible to visualize often complex processes in relatively simple terms. Thus, they provide an easy to understand yet powerful framework for interpreting and understanding complex natural phenomena.

It is, however, ironic that adiabatic melting (also referred to as decompression melting), the most important process by which magmas form in the mantle (and thus arguably the most significant of all igneous processes), cannot be modeled readily within the framework of the phase diagrams with which we all teach and were taught. Figure 1 shows the usual way in which adiabatic melting is portrayed, as originally proposed by Verhoogen in the 1950s. From 1→2, solid mantle ascends adiabatically (i.e., the region of ascending mantle is envisioned to be sufficiently large that the flow of heat into or out it can be neglected; in thermodynamic terms, $q=0$), but because the solidus is steeper in P-T space than the adiabat of the solid, the ascending solid mantle intersects the solidus at 2, and as it ascends further, it begins to melt. From 2→3, the ascending mantle melts progressively, and the "wet" adiabat is steeper than the deeper, entirely solid adiabat because given the adiabatic constraint the heat of fusion must be supplied by cooling of the ascending material. This is usually where the analysis ends, and the kinds of questions that phase diagrams are so useful at answering, such as how do the proportions of solid and liquid change as the parcel of mantle ascends and how do batch and fractional melting differ during decompression melting, cannot be addressed with this presentation or with any of the simple phase diagrams we ordinarily use.

The problem is basically that the familiar phase diagrams, such as P-T diagrams (e.g., Figure 1), isobaric binary T-X diagrams (with their familiar phase loops, eutectics, peritectics, azeotropes, solvi, etc.), and isobaric ternary liquidus diagrams, are constructed based on the choice of P, T, and composition as the independent variables, in which case the specific Gibbs free energy (G) is minimized at equilibrium. For processes in which P, T, and composition are specified, these phase diagrams are useful for evaluating equilibrium assemblages and how they change with changes in these variables. Thus, for processes such as isobaric crystallization in magma chambers or isobaric melting, these diagrams are very useful, and indeed, it is for this reason that our predecessors focused on these diagrams, since these processes, especially isobaric crystallization, were the ones they considered most important for understanding the observed diversity of igneous rocks. However, P, T, and composition are *not* the independent variables during decompression melting;

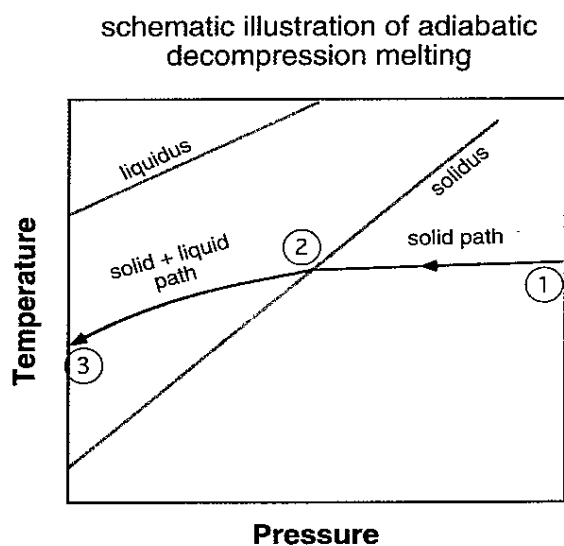


Figure 1

this can be understood with Figure 1, where it is clear that given the choice of an adiabat, the temperature at a particular pressure is a dependent variable, rather than an independent one.

What then are the appropriate variables for thinking about decompression melting? If we approximate the process as both adiabatic ($q=0$) and reversible ($q=TdS$, where S is entropy), then the process is isentropic (i.e., $dS=0$). This is at best an approximation as there are several possible sources of irreversibility and thus of increases in entropy, but the isentropic approximation is nevertheless a useful starting point for evaluating this process. So, the independent variables during reversible, adiabatic decompression melting are S (specific entropy), P , and composition; the variable that reaches a minimum for this choice of independent variables at equilibrium is the specific enthalpy (H). Phase diagrams that show equilibrium (i.e., minimum H) assemblages as functions of P , S , and composition should thus provide a useful, simple framework for understanding reversible adiabatic melting in much the same way that the more familiar diagrams that show equilibrium (i.e., minimum G) assemblages as functions of P , T , and composition provide such a framework for understanding isobaric crystallization or melting.

Figure 2a shows a schematic P-S diagram for a one-component system involving a solid and a liquid. This diagram shows the assemblage with minimum H at each P and S . Note that this diagram is topologically similar to the familiar isobaric T-X phase loop for a binary system, and it can be read in very much the same way. An isentropic decompression is described on this diagram by a vertical (constant S) line. The vertical line shown on this figure illustrates a representative adiabat for batch melting (i.e., where the melt does not segregate from the residual crystals). Starting from state 1, the system remains en-

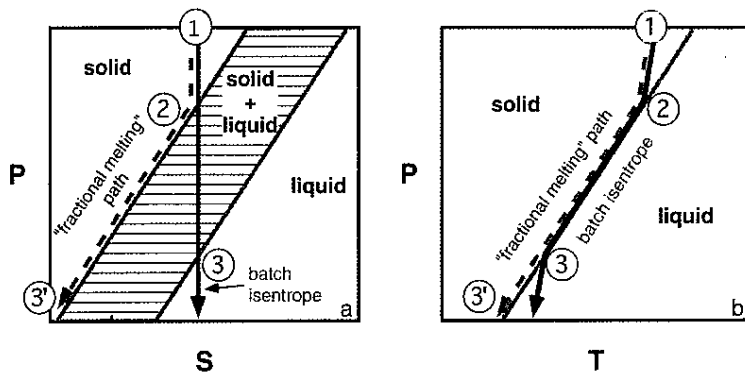


Figure 2

tirely solid until it reaches state 2, at which point it passes into the two-phase, solid + liquid field and begins to melt. The amount of melt present at any pressure can be determined from the lever rule; for this particular artificial example, the melt productivity (the change in melt fraction per pressure decrement) is constant since the solid and liquid boundaries of the two-phase field are linear and parallel. Melting is complete at state 3. Note that given the isentropic condition, melting occurs over a finite temperature range even though this is a one-component system, in contrast to the more familiar case of isobaric melting in such a system, for which melting in a one-component system occurs at a single temperature. Figure 2b shows the P-T diagram for this same system, and shows the same adiabatic path for batch melting.

The P-S diagram can also be used to evaluate what happens during fractional fusion, by which is meant that all melt is extracted from the system instantaneously as it is generated. Such a process is, of course, neither reversible nor adiabatic because melt leaves the system carrying entropy with it, but the case can be considered where each *increment* of melting is accomplished isentropically, followed by extraction of the melt. The dashed line in Figure 2 describes such a process starting with a specific entropy for the solid identical to that for the batch fusion process described above. The path $1 \rightarrow 2 \rightarrow 3'$ shows the specific entropy of the solid residue (i.e., of the source region as melting proceeds, since all melt is instantaneously removed) as fractional melting proceeds. Once melting begins (i.e., at state 2), the specific entropy of the solid residue declines along the solid edge of the two-phase solid + liquid field. Note that at the very start of melting (i.e., state 2), the first increment of melting is identical for the batch and fractional fusion cases, so right at the solidus of the system, the productivity of batch and fractional fusion are identical. However, for fractional fusion, although the mass of the solid residue decreases continuously and eventually becomes vanishingly small, it is not possible to melt fully the solid by this process; i.e., there will always be some residual solid. Thus, whereas batch melting is completed over a finite pressure interval ($2 \rightarrow 3$), for fractional fusion, the system is never fully molten, so as melting proceeds, the productivity for fractional fusion (normalized to the original mass of the system) must be lower than that for batch fusion.

We thus begin to see, even with this extremely simple example, the utility of the P-S diagram for a one-component system for illuminating aspects of decompression melting. We can see why *partial* melting must occur for this process; we can visualize the productivity in terms of a simple application of the lever rule; we can see why right at the solidus, the productivities of batch and fractional fusion must be identical, but we can also see that for higher degrees of melting, fractional fusion will be less productive than batch fusion. Although it is beyond what I want to present here, it can be shown that these simple insights generally carry over to melting of peridotites under actual mantle conditions.

Figure 2 was artificially constructed so as to be easy to read and follow. P-S diagrams can, however, be constructed for "real" systems, and such a diagram is shown for diopside (approximating its melting as congruent) in Figure 3. The important point here is that in contrast to the artificial construction in Figure 2, the edges of the two-phase boundaries are not straight. This reflects the effects of decreasing temperature and the changing slope of the diopside solidus in P-T space with decreasing pressure. Note now that if we follow a batch melting path (a vertical line) on this diagram, simple application of the level rule shows that the amount of melt generated per decrement of pressure *increases* with decreasing pressure. This can be readily seen by noting that from state 1 to state 2, the amount of melt increases from 0 to 50%, and from state 2 to state 3 it increases from 50 to almost 100%, but the pressure interval from $1 \rightarrow 2$ is much larger than from $2 \rightarrow 3$ as a consequence of the curvature of the two-phase boundaries. We thus have the rather surprising result, which would be exceedingly difficult to work out from following this process on a P-T diagram, that isentropic melting

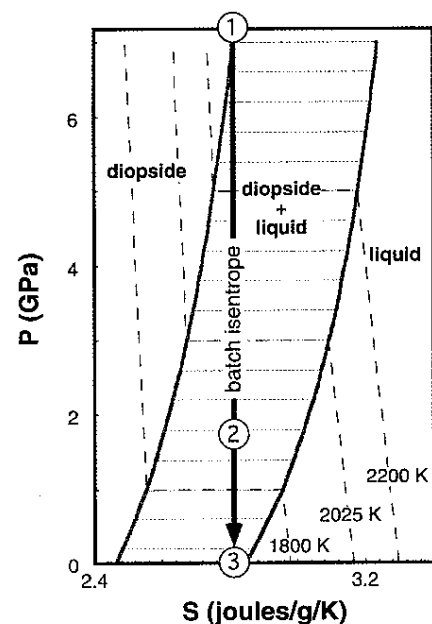


Figure 3

in this simple one-component system actually "accelerates" with decompression. This effect is not a small one, and for the path shown in Figure 3, the increase in productivity from the solidus to the liquidus is about a factor of 6. Although I will not demonstrate it here, it can be shown that the increase in productivity seen in this simple system carries over to natural peridotitic sources in the mantle; in fact, there are additional effects related to compositional contrasts between solid and liquid that tend in the case of peridotites to enhance this phenomenon, such that there can be a more than 20-fold increase in productivity from the solidus to the exhaustion of clinopyroxene at about 20% melting (see Asimow, P.D., Hirschmann, M.M., and Stolper, E.M., An analysis of variations in isentropic melt productivity, *Phil. Trans. Roy. Soc. London A*, **355**, 1-27, 1997, for an in-depth treatment). There are a variety of additional complications in multicomponent systems (e.g., exhaustion of a phase from the residue leads to a discontinuous drop in productivity), but this phenomenon of increasing productivity with decompression is likely to be extremely important in nature, and although it has not previously been noted, it is easy to understand if examined using simple phase diagrams, as long as the appropriate variables are chosen.

All of this is both good news and bad news for future generations of geology students. The good news is that the most significant process in the generation of magmas on our planet can be routinely and simply visualized using simple phase diagrams. The bad news is that students will still have to learn to read phase diagrams, and now there are even more than there used to be!

Edward M. Stolper is the William E. Leonhard Professor of Geology in the Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, CA 91125 USA

Geochemical Society Events at 7th V.M. Goldschmidt Conference Tucson, Arizona, USA, June 1-6, 1997



(Specific times and places for most of the events below have not yet been established. Look for them in the conference program.)

GS Board of Directors Meeting: Sunday, June 1, 8:00 AM to 5:00 PM.

President's Address: Geochemical Society President **Alex N. Halliday** of the University of Michigan will present a lecture entitled "*Plasmas, The Early Solar System and Climate Dynamics*".

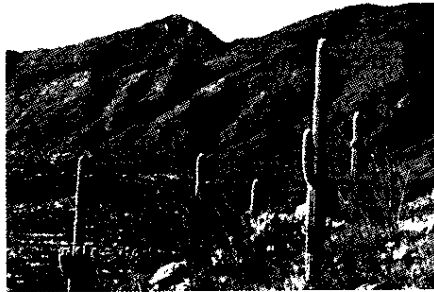
V.M. Goldschmidt Award: The 1997 Goldschmidt Medal and Lester W. Strock Honorarium will be presented to **Dr. Devendra Lal**, Professor of Nuclear Geophysics at Scripps Institute of Oceanography, for his lifetime achievements in the application of theoretical and experimental studies toward a better understanding of the evolutionary processes of meteorites, the properties of solar and galactic cosmic rays, and a number of earth surface processes including atmospheric circulation and aerosol dynamics, water circulation, solute-particle interactions and nutrient cycling in the oceans, erosion of rock surfaces, and glacier accumulation/ablation history.

F.W. Clarke Award: The 1997 Clarke Medal will be presented to **Dr. Jonathan David Blundy**, Royal Society University Research Fellow at Bristol University, for his Ph.D. studies of the structure and petrologic history of the Adamello complex (Supervisor: Dr. Steve Sparks at Cambridge) and his development of a comprehensive model to explain the partitioning behavior of trace elements during igneous fractionation, based on innovative experimental, analytical, and theoretical approaches.

Geochemistry Fellows: The 1997 Geochemistry Fellows of the Geochemical Society and the European Association of Geochemistry will be introduced: **Philip Abelson, Yan Bottinga, Ian Carmichael, Donald J. DePaolo, Bruno J. Gilletti, Tom Krogh, Ikuo Kushiro, Günter W. Lugmair, Fred T. Mackenzie, Alexandra Navrotsky, Michael O'Hara, Keith O'Nions, Denis M. Shaw, Edward M. Stolper, George W. Wetherill, and Derek York.**

Paul W. Gast Lecture: The inaugural Gast Lecture will be delivered by **Dr. Edouard Bard** of Université Aix-Marseille III. The title of his presentation is "*Geochemical and Geophysical Implications of the Radiocarbon Calibration*", which will involve an overview of the ¹⁴C calibration problem in order to update the calibration curve with recent published and unpublished data, to review the causes of ¹⁴C variability and their impacts on geochemistry and geophysics, and to outline new geochemical applications of radiocarbon dating made possible by a more refined calibration.

SEVENTH ANNUAL V. M. GOLDSCHMIDT CONFERENCE



JUNE 2-6, 1997

THE WESTIN LA PALOMA ▲ TUCSON, ARIZONA

<http://cass.jsc.nasa.gov/goldschmidt.html>

HOSTED BY

Department of Planetary Sciences/
Lunar and Planetary Laboratory
and
Department of Geosciences,
The University of Arizona

SPONSORS

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ORGANIZERS

Dr. Michael J. Drake, Conference Chair
Dr. Joaquin Ruiz, Program Committee Chair

PROPOSED INTERDISCIPLINARY SYMPOSIA

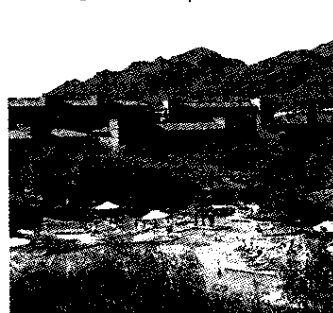
Large Igneous Provinces and Their Relation to Plumes and Climate ▲ Links Between Ocean Chemistry, Climate, and Tectonics ▲ Carbon Cycling in Soils ▲ Comparative Chemistry Between Mars and Earth ▲ Mineral Growth Kinetics and Reactivity ▲ Fluxes in Subduction Zones ▲ Symposium in honor of Prof. Paul Damon ▲ Symposium in honor of Dr. Tatsumoto ▲ Symposium in honor of Prof. Bart Nagy

PROPOSED TECHNICAL SESSIONS

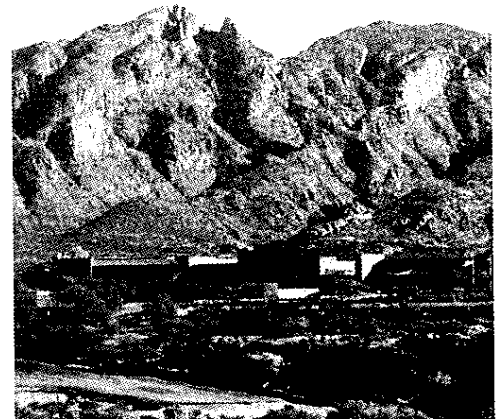
Microbial-Geochemical Interactions in Soils ▲ Chemical Weathering ▲ Planetary Geochemistry ▲ Core, Mantle, and Crust in Early Earth ▲ Record of Climate Change ▲ Evolution of Mantle Reservoirs ▲ Fundamental Controls of Trace Elements ▲ Isotopic Exchange in Crustal and Mantle Processes ▲ Geochemical Kinetics

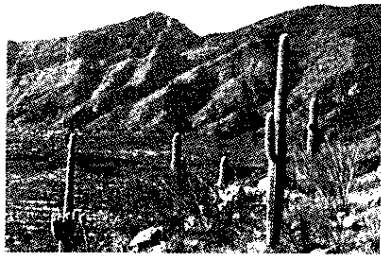
CONTACT

Dr. Michael J. Drake, Department of Planetary Sciences,
Lunar and Planetary Laboratory, The University of Arizona,
Tucson AZ 85721, USA; phone: 520-621-6962; fax: 520-621-4933
e-mail: goldconf@lpl.arizona.edu



The rugged beauty of the Santa Catalina mountains provides a lush backdrop for the Westin La Paloma, the site of the Seventh Annual V. M. Goldschmidt Conference.





SEVENTH ANNUAL V. M. GOLDSCHMIDT CONFERENCE

JUNE 2-6, 1997
TUCSON, ARIZONA

<http://cass.jsc.nasa.gov/goldschmidt.html>

PREREGISTRATION FORM

REGISTRANT INFORMATION

PLEASE PRINT CLEARLY.

LAST NAME _____ FIRST _____ M.I. _____

AFFILIATION _____

ADDRESS _____

PHONE _____ FAX _____

E-MAIL _____

GUEST NAME(S) _____

REGISTRATION FEES			ALL FEES PER PERSON.	METHOD OF PAYMENT
	Registration Through April 25	Registration After April 25	Amount Enclosed	Payment MUST accompany form.
Participant	\$275	\$325	\$ _____	<input type="checkbox"/> Foreign participants who have currency exchange problems may return this form and pay in <u>cash</u> at the meeting. <input type="checkbox"/> Check or Money Order Payable to the Lunar and Planetary Institute. Checks must be drawn on a U.S. bank. <input type="checkbox"/> VISA <input type="checkbox"/> MasterCard <input type="checkbox"/> American Express
Guest	\$200	\$250	\$ _____	
Sierrita Mine Field Trip	\$50	\$50	\$ _____	
Do you have any physical or dietary restrictions? <input type="checkbox"/> YES <input type="checkbox"/> NO If yes, briefly describe _____ _____ _____				CARD NUMBER _____ EXPIRATION DATE _____ NAME AS IT APPEARS ON CARD _____ SIGNATURE _____
			Total \$ _____	

Return this form by **April 25, 1997**, to Goldschmidt Registration, Lunar and Planetary Institute, Publications and Program Services Department, 3600 Bay Area Boulevard, Houston TX 77058-1113, USA.

For registration information contact the LPI Publications and Program Services Department.
 Phone: 281-486-2142; fax: 281-486-2125; e-mail: tanner@lpi.jsc.nasa.gov



The Geochemical Society: Call for Nominations 1998 F.W. Clarke Award

The F. W. Clarke Award, consisting of a silver medal and a certificate, shall be made to a young scientist for a single outstanding contribution to geochemistry or cosmochemistry, published as either a paper or a series of papers on a single topic. Candidates must have held a recognized doctorate or its equivalent for no more than six (6) years, or be not more than thirty-five (35) years of age, whichever anniversary date is later on December 31st of the year in which the award is approved by the Board of Directors. Independence and originality shall be important factors.

1972 D. A. Papanastassiou	1985 E. M. Stolper
1973 H. Ohmoto	1986 M. D. Kurz
1974 L. Grossman	1987 E. Takahashi
1975 D. Walker	1988 F. M. Phillips
1976 J. R. Wood	1989 no award
1977 B. Mysen	1990 R. J. Walker
1978 D. J. DePaolo	1991 D. Sherman
1979 A. C. Lasaga	1992 E. Klein
1980 R. W. Potter	1993 Y. Zhang
1981 J. F. Minster	1994 C. Agee
1982 P. J. Patchett	1995 R. Lange
1983 E. B. Watson	1996 P.M. Dove
1984 A. Mackenzie	1997 J. D. Blundy

Nominations for the 1998 F. W. Clarke Award should be submitted before November 1, 1997 to:

Dr. John Jones
SN4, NASA/Johnson Space Center
Houston, TX 77058 USA
Tel: 713-483-5319
Fax: 713-483-5347
E-mail: jjones@snmail.jsc.nasa.gov

The Goldschmidt and Clarke awards will normally be given annually at the V.M. Goldschmidt Conference, but may be reserved at the discretion of the Board of Directors. Neither award is normally shared, except in highly unusual cases, such as independent discoveries or joint work where the contributions of the co-workers are essentially equal. Members of the Board are ineligible for the duration of their terms. Past medalists are permanently ineligible.

Nominations should specify the name, address, citizenship, and chief fields of specialization of the nominee, and be accompanied by a curriculum vitae and bibliography of the nominee, limited to two pages each, and up to three supporting let-

ters. Nominations should also be accompanied by a letter from the nominator giving name, address, phone number, signature, and a few paragraphs summarizing why the candidate is suitable for the award.

Nominations for the Clarke Award should be accompanied by a copy of the paper(s) for which the nominee is to be considered for the award, together with a statement explaining the significance of the work. Nominators should also specify the nominee's final degree, the degree advisor's name, the year granted, and the name of the granting institution.

All nominations will be considered by the Award Committees and will remain active for three years, unless the candidate becomes ineligible due to time limitations (Clarke), or on grounds of membership on the Board or on one of the Award Committees. Such nominations will then be tabled for the duration of this nominee's term, then reactivated for the balance of the three year period after expiration of the term.

Award winners are chosen by the Board of Directors, normally from between a nominee and an alternate recommended by each Award Committee. The awards are based solely on scientific merit, without regard to citizenship or membership in the Society.

International Pressure Calibration Workshop

On August 22-23, 1997, the Institute for Study of the Earth's Interior, Okayama University, Misasa, Japan, will host the International Pressure Calibration Workshop. The workshop is being co-sponsored by the Center for High Pressure Research (SUNY-Stony Brook, Princeton, Geophysical Laboratory). The purpose is to work toward the development of an International Pressure Scale that extends to the highest pressures attainable in the laboratory and serves as a reference for calibration of high pressure apparatus. The workshop is directed toward the mineral physics, petrological, and materials science communities that use piston-cylinder, multianvil and diamond anvil presses and shock-wave apparatus.

The workshop is being held immediately before the International Conference on High Pressure Science and Technology (Joint AIRAPT-16 and HPCJ-38 meetings) in Kyoto. Those interested in receiving further details should send a brief message to presnall@utdallas.edu; Dean C. Presnall, Department of Geosciences, University of Texas at Dallas, P.O. Box 830688, Richardson, TX 75083-0688; Phone: 972-883-2444, Fax: 972-883-2829

THE GEOCHEMICAL SOCIETY

Call for Nominations for 1998 Joint EAG-GS Geochemistry Fellows



The European Association of Geochemistry (EAG) and the Geochemical Society (GS) established in 1996 the honorary title of Geochemistry Fellow, to be bestowed upon outstanding scientists who have, over some years, made a major contribution to the field of geochemistry. Existing and new Urey, Goldschmidt and Treibs Medal winners become Fellows automatically. In addition, up to 0.5% of the total combined membership of the two societies should be elected as Fellows each year. This corresponds to approximately 15 honorees per year at current enrollment levels, and allows for growth in the societies. Nominations will be sought and recommendations for election made by a committee (Fellows Selection Committee) of 8 persons, 4 from GS, and 4 from EAG.

Any member of either society may nominate Fellows by right. No individual may be elected a Fellow, except as a result of having previously won the Urey, Goldschmidt or Treibs Medal, while they are serving either on the Fellows Selection Committee or as a Council / Board member of EAG / GS. The Selection Committee may not themselves nominate individuals, but may actively solicit nominations from others. Members of the Selection Committee and Council / Board may not vote on any nomination where there is a clear conflict of interest. Final approval of all nominees will be made by the EAG Council and the GS Board of Directors. In the event that the EAG Council and the GS Board differ over the ratification of a nomination, the Executive Committee of the Goldschmidt Forum (the Presidents and Vice Presidents of EAG and GS) will resolve the issue. Fellows will be inaugurated at the 8th V.M. Goldschmidt Conference in Toulouse, France in 1998.

Nominations should include the name, address, and telephone number of the nominee, a citation of no more than two pages describing the contributions the individual has made to geochemistry, and up to three letters of support from members of either society. The nomination should also include the nominator's name, address, telephone number, and signature.

Nominations should be sent no later than November 1, 1997 to:

Dr. John M. Hayes (Chair, Fellows Selection Committee)
WHOI, MS8
Woods Hole, MA 02543 USA

T: 508-289-2585
F: 508-457-2183
E: jhayes@whoi.edu

Geochemistry Fellows (excluding Urey, Goldschmidt and Treibs Medalists)

1996: William Compston, Willi Dansgaard, John Edmond, John M. Hayes, Marc Javoy, Ho-Kwang Mao, Stephen Moorbath, John Reynolds, Jean-Guy Schilling, Nick Shackleton, Mitsunobu Tatsumoto, Werner Stumm, George Tilton, Grenville Turner, Heinrich Wänke, William White

1997: Donald J. DePaolo, Jan Bottinga, Philip Abelson, Gunter W. Lugmair, Tom Krogh, Michael O'Hara, Ikuo Kushiro, Fred T. Mackenzie, Denis M. Shaw, Bruno J. Giletti, George W. Wetherill, Keith O'Nions, Ian Carmichael, Edward M. Stolper, Derek York, Alex Navrotsky

International Conference on ISOTOPES IN THE SOLAR SYSTEM Ahmedabad, India November 11-14, 1997

The Physical Research Laboratory, Ahmedabad will hold an International Conference on "Isotopes in the Solar System" at Ahmedabad during November 11-14, 1997. The themes that will be covered in the conference are:

- Isotopic Records in Meteorites and the Early Solar System.**
- Isotopic Geology, Geochemistry and Geochronology of Himalayas and peninsular India.**
- Isotopic Records of Quaternary Climates.**
- Isotopic Tracers for Water and Particle Dynamics in the Ocean**

For further information please contact: Prof. J. N. Goswami (Chairman, Local Organizing Committee), Physical Research Laboratory, Ahmedabad 380 009, INDIA; Fax: (91)-79-6560502; Phone: (91)-79-462129; E-mail: isotope@prl.ernet.in

1997 GEOCHEMICAL SOCIETY SYMPOSIA



GSA Annual Meeting, Salt Lake City, Utah, October 20-23, 1997

“Geochemical Record of Hydrologic Response to Climate Change”

Convenors: Emi Ito, University of Minnesota; Jay L. Banner, University of Texas at Austin

Measurements of chemical and isotopic variations in surface and ground waters have been fundamental tools in studies of modern hydrologic processes in continental settings. These tools are being increasingly applied to geologic records of paleohydrologic processes, such as lacustrine sediments, cave deposits, weathering products, and biota. This approach is essential for improving our understanding of the connections between climate variability and the evolution of natural waters. This symposium will examine the types of geologic records and geochemical tracers of coupled hydrologic-climatic variability, and the prospects for 1) advancing chronologic and spatial resolution of such variability, and 2) integrating continental records with marine and ice-core records.

Emi Ito, Department of Geology and Geophysics, and Limnological Research Center, University of Minnesota, 310 Pillsbury Drive, SE, Minneapolis, MN 55455, P: (612) 624-7881, F: (612) 625-3819, E: eito@umn.edu

Jay L. Banner, Department of Geological Sciences, University of Texas, Austin, TX 78712, P: (512) 471-5016, F: (512) 471-9425, E: banner@maestro.geo.utexas.edu

Spring AGU, Baltimore, Maryland, USA, May 27-30, 1997

“The isotopic Record of Pre-Cenozoic Global Change”

A diverse, international group of specialists with interests ranging from early development of an oxygenated atmosphere, to the coupling of marine carbon and sulfur cycles, to the timing of isotopic variations with biological event horizons, will address the application of isotopic methods to the pre-Cenozoic geologic record of global change. Empirical data sets for elements including carbon, oxygen, sulfur, and strontium are now available at fairly high resolution for much of the Paleozoic and Mesozoic. Despite this improvement, the description of relationships between isotopic variations and their driving mechanisms, and the use of the isotopic record to constrain geochemical models, are research avenues that remain both fertile and contentious.

For more information about the symposium, contact Robert L. Ripperdan, Oak Ridge National Laboratory, (isotopy@aol.com), and find full details about the AGU meeting at <http://www.agu.org>

Organic Geochemistry Division Symposium: 1997 GSA Meeting, Salt Lake City

“Organic Perspectives on Geochemical Processes”

This will be the usual Sunday symposium of the Organic Geochemical Division of the Geochemical Society and will focus on how organic substances can be used as unique windows on processes occurring in contemporary aquatic and terrestrial environments. The co-conveners (Cindy Lee, Stu Wakeham and John Hedges) plan on a dozen or so invited talks that would target fundamental processes such as dissolution, sorption, biodegradation and transport. However, some of the processes expected to be highlighted might include: primary production, particle transport, particle aggregation/disaggregation, leaching/dissolution, microbial degradation, abiotic degradation, adsorption/desorption, photolysis, diffusion, ion complexation, heterocondensation, weathering, air/sea exchange, preservation, and thermal alteration. Subjects of the talks will depend on interest and availability of speakers. Any suggestions are welcome.

Contact John I. Hedges, School of Oceanography, University of Washington, Box 357940, Seattle, WA 98195-7490 USA, phone: 206-543-0744, fax: 206-543-6073, email: jihedges@u.washington.edu



Joint MSA/GS Reception at 1996 GSA

The annual joint reception of the Geochemical Society and the Mineralogical Society of America, held at the GSA Annual Meeting, Denver, Colorado, Oct. 29, 1996, was a rousing success. Presidents Gordon Brown, MSA, and Alex Halliday, GS, presided over the festivities (shown in the top left photo), and the highlight of the evening was the presentation of a plaque by Alex on behalf of the Geochemical and the Meteoritical Societies to Gunter Faure in recognition of his nine long years of outstanding service as Executive Editor of *Geochimica et Cosmochimica Acta*. Gunter is shown in the top right shot, flanked by GCA Managing Editor Lee Mobley (left), and GS Director, Terri Bowers. The smiles in the other photos on this page are representative of the conviviality shared by the more than 200 attendees. Please join us for this year's reception in Salt Lake City!



THE GEOCHEMICAL SOCIETY

Slate of 1997 Officer and Director Candidates



The Geochemical Society has a 16-member Board of Directors composed of 8 Officer-Directors and 8 Non-officer Directors. The terms of Directors are either two years (President, Vice-president, Past-president) or three years (all other officers) and are staggered. Any one year will typically see the nomination and election of about one-third of the Board. Officer-Directors carried over for 1997 are David Wesolowski (Secretary), Donald Elthon (Treasurer), Karl Turekian (GCA Executive Editor), Scott McLennan (Special Publications Series Editor), Alex Halliday (Past-President). Non-officer Directors carried over are Lynn Walter, Jochen Hoefs, Susan Brantley, and Mike Hochella. Departing Officers and Directors are Tony Lasaga, Chris Hawkesworth, Don Dingwell, John Hedges, Steve Macko, and Dimitri Sverjensky.

The By-Laws of the Geochemical Society require that its members be notified of the candidates for new Officers and Directors, who are proposed by the Nominations Committee and approved by the Board of Directors of the Society at their spring meeting. The By-Laws further require that the members be notified of these nominations well before the Annual Meeting of the Geochemical Society, held in conjunction with the Annual Meeting of the Geological Society of America, which this year is October 20-23, 1997, in Salt Lake City, Utah. The purpose is to allow the general membership to nominate additional candidates for those positions that are up for election. Please consider these candidates carefully and propose others only if you so desire. Remember that they must be Geochemical Society members and they must agree to serve if nominated. Additional candidates must be nominated by at least ten (10) members of the society, either by returning this nominations notice to the Secretary of the Geochemical Society (Dr. David J. Wesolowski, Chemical and Analytical Sciences Division, Oak Ridge National Laboratory, P.O. Box 2008, Oak Ridge, Tennessee 37831-6110 USA) or by contacting the Secretary directly (T: 1-423-574-6903, F: 1-423-574-4961, E: dqw@ornl.gov). **Only return this form if you wish to nominate additional candidates in writing. If you are satisfied with the slate of officers and directors for 1997, do nothing. To be valid, the names of additional nominees must be received by the Secretary prior to August 1, 1997.** If additional candidates for any position are nominated, election of officers must be by the general membership and ballots will be sent to all GS members. If no additional candidates are proposed, the slate of officers will be considered elected by the Board of Directors and will assume their duties immediately after the 1997 Annual Meeting. In this case no ballots will be sent to the membership.

Notice of 1997 Nominations of new Officers and Directors of the Geochemical Society

DIRECTORS:	Michael D. Lewan (1997-1999) (<i>Chair-elect of OGD</i>) U.S. Geological Survey Denver, Colorado USA	Stephen A. Macko (1997-1999) (<i>Secretary of OGD</i>) University of Virginia Charlottesville, VA USA
	R. Keith O'Nions (1997-2000) Oxford University Oxford, UK	Edward M. Stolper (1997-2000) California Institute of Technology Pasadena, CA USA
OFFICERS:	Michael J. Drake for <i>President</i> (1997-1999) Lunar and Planetary Laboratory University of Arizona Tucson, AZ USA	Michael F. Hochella, Jr. for <i>Vice President</i> (1997-1999) Department of Geological Sciences Virginia Polytechnic Institute Blacksburg, VA USA
	S. Ross Taylor for <i>International Secretary</i> (1997-2000) Australian National University Canberra, Australia	

ADDITIONAL NOMINEES (nominations must be received by August 1, 1997)

 Nominator's Signature _____
 Nominator's Name (printed) _____
 Nominator's Address _____
 Date _____



Parker Awarded Treibs Medal

Dr. Patrick LeGrand Parker was awarded the Alfred Treibs medal of the Organic Geochemistry Division of the Geochemical Society at the Gordon Conference on Organic Geochemistry at Holderness, New Hampshire, USA in August, 1996. Owing to an accident in which Pat broke his leg prior to the conference, actual presentation of the medal was delayed until the GSA in Denver. Pat Parker's first interests in geochemistry were sparked by Dr. Paul K. Kuroda who supervised his 1957 Master of Science work on "The Spontaneous Fission Half-life of Uranium-238." Dr. Thomas C. Hoering, Treibs Medalist of 1989, directed Pat's studies toward the PhD Degree awarded in 1960. His dissertation was entitled, "Variations in the Natural Abundance Ratio of the Chlorine Isotopes," and remains a key study in the understanding of the geochemistry of chlorine. Both degrees were from the University of Arkansas.



Patrick L. Parker's record of accomplishments are recognized as foundation works in the field. His pioneering studies on stable isotope relationships represent some of the first true applications as tracers of organic matter in complex systems. His work on the biogeochemistry of lipids established the fundamentals for what we now call early diagenesis. In addition to the scientific contribution, he has been a leader at the national level, serving as Chair of the ACS Geochemical Division, and as president of the American Society of Limnology and Oceanography, and director of the Marine Laboratory at the University of Texas at Austin.

**The Organic Geochemistry Division
of the Geochemical Society
is pleased to announce...**



THE BEST PAPER AWARD in ORGANIC GEOCHEMISTRY

The Best Paper Award for 1996 (1995 publication) was awarded to **Edward Laws, Brian Popp, Robert Bidigare, Mahlon Kennicutt and Stephen Macko** for their paper entitled, "**Dependence of phytoplankton carbon isotope composition on growth rate and [CO₂] aq: Theoretical consideration and experimental results**" which appeared in GCA 59:1131-1138.

Based on laboratory study of a diatom culture grown in a chemostat, Laws et al. show that dissolved carbon dioxide pCO₂ levels in oceans of the past cannot be ascertained unequivocally from δ¹³C analysis of total organic carbon (or individual algal biomarkers) and planktonic foraminiferal carbonate preserved in dated sediment cores. At the very least, the δ¹³C composition of TOC (and individual algal biomarkers) is affected by dissolved CO₂ availability and plant growth rate. This conclusion, drawn from theory and documented by results from a well-controlled experiment, provides a clear message for anyone trying to reconstruct processes in the world ocean from stable carbon (and nitrogen) isotopic analyses. At the moment, our ability is taxed to reliably reconstruct past pCO₂ variations from the geological record. Perhaps this uncertainty can be lifted by some as yet unidentified form of organic geochemical wizardry. Until then, the community generating datasets for δ¹³C of individual molecules by isotope ratio GCMS technology are clearly put to the test when it comes to extracting the true environmental meaning from their data collection. It remains to be shown whether the documented, analytically significant wiggles and waggles now apparent in the geological record for δ¹³C of TOC and individual algal biomarkers is controlled by variations in pCO₂, algal growth rate or perhaps even some other factor.

THE BEST STUDENT PAPER in ORGANIC GEOCHEMISTRY

The Best Student Paper Award for 1996 (1995 publication) is presented to **Stefan Shouten**, for the paper entitled, "**A novel, triterpanoid carbon skeleton in immature sulfur-rich sediments**," which appeared in GCA 59:953-958. In addition to the certificate, the award includes a one-year membership in the Society with all rights and privileges.

**Geochemical Society
Minutes of the Fall, 1996 Meeting of the
Board of Directors**



The meeting was convened at the Marriott City Center Hotel, Denver, Colorado, USA, 27 October, 1996, and came to order at 6:10 PM.

Present: Alex Halliday (President), Mike Drake (Vice President), Dave Wesolowski (Secretary), Karl Turekian (Executive Editor), Tony Lasaga (Past President), Terri Bowers (Director), Don Dingwell (Director), John Hedges (Director), Mike Hochella (Director), Steve Macko (Director), Frank Podosek (Joint Publications Committee Chair), Louis Derry (Program Committee Member), TinaGayle Osborn (GS Business Manager), Lee Mobley (GCA Managing Editor), Mark Bloom (presenting a joint MSA/GS proposal on educational outreach).

Approval of Minutes of Spring, 1996, Board Meeting.

Board Actions Taken Prior to Fall, 1996 Meeting: The Board voted to a.) offer the Editorship of *Geochimica et Cosmochimica Acta* to Karl K. Turekian; b.) retain the current guidelines for the F.W. Clarke Award (one recipient per year, at the Board's discretion); and c.) make Special Publication #5 available for sale.

Educational Outreach Program: Mark Bloom presented a proposal to serve as Internet Coordinator for a joint effort involving the Geochemical Society and the Mineralogical Society of America, to provide web-based educational resources for kindergarten through undergraduate college students to learn about mineralogy and geochemistry. The concept was initiated by MSA, which has submitted a proposal to the US National Science Foundation to partially support the effort. An ad hoc committee was appointed to investigate the advantages to members of our Society and the cost/benefits to the Society and the public.

Goldschmidt Forum: The Forum, consisting of the Presidents and Vice Presidents of the Geochemical Society and the European Association of Geochemistry, agreed that in the future, EAG would assist with financial support for Goldschmidt Conferences held in Europe, while GS would do the same for conferences held in North America. The Paul W. Gast Lecture Series was established, with lectures to be delivered annually at the Goldschmidt Conference, and appointed by EAG for North American meetings, and GS for meetings held elsewhere.

Enhancing GS Contributions to GSA and AGU: There was much discussion of how much activity the Geochemical Society should sponsor at the spring and fall AGU meetings, and the GSA Annual Meeting, while at the same time expanding and focusing on the Goldschmidt Conferences as the principal meeting of the Society.

Future Goldschmidt Conferences: The 8th V.M. Goldschmidt Conference will be held in Toulouse France, Aug. 30 - Sept. 3, 1998, with Jacques Schott as principal organizer. Stein Jacobsen at Harvard will oversee the organization of the 9th Goldschmidt in Boston in 1999, and planning is well under way for both meetings.

Future Meetings of the Board of Directors: The Board agreed to physically meet only once per year, in a full day session at each Goldschmidt Conference. No travel support will be provided for any officer or director to attend these meetings, and attendance at the annual Board Meeting is expected. Much of the Board's routine business is now handled by email correspondence, and a full day session with most or all directors present will facilitate in-depth discussion of more complex issues.

New Medals and Divisions: Much discussion revolved around the establishment of new divisions of the Society, similar to the Organic Geochemistry Division, to provide a focus for the other major subdisciplines of geochemistry, such as low and high temperature geochemistry, planetary sciences, etc. New medals, in addition to the Goldschmidt, Clarke and Treibs medals, were also discussed, to recognize the achievements of senior scientists in specific subdisciplines of geochemistry, as well as young and mid-career scientists. These new medals might be associated with new divisions, much as the Treibs medal is with OGD. No specific actions were taken, and an ad hoc committee was appointed to make recommendations for new medals.

By-Laws Change: The Board voted to strike from the By-Laws the sentence in Section 4.02 which reads "*In addition, the Chairperson of the Organic Geochemistry Division shall sit on the Board as an ex-officio non-voting member.*" This stipulation was made superfluous and misleading when OGD adopted the policy of nominating its Chairperson and Secretary as candidates for Director of the Society. Our By-Laws contain the stipulation that OGD has the right to nominate two of the eight non-officer Directors of the Society.

Geochemical Society Financial Resources: The Society currently has accumulated unspent reserves of over \$300,000 and this reserve is growing at the rate of approximately \$45,000 per year, at current spending levels. An ad hoc committee was appointed to investigate ways to safely invest a portion of this reserve so as to achieve greater returns than is possible from insured bank certificates, while minimizing risk of loss of capital.

Joint Publications Committee Report: Frank Podosek reported that there were no current plans in place for offering GCA in an online format, but that electronic archival of back issues of GCA was under discussion with Elsevier. Evan Lee Mobley will continue as Managing Editor of GCA, under contract to Elsevier, and has established a private office in Columbus Ohio. All contractual discussions between Elsevier, GS, the Meteoritical Society, and the new Executive Editor of GCA have been satisfactorily completed. An addendum to the current contract between the Societies and Elsevier permits the exercising of an option whereby an individual subscriber may elect to receive half the issues of GCA, at a reduced subscription price, divided along some appropriate disciplinary boundaries. The Societies have not as yet elected to implement this option.

Geochemical Society Publications: Karl Turekian relayed his plans for changes in the handling of manuscripts submitted to GCA, including the institution of an Editorial Advisory Board, in addition to the Associate Editors. Manuscripts

would be first screened by this Board for either rapid publication in GCA, or rejection based on inappropriateness of subject matter. Reviews by the Editorial Board members, by the Associate Editors, or other experts will be solicited as needed. The Society's newsletter was also discussed, and it was decided that an enhanced, possibly quarterly, newsletter would be desirable, and that a volunteer should be sought to take over production.

Geochemical Society Business Office: The current Business Manager, TinaGayle Osborn reported her activities for the past six months, and described the nature of her ongoing responsibilities. The Board expressed a strong desire to have the Business Office remain in Columbus, at least through 1997, and closely associated with the GCA Managing Editor's office. A budget of up to \$35,000 was approved for maintenance of the Business Office and all associated expenses.

The meeting adjourned at 11:55 PM

Geochemical Society 1996 Treasurer's Report

The liquid assets of The Geochemical Society, Inc. were as follows on 12/31/96:

Certificate of Deposit in NationsBank	\$100,000.00
Certificate of Deposit in Bank One	\$100,000.00
Certificate of Deposit in Bank United	\$45,855.00
Certificate of Deposit in Bank United	\$32,753.00
Checking Account in Texas Commerce Bank	\$3,172.00
Checking Account in NationsBank	\$55,380.00
Checking Account in County Savings Bank	\$14,920.00
Money Market Account in Fidelity Investments	\$47,268.00
Total liquid assets	\$399,348.00

These assets are partitioned into the following funds:

Lester W. Strock and Family Honorarium Fund	\$5,638.00
Treibs Medal Fund	2,512.00
Special Meetings Loan Fund	8,645.00
Special Publications Fund	57,915.00
Geochemical Futures Fund	2,992.00
Medals Fund	2,814.00
Ingerson Fund	14,218.00
Reserve Fund	70,107.00
GCA Royalties Fund	24,508.00
Total funds balance	\$399,348.00

The Society's income and expenses during the 1996 calendar year were:

Income:	
1996 Members' Dues (includes GCA subscriptions)	\$93,274.00
1997 Members' Dues (includes GCA subscriptions)	\$78,597.00
C.D.s that matured (principal, for reinvestment)	\$185,000.00
Book Sales	\$3,574.00
Donation	\$100.00
Royalty Payment	\$50,230.00
Interest	\$20,511.00
Miscellaneous Income	\$50.00
Total Income	\$431,336.00
Expenses:	
Accounting Fees	\$2,074.00
Banking Fees	\$2,585.00
Business Manager's Office Geochimica et Cosmochimica Acta (1996 subscriptions)	\$27,900.00
Honoraria	\$1,000.00
Insurance	\$2,859.00
Medals	\$715.00
Meetings	\$10,122.00
Purchase of C.D.s (reinvestment)	\$145,000.00
Postage	\$2,374.00
Printing	\$12,764.00
Office Supplies	\$481.00
Telephone	\$6.00
Travel	\$5,604.00
Special Publication No. Five	\$30,003.00
Miscellaneous Expenses	\$251.00
Administrative Salaries	\$196.00
Total Expenses	\$337,419.00

A copy of the complete Treasurer's report is available from Don Elthon, Treasurer, Department of Chemistry, University of Houston, Houston, TX 77204 USA.



THE GEOCHEMICAL SOCIETY SPECIAL PUBLICATION SERIES

Volume	Title	Year	Institutions & Non-member Price	Member Price
1	Magmatic Processes: Physiochemical Principles Edited by B.O. Mysen	1987	US\$65.00	US\$45.00
2	Fluid-Mineral Interactions: A Tribute to H.P. Eugster Edited by R.J. Spencer and I-Ming Chou	1990	US\$65.00	US\$45.00
3	Stable Isotope Geochemistry: A Tribute to Samuel Epstein Edited by H.P. Taylor, J.R. O'Neil, I.R. Kaplan	1991	US\$65.00	US\$45.00
4	Victor Moritz Goldschmidt: Father of Modern Geochemistry by Brian Mason	1992	US\$40.00	US\$30.00
5	Mineral Spectroscopy: A Tribute to Roger C. Burns Edited by M. D. Dyar, C. McCammon, and M. W. Schaefer	1996	US\$65.00	US\$35.00*

*Introductory price is valid until June 15, 1997. The member price will be US\$45.00 after this date.

Prepayment in U.S. dollars is required. Please remit the proper amount by check, money order, or credit card (Mastercard and Visa only). All payments must be made to the Geochemical Society. Price includes postage (bookrate/foreign surface). Please send payment to:

The Geochemical Society
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**The Mineralogical Society of America announces the 1998
GRANT FOR RESEARCH IN CRYSTALLOGRAPHY
from the Edward H. Kraus Crystallographic Research Fund
with contributions from MSA membership and friends
and the 1998**

**MSA GRANT FOR STUDENT RESEARCH IN MINERALOGY AND PETROLOGY
from an endowment created by contributions from the MSA membership**

The Grant for Research in Crystallography is a \$3500 grant for research in crystallography. There are no restrictions on how the grant funds may be spent, as long as they are used in support of research. The only restrictions on eligibility for the grant are that the applicant must have reached his or her 25th birthday but not yet have reached his or her 36th birthday on the date the grant is awarded, and that the person is not a MSA Counsellor. The award selection will be based on the qualifications of the applicant, the quality, innovativeness, and scientific significance of the proposed research, and the likelihood of success of the project. The next award will be made in January, 1998.

MSA Grant for Student Research in Mineralogy and Petrology is a \$3500 grant for research in mineralogy and petrology. Students, including graduate and undergraduate students, are encouraged to apply. There are no restrictions on how the grant funds may be spent, as long as they are used in support of research. The award selection will be based on the qualifications of the applicant, the quality, innovativeness, and scientific significance of the research, and the likelihood of success of the project. The next award will be made in January, 1998.

Application forms for both grants may be obtained from Dr. J. Alex Speer, MSA Business Office, 1015 Eighteenth Street, NW, Suite 601, Washington, DC 20036-5203, USA; Phone: 202-775-4344, Fax: 202-775-0018, Email: j_a_speer@minsocam.org or from the MSA worldwide web home page, <http://geology.smith.edu/msa/msa.html>. Completed applications must be returned to the MSA Business Office by June 1, 1997.

1997 MSA Shortcourse

- Title:** Geomicrobiology: interactions between microbes and minerals
Dates: October 18 and 19, 1997
Location: Alta Peruvian, near Snowbird, Utah
Conveners: Jillian F. Banfield, Department of Geology and Geophysics, University of Wisconsin-Madison, Madison, WI 53706 and Mineralogical Institute, University of Tokyo, hongo, Bunkyo-ku, Tokyo 113, Japan, email: jill@geology.wisc.edu or jill@min.s.u-tokyo.ac.jp
 Kenneth Nealson, University of Wisconsin Great Lakes Institute, University of Wisconsin-Milwaukee, email: knealson@csd.uwm.edu
Sponsored by: Mineralogical Society of America

Recent studies reveal enormous microbial diversity in geological environments. Microorganisms cause mineral precipitation and dissolution and control the distribution of elements in diverse environments at and below the surface of the Earth. Conversely, mineralogical and geochemical factors exert important controls on microbial evolution and the structure of microbial communities. Thus, the mineralogical and geochemical characteristics of the crust, hydrosphere, and atmosphere have evolved in parallel with evolution of microorganisms. The first goal of this symposium is to teach geologists about the ways in which microbial activity impacts what have traditionally been considered inorganic processes and to teach microbiologists and other life scientists about the mineralogical and geochemical aspects of biogeochemical systems. Topics include what modern molecular biological methods teach us about early life and the types of microorganisms present in natural environments, the structure, chemistry, and reactivity of mineral surfaces, the reasons microbes have evolved strategies to extract metals from mineral surfaces and the metabolic function of metals, microbial attachment to mineral surfaces and biofilm formation, microbial precipitation and the characteristics of biologically precipitated minerals that might allow us to distinguish them from minerals grown by inorganic mechanisms, microbial mineral dissolution, and the impacts of microbial processes on geochemical cycles in soils and sediments.

The short course will be held in conjunction with a planned MSA Geomicrobiology Symposium and theme session on Monday, October 20, 1997. For further short course information and registration, contact the MSA home page: <http://geology.smith.edu/msa/msa.html> or the MSA Business Office, 1015 Eighteenth Street, NW, Suite 601, Washington, DC 20036-5274. Phone: 202-775-4344, Fax: 202-775-0018, Email: j_a_speer@minsocam.org. Registration information will be available starting in May, 1997.

Calendar of Meetings

- Apr. 8-10, 1997: Symposium, *Principle Genetic Problems Related to Mineral Deposits of Magmatic Affiliation***, dedicated to the Centenary of Academician Anatolii G. Betekhtin, Moscow, Russia. Contact: Dr. Nick S. Bortnikov, Secretary of the Org. Committee, IGM RAS, Staromonetny per., 35, Moscow 109017, Russia; Tel. 007-095-230-8259 or 230-8244, Fax 7-95-230-2179, Email: symposium@igem.msk.su
- Apr. 13-17, 1997: American Chemical Society, Annual Meeting**, San Francisco, CA USA. Contact: Peggy O'Day, Assistant Professor, Geology Dept., Arizona State University, Tempe, AZ 85287-1404; Tel. 602-965-4581; Fax 602-965-8102, Email: oday@asu.edu; or Carrick M. Eggleston, Dept. of Geology and Geophysics, University of Wyoming, Laramie, WY 82071-3006; Tel. 307-766-6769, Fax 307-766-6679, Email: carrick@uwoyo.edu
- Apr. 14-18, 1997: Plumes, Plates and Mineralization**, Pretoria, South Africa. Contact: PPM'97, c/o Prof. S. A. de Waal, Dept. of Geology, University of Pretoria, Pretoria 0002, South Africa, Tel. 012 4202454; Fax 012 433430; Email: ppm97@scientia.up.ac.za
- Apr. 21-25, 1997: 22nd General Assembly of the European Geophysical Society**, Vienna, Austria. Contact: EGS Office, Max-Planck-Str. 1, 37191 Katlenburg-Lindau, Germany; Tel. 49-5556-1440, Fax 49-5556-4709; Email: egs@linax1.mpae.gwdg.de; <http://www.mpae.gwdg.de/EGS/EGS.html>
- Apr. 22-24, 1997: First International Conference on Measurements and Modeling in Environmental Pollution**, Madrid, Spain. Contact: S. Owen, MMEP 97 Conference Secretariat, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton SO40 7AA UK; Tel. 44-1703-293-223; Fax: 44-1703-292-853; Email: wit@wessex.witcmi.ac.uk; URL: <http://www.witcmi.ac.uk/>
- Apr. 23-25, 1997: Mine Quest 97, Pacific Northwest Metals and Minerals Conference**, Spokane, WA USA. Contact: Andrew Berg, Tel. 509-747-3659, Email: aberg@on-ramp.ior.com
- Apr. 23-May 3, 1997: International Association of Hydrological Sciences, Scientific Assembly**, Rabat, Morocco. Contact: IAHS SA5-97 Organizing Committee, Direction Generale de l'Hydraulique, Casier Rabat-chellah, Morocco, Fax 212-7-778696
- Apr. 24-30, 1997: Paleocene/Eocene Boundary Events in Time and Space, Penrose Conference**, Albuquerque, NM USA. Contact: Dr. Spencer Lucas, New Mexico Museum of Natural History, 1801 Mountain Road NW, Albuquerque, NM 87104, Tel. 505-841-2873, Fax 505-841-2866; Email: lucas@darwin.nmmnh-abq.mus.nm.us
- Apr. 25-30, 1997: SOLAR 97 Conference and Symposium**, Washington, DC USA. Contact: American Solar Energy Society, 2400 Central Ave., Suite G-1, Boulder, CO 80301, Tel. 303-443-3130, Fax 303-443-3212, Email: ases@ases.org; <http://www.ases.org/solar>
- Apr. 28-29, 1997: Volcanoes and Archaeology**, Burlington House. Contact: Dr. Bill McGuire, Dept. of Geography and Geology, Cheltenham & Gloucester College of HE, Francis Close Hall, Swindon Road, Cheltenham GL50 4AZ; Tel. 01242 543496; Fax 01242 532997; and Dept. of Geological Sciences, University College London, Gower Street, London WC1E 6BT; Tel. 0171 387 7050 x2383; Fax 0171 388 7614; Email: w.mcguire@ucl.ac.uk
- Apr. 28-May 1, 1997: In-Situ and On-Site Bioremediation, International Symposium**, New Orleans, LA USA. Contact: The Conference Group, 1989 W. Fifth Ave., Suite 5, Columbus, OH 43212-1912; Tel. 800-783-6338, Fax 614-488-5747, Email: 102632.3100@compuserve.com
- May 4-7, 1997: International Symposium on Electricity Production and Greenhouse Gases: Facts and Perspectives**, University of Quebec at Montreal, Canada. Contact: P. Ferland, UQAM, PO Box 8888, Succursale Centre-ville, Montreal, Quebec, Canada H3C 3P8; Tel. 514-987-4630, Fax 514-987-4634; Email: symp97.ghg@uqam.ca; <http://www.er.uqam.ca/nobel/symp97/symposium.html>
- May 4-8, 1997: Canadian Geophysical Union Annual Scientific Meeting**, Banff, Alberta, Canada. Contact: J. A. R. Blais, Geomatics Engineering, University of Calgary; Tel. 403-220-7379, Fax 403-284-1980; Email: blais@acs.ucalgary.ca; www.geo.ucalgary.ca/~wu/cguconf.html
- May 4-9, 1997: Joint Meeting of CGU-Hydrology Section, Western Snow Conference**, Banff, Alberta, Canada. Contact: M. Stroh, Conference Management Services, The University of Calgary, 1833 Crowchild Trail NW, Calgary, Alberta T2M 4S7; Tel. 403-220-6229, Fax 403-284-4184, Email: cguconf@acs.ucalgary.ca; <http://www.geo.ucalgary.ca/~wu/cgu97hydro.html>
- May 5-9, 1997: U.S. Department of Energy, Third Alfred O. Nier Symposium on Inorganic Mass Spectrometry**, Durango, CO, USA. Contact: D. J. Rokop, Tel. 505-665-2640, Fax: 505-665-6637; Email: drokop@lanl.gov
- May 12-14, 1997: Oceanology International Pacific Rim 97**, World Trade Centre, Singapore. Contact: L. Sandbach, OI Pacific Rim, Ocean House, 50 Kingston Rd., New Malden, Surrey KT3 3LZ; Tel. 44-0-181-949-9222, Fax 44-0-181-949-8186; Email: oiasia@spearhead.co.uk; <http://www.acrso.nsf.ca/~spearhead/>
- May 14-16, 1997: EAG-Workshop at the Max-Planck-Institut für Chemie**, Mainz, Germany. Contact: Gerhard Brugmann, Max-Planck-Institut für Chemie, Postfach 3060, D-55128 Mainz, Germany; Tel. 49-6131-305362, Fax 49-6131-371051
- May 17-18, 1997: Volcanic-associated Massive Sulfide Deposits in Ancient and Modern Settings: Processes and Examples**, Short Course sponsored by SEG and GAC/MDD, preceding the '97 GAC-MAC Joint Annual Meeting, Ottawa, ONT, Canada. Contact: T. Barrie, GSC, 601 Booth St., Ottawa, ONT, Canada, K1A 0E8, Tel. 613-947-2793, Fax 613-996-9820, Email: barrie@gsc.emr.ca
- May 19-21, 1997: Geological Association of Canada/Mineralogical Association of Canada**, Ottawa, Canada. Contact: GAC, Room 757, 601 Booth St., Ottawa, Ontario K1A 0E8, Tel. 613-947-7649, Fax 613-947-7650, URL: <http://www.emr.ca/~ottawa97/>; Special symposium: *Extraction, Transport, and Emplacement of Granitic Magmas: Physical Processes and Structural Signatures*; Contact: Keith Benn, Email: kbenn@aix1.uottawa.ca, or Alexander Cruden, Email: cruden@credit.erin.utoronto.ca, or Edward W. Sawyer, Email: edward_w_sawyer@uqac.quebec.ca

- May 21-23, 1997: Petroleum Systems of Southeast Asia and Australasia, International Symposium**, Jakarta, Indonesia. Contact: Jim Howes, ARCO Indonesia; Tel. 62-21-521-8108, Fax 62-21-521-9063; Email: jhowes@is.arco.com
- May 25-28, 1997: 8th Global Warming International Conference & Expo**, New York, NY, USA. (Abstract deadline: Oct. 17, 1996) Contact: B. J. Jefferson, Global Warming International Center, P.O. Box 5275, Woodbridge, IL 60517; Tel. 630-910-1551; Fax 630-910-1561
- May 25-30, 1997: Geochemical Exploration**, 18th International Symposium of AEG, Jerusalem, Israel. Contact: IGES Secretariat, PO Box 50006, Tel Aviv, 61500 Israel; Fax 972 3 5140000; Email: igcs@mail.igs.gov.il
- May 26-29, 1997: Unzen International Workshop: Decade Volcano and Scientific Drilling**, Shimabara, Japan. Contact: S. Nakada, ERI; Tel. 81-3-3812-2111 ext. 5695, Fax 81-3-3812-6979; Email: nakada@eri.u-tokyo.ac.jp
- May 26-31, 1997: Water Tracing, International Symposium**, Postojna, Slovenia. Contact: Karst Research Institute ZRC SAZU, Titov trg 2, SI-66230 Postojna, Slovenia; Tel. 386-6724-781, Fax 386-6723-965, Email: IZRK@ZRC-SAZU.SI
- May 27-30, 1997: Spring AGU Meeting/MSA/GS**, Baltimore, MD USA. Contact: AGU Meetings Department, 1997 Spring Meeting, 2000 Florida Ave., NW, Washington, DC 20009 USA; Tel. 202-462-6900 (or 800-966-2481 in the US), Fax 202-328-0566, Email: meetinginfo@kosmos.agu.com; <http://www.agu.org/meetings/sm97top.html>
- May 30-June 6, 1997: Acid Rock Drainage, International Conference**, Vancouver, British Columbia. Contact: Peggy Shepard, Venue West Conference Services, 645 The Landing, 375 Water St., Vancouver, B.C., Canada V6B 5C6; Tel. 604-681-5226, Fax 604-681-2503, Email: weathere@emrl.emr.ca
- June 1-6, 1997: Sedimentary Events and Hydrocarbon Systems, Joint Convention**, Alberta, Canada. Contact: CSPG Office, #505, 206 7th Ave., SW, Calgary, Alberta, T2P 0W7
- June 2-6, 1997: Seventh Annual V. M. Goldschmidt Conference**, Tucson, AZ, USA. Contact: M. J. Drake, Tel. 520-621-6962, Fax 520-621-4933, Email: goldconf@lpl.arizona.edu
- June 2-6, 1997: 31st Annual Congress of the Canadian Meteorological and Oceanographic Society (CMOS)**, University of Saskatchewan, Saskatoon, Saskatchewan, Canada. Contact: <http://ecsask65.innovplace.saskatoon.sk.ca/pages/cm0597/congrs97>
- June 10-12, 1997: International Symposium on Physics, Chemistry, and Ecology of Seasonally Frozen Soils**, Fairbanks, AK. Contact: Conferences and Special Events, 104 Eielson Bldg., P.O. Box 757800, Fairbanks, AK 99775-7800, Tel. 907-474-7800, Fax 907-474-5592, Email: fyci@aurora.alaska.edu, <http://www.nstl.gov/frozen>
- June 11-13, 1997: Workshop on Remote Sensing of Planetary Ices: Earth and Other Solid Bodies**, Flagstaff, AZ USA. Contact: W. M. Calvin, U. S. Geological Survey, 2255 N. Gemini Dr., Flagstaff, AZ 86001 USA; Tel. 520-556-7035, Fax 520-556-7014, Email: wcalvin@flagmail.wr.usgs.gov
- June 15-18, 1997: The South American Symposium on Isotope Geology**, Sao Paulo, Brazil. Contact: Dr. M. A. S. Basei, Tel. 55-11-818-39-89; Fax 55-11-818-39-93; Email: BASEIMAS@USP.BR
- June 15-21, 1997: Eleventh International Clay Conference**, Ottawa, Ontario, Canada. Contact: Jeanne Percival, Geological Survey of Canada, 601 Booth St., Ottawa, Ontario K1A 0E8, Canada; Fax 613-943-1287; Email: ICC97@gsc.emr.ca
- June 15-21, 1997: Clay Minerals Society 34th Annual Meeting**, Ottawa, Ontario, Canada. Contact: Hideomi Kodama, Center for Land & Biological Research, Agriculture Canada C.E.F., Ottawa, Ontario K1A 0C6, Canada; Tel. 613-995-5011; Fax 613-995-1823; Email: kodama@ncccot.agr.ca
- June 18-20, 1997: Water Pollution Modelling, Measuring and Prediction, Fourth International Conference**, Bled, Slovenia. (Abstract deadline: Aug. 30, 1996) Contact: Liz Kerr, WATER POLLUTION 97 Conference Secretariat, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton SO40 7AA, UK; Tel. 44-1703-293-223; Fax 44-1703-292-853; Email: wit@wessex.witcmi.ac.uk; Web: <http://www.witcmi.ac.uk> (choose conference information link)
- June 20-25, 1997: Tourmaline 1997**, Brno, Czech Republic. Contact: Dr. Milan Novak, Dept. of Mineralogy and Petrology, Moravian Museum, Zelný trh 6, 659 37 Brno, Czech Republic; Fax 05-4221-2792, Email: mzm@mzm.anet.cz
- June 22-25, 1997: Tectonics, Stratigraphy & Petroleum Systems of Borneo International Workshop**, Bandar Seri Begawan, Brunei. Contact: James W. Granath, Conoco, Inc., 600 North Dairy Ashford, Houston, TX 77079-6651, Tel. 713-292-6695, Fax 713-293-1333, Email: granajw@howwe.dnet.dupont.com
- June 23-26, 1997: Fourth International Conference on the Biogeochemistry of Trace Elements**. Contact: A. Iskander, U.S. Army Corp of Engineers, CRREL, 72 Lyme Road, Hanover, NH 03755-1290 USA
- June 23-27, 1997: Engineering Geology and the Environment International Symposium**, Athens, Greece. Contact: Hellenic Committee of Engineering Geology, Athens 1997 Symposium Secretariat, P.O. Box 19140, GR-117 10, Athens, Greece, Tel. 30-1-3813900 or 3804375 or 9225835, Fax 30-1-3813900 or 9242570.
- June 23-27, 1997: International Symposium on Solar-Terrestrial Coupling Processes**, Paros, Greece. Contact: I. A. Daglis, National Observatory of Athens, Palea Penteli, 15236 Greece; Tel. 30-1-6138340, Fax 30-1-6138343; Email: daglis@creator.space.noa.gr; <http://www.mpae.gwdg.de/~daglis/symposium.html>
- June 24-25, 1997: Wetlands for Treatment of Landfill Leachates**, Romulus (Detroit), Michigan, USA. Contact: M. Draeger, Conestoga-Rovers and Associates, Ltd., 851 Colby Drive, Waterloo, Ontario, Canada N2V 1C2; Tel. 519-725-3313, ext. 3426, Fax 519-725-1736; Email: mdraeger@rovers.com
- June 26-27, 1997: Unravelling Tectonic and Climatic Signals in Sedimentary Successions, Conference**, London. Contact: Dr. Lynne Frostick or Dr. Martyn Pedley, Research Institute for Environmental Science and Management, University of Hull, Cottingham Road, Hull HU6 7RX, UK; Tel. 44-1482-465385, Fax 44-1482-466340

- June 29-July 3, 1997: Water Resources, Education, Training, and Practice: Opportunities for the Next Century**, Summit County, CO, USA. Contact: J. Warwick, Technical Chairperson, University of Nevada, Reno, 1000 Valley Rd., Reno, NV 89512-0180 USA; Fax 702-784-1953; Email: keystone@dream.unr.edu
- July 1-9, 1997: 1997 Joint Assemblies of the International Association of Meteorology and Atmospheric Sciences and the International Association for Physical Sciences of the Ocean**, Melbourne, Australia. Contact: IAMAS/IAPSO Secretariat, Convention Network, 224 Rouse St., Port Melbourne, Victoria 3207, Australia; Tel. +61-3-9646-4122; Fax +61-3-9646-7737; Email: mscarlett@peg.apc.org
- July 7-9, 1997: Glaciers of the Southern Hemisphere**, Melbourne, Australia. Contact: A. G. Fountain, U. S. Geological Survey, PO Box 25046, MS 412, Denver, CO 80225 USA; Tel. 303-236-5025, Fax 303-236-5034, Email: andrew@usgs.gov
- July 9-12, 1997: Mining Philippines: Philippines Minerals Exploration, Mining Equipment, and Technology, Exhibition and Conference**, Manila, Philippines. Contact: Stephen Luff; Fax 44-171-413-8222
- July 14-15, 1997: Rocky Mountain Symposium on Environmental Issues in Oil and Gas Operations**, Golden, CO USA. Contact: Special Programs and Continuing Education, Colorado School of Mines, Tel. 1-800-446-9488, ext. 3321 (8-5 MST), Fax 303-273-3314, Email: space@mines.edu, http://www.mines.edu/Outreach/Cont_Ed
- July 13-18, 1997: International Symposium on Antarctica and Global Change**, Hobart, Tasmania, Australia. Contact: Secretary General, International Glaciological Society, Lensfield Road, Cambridge, CB2 1ER, UK; Tel. 44-1223-355974; Fax 44-1223-336543; Email: 100751.1667@compuserve.com
- July 14-18, 1997: International Workshop on Application of Stable Isotopes in Water Balance Studies**, Saskatoon, Saskatchewan, Canada. Contact: ISOBALANCE Workshop, c/o Dr. John J. Gibson, National Hydrology Research Institute, 11 Innovation Blvd., Saskatoon SK S7N 3H5 Canada; Tel. 306-975-5744, Fax 306-975-5143; email: gibsonj@nhri.sv.nhrc.sk.doe.ca
- July 17-19, 1997: Lunar and Planetary Institute, Workshop on Parent Body and Nebular Modifications of Chondritic Materials**, Maui, HI, USA. Contact: M. Zolensky, Tel. 713-483-5128, Email: zolensky@snmail.jsc.nasa.gov; E. Scott, Tel. 808-956-3955, Email: escott@kahana.pgd.hawaii.edu; or S. Krot, Tel. 808-956-3900, Email: sasha@kahana.pgd.hawaii.edu
- July 20-24, 1997: Fifth International Symposium on Hydrothermal Reactions (ISHR '97)**, Gatlinburg, TN, USA. Contact: ISHR '97, ORNL, P.O. Box 2008, Building 4500S, MS 6110, Oak Ridge, TN 37831-6110 USA; Tel. 423-576-5109; Fax 423-574-4961; Email: ddp@ornl.gov; <http://flory.engr.utk.edu/ishr97>
- July 20-25, 1997: American Crystallographic Association, Annual Meeting**, St. Louis, MO USA. Contact: Marcia Vair, Tel. 716-856-9600, ext. 321, Email: marcia@hwi.buffalo.edu
- July 22-24, 1997: Concord Workshop (Conference of Cooperative Ocean Riser Drilling)**, Japan. Contact: WEB Site <http://www.dlc.ku.dk/>
- July 23-26, 1997: Interactions: Managing Ecosystems on a Watershed Basis, Annual Conference**, Toronto, Canada. Contact: Soil and Water Conservation Society, 7515 N.E. Ankeny Rd., Ankeny, IA 50021-9764
- July 28-Aug. 1, 1997: Second International Conference on Geoscience Education**, Hilo, HI USA. Contact: M. Frank Watt Ireton, GeoSciEd II, American Geophysical Union, 2000 Florida Ave., NW, Washington, DC 20009; Email: fireton@kosmos.agu.org
- Aug. 3-8, 1997: Gordon Conference on Hydrobiogeochemistry of Forested Watersheds**, New London, NH USA. Contact: M. Mitchell, SUNY-ESF, Syracuse, NY 13210-2788, Tel. 315-470-6765, Fax 315-470-6996, Email: mitchell@mailbox.syr.edu; <http://www.grc.uri.edu/>
- Aug. 5-8, 1997: Cryogenic Soils, International Conference**, Syktyvkar, Russia. Contact: I. V. Zaboeva, Institute of Biology, Komi Center, Russian Academy of Sciences, 167610 Syktyvkar, Komi Republic, Russia; Tel. 7-821-22-25213, Fax 7-821-22-25231, Email: biol@omkomi.intec.ru
- Aug. 10-14, 1997: Changing Ecosystems: Natural and Human Influences Annual Meeting**, Albuquerque, NM USA. Contact: Nadine Cavender; Tel. 202-833-8773; Email: esahq@esa.org
- Aug. 10-15, 1997: Gordon Research Conference on Inorganic Geochemistry of Metal Ore-Forming Systems**, New Hampton School, New Hampton, NH. Contact: Dr. Mark Reed, Dept. of Geological Sciences, University of Oregon, Eugene, OR 97403-1272 USA; Tel. 541-346-5587, Fax 541-346-4692, Email: mhreed@oregon.uoregon.edu
- Aug. 19-20, 1997: I.M.A. Working Group on Mineral Equilibria and Data Bases International Meeting**, Helsinki, Finland. Contact: Pentti Holttä, Geological Survey of Finland, SF-02150 Espoo, FINLAND, Tel. 358-0-46932312, Fax 358-0-462205, Email: pentti.holttä@gsf.fi (abstract deadline: November 31, 1996)
- Aug. 19-20, 1997: Mineral Equilibria and Databases, International Meeting**, Helsinki, Finland. Contact: Pentti Holttä, Geological Survey of Finland, SF-02150 Espoo, Finland; Email: pentti.holttä@gsf.fi; Fax 358-0-462205
- Aug. 22-23, 1997: Geochemistry Department, Utrecht University, Geochemical Engineering, Current Applications and Future Trends**, Utrecht, The Netherlands. Contact: EmRDS Committee, Tel. 31-30-2535007, Fax 31-30-2535030, Email: vriend@earth.ruu.nl
- Aug. 22-23, 1997: International Pressure Calibration Workshop**, Institute for Study of the Earth's Interior, Okayama University, Misasa, Japan. Contact: Dean C. Presnall, Dept. of Geosciences, University of Texas at Dallas, PO Box 830688, Richardson, TX 75083-0688; Tel. 972-883-2444, Fax 972-883-2829, Email: presnall@utdallas.edu
- Aug. 24-29, 1997: Second International Symposium on Granites and Associated Mineralizations**, Brazil. Contact: General Secretariat, SGM-ISGAM, Av. 3, 390 Plataforma IV, CAB, 41.746-900 Salvador, BA, Brazil, Tel. 55-71-370-6274 (14:00-18:00 local time), Fax 55-71-231-5655, Email: ISGAM@NPD.UFPE.BR (Abstract Deadline: February 28, 1997)

- Aug. 26-28, 1997: Modeling Reactions and Reactive Transport in Geochemical Systems**, Urbana, IL USA. Contact: Craig Bethke, University of Illinois, Dept. of Geology, 1301 West Green Street, Urbana, IL 61801 USA; Tel. 217-333-3369 or 217-244-4068, Fax 217-244-4996, Email: c-bethke@uiuc.edu
- Aug. 30-Sept. 5, 1997: Lunar and Planetary Institute, Second International Conference on Large Meteorite Impacts and Planetary Evolution**, Sudbury, Ontario, Canada. Contact: Burkhard Dressler, Tel. 713-486-2112, Fax 713-486-2162; Email: dressler@lpi.jsc.nasa.gov; <http://cass.jsc.nasa.gov/lpi.html>
- Sep. 1-5, 1997: International Conference on Hydrology, Sedimentology, Geochemistry, and Ecology of Muddy Coasts, Muddy Coasts 97**, Wilhelmshaven, Germany. Contact: G. Liebezeit, Tel. 49-4421-9440, Fax 49-4421-944199, Email: liebezeit@terramare.fh-wilhelmshaven.de
- Sep. 1-5, 1997: Challenges to Chemical Geology, 10th Meeting of the European Geological Societies**, Carlsbad, Czech Republic. Contact: Dr. Martin Novak, Czech Geol. Survey, Geologicka 6, 15200 Prague 5, Czech Republic, Tel. 422-581-71-20, Fax 422-581-87-48, Email: Novak@eguc.cz
- Sep. 1-6, 1997: IXth World Water Congress of IWRA**, Montreal, Quebec, Canada. Contact: A. Shady, CIDA, 200 Promenade du Portage, Hull, Quebec, K1A 0G4, Canada; Tel. 819-994-4098, Fax 819-953-3348, Email: aly_shady@ACDI-CIDA.gc.ca
- Sep. 1-7, 1997: Fifth International Ecogite Conference, Centro Stefano Franscini**, Monte Verita, Ascona, Switzerland. (Preliminary registration: Oct. 31, 1996; Registration Due: May 31, 1997; Abstracts due: May 31, 1997) Contact: Dr. Rolf Schmid, Mineralogy, IEC 97, ETH-Centre, NO E43, 8092 Zurich, Switzerland, Tel. direct: XX41 1 6323791, Tel. secr.: XX41 1 6323779, Fax XX41 1 6321088, Email: rolf@erdw.ethz.ch; http://www.erdw.ethz.ch/~rolf/pre_reg.html
- Sep. 2-6, 1997: International Symposium on Geology and Environment**, Istanbul, Turkey. Contact: Secretary GEOENV '97, P. K. 464 K_z_lay, 06424 Ankara, Turkey, Tel. 90-312-4343601, Fax 90-312-4342388, Email: jdogan@et.cc.hun.edu.tr
- Sep. 7-9, 1997: Earth-Sciences Education in Southern Africa - Workshop**, University of Zimbabwe, Harare. Contact: The Conference Secretary, Geological Society of Zimbabwe, PO Box CW1719, Harare, Zimbabwe
- Sep. 8-12, 1997: Fifth International Carbon Dioxide Conference**, Queensland, Australia. Contact: Carbon Dioxide Conference Secretariat, CSIRO Division of Atmospheric Research PMB #1, Aspendale, 3195, Victoria, Australia; Tel. 61-3-9239-4661, Fax 61-3-9239-4444, Email: pnh@dar.csiro.au
- Sep. 9-12, 1997: Visual Air Quality, Aerosols, and Global Radiation Balance**, Bartlett, NH USA. Contact: I. Tombach, ENSR, 1220 Avenida Acaso, Camarillo, CA 93012-8727; Fax 805-388-3577, Email: visibility@ensr.com
- Sep. 9-12, 1997: MINExpo International '96**, Las Vegas, NV USA. Contact: National Mining Association, 1130 17th St., NW, Washington, DC 20036.
- Sep. 10-12, 1997: Intraplate Magmatism and Tectonics of Southern Africa Conference**, University of Zimbabwe, Harare. Contact: The Conference Secretary, Geological Society of Zimbabwe, PO Box CW1719, Harare, Zimbabwe
- Sep. 10-15, 1997: Penrose Conference: Faults and Subsurface Fluid Flow: Fundamentals and Applications to Hydrogeology and Petroleum Geology**, Albuquerque and Taos, New Mexico. Contact: William C. Haneberg, New Mexico Bureau of Mines and Mineral Resources, New Mexico Institute of Mining and Technology, 2808 Central Ave. SE, Albuquerque, NM 87106, Tel. 505-262-2774, Fax 505-255-5253, Email: haneberg@nmt.edu; <http://www.nmt.edu/~haneberg/Fluids.html>
- Sep. 14-18, 1997: Fourth Decennial International Conference and Exhibition on Mineral Exploration** with a theme of Geophysics and geochemistry at the Millennium, Toronto, Canada. Contact: Jon Baird, c/o CAMESE, 345 Renfrew Drive, Markham, Ontario, Canada, L3R 9S9, Tel. 905-513-0046, Fax 905-513-1834, Email: 103214@compuserve.com
- Sep. 15-18, 1997: Volcanism and Volcanic Hazards in Immature Intraplate Oceanic Islands**, La Palma, Canary Islands, Spain. Contact: W. J. McGuire, Dept. of Geological Sciences, University College London, Gower Street, London WC1E 6BT, UK; Email: w.mcguire@ucl.ac.uk
- Sep. 20-Oct. 2, 1997: American Association of Radon Scientists and Technologists**, Haines City, FL USA. Contact: Teedra Hudson, Tel. 309-728-2363, Fax 309-728-2364 or Tel. 312-996-2613, Fax 312-413-1857, Email: nishna@aol.com
- Sep. 21-27, 1997: International Symposium on Environmental Biochemistry, Matter and Energy Fluxes in the Anthropogenic Environment**, Monopoli (Bari), Italy. Contact: N. Senesi, Tel. 39-80-544-2853, Fax 39-80-5442831, Email: nsenisi@mail2.clio.it
- Sep. 22-26, 1997: European Association of Organic Geochemists, 18th International Meeting on Organic Geochemistry**, Maastricht, The Netherlands. Contact: B. Horsfield, Tel. 49-2461-613670, Fax 49-2461-614666, Email: b.horsfield@kfa-juelich.de
- Sep. 27-30, 1997: Joint Annual Meeting: American Association of Petroleum Geologists-Eastern Section and the Society for Organic Petrology**, Lexington, KY USA. Contact: J. Drahovzal, Kentucky Geological Survey, University of Kentucky, Lexington, KY 40506-0107; Tel. 606-257-5500; Fax 606-257-1147; Email: drahovzal@kgs.mm.uky.edu; <http://www.uky.edu/ArtsSciences/Geology/eaapg/welcome.html>
- Oct. 5-10, 1997: Fourth International Symposium on Environmental Geochemistry**, Vail, CO USA. Contact: 4th ISEG, c/o USGS/CEGG, Federal Center, Box 25046, MS 973, Denver, CO 80225; Fax 303-236-3200, Email: iseg@helios.cr.usgs.gov
- Oct. 6-9, 1997: Oceans '97 MTS/IEEE**, Halifax, Nova Scotia, Canada. Contact: Oceans '97, MTS/IEEE, IEEE Travel and Conference Management Services, 445 Hoes Lane, Piscataway, NJ 08855 USA, Tel. 800-810-4333, (in the U.S.) and 908-562-5598 (outside the U.S.); Fax 908-981-1203; Email: publications@sirius.ns.ca
- Oct. 8-10, 1997: Fourth International Conference on Rare Gas Geochemistry**, Rome, Italy. Contact: Conference Secretariat, W. Plastino, 4th ICRGG, Physics Department, University of Roma III, Via della Vasca Navale, 84, I-00146 Rome, Italy; Tel. +39 6 49914200; Fax +39 6 4957697; Email: 4ICRGG@uniroma3.it

- Oct. 8-11, 1997: Large and Unique Deposits of Rare and Precious Metals International Symposium**, St. Petersburg, Russia. Contact: Y. B. Marin, St. Petersburg State Mining Institute, 21--th Line, 2, V.O., St. Petersburg 199026, Russia, Tel. 7-812-2188247, Fax 7-812-2132613, Email: marin@mineral.spb.su
- Oct. 10-13, 1997: International Workshop on Continental Roots**, Harvard University, Cambridge, MA USA. Contact: Bill McDonough, Earth and Planetary Sciences, Harvard University, 20 Oxford St., Cambridge, MA 02138; Tel. 617-496-2010, Fax 617-496-0434, Email: mcdonough@eps.harvard.edu
- Oct. 14-16, 1997: East Sea Oceanography Conference (ESOC)**, KIOS, Pukyong National University, KOREA. Contact: Dr. Seok-Yun Kim, Secretariat, ESOC, KIOS, Pukyong National University, 599-1, Daeyon-dong, Nam-ku, Pusan 608-737, KOREA; Tel. 82-51-620-6218, Fax 82-51-624-5387, Email: ksyun@dolphin.pknu.ac.kr
- Oct. 19-24, 1997: Applications of GIS, Remote Sensing, Geostatistics, and Solute Transport Modeling to the Assessment of Non-Point Source Pollutants in the Vadose Zone**, Riverside, CA USA. Contact: AGU Meetings Dept., 2000 Florida Ave., Washington, DC 20009; Tel. 202-462-6900
- Nov. 2-5, 1997: 28th Underwater Mining Institute**, Seattle, WA USA. Contact: K. Chong Morgan, Underwater Mining Institute, c/o Marine Minerals Technology Center, 811 Olomehani Street, Honolulu, HI 96813-5513 USA, Tel. 808-522-5611, Fax 808-522-5618, Email: 70673.534@compuserve.com
- Nov. 8-9, 1997: Structural Controls and Genesis of Economic Resources (Mineral and Hydrocarbon Deposits): The Dave Johnston Memorial Meeting**, Trinity College, Dublin, Ireland. Contact: Dr. Ken McCaffrey, Kingston University; Tel. 44-181-547-2000, Email: k.mccaffrey@kingston.ac.uk; Dr. Linda Lonergan, Imperial College, London, Tel. 44-171-594-6465, Email: l.lonagan@ic.ac.uk; Dr. Jamie Wilkinson, Imperial College, London, Tel. 44-171-5946415, Email: j.wilkinson@ic.ac.uk; Dr. Patrick Wyse Jackson, Trinity College, Dublin, Tel. 353-1-608-1477, Email: wysjcknp@tcd.ie; or Dr. Kerr Anderson, Navan Resources, Tel. 353-1-46-22363
- Nov. 9-13, 1997: 43rd Annual Conference on Bioassay, Analytical, and Environmental Radiochemistry**, Charleston, SC USA. Contact: N. Slater, 43rd Bioassay Conference, PO Box 30712, Charleston, SC 29417 USA; Tel. 803-556-8171, Email: nancy.slater@lims.gel.com; <http://mwana.lanl.gov/bioassay/bioassay.html>
- Nov. 11-14, 1997: Physical Research Laboratory, International Conference, Isotopes in the Solar System**, Navrangpura, Ahmedabad, India. Contact: J. N. Goswami, Tel. 91-79-462129, Fax 91-79-6560502, Email: isotope@prl.ernet.in
- Nov. 11-15, 1997: Comparative Evolution of PeriTethyan Rift Basins**, Cairo, Egypt. Contact: William Cavazza, Dept. Earth and Geoenvironmental Sciences, University of Bologna, Bologna, Italy; Fax 39-51-243-336, Email: cavazza@geomin.unibo.it
- Nov. 12-13, 1997: The Rates and Timescales of Magmatic Processes**, Geological Society of London, Burlington House, London, UK. Contact: Nick Rogers; Tel. 1908-653013; Fax 1908-655151; Email: n.w.rogers@open.ac.uk
- 1998: Canadian Institute of Mining, Metallurgy and Petroleum**, 100th Annual General Meeting, Quebec, Canada. Contact: John Gaydos, Meetings Manager, Canadian Institute of Mining and Metallurgy, 1 Place Alexis Nihon, 1210-3400 de Maisonneuve Boulevard West, Montreal, Quebec H3S 3B8, Canada; Tel. 514-939-2710; Fax 514-939-2714.
- 1998: 10th IAGOD Symposium**, Australia. Contact: Professor I. R. Pliner, University of Melbourne, Parkville, VIC 3052, Australia; Tel. 613 3446520; Fax 613 3447761.
- Mar. 30-Apr. 4, 1998: International Association of Geochemistry and Cosmochemistry, Water-Rock Interaction-9**, Taupo, New Zealand. Contact: B. W. Robinson, Tel. 64-7-374-8211, Fax 64-7-374-8199, Email: wri-9@gns.cri.nz; <http://www.ruamoko.gns.cri.nz/wri-9.html>
- Apr. 13-17, 1998: 7th International Kimberlite Conference**, Capetown, South Africa. Contact: James Gurney, Secretary/Treasurer, 7IKC, Dept. of Geological Sciences, University of Capetown, Private Bag, Rondebosch 7700, South Africa; Email: 7IKC@GEOLOGY.UCT.AC.ZA, <http://www.uct.ac.za/depts/geolsci/7ikc/>; Tel. 27-21-650-3783, Fax 27-21-531-3162
- May 18-21, 1998: First International Conference on Remediation of Chlorinated and Recalcitrant Compounds**, Monterey, CA, USA. Contact: J. Purvis, The Conference Group, Inc., 1989 West Fifth Ave., Suite 5, Columbus, OH 43212-1912 USA; Tel. 800-783-6338 or 614-424-5461; Fax 614-488-5747
- June 23-27, 1998: 7th International Conference on Permafrost**, Yellowknife, Canada. Contact: J. A. Heginbottom, Geological Survey of Canada, 601 Booth St., Ottawa, Ontario, Canada K1A 0E8; Tel. 613-992-7813, Fax 613-992-2468; http://www.ncrcan.gc.ca/gsc/permaf_e.html
- June 29-July 15, 1998: 8th International Platinum Symposium (IAGOD/CODMUR)**, Johannesburg, South Africa. Contact: Dr. C. A. Lee, PO Box 68108, Bryanston, South Africa; Tel. 2711 411 2253; Fax 2711 692 3693.
- Aug. 10-14, 1998: International Mineralogical Association: IMA '98**, 17th General Meeting, Toronto, Canada. Contact: Professor A. J. Naldreli, Department of Geology, University of Toronto, Canada M5S 3B1; Tel. 461-978-3030; Fax 416-978-3938; Email: ima98@quartz.geology.utoronto.ca
- Aug. 10-16, 1998: International Ophiolite Symposium and Field Excursion; Generation and Emplacement of Ophiolites Through Time**, Oulu, Finland. Contact: Jouni Vuollo, University of Oulu, Dept. of Geology, FIN-90570 Oulu, Finland; Fax 358-81-5531484, Email: vuollo@sveka.oulu.fi or Eero Hanski, Geological Survey of Finland, P.O. Box 77, FIN-96101 Rovaniemi, Finland, Fax 358-60-3297289, Email: eero.hanski@gsf.fi
- Oct./Nov. 1998: Physical, Chemical and Biological Aspects of Aquifer—Stream Sediment Interrelations**, 28th IAH Congress. Contact: Dr. J. Rosenschein, USGS, MS 414, National Center, Reston, VA 22092, USA; Fax 703-648-5722.



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Inquiries to: Dr. Martin Novak, Czech Geological Survey, Geologicka 6, 152 00 Prague 5, Czech Republic;
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