Lunar and Planetary Science Conference XX

The TWENTIETH LUNAR AND PLANETARY SCIENCE CONFERENCE will begin Sunday March 12 at 6:00 p.m. with registration and an open house at the Lunar and Planetary Institute. The preregistration fee for the conference is $40.00 for all attendees except students with student ID's who may register for $20.00; there will be a late fee of $10.00 assessed for all registrations received after March 6, including those received during the conference. A shuttle bus will run between NASA area hotels and the LPI from 5:45-10:00 p.m. Registration will continue throughout the conference on the 2nd floor of the Gilruth Center at the Johnson Space Center. All conference activities, technical sessions, exhibits, poster sessions, etc., unless otherwise listed, will be at the Gilruth Center.

From a total of 643 abstracts accepted for publication in Lunar and Planetary Science XX, the Program Committee has constructed 28 technical sessions and 1 special session. The general structure of the program is as follows:

MONDAY AM, MARCH 13
- Mars Remote Sensing
- Chondrules and Ordinary Chondrites
- Cosmic Dust I

MONDAY PM, MARCH 13
- Mars Remote Sensing/Volcanism
- Carbonaceous Chondrites
- Shock Metamorphism and Terrestrial Craters
- Planetary Differentiation (Bldg. 30 auditorium)

TUESDAY AM, MARCH 14
- Mars Geology
- Bhoghati and Angrite Consortia Plus Pallasites
- Cosmic Dust II and Interstellar Grains/Dust

TUESDAY PM, MARCH 15
- Origin and Crystallization of Mare Basalts and Asteroids and Small Bodies
- Chemical and Isotopic Characteristics of Solar System Material
- Planetary Physics

FRIDAY AM, MARCH 17
- Magma Evolution in the Lunar Highlands
- Planetary Accretion
- Outer Solar System

The preliminary program included in this issue reflects plans for the conference as they exist early in February. Minor changes may yet occur before the Conference itself (see Appendix to this Bulletin)
Conference Highlights and Peripheral Meetings

Posters entered in the Technical Poster Session will be highlighted Monday, Tuesday, and Thursday of the Conference in the Gilruth Center. Approximately 30 posters will be displayed each day. Authors will be available for discussion from 5:00-6:30 p.m. on these days, during which time complimentary keg beer and soft drinks will be served.

The on-line and remote access capabilities of the interrelated database systems in use at the LPI will be displayed in the coffee area of the Gilruth center during regular conference hours. These databases include the Geophysical Data Facility (GDF) and the Bibliographic Search Service (BSS) developed and maintained by the LPI, as well as the Image Retrieval and Processing System (IRPS) sponsored by Washington University, which includes the Planetary Image and Cartography System (PICS) created by USGS Staff.

The Combined Publishers Exhibit will be on display in the coffee area of the Gilruth Center from Monday through Friday noon. Several publishers have already indicated an intent to participate, including Annual Reviews, Inc., American Geophysical Union, Springer-Verlag, Taylor & Francis, Macmillan Trade Books, and The University of Arizona Press.

Tuesday — March 14
There will be an evening session held in the Bldg. 2 auditorium entitled “NASA Opportunities in Solar System Exploration.”

Wednesday — March 15
A JSC Astronomer’s Brownbag Lunch Club seminar will be held in the Conference Room (Room 193) of Building 31 at noon. Jim Oberg will be presenting a talk entitled “Soviet Shuttle Update.”

The Planetary Meetings Steering Committee (PMSC) will hold a meeting at noon in the Blue Room of the LPI. Members of the committee should contact Pam Jones, LPI Projects Office, at 713-486-2150 for additional information.

There will be a banquet held this year at the South Shore Harbour Hotel and Conference Center. Tickets for the banquet are $25 or $15 for students. The speaker will be George Mueller, who was the Associate Administrator for Manned Space Flight at NASA Headquarters during the Apollo era. The banquet begins at 7:00 and a cash bar will be open starting at 6:00. Shuttle service will be provided from the other area hotels to the South Shore Harbour Hotel.

Thursday — March 16
The Lunar and Planetary Science Conference Forum convened by the PMSC will be held at noon in Room 104 of the Gilruth Center. The Forum provides a session where conference participants can openly express and discuss mutual concerns.

Suggestions for issues to be placed before the Forum are solicited. Questions, comments, and suggestions should be sent to the LPS Forum, c/o LPI Projects Office, so that they can be included in the summary and agenda for the Forum.

The Planetary Society, in cooperation with NASA, is sponsoring a symposium entitled “Current Questions on Planetary Exploration.” This event will be held from 8 to 10 p.m. in the Building 2 auditorium. The panelists will include Louis Friedman, James W. Head, Michael B. Duke, Valery Barsukov, Mikhail Marov, and Lev Mukhin. Attendance is free, but tickets must be obtained beforehand from the Planetary Society. To obtain tickets, please write to the Planetary Society, Re: Houston Event, 65 N. Catalina Ave., Pasadena, CA 91106 or call 818-793-5100.

Abstracts

Lunar and Planetary Science XX
A staple-bound copy of abstracts will be sent before the conference to the corresponding author of an abstract. No copies will be sent to foreign authors this year unless the author has prepaid for the cost of shipping. Due to time constraints in our printing schedule and to budgetary constraints on postage, a limited number of posters to the same institution will be mailed. It is suggested that these copies be shared among the author’s colleagues.

Abstract volumes will be distributed to all conference attendees. Those who cannot attend the conference but wish to have the abstracts, a supply will be available after the conference at the cost of shipping and handling. Refer to the order form included in this Bulletin and mail with payment to the LPI Order Department.

On-line 20th LPSC Program

To access the online program, use either the NASA/SPAN network, NASA NPSS (NASA Packet Switching System) access, or dial in direct. When using NASA/SPAN, the node name for the LPI VAX is LPI:. Direct dial phone lines are 713-486-8214 or 713-486-9782.

When connection is made, use the following directions:

**USERNAME**: Program
**PASSWORD**: LPI
You will then get the usual “welcome” to the system and a menu of options will be displayed.

**20TH LPSC PROGRAM ONLINE**
Select the routine you wish to use by entering its letter below
A. AUTHOR/SPEAKER NAME
B. SESSION
C. TOPIC/TITLE/KEYWORDS
G. QUIT/EXIT ROUTINE

A series of menus and prompts will cue you to the appropriate way to access the various aspects of the program. We hope this innovative way of presenting the program to the community will assist you. If you have difficulty in accessing the LPI computer, please contact Kinpong Leung, LPI Computer Systems Manager, at 713-486-2165, [KLEUNG@NASA] (on NASAMAIL), or LPI::LEUNG (on SPAN).

**The LUNAR AND PLANETARY INFORMATION BULLETIN** is published three times a year by the Lunar and Planetary Institute, 3001 NASA Road One, Houston, Texas, 77058-4399.

Ivan Warren, Editor.

Editorial and production support were provided by the Publications Services Department at the LPI.

Copyright deadline for the May issue of the Bulletin is April 17, 1989. Send information of announcements to be included to the LPI Publications Office, 1303 NASA Road One, Houston, TX 77058-4399.
19th Proceedings Ordering Information

Published by Cambridge University Press and the Lunar and Planetary Institute

The Proceedings of the Nineteenth Lunar and Planetary Science Conference is a volume of papers including original research and reviews of current interest in the planetary sciences. This book incorporates, but is not limited to, material from the Nineteenth Lunar and Planetary Science Conference held at the NASA Johnson Space Center, Houston, Texas, in March 1988. The LPSC has been convened annually since 1970, and is one of the most important forums for research in planetary science. It thus represents a broad spectrum of disciplines and interests.

This year's Proceedings are edited by Dr. Graham Ryder and Dr. Virgil L. Sharpton. Topics range from plans to build an inhabited lunar base, to tectonic processes on Venus, to the geochemical distinctions between the Earth and the Moon and how they might be used to determine the origin of the Moon, to the effect of impact events on the Earth. The volume also contains papers on meteorites, comets, cosmic dust, solar system geochemistry, geology and petrology of the Moon and other planets, and a large section on impact cratering studies. The Proceedings are considered a prestigious publication, and the papers comprising it are reviewed with the rigor of an academic journal.

This volume should be of interest to researchers and their graduate students in all lunar and planetary programs, particularly workers in petrology, geochemistry, geophysics, geology, and astronomy.

Proceedings of the Nineteenth Lunar and Planetary Science Conference
Edited by Lunar and Planetary Institute/ Graham Ryder and Virgil L. Sharpton
$100 / £65
Publication date: March 1989

Also available:
Proceedings of the Eighteenth Lunar and Planetary Science Conference
Edited by Lunar and Planetary Institute/ Graham Ryder
ISBN 0-521-35090-5 753 pages
$65 / £60
Published: March 1988

These books may be ordered from Cambridge University Press, Order Department, 310 North Avenue, New Rochelle, NY 10801 (Phone: 800-872-7423 or 914-235-0300). Outside of North America, please order from Cambridge University Press, Customer Services Department, Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU, U.K. (Phone: 223 312393).

Publication of 20th Proceedings

The Proceedings of the Twentieth LPSC will be published as a hard cover book and is planned to be a joint venture between the LPI and a major book publisher. Graham Ryder and Buck Sharpton have agreed to serve as co-editors and will be assisted by a team of distinguished associate editors.

The deadline for submission of manuscripts to the Twentieth Proceedings is May 26, 1989. Full information, including detailed instructions for prospective authors, will be available at the registration desk. Please contact LPI Publications at 713-486-2188 for more information.

USRA Establishes New Initiatives Office

At the recently held Universities Space Research Association (USRA) Strategic Development retreat it became clear that a need exists for heightened public awareness of the LPSC as a whole. Nancy Wood, former executive director of The Space Foundation, has been appointed to the post of Special Assistant to the President of USRA. One of her first responsibilities will be to enhance and expand the research capabilities of the USRA facilities in Houston, which include the LPI, the Division of Space Biomedicine, and the Universities Advanced Design Program. Ms. Wood comes to this position with a long history of interest in and involvement with the space program and related activities. For eight years she has directed the Space Business Roundtable and the fellowship programs of The Space Foundation. She serves on the executive committee of the 1000-member Houston Chapter of American Institute of Aeronautics and Astronautics. Her professional affiliations include Fellow of the British Interplanetary Society and Associate Fellow of AIAA, and membership in Women in Aerospace, American Astronautical Society, Planetary Society, and the Astronomical Society of the Pacific.

Wood will be ably assisted by the new Executive Secretary to the New Initiatives Office, Joan Wade, who brings a unique background to this position. Wade was formerly Executive Secretary to the Director of Research and Development and the Vice President of Engineering and Technology of Vetco Gray, Inc. In addition, she has a professional background in government, as City Councilwoman of Nassau Bay for five years, Congressional Aide to a U.S. Senator, and office manager to a U.S. Representative. Her professional competence combines with an understanding of the requirements of international space research to make her a welcome addition to the USRA space research support staff.

The latest addition to the New Initiatives program is Beth Williams, who has been appointed by the LPI as Consultant to the Director's Office. Williams, who was married to the late astronaut C. C. Williams, has been an area resident for 25 years. Her function is to assist the LPI Director and the New Initiatives Office in developing local education programs and related tasks and increasing public awareness of the LPI as a whole. Her knowledge of the area as well as her wide-ranging circle of acquaintances serve to make her an excellent choice for this task.

Anyone desiring further information regarding the New Initiatives Office should contact Nancy Wood at 713-486-2196 or the LPI Director's Office at 713-486-2180.
Microsymposium 9

The ninth in a series of small symposia organized under the auspices of the Brown University - V. I. Vernadsky Institute (ASUSSR) institution-to-institution agreement, and including representatives from the Institute of Space Research (IKI) and several other institutions of the Soviet Academy of Sciences, will be held at Brown University, March 20-22, 1989. The meeting is entitled "Recent Scientific Results and Future Plans in the Exploration of the Solar System (Microsymposium 9)" and the co-conveners are V. L. Barsukov and James W. Head. Topics will include:

Venus Volcanism: Processes and Deposits
Vulcanism is clearly an important process on Venus, but how does it manifest itself, what is its contribution to heat loss, what are the rates of volcanism today, what are the implications of volcanism for geochemical cycles of volatiles, and where does Venus display presently active volcanism?

Venus Tectonics and Interior Dynamics
Data from Venera 15/16 and other sources revealed a wide variety of tectonic deformation, and previous discussions have focused on several possible mechanisms for interior dynamics and surface deformation (hot spots, spreading, conduction, convection, etc.). In this session, attention will be focused on the nature of surface deformation and how it may be linked to the nature and dynamics of the interior of Venus.

Venus Science: A Pre-Magellan View
Magellan will be launched in April 1989 and will begin returning data in 1990. The purpose of this discussion session is to outline the significant questions that the global high-resolution data from Magellan will help resolve. Emphasis will be placed on what we have learned from Venera, Pioneer-Venus, Arecibo/Goldstone, and other data, and how the analysis of these data have focused our attention on specific problems to be tested by Magellan Mission results.

Scientific Problems and Objectives for Lunar Exploration
The Moon is the cornerstone for our understanding of processes in the early history of the solar system. Scientific attention is again focusing on the Moon with Galileo encounters in 1990 and 1992, and interest on the part of the U.S.S.R. and the U.S. in missions to the Moon in the 1990s. This session will focus on recent data and scientific questions for future missions.

Nature, Origin, and Evolution of Phobos
The Pre-Encounter View
The Phobos Mission will encounter Phobos this spring, and this session will offer an opportunity to summarize existing knowledge about Phobos and to discuss the important questions that the mission will help resolve. Several Soviet and French investigators and Phobos IDSS will participate.

Mars Stratigraphy, History, and Science Objectives for Future Exploration
The recent opposition of Mars and the Phobos Mission offer new regional data for the surface of Mars. This session will emphasize recent scientific results and the scientific questions associated with future Mars exploration, including possible sample return missions. The theme of this session will be the stratigraphy of Mars, the history of reservoirs of fine-grained material and volatiles, the important scientific questions relating to the major stages in the atmospheric and geologic evolution of Mars, and recent Soviet thinking on the biological evolution of Mars.

Lunar Polar Probe Conference Scheduled Prior to LPSC
The Houston Space Society is planning the Lunar Polar Probe Conference to be held in Houston on March 11 and 12, the two days immediately preceding the 20th LPSC. The conference is intended to formalize plans for the development, funding, and launch of a small satellite to explore the polar regions of the Moon. The weekend conference will be held at the Nassau Bay Hilton, located across the street from the LPI and the Johnson Space Center. Attendance is open to members of the general public with an interest in space, and the registration fee is $15. A banquet will be held on Saturday, March 11, and the cost for attending is $25 per person. Guest speakers at the conference will include Dr. Wendell Mendell of the NASA Johnson Space Center. General information will be discussed in a series of panels on Saturday followed by workshop sessions and a press conference on Sunday. More information on the conference may be obtained from Howard Stringer (713-783-1181) or James Davidson (713-643-6373), or by writing the Houston Space Society at P.O. Box 266151, Houston, TX 77207-6151.

International Congress to Draw Top Earth Scientists to U.S.
An international gathering of over 6000 earth scientists will convene in Washington, D.C., during July 1989 for the prestigious 28th International Geological Congress. The IGC provides a forum for the world's foremost geoscientists to present state-of-the-art findings and exchange ideas on topics ranging from research on earthquakes and volcanoes to the recovery of oil and water.

The last IGC was held in 1984 in Moscow and previously in 1980 in Paris, the site of the first IGC in 1878. The July 9-14 meeting at the Washington Convention Center marks only the third time in its history that the United States will host the meeting. The last U.S. meeting of the IGC was in 1933.

The attendees will include earth scientists and researchers from the energy and minerals exploration industry, federal agencies, geological survey, and academic institutions. The scientific credentials of the Congress are underscored by more than 3000 oral presentations, over 100 pre- and post-Congress field trips to explore geology from Antarctica to Alaska, and more than 50 short courses and workshops.

Two major colloquia will highlight the 20th anniversary of the Apollo 11 lunar landing and provide an assessment of world natural resources. Other symposium sessions will include the latest research on the influence of extraterrestrial impact phenomena on the course of geologic history, including the death of the dinosaurs and other species; new tools and frontiers in the exploration for oil and gas; energy and mineral resources of the Circum-Pacific region; advances in earthquake prediction; hydrogeology; and rate and frequency of volcanic eruptions.

Hosts for the IGC, held in collaboration and under sponsorship of the International Union of Geological Sciences, are the U.S. Geological Survey and the U.S. National Academy of Sciences, working in cooperation with major U.S. earth science societies and industry organizations on behalf of the entire U.S. earth science community.

For further information contact:
Dr. Bruce Hanshaw
Secretary General
28th IGC
P. O. Box 1001
Herndon, VA 22070-1001
703-643-6053
Venus Geoscience Tutorials and Workshops

The NASA PGG Program and Magellan Project has encouraged the organization of several LPI-sponsored tutorials and/or workshops on Venus geoscience to take place between the spring of 1989 and the start of Venus mapping by Magellan, which is scheduled for July 1990. The major objectives of these tutorials and workshops will be to (1) summarize for the planetary geoscience community the rapidly evolving state of our knowledge of the surface and geology/geophysics of Venus, (2) prepare the community for the extremely large Venus geoscience "data dump" expected from Magellan, and (3) discuss mapping standards and provide early training in "radar geology" mapping in support of NASA's formal Venus Geologic Mapping Program, to begin after the Magellan mission in the early 1990s.

Joseph Boyce, NASA Program Scientist Planetary Geosciences, has asked Gerald G. Schaber of the U.S. Geological Survey in Flagstaff to supervise the planning and organization of the first Venus Geoscience Tutorial (and associated Venus Geologic Mapping Workshop) to be held June 12-15, 1989 at the U.S.G.S. Field Center in Flagstaff, Arizona. A first announcement regarding the Venus tutorial and mapping workshop has already been mailed. Anyone desiring a copy of this announcement or to be added to the mailing list should contact Pam Jones at the LPI (713-486-2150). For additional information, contact Pam Jones or Gerry Schaber (602-257-7485; FTS 765-7485).

Change in Meeting Location

The conference on "The Sun in Time" is to be held in Tucson, Arizona, March 6-10, 1989, the week before the Lunar and Planetary Science Conference. Please note that this conference was originally scheduled to be held in Monterey, California, but due to administrative difficulties it was necessary to move it to Tucson. The new location of the conference is the Tucson Hilton East, 7600 E. Broadway. For further information, please contact Mildred S. Matthews, University of Arizona, at 602-621-2902.

Engineering, Construction and Operations in Space

Edited by Stewart W. Johnson and John P. Wetzel

A new book relating to space activities and lunar bases has been published by the American Society of Civil Engineers. This volume, the Proceedings of the Space 88 Conference held in Albuquerque, New Mexico, contains 125 papers providing in-depth discussions of space policy, extraterrestrial basing, space stations and orbiting structures, lunar surface construction and operations, lunar base design, martian basing, space environmental effects, role of space station technology, and other areas of special interest. To obtain a copy, write to:

American Society of Civil Engineers
345 East 47th Street
New York, NY 10017
212-705-7538

Library of Congress Catalog Card
No. 88-21760
ISBN 0-97262-671-7
1988, 1349 pages, softcover, $98 U.S.

Science for Children: Resources for Teachers

This new publication is a guide designed to assist those who are working to improve elementary science education. The materials described here are recommended because they provide outstanding support for carrying out effective hands-on, inquiry-based programs. Science for Children has been prepared by the National Science Resources Center, a joint effort of the National Academy of Sciences and the Smithsonian Institution.

The guide is divided into three major sections: Curriculum Materials, Supplementary Resources, and Sources of Information and Assistance. A brief description of each item is included along with the address, phone contact, scope of the material, and price. It is divided by subject and contains several indexes to allow access to the information in a number of ways.

This guide should be available to every elementary teacher who is introducing science into the curriculum for the first time or to the experienced science teacher who is looking for new ideas and materials, as the guide can save a lot of time and effort in locating materials and evaluating them.

The 176-page guide is available from:

National Academy of Sciences Press
2102 Constitution Avenue N.W.
Washington DC 20007-5575

The price is $7.95 for a single copy, $6.50 for 2 to 9 copies, and $4.95 for 10 or more copies; VISA/Mastercard/American Express is accepted.
National Space Society Launches New Publication

The National Space Society, a nonprofit organization that actively promotes space exploration, will publish a new monthly space magazine beginning in January 1989 entitled *Ad Astra*, which is Latin for “To The Stars.” Editorial topics planned for *Ad Astra* during 1989 include articles on Space Station “Freedom,” updates on shuttle missions, Mars exploration, the politics of space, superconductivity in space, commercial space, international programs, life sciences, remote sensing, space probes and satellites, spinoffs, missions of tomorrow, and interviews, plus all the latest activities of the National Space Society.

Subscriptions to *Ad Astra* are available for $30 per year, and are a benefit of membership in the National Space Society.

Students and senior citizens receive a special subscription rate of $18, and the rate for educators is $20. Advertising will be accepted and media kits are available upon request.

The National Space Society, founded by a merger between the National Space Institute and the L5 Society, is one of the foremost civilian space advocacy groups in the world. Headquartered in Washington, D.C., the National Space Society has more than 20,000 members and 100 chapters worldwide. For more information, contact:

Kate McMains, Managing Editor
National Space Society
922 Pennsylvania Ave., S.E.
Washington, DC 20003
202-543-3991

More Volumes Published in Isaac Asimov’s Library of the Universe

When the first volume of Isaac Asimov’s Library of the Universe series was reviewed in this Bulletin in February 1988, we were very pleased with the excellence of the book. Now that 16 volumes of the series have been published, it is obvious that the quality of the series will be maintained throughout the entire 32-volume sequence.

Publisher Gareth Stevens, Inc., working with Dr. Asimov, has selected a wide spectrum of astronomical time, events, and phenomena ranging from ancient astronomy to a book for the sun and each planet in our solar system, to quasars and black holes, space garbage, rockets and satellites, to UFOs, to future homes for human beings in space.

They have worked with various space organizations to acquire powerful, instructive and beautiful imagery to create clear, elucidative illustrations for each book in the series. Each volume contains Asimov’s special contribution of “Amazing Facts” and “Unexplained Mysteries,” which are both provocative and fun. A “Fact File” is included in the back matter of each book along with a glossary, guide for further reading, and, for children who wish to learn more, places to visit and write. An index appears in each book and Volume 33 will be a comprehensive index for the entire series.

The books are designated for Grades 3-4 but should be of interest to children whose ages range from 6-12. Asimov writes in a friendly and insightful way that presents the science facts and concepts in simple, thoughtful language.

The latest volumes in the set (volumes 11-16) include *Ancient Astronomy, How was the Universe Born?, Space Spotter’s Guide, Earth: Our Home Base, Saturn: The Ringed Beauty, and Unidentified Flying Objects*. Each of the books is priced at $9.95 and is library bound and cotton drill reinforced.

To order or request more information on this much needed series of books for the elementary science student, contact:

Gareth Stevens, Inc.
7221 West Green Tree Road
Milwaukee, WI 53223
414-466-7550

Fran Waranius

New Materials Available from A.S.P.

Catalog of Education Materials

A new catalog from the nonprofit Astronomical Society of the Pacific features interesting materials about the exploration of the universe. It includes slide sets, a laser disk, and videotapes with the latest images from the world’s largest telescopes and U.S. and Soviet space probes. Also featured are software packages for various home computers that can show the night sky in any orientation and simulate some of the techniques and principles of space flight. Posters, observing aids, audioteapes, and books to help youngsters learn about astronomy round out the 32-page catalog. To obtain a copy, please write to:

Catalog Requests
A.S.P.
390 Ashton Ave.
San Francisco, CA 94112

The Society would be grateful if you can include two first class stamps to help with the mailing costs.

Moon Kit

A new kit of slides and information about the Moon has been released by A.S.P. The 18 slides in the kit show many different aspects of the Moon, including close-ups of dramatic craters, lava tubes, and mountains, as well as a map of the far side of the Moon and photos from the Apollo 11 landing. The slides are accompanied by a 24-page book with detailed captions, background information, projects, activities, and an introductory reading list. Among the topics covered in the book are a guide to the phases of the Moon, explanations of the names of full moons (including “blue moon” and “harvest moon”), and a description of what it is like on the lunar surface. The booklet also has tables of the automated and manned lunar probes and a chart for telling time by the Moon.

The kit is ideal for teachers, students, and anyone interested in getting to know our planet’s satellite more intimately. To order, send $24.45 (which includes postage and handling) to:

A.S.P.
Moon Kit Dept. NPK
390 Ashton Ave.
San Francisco, CA 94112

Californiia residents should add sales tax. Orders from outside the U.S. should include $3.00 for additional postage.
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**ABSTRACTS of the Conference**

Prepayment (in $US) required on all foreign orders. To obtain abstracts enclose payment in U.S. dollars only (checks made out to LPI Order Dept.).

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All prices subject to change. These prices effective 2/15/89.

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Mailed to anywhere in the United States $7.00.
There are two LPI Library Information Center datasets available on-line. These are:

**USERNAME and PASSWORD**

**USERNAME**
- **PATRQN**: Enter **PATRQN** or **SEARCH** as appropriate. Password on either account is LPI.

**PASSWORD**

This would result in a population in which both of these terms appear in titles or in the keywords.

APOLLO 15·
APOLLO 16

Would result in a population in which either Apollo 15 or Apollo 16 appeared in the citation.

It is possible to refine your searches by using 99 in the date ranging statement. If 99 is typed for the year to begin and also for the year to end, then the next search statement will apply only to the year previous performed. For example:

After obtaining a file of the references with either Apollo 15 or Apollo 16, at the data ranging feature type in 99 and 99 to both prompts, then structure another search statement, i.e.,

15014+
16240

This would result in a search of the Apollo 15/Apollo 16 file for references with either of these two sample numbers.

You can get an idea of the size of the file created if you will say “no” to the prompt “DO YOU WANT CITATIONS PRINTED ON YOUR SCREEN.” The computer automatically puts the citations retrieved into a file for you to scan or print out later. By responding “no” you will get a year-by-year accounting of how many references were found as matches to your search statement, and a total number when it is finished. Then to see the references you may use the PRTOUT command and follow the instructions for previewing references on the screen or to your printer.

You may always get a list of the commands available by typing “HELP” or at the command level answer “PROMPTS”.

Remember to “quit” when you are finished. For additional help or information call Stephen Tellier at 713-486-2191 or on NASA/SPAN LPI:STEPHEN.

**AFFIRMATIVE CONNECTING TO PATRQN:**

Menus and prompts will direct you to the individual databases in this account. The same Boolean operators are available in Catalog as in SEARCH. At present searching the card catalog is sometimes a lengthy process. There are plans to upgrade soon.

**SEARCH**

**USERNAME**
- **NEWUSER**

Password (to either). LPI

**PASSWORD**

The same Boolean operators are available as in SEARCH. This is NOT a VAX Username (YOR N)?

Remember: At any time you may type “HELP” in the word HELP and you will receive on-line instructions. Other important considerations: the Boolean operators are:

- **ampersand (&)** to “and” terms together plus sign (+) to “or” terms.

At this point you may NOT combine “and” and “or” in the same search statement. A sample search statement would be entered thus:

**PHOBOS& DEIMOS**

**TO ACCESS:**

DIRECT DIAL: 713-486-9782 or 8214. This connection to the LPI VAX will give you the prompt **USERNAME**. Enter **PATRQN** or **SEARCH** as appropriate. Password on either account is LPI.

**NASA/SPAN: SET HOST LPI:**

**USERNAME** prompts same as above.

**OMNET (SEARCH SERVICE ONLY):**

**GOTO XDATA**

One Moment please... Welcome to **XDATA**

Connect me to: **LPI.BSS**

**AFTER CONNECTING TO SEARCH:**

A message will appear identifying the search service, giving you the choice to select a number of news items and ask a question.

**DO YOU WISH TO CONTINUE (Y OR N)?**

A “Y” response will begin the Search program sequence with a prompt for:

**ACCOUNT NAME**

**PASSWORD**

As a beginning user, you may use the general account **NEWUSER**, password **SEARCH**. This is NOT a VAX Username prompt.

**REMEMBER**: At any time you may type “HELP” in the word HELP and you will receive on-line instructions. Other important considerations: the Boolean operators are:

- **ampersand (&)** to “and” terms together plus sign (+) to “or” terms.

At this point you may NOT combine “and” and “or” in the same search statement. A sample search statement would be entered thus:

**PHOBOS& DEIMOS**

This would result in a population in which both of these terms appear in titles or in the keywords.

APOLLO 15+
APOLLO 16

Would result in a population in which either Apollo 15 or Apollo 16 appeared in the citation.

It is possible to refine your searches by using 99 in the date ranging statement. If 99 is typed for the year to begin and also for the year to end, then the next search statement will apply only to the year previous performed. For example:

After obtaining a file of the references with either Apollo 15 or Apollo 16, at the data ranging feature type in 99 and 99 to both prompts, then structure another search statement, i.e.,

15014+
16240

This would result in a search of the Apollo 15/Apollo 16 file for references with either of these two sample numbers.

You can get an idea of the size of the file created if you will say “no” to the prompt “DO YOU WANT CITATIONS PRINTED ON YOUR SCREEN.” The computer automatically puts the citations retrieved into a file for you to scan or print out later. By responding “no” you will get a year-by-year accounting of how many references were found as matches to your search statement, and a total number when it is finished. Then to see the references you may use the PRTOUT command and follow the instructions for previewing references on the screen or to your printer.

You may always get a list of the commands available by typing “HELP” or at the command level answer “PROMPTS”.

Remember to “quit” when you are finished. For additional help or information call Stephen Tellier at 713-486-2191 or on NASA/SPAN LPI:STEPHEN.

**AFFIRMATIVE CONNECTING TO PATRQN:**

Menus and prompts will direct you to the individual databases in this account. The same Boolean operators are available in Catalog as in SEARCH. At present searching the card catalog is sometimes a lengthy process. There are plans to upgrade soon.

**SEARCH**

**USERNAME**
- **NEWUSER**

Password (to either). LPI

**PASSWORD**

The same Boolean operators are available as in SEARCH. This is NOT a VAX Username (YOR N)?

Remember: At any time you may type “HELP” in the word HELP and you will receive on-line instructions. Other important considerations: the Boolean operators are:

- **ampersand (&)** to “and” terms together plus sign (+) to “or” terms.

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You may always get a list of the commands available by typing “HELP” or at the command level answer “PROMPTS”.

Remember to “quit” when you are finished. For additional help or information call Stephen Tellier at 713-486-2191 or on NASA/SPAN LPI:STEPHEN.

**AFFIRMATIVE CONNECTING TO PATRQN:**

Menus and prompts will direct you to the individual databases in this account. The same Boolean operators are available in Catalog as in SEARCH. At present searching the card catalog is sometimes a lengthy process. There are plans to upgrade soon.
The SPAN management team now includes an Internetworking Manager, who is working on issues such as dual protocol testing, coordination with other wide-area networks, and the migration of SPAN to OSI (the International Standards Organization's Open System Interconnect). He is also working with others from HEPlNET and Digital Equipment Company to develop a coordinated plan for the migration of SPAN and HEPlNET to DECnet PHASE V/OSI.

LPI Computer Access from Omnet

Whether you're in Valparaiso, Indiana or Valparaiso, Chile, you can access the LPI's computers. International access is available on SCIENCEnet, an electronic mail network from Omnet, Inc.

LPI databases currently available are the Geophysical Data Facility, the Lunar and Planetary Science Conference Program (option LPI) and the Bibliographic Search Service (option LPI.BSS). Others will be added soon.

To access the LPI from a SCIENCEnet mailbox, just type:

Command? Goto XDATA
Connect me to: LPI (or LPI.BSS)
LPI is just one of the databases available. There's also Pnet (from the American Institute of Physics); ASTIS (from the Space Telescope Science Institute); ADC (the Astronomical Data Center of the National Space Science Data Center); and SIMBAD (Set of Identifications, Measurements, and Bibliography for Astronomical Data of the Strasbourg Astronomical Data Centre; you must have an ID assigned by the Smithsonian Astrophysical Observatory to access SIMBAD). Many other databases—oceanographic, climatic, polar—are also available on SCIENCEnet.

SCIENCEnet offers researchers access from most places in the world. Scientists in two experiment groups currently log on from three continents. Electronic mailing lists and many general and specific bulletin boards facilitate communication.

From a SCIENCEnet mailbox you can send messages to NASAnet, PLmail, Bitnet, Internet, SPAN, Dialcom, Easylink, and many other systems. You can also send telex and fax messages.

For more information about SCIENCEnet, write:

Omnet, Inc.
137 Tonawanda St.
Boston, MA 02124
617-265-9230

OSSA-Sponsored

NASA Science Internet Project

The NASA Science Internet (NSI) project is sponsored by NASA's Office of Space Science and Applications (OSSA) and is responsible for providing networking services to OSSA-funded researchers worldwide. The NSI network infrastructure includes both SPAN (a DFCnet-based net) and NSN (TCP/IP based). In addition, the NSI formally cooperates with non-NASA networks (i.e., NSNet or HEPlnet) to provide additional connectivity. Plans for FY89 include the following:

- Meet all OSSA science communications requirements using SPAN, NSN, and other cooperating networks.
- Consolidate diverse networking activities into optimum design to improve both connectivity and interoperability and to reduce costs.
- Encourage international regional infrastructure (Paciefic Basin, Europe, South America) and make connections as appropriate.
- Build effective operations environment including trouble reporting/resolution and act as a clearing house for network information.
- Improve customer support by defining and initiating development of user, security, and network tools.
- Further the interoperability of SPAN with NSN (DECnet with TCP/IP).
- Demonstrate use of new technology, methodologies, and service offerings.
- Improve understanding of security issues and implement preventive security measures.
- Promote resource sharing with other providers, e.g., NSF or DOE.
- Participate in NASA user information forums, e.g., Lunar and Planetary Science Conference and Data Systems Users Working Group (DSUWG).
- Participate in Strategic Planning with Code EC (Communications Division of OSSA).

Representatives of NSI will be attending the 20th Lunar and Planetary Science Conference in Houston this spring. They will take this opportunity to meet with the science community in attendance, and they hope that individual concerns or issues regarding networking will surface as a result. The NSI Project Office encourages your comments or queries and can be reached directly by telephone (415-694-5859, FTS 464-5859) from 7:30 a.m. - 5:00 p.m. Pacific time.

LPI Telecommunications Numbers

This list of LPI telecommunication numbers is provided for your convenience:

1. LPI telex number: 4400832
Answerback: LAPI

2. LPI FAX number:
713.486-2162

3. Direct dial access to LPI VAX:
713.486-8214 or 713.486-9782

LPI SPAN Node Name: LPI
Guest Account Username: LPI
No Password Needed

Bibliography Username: SEARCH
Password: LPI

NASAnet Account: LPI

LPIB No. 52
The International Space University (ISU), headquartered in the United States, is a nonprofit international graduate education program for space development and research. The first educational institution of its kind in the world, ISU was founded in 1987 to provide graduate-level students who demonstrate academic excellence and leadership qualities with an annual Summer Session embracing eight concentrations of study in a multidisciplinary approach to space science and policy. The Summer Session offers projects of importance for the advancement of space research and development. The intensive summer course, consisting of over 240 hours of lectures and 280 hours of design project work, compresses a full year of study into two months.

At ISU's 1988 Summer Session, held at the Massachusetts Institute of Technology, 104 students from leading educational institutions in 21 nations spent two months covering Space Life Sciences, Resources and Manufacturing, Satellite Applications, Space Sciences, Business and Management, Space Architecture, Space Policy and Law, and Space Engineering. A joint class project was the development of a model international lunar base. Future Summer Sessions will be held in Europe and other regions. The ISU Board of Directors and Board of Advisors is comprised of distinguished business and government leaders, scientists, space experts, and academicians from many countries. In addition, there are 10 ISU liaisons throughout the world. They are located in Canada, India, Japan, People's Republic of China, Sri Lanka, Switzerland, United Kingdom, United States, USSR, and the European Space Agency. ISU is supported by over 70 corporate and governmental sponsors.

An agreement formalizing cooperation between the Moscow Aviation Institute (MAI) and ISU was signed in Moscow on December 16 designating MAI as the Soviet Union's official National Liaison to ISU. The agreement followed a week of negotiations held at MAI, the leading academic institution for aeronautics and astronautics in the USSR. The cooperation agreement was initiated following the Soviet Union's successful participation in the inaugural ISU'88 Summer Session program held at the Massachusetts Institute of Technology. Four of twelve Soviet students who participated in ISU'88 came from MAI as the result of a U.S. $100,000 grant scholarship underwritten by the USSR State Committee on Public Education.

Included in the ISU/MAI agreement is the possibility that MAI may host a future ISU Summer Session following the 1989 program, which will be held at the Universite Louis Pasteur in Strasbourg, France, June 30 through August 31.

The agreement between Moscow Aviation Institute and the International Space University is subject to approval by the ISU Board of Directors.

**Astronomy Day: Taking Astronomy to the People**

1989 marks the 16th year that amateur and professional astronomers have banded together to host special events worldwide promoting astronomy to the general public. This year's Astronomy Day has been set for May 13, 1989. Now is the time for astronomy clubs, science museums, astronomy departments, planetariums, etc., to start planning events for the spring. To aid these institutions, the Astronomical League has published a 120-page handbook listing ideas, suggestions, and resources. This booklet was produced under the V. M. Slipher grant of the National Academy of Sciences and is free (while supplies last), except for a minimal $2.00 charge for postage and handling. Requests from outside the U.S. should include $3.00 in U.S. currency.

The first annual "Sky and Telescope Astronomy Day Award" is being offered in 1989 to the organization that best exemplifies the concept of Astronomy Day. First prize is a $100 gift certificate from Sky Publishing. For a set of rules and entry forms (without ordering the handbook), send a self-addressed stamped legal size envelope to:

Gary E. Fomlinson
Astronomy Day Coordinator
Astronomical League
c/o Chaffee Planetarium
54 Jefferson Avenue S.E.
Grand Rapids, MI 49503
616-456-3985

Astronomy Day is sponsored by 13 astronomy and astronomy education organizations representing a combined membership of over 30,000 people. Individuals wanting more information about local events should contact their local astronomy institution.

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**Earlier Launch Date Set for NASA Hubble Space Telescope**

NASA has rescheduled the launch of the Hubble Space Telescope from February 1990 to December 1989. The earlier date was made possible following reassessment of a variety of factors including payload requirements and Space Shuttle orbiter assignments during the period.

The telescope, which fills the orbiter cargo bay, will be deployed by the Shuttle crew with the aid of the orbiter remote manipulation system.

The Hubble telescope is the first spacecraft designed for routine on-orbit servicing by the Space Shuttle crew. In the mid-1990s, a Shuttle crew is expected to revisit the telescope to replace onboard scientific instruments with new instruments incorporating advanced technology now under development.

The Astrophysics Division of the Office of Space Science and Applications, NASA Headquarters, and the project management center, Marshall Space Flight Center, will establish a new shipment schedule for the Hubble spacecraft, which is presently located at the Lockheed Missiles and Space Co. facility in Sunnyvale, California. The schedule for a final ground systems test involving the Hubble spacecraft also may be affected.

NASA Press Release 88-143

**Results of PCWG Image Display Questionnaire**

At last year's I PSC, a questionnaire was distributed to ask the planetary community about the level of interest in digital image processing and display. Although the response was somewhat disappointing there does appear to be a good core of interest. A list of the names will be kept for future distribution of information about CDROMs. The production of Voyager CDs is nearly complete, and the Planetary Data System (PDS) and Washington University are beginning to put Viking images on CD. A large image database of Mars that was created for Mars Observer will also be put on CD. The Magellan Project is producing a Venus CD with Pioneer Venus and Earth-based radar data.

Thanks to those who responded; anyone others who have an interest in working with CDs can contact me at 818-354-3372 and your name will be added to the list.

Stephen Saunders
Jet Propulsion Laboratory
<table>
<thead>
<tr>
<th>Month</th>
<th>Event</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>March</td>
<td><strong>Symposium on Space Commercialization: Roles of Developing Countries.</strong> Nashville, Tennessee.</td>
<td>Prof. F. Shahroky, University of Tennessee Space Institute, Tullahoma. TN 37388. Phone: 615-435-0631.</td>
</tr>
<tr>
<td>13-17</td>
<td><strong>20th Lunar and Planetary Science Conference.</strong> Houston, Texas. Pam Jones, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77058-4399.</td>
<td>Phone: 713-486-2150</td>
</tr>
<tr>
<td>20-22</td>
<td><strong>Brown University—Vernadsky Institute Microsymposium 9.</strong> Providence, Rhode Island. Angel Hilliard, Department of Geological Sciences. Box 1846, Brown University, Providence, RI 02912.</td>
<td>Phone: 401-863-2436 or 2526.</td>
</tr>
<tr>
<td>6-9</td>
<td><strong>MFTV Workshop on Tectonic Features on Mars.</strong> Richland, Washington. Pam Jones, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77058-4399.</td>
<td>Phone: 713-486-2150</td>
</tr>
<tr>
<td>20-23</td>
<td><strong>Comets in the Post-Halley Era.</strong> Bamberg, Federal Republic of Germany. R. Newburn and J. Rahe, Jet Propulsion Laboratory. 264-664, 4800 Oak Grove Drive, Pasadena, CA 91109.</td>
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<tr>
<td>May</td>
<td>(date to be announced)</td>
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<tr>
<td></td>
<td><strong>Planetary Detection Workshop.</strong> Houston, Texas. Ken Nishioka, Mail Stop 244-14, NASA Ames Research Center, Moffett Field, CA 94035.</td>
<td>Phone: 415-694-6540</td>
</tr>
<tr>
<td>10-14</td>
<td><strong>Ninth SSI/Princeton Conference on Space Manufacturing.</strong> Princeton, New Jersey. Mary Ann Grams, Space Studies Institute, P.O. Box 82, Princeton, NJ 08542.</td>
<td>Phone: 609-921-0377</td>
</tr>
<tr>
<td>14-17</td>
<td><strong>Joint Annual Meeting, Geological Association of Canada and the Mineralogical Association of Canada, with the participation of the Canadian Geophysical Union.</strong> Dr. Colin Stearn, Chairman. Local Organizing Committee for Montreal ‘89. Rm. 238, 3450 University St., Montreal, Quebec, H3A 2A7.</td>
<td>Phone: 514-398-4082</td>
</tr>
<tr>
<td>26-29</td>
<td><strong>Eighth Annual International Space Development Conference.</strong> Chicago, Illinois. SDC Ltd., P.O. Box 64397, Chicago, IL 60664-0397.</td>
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<tr>
<td>11-15</td>
<td><strong>Venus Geoscience Tutorial and Venus Geologic Mapping Workshop.</strong> Flagstaff, Arizona. Pam Jones, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77058-4399.</td>
<td>Phone: 713-486-2150</td>
</tr>
<tr>
<td>19-23</td>
<td><strong>IAU Colloquium No. 119: “Comparative Planetology and the Origin of the Solar System.”</strong> Nanjing, China. H. J. Smith, Astronomy Department, R. L. Moore Hall, 15,206, University of Texas, Austin, TX 78712.</td>
<td>Phone: 512-471-3300</td>
</tr>
</tbody>
</table>
Calendar

July

24-Aug. 4 International Association of Geomagnetism and Aeronomy, 6th Scientific Assembly, Exeter University, United Kingdom. Dr. Roy Jady, IAGA 1989 Organizing Secretary, Department of Mathematics, University of Exeter, Exeter, ED4 4QE, United Kingdom.

25-26 Cosmogenic Nuclide Production Rates in Meteorites, Vienna, Austria. Pam Jones, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77038-4399. Phone: 713-486-2150.

27-28 Differences Between Antarctic and Non-Antarctic Meteorites, Vienna, Austria. Pam Jones, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77038-4399. Phone: 713-486-2150.

31-Aug. 4 52nd Meteoritical Society Meeting, Vienna, Austria. Pam Jones, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77038-4399. Phone: 713-486-2150.

September
24-29 Seventh International Conference on Geochronology, Cosmochronology and Isotope Geology, Canberra, Australia. Organizing Committee, ICGO 7, Research School of Earth Sciences, Australian National University, G.P.O. Box 4, Canberra, A.C.T. 2601, Australia.

October
2-6 Seventh Thematic Conference on Remote Sensing for Exploratory Geology, Calgary, Alberta, Canada. Robert H. Rogers, Chairman, Program Committee, ERIM, P.O. Box 8618, Ann Arbor, MI 48107-8618. Phone: 313–994–1200, ext. 3382.


November

LPI Announces Summer Research Opportunity

The Lunar and Planetary Institute is once again offering selected undergraduates an opportunity to participate actively in lunar and planetary research with scientists at the Institute and at the NASA Johnson Space Center. The purpose of this program is to expose undergraduate students in planetary and astrophysical studies to an actual research environment in order to help them examine and focus on their goals. Typical projects in past years have included studies in cosmic dust and lunar sample characterization, meteorites and their origins, properties of planetary regoliths and atmospheres, planetary volcanism, geochemistry, and spectroscopic observations of planetary surfaces. Each project is directed by an LPI or JSC scientist.

College undergraduates with at least 50 semester hours credit who are interested in pursuing a career in the physical sciences are eligible. Selection is based upon the following criteria: (1) scholarship, curriculum, and experience, (2) career objectives and scientific interest, and (3) match of interest of applicant with available research projects.

The application deadline for this year's Summer Intern Program is March 13, 1989. For questions concerning the application information or the Summer Intern Program in general, please contact:

LPI Projects Office
3303 NASA Road One
Houston, TX 77038-4399
713-486-2150 or 2158

This program is supported by the LPI through funding from NASA Headquarters through the Universities Space Research Association.
PRELIMINARY CONFERENCE PROGRAM
20th Lunar and Planetary Science Conference
March 13-17, 1989

Monday, March 13, 1989
MARS REMOTE SENSING
8:30 a.m. Gilruth 104

Lee S. W.* Clancy R. T.
Viking IRM Observations: Regional Albedo and Photometric Studies of Mars

Dollfus A.* Deschamps M. Zimbelman J.
Granulometry of the Martian Surface by Photopolarimetry

Gaussig E. A.* Arvidson R. E.
Viking Optical and Thermal Evidence for Widespread Duricrust Substrate on Mars

Strickland E. L. III*
Physical Interpretation of Thermal and Reflected Data on Martian Surface Units

Pine P.* Chevrel S.
Earthbased Telescopic Near-infrared Probing of Mars by CCD-imaging

Bell J. E. III* McCord T. B. Lucas B. G.
Iron Oxides/Infrared studies on Mars: New Results Based on High Resolution Imaging Spectroscopy During 1988

Morris R. V.* Lauer H. V.
Effect of Matrix Properties on the Reflectivity of Dispersed Nanocrystalline Hematite: Implications for Martian Spectral Data

Bibring J.-P.* Combes M. Encraven T. Frard S. Forni O. Gondet B. Head J. Ksanfomaliti L. Langevin Y.
Mars Observations: Very First Results

Metzger A. E.* Haines E. L.
Gamma-ray Methods for the Measurement of Atmospheric Thickness and Surface Pressure at Mars

Feldman W. C.*
Neutron Signature of Carbon Dioxide and Water Ice at the Martian South Pole

Gaffey S. J.*
Carbonates on Mars: A Sedimentological Perspective

Chyba C. F.* Squyres S. W. Sagan C.
Depth to Unoxidized Material in the Martian Regolith

Traub S. G.* Cassidy W. A.
Alteration of Campo Del Cielo Soil by Meteorite Impact: Implications for the Surface of Mars

POSTER PRESENTATIONS

Bartels K. S. Burns R. G.
Oxidized Olivines on Mars: Spectroscopic Investigations of Heat-Induced Aerial Oxidation Products

Crisp J. Bartholomew M. J.
Mid-Infrared Spectroscopy of Palagonite

Edgett K. S. Christensen P. R.
The Physical Properties of Dark Intracrater Materials on Mars: Examination of Photographic and Thermal Infrared Data

McEwen A. S. Soderblom L. A. Swann J. D. Becker T. L.
Mars' Global Color and Albedo

Neukum G. Drescher A. Enderlein G. Gonano M. Hiller K. Hoffmann H. Jaumann R. Lehner M. Regner P.
Ross E. Richter R. Schmidt K. Schwarz G. Albrect J. Ebner H.
High Resolution Stereo Camera (HRSC) Experiment Proposal for the Soviet Mars 94 Mission

Stoker C. R. Mancinelli R. Tsay F. Kim S. White L. Scully J.
Degradation of Organic Compounds under Simulated Martian Conditions Strickland E. L. III Surface Photometric Properties and Albedo Changes in the Central Equatorial Region of Mars

Thompson T. W.
Goldstone Radar Observations of Mars: The 1986 Opposition
PRESENTED BY TITLE ONLY

Gaffey S. J.
Carbonates on Mars?: Requirements for Detection and Characterization Using Reflectance Spectroscopy

Morris R. V.
Reflectivity Spectra (350-2200 nm) of SNC Meteorites

Mustard J. F. Pieters C. M. Pratt S. F.
Systematics of the 1.0 µm Absorption Band in Reflectance Spectra of Actinolite

Pieters C. M.
Seeing Through the Dust and Alteration Products of Mars

Presley M. A. Christensen P. R.
The Distribution and Origin of Dust on Mars

Smith M. O. Adams J. B.
Isolation of Compositional Variance from Viking Lander Multispectral Images

Strickland E. L. III
Physical Properties of Oxio/Lunae Planum and Arabia-Type Units in the Central Equatorial Region of Mars

Strickland E. L. III
Physical Properties of Meridiani Sinus-Type Units in the Central Equatorial Region of Mars

Zolotov M. Yu.
Water-bearing Minerals in the Martian Soil (Thermodynamic Prediction of Stability)

Monday, March 13, 1989
CHONDRULES AND ORDINARY CHONDrites
8:30 a.m. Gilruth Gym

Kurat G.* Palme H.
Origin of Chondrules

Wood J. A.* Hashimoto A. Holmberg B. B.
Chondrules as Near-Equilibrium Assemblages that Formed in Fractionated Systems

Hewins R. H. Kozul J. M.* Ulmer G. C.
Allende Olivine Chondrules, Ferroan Olivine and Oxidation

DeHart J. M.* Lofgren G. F. Sears D. W. G.
The Composition and Luminescence Properties of Chondrule Olivines and Pyroxenes in the Type 3 Ordinary Chondrites

Jones R. H.*
Petrology and Conditions of Crystallization of Type II FeO-rich Chondrules in Semarkona (11.3.0)

McCoy T. J.* Scott E. R. D. Jones R. H. Keil K.
Homogenization of Chondrule Silicates in Ordinary Chondrites: Constraints on Asteroidal Metamorphism

Hewins R. H.* Radomsky P. M. Connolly H. C. Jr.
Influence of Melting Kinetics on the Formation of Barred Olivine Chondrules

Lofgren G.*
Dynamic Crystallization Experiments on Pyroxene-rich Chondrule Melts: Comparison of Experimentally Produced and Natural Textures and Mineral Compositions

Graf T.* Marti K.
Exposure Ages of H-Chondrites and Parent Body Structure

Skinner W. R.*
Compaction and Lithification of Chondrites

Alexander C. M. O'D.* Arden J. W. Pillinger C. T.
Carbonaceous Components in Ordinary Chondrites: Implications for Metamorphism Vs. Heterogeneous Accretion

Hasan F.* Score R. A. Sears D. W. G.*
The Natural Thermoluminescence Survey of Antarctic Meteorites — A Discussion of Methods for Reporting Natural TL Data

Hutchison I. D.* Hutchison R. Kennedy A.
Mg Isotopes and Rare Earth Abundance in Plagioclase from Ordinary Chondrites: A Search for 26Al
POSTER PRESENTATIONS

Batelhor J. D., Sears D. W. G.,
*Thermoluminescence of Plagioclase Feldspars and Implications for Meteorite Studies*

Fulde F., Clark B.
*Regolit Processes as Possible Reflectance Spectra Controls*

Husson M.
*Shock Effects in H-Group Chondrites*

Smith M. R., Koppenaal D. W., Gosselin D. C., Paul J. C.
*Direct Analysis of Terrestrial and Meteorite Samples Using Laser Ablation Inductively Coupled Mass Spectrometry*

PRESENTED BY TITLE ONLY

DeHart J. M., Lofgren G. E., Sears D. W. G.,
*Cathodoluminescent Phosphors in the Matrices of Type 3 Ordinary Chondrites*

Marakushev A. A., Granovsky I. B., Zinovceva N. G., Mitreikina O. B.,
*Microprobe Analysis of chondrule Vefreimova (C3): New Data and Their Genetic Interpretation*

Kashkarova L. I., Korotkova V. I., Kashkarova V. G., Skripnik A. Ya.,
*Investigation of Nikol’skoe 14-5 Chondrule Olivines by Thermoluminescence Method*

Kashkarov L. I., Katinina G. V.,
*Frank Studies in Olivines from Chondrules and Matrix for the Ordinary Chondrites Tieschitz 113, Saratov 1A, and Elenovka 15*

Koeberl C., Horch H. F., Merkle R. K. W., Reimold W. U.,
*New Mineralogical and Chemical Data on the Machinga (16) Chondrite, Malawi*

Matsuda H., Nakamura N., Noda S.,
*Allende Chondrules: Further Demonstration of Fractionated and Unfractionated REE and Alkali Metals*

Metzler K., Bischoff A.,
*Accretionary Dust Mantles in CM Chondrites as Indicators for Processes Prior to Parent Body Formation*

Miyamoto M.,
*Carbonates in Some Meteorites: Information from Absorption Ba Bands Near 3-1 pm*

Nagahara H.,
*Formation of Chondrules and Matrix Materials in the Heterogeneous Solar Nebula*

Nakamura N., Shimaoka T.,
*Experimental Investigation of Vaporization and Fractionation of Alkali Metals During Melting of a Chondritic Material and Their Bearing on Chondrule Formation*

Noda S., Nakamura N.,
*R.F.E. Sr Ba and Alkali Metal Characteristics of Fine-Grained Rims from Allende Chondrules*

Skinner W. R.,
*Cold vs Hot Accretion of Tieschitz and Other Chondrites*

Monday, March 13, 1989
COSMIC DUST I
8:30 a.m. Gilruth 206

Jackson A. A.* Zook H. A.,
*Resonance Trapping of Comet and Asteroid Dust Particles by the Earth and Mars*

Tsou P.* Aubert J., Brownlee D., Hrubesh L., Williams J., Albee A.,
*Effectiveness of Intact Capture Media*

Lindstrom D. J.* Zolensky M. E., Lindstrom M. M.,
*Procedures for Instrumental Neutron Activation Analysis of Individual Cosmic Dust Particles*

Gibson E. K., Jr.* Hartman C. P., Blandford G. F.,
*Analysis of Interplanetary Dust Particles for Volatiles and Simple Molecules*

Richter C. J. M.* Mukhin I. M., Ponomareva M. N., Pelyagin E. M.,
*Laser Silicate Chemistry in P/Comet Halley from Puma-2 Data*

McDonnell J. A. M.* Pankow J. S., Green S. F., Perry C. H.,
*The Comet Nucleus, Ice and Dust Morphological Balances in a Production Surface of Comet P/Halley*
**Poster Presentations**

Brownlee D. F., Schramm L. S., Wheelock M. M., Maurette M.

**Large Mineral Grains in Interplanetary Dust**

Hyde T. W., Alexander W. M., Mackinnon I. D. R.

**Grain Size Distributions of Magneli Phases and Metallic Titanium in Chondritic Porous Interplanetary Dust Particles**

Kochan H., Ratke L., Hellmann H., Thiel K., Grün E., Kohl H.

**Crustal Evolution and Dust Emission of Artificial Cometary Nuclei**

Tsou P., Bradley J. G., Brownlee D. F., Albee A. L.

**Nondestructive Cosmic Dust Positioning and Velocity Sensor**


**Multielement Analyses of Interplanetary Dust Particles with PIXES and SYVA**

Yates P. D., Wright I. P., Pil linger C. T., Hutchison R.

**Carbon Isotopic Measurements of Deep Sea Spherules**

Zook H. A., Cour-Palais B., Allton J. H.

**On the Meteoroid Flux Striking the Solar Max Satellite**

Monday, March 13, 1989

**MARS: REMOTE SENSING/VOLCANISM**

1:30 p.m. Gilruth 104

Harmon J. K.*

**Comparison of Mars Radar Scattering Measurements at Widely Separated Subradar Latitudes**

Moore H. J.*

**Thompson T. W.**

**Martian Quasi-Specular Echoes: Preliminary 1986 Results**

Blanev D. L.* McCord T. B.

**Telescopic Detection of Sulfur Compounds on Mars**

Roush T.*

**Pollack J. Stoker C. Witteborn F. Bregman J. Wooden D. Rank D.**

**CO₂ and SO₂-Bearing Anionic Complexes Detected in Martian Atmospheric Dust**

Fisher D. S., Burns R. G.*

**Acid Weathering on Mars: Spectroscopic Investigations of Sulfuric Acid — Degraded Olivines and Sulfides**

Crisp J.*

**Balog S.**

**Estimating Eruption Rates of Planetary Lava Flows**
POSTER PRESENTATIONS

Christensen P. R., Thievetis S. L.
Thermal Infrared Spectral Observations of Coated Surfaces

Greeley R., Crown D. A.
Volcanic Geology of Tyrhenia Patera: Morphologic Similarities to Terrestrial Ash Shields

McBride K.
Geologic and Structural Features of the Elysium Mons Caldera

Miura Y., Sasaki S., Kawashima N., Yamori A.
Identification of Planetary Surfaces by Remote Secondary-Ion Method

Moore H. J., Ackerman J. A.
Marsian and Terrestrial Lava Flows

Posin S. B., Greeley R.
Effect of Eruptive Conditions on Volcano Morphology

Salisbury J. W., D’Aria D.
Measurement of Christiansen Frequencies in Spectra of Particulate Samples for Determination of Rock Composition

Sunshine J. M., Pieters C. M., Pratt S. F.
Mathematical Deconvolution of Mineral Absorption Bands

Whitford-Stark J. L.
Application of Remote Sensing Techniques to Alkaline Volcanic Rocks; Trans-Pecos, Texas

Zimbelman J. R., McBride K. M.
A Possible Pyroclastic Deposit Near Elysium Mons, Mars.

PRESENTED BY TITLE ONLY

Anderson D., Mann M.
Video Image Processing Using Unix, X Windows, and CDROMs

Azuma H., Fujii N.
Grain Size Effects on Spectral Reflectance of Ol, Opx, and Cpx Minerals - Applied to the Hurl Quotient Method

Benes K.
The Role of Analogy and Exclusiveness in Planetary Geology

Crown D. A., Greeley R., Sheridan M., Carrasco R.
Analysis of Igneous Plateau in the Central Andes Using Landsat Thematic Mapper Data: Implications for the Identification of Ash Deposits on Mars

Edgett K. S.
The Lobate Features West of Each of the Tharsis Montes: Mars: A Re-evaluation of Their Origins

Alteration of Reflectance Spectra for Phonolite Processed by Laser Irradiation

Mossbauer Backscatter Spectrometer: A New Approach for Mineralogical Analysis on Planetary Surfaces

Parfit F. A.
Theoretical Constraints on the Location of Eruptions and Injuries of Planetary Volcanoes: Data from Kilauea Volcano, Hawaii
Raflalta J., Kauhanen K.
Lavas, Calderas and Magna Chambers of Alba Patera on Mars

Wilson L., Partiti E. A.
The Influence of Gravity on Planetary Volcanic Eruption Rates: A Reappraisal

Zimbelman J. R., Fink J. H.
Estimates of Rheologic Properties for Flows on the Martian Volcano Olympus Mons

Monday, March 13, 1989
CARBONACEOUS CHONDRTS
1:30 p.m. Gilruth Gym

Further Studies on the Isotopic Composition of Interstellar Grains in Allende: 1. Diamonds

Further Studies on the Isotopic Composition of Interstellar Grains in Allende: 2. Carbon Associated with Spinel

Virag A.*, Zinner E., Lewis R. S., Tang M.
Isotopic Compositions of H, C, and N in C-B Diamonds from the Allende and Murray Carbonaceous Chondrites

Bernatowicz T.*, Gibbons P., Lewis R.
Meteoritic Diamonds: Nature of the Amorphous Component

Wiel A. R., Baur H., Signer P., Lewis R. S., Anders F.
Planetary Noble Gases in "Phase Q" of Allende: Direct Determination by Closed System Etching

Clayton R. N., Maveda T. K.
Oxygen Isotopes in Carbonaceous Chondrites

Weinbruch S.*, Zinner E. K., El Goresy A., Palme H.
Oxygen-Isotopic Compositions of Individual Forsterite Grains: Fayalite Rims, and Matrix Olivines from the Allende Meteorite

McSween H. Y., Jr.*, Grimm R. E.
Carbonaceous Chondrite Parent Bodies: I. Constraints and Formulation of Thermal Models

Carbonaceous Chondrite Parent Bodies II: Results and Implications of Thermal Models

Steele I. M. *
Forsterite in CI Meteorites and Interplanetary Dust: Minor Elements and Comparison with Other Meteorite Types

Dark Inclusions in Allende, Vigarano, and Leoville: Implications for Oxidation Prior to Final Accretion of CV3 Parent Bodies

In Situ Analysis of Volatile Elements and Molecules in Carbonaceous Chondrites

Zolensky M. E.*, Barrett R. A., Prinz M.
Petrography, Mineralogy and Matrix Composition of Yamato-82162, a New Cl2 Chondrite

Paul R. I., Lipschutz M. E.*
Carbonaceous Chondrites from Queen Maud Land, Antarctica: Glimpses of New Parents

POSTER PRESENTATION

Zolensky M., Barrett R., Gooding J.
Matrix and Rim Compositions Compared for 13 Carbonaceous Chondrite Meteorites and Clasts

PRESENTED BY TITLE ONLY

Frisenko A. V., Baryshnikova G. V., Guzhova A. V., Lavrukhina A. K.
The Assemblage of Al-rich Pigeonite with Crystobalite in the Metal Particle from the Efremovka CV Chondrite

Geiger Th., Metzler K., Bischoff A., Arndt J.
Annealing Experiments on Allende (CV3): Textural and Mineralogical Modifications

Geiger Th., Bischoff A.
(Ox, Ru, Ir)S and Other Refractory Siderophile Element-rich Particles in the Metamorphosed Carbonaceous Chondrites Karoonda, Mulga (West), and PCA 82500

Ivanov A. V., Ivanov B. A.
The Kaidan Meteorite: Estimation of the Impact Velocity of the Meteorite Parent Bodies
Monday, March 13, 1989

SHOCK METAMORPHISM AND TERRESTRIAL CRATERS
1:30 p.m. Gilmour 206

Sharpton V. L.* Schuraytz B. C.
On Reported Occurrences of Shock-Deformed Glasses in the Volcanic Ejecta from Toba Caldera, Sumatra

Grothues J. Horne mann U. Stöffler D.*
Mineralogical Shock Wave Barometry: (1) Calibration of Refractive Index Data of Experimentally Shocked Alpha-Quartz

Grothues J. Deutsch A. Horne mann U. Stöffler D.*
Mineralogical Shock Wave Barometry: (II) Applications to Experimentally Shocked Glasses

Bodough M. B.* Cygan R. T. Kirkpatrick R. J. Monte B.
NMR Spectroscopic Analysis of Experimentally Shocked Quartz and the Formation of Diaplectic Glass

Bottomly R. J.* York D.
The Dating of Impact Melt Rocks Using the $^{40}Ar/^{39}Ar$ Method

Deutsch A.* Schirer U. Horne mann U.
Response of U-Ph Systematics to Shock-Wave Metamorphism II: 350-590 GPa Shock-Recovery Experiments on Zircon and Titanite

Schirer U. Deutsch A.*
Response of U-Ph Systematics to Shock-Wave Metamorphism I: Accessory Minerals in the Haughton Impact Structure, Devon Island, Arctic Canada

Garvin J. B.* Bilton J. L. Campbell B. Zisk S.
Tectonic Analysis of the Meteor Crater Ejecta Blanket

Nishizumi K.* Kohl C. P. Shoemaker E. M. Arnold J. R. Lel D. Klein J. Fink D. Middleton R.
In Situ $^{10}Be$ Exposure Ages at Meteor Crater, Arizona

Grant J. A.* Schultz P. H.
The Erosional State and Style of Meteor Crater, Arizona

Schultz P. H.* Grant J. A.
Styles of Ejecta Emplacement, Meteor Crater

Shoemaker E. M.* Shoemaker C. S.
Geology of the Connolly Basin Impact Structure, Western Australia

Shoemaker E. M.* Shoemaker C. S. Plescia J. B.
Gravity Investigation of the Connolly Basin Impact Structure, Western Australia

Sec T. H.* Mittlefehldt D. W. Horz E.
Analysis of Aeroballistically Dispersed Glass Samples from Wabar Crater, Saudi Arabia

Wichman R. W.* Schultz P. H.
Loss of Large Craters in the Terrestrial Impact Record

Strom R. G.*
Are Asteroids the Source of the Period of Late Heavy Bombardment in the Inner Solar System?

POSTER PRESENTATIONS

Aldworth J. S. Owen M. R. Crieve R. A. V.
Cathodoluminescence and Microscopic Tasselar Features in Quartz from the K/T Boundary and Other Environments: Implications for Their Origin
Bohor B. F., Betterton W. J., Jablonski D., Chen C. Z.  
*Permian-Triassic Boundary Clay in China is Volcanic, Not Impact Ejecta*

Duane M. J., Reimold W. U.  
*The Simpson Desert Depression — An Ancient Impact Basin?*

Gaffney E. S.  
*Two-Dimensional Gauge Interaction Effects for Plane Shocks in Snow*

Miura Y., Kato T.  
*Different Densities of Diaplectic Plagioclase Crystals Among Meteorites, Lunar Rocks and Terrestrial Impact Craters*

*Chemical Signatures of the Infratrappean Sediments of Deccan Traps, India and Their Implications to the K-T Boundary Scenario*

Pilov J., Grieve R. A. F., Sharpton V. L., Kennedy J., Codere J.  
*A Ground Probing Radar Survey at Meteor Crater Arizona: First Results*

Posin S. B.  
*Yield Strengths of Martian Complex Craters*

Rocchia R., Boclet D., Bonté Ph., Castellarin A., Courtillot V., Jéhanno C., Wezel F. C.  
*On the Existence of Several Iridium-enriched Layers at the K-T Boundary and in a Jurassic Sequence*

Tomlinson W. D.  
*A Possible Impact Crater in Tunisia*

**PRESENTED BY TITLE ONLY**

Alekseev A. S., Smirnova S. B., Nazarov M. A., Badjukov D. D.  
*Paleontological Age of the Kara Impact Event*

Badjukov D. D., Bazhenov M. L., Nazarov M. A.  
*Paleomagnetism of Impactites of the Kara Impact Crater: Preliminary Results*

Badjukov D. D., Nazarov M. A., Suponeva I. V.  
*Impact Glasses from the Kara and UST-Kara Structures*

Brockmeyer P., Deutsch A.  
*The Origin of the Breccias in the Lower Onaping Formation, Sudbury Structure (Canada): Evidence from Petrographic Observations and Sr-Nd Isotope Data*

Fedosova S. P., Sazonova I. V., Stechletkin S. I., Feldman V. I.  
*Diaplectic Transformation of Horoblende from Puchezh-Katunki Astrobleme, USSR*

Feldman V. I., Matveeva Yu. B.  
*Experimental Study of Regional Metamorphism of Impactites*

Masaitis V. I., Mashchak M. S., Selivanovskaya T. V.  
*Parameters of Excavation and Melting Zones of Kara Crater*

*Geology and Chemistry of the Kara and UST-Kara Impact Craters*

Nazarov M. A., Badjukov D. D., Alekseev A. S.  
*Morphology of the Kara and UST-Kara Impact Craters, USSR*

Nazarov M. A., Kolesnikov E. M., Badjukov D. D., Masaitis V. I.,  
*Potassium-Argon Age of the Kara Impact Event*

Reimold W. U., Horsch H., Durrheim R. J.  
*The Bronze-Gramphyre from the Vredefort Structure — A Review*

Sazonova L. V.  
*Orthopyroxene of Impact Melts - Indicator of Impact Melt Cooling (Boltysh Astrobleme, USSR)*

Sazonova L. V., Feldman V. I., Korotaeva N. N.  
*Plagioclase Crystalization Peculiarities in Impact Melts of Boltysh Astrobleme (USSR)*

Wu S.  
*Geologic Feature of the Duolun Impact Crater, China*

Valer A. A., Kolesov G. M., Sapozhnikov D. Y., Mikishansky A. Z.  
*The Distribution of Meteoritic Material in Impactites from the Terny Astrobleme (Krivot Rog, Ukr.Ssr)*
Vrina S.  
*Petrology and Chemistry of Probable Impact Melt Rocks at the Seven Crater*

**Monday, March 13, 1989**  
**PLANETARY DIFFERENTIATION**  
1:30 p.m.  
Bldg. 30 Auditorium

Taylor G. J.*  
*Metal Segregation in Asteroids*

Newsom H. E.*  
*The Nickel Content of the Lunar Core*

Kadik A. A.  
Holloway J. R.*  
*Nickel and Cobalt Partitioning Between Silicate and Metal Liquids in the Presence of Graphite at Ten Kilobars*

Bertka C. M.*  
Holloway J. R.  
*Martian Mantle Primary Melts: An Experimental Study of Melt Density and Viscosity at 23 kb*

McFarlane E. A.*  
Drake M. J.  
Gasparik T.  
*Partitioning of Ni, Co, Sc, La, and Other Elements Between Olivine and Natural Basaltic Melt at 75 Kbars and 1800°, and Implications for the Early Thermal History of the Earth*

Mussewhite D. S.*  
Drake M. A.  
Swindle T. D.  
*Early Outgassing of the Earth's Mantle: Implications of Mineral Melt Partitioning of I*

**Warren P. H.**  
*Volumes and Compositions of Crusts Stable Over Primordial Silicate Mantles: Effects of Planet Size and FeO Content*

Tonks W. B.  
Melosh H. J.  
*Cryovolcanic Activity of a Forming Magma Ocean*

Turner G.*  
Burgess R.  
*Volatile Enriched Mantle Fluids in Diamond*

Tyburczy J. A.*  
Krishnamurthy R. V.  
Epstein S.  
Ahrens T. J.  
*Hydrogen Isotopic Fractionation During Impact: Serpentine, Isotopically Enriched Serpentine, and Marchison*

Matsui T.*  
Tajika Fuchi  
*Coupled Evolution of the Atmosphere-Ocean, Continents and Interiors*

**PRESENTED BY TITLE ONLY**

Abe Y.  
*Surface of a Terrestrial Planet Growing by Planetary Impacts*

Bychkov A. M.*  
Polosin A. V.  
*Change of Structural and Valence State of Fe Ions During Melting of Minerals (Mössbauer Study)*

Bychkov A. M.*  
Polosin A. V.  
*Double Structural Role of Fe²⁺ Ions in Carbonate Glasses (Mössbauer Study)*

Jones J. H.*  
*Geochemical Modeling of Igneous Fractional Cristallization*

Kožař S. J.  
Schreiber H. D.  
Reithmüller M. W.  
Bienert S. E.  
Webb J. W.  
*Iron Redox Characteristics and Chemical Oxygen Diffusion in the System Anorthite-Diopside*

Lacey P. G.  
Bell J. F.  
An \[\text{FeTiO}_3\] Crystalline Composition for Mercury*

Mokhir-Fleab A. B.  
Bulutov V.  
Kotelnikov A.  
*New High P-T Experimental Results on Orthopyroxene-Chrome Spinel Equilibria and a Revised Orthopyroxene-Spinel Conversion Temperature*

**Tuesday, March 14, 1989**  
**MARS GEOLOGY**  
8:30 a.m.  
Gilruth 104

Mouginis-Mark P.*  
*Geological Rationale for a Mars Rover/Sample Return Mission to North Elysium Planitia*

Greeley R.  
Skypeck A.*  
Pollack J. B.  
*Martian Aeolian Features: Comparison with Results from the Global Circulation Model*
Wilkinson M. J.*
Streaking on Earth and Mars

Bridges N.* Barlow N.
Variation of Martian Rampart Crater Ejecta Lohateness in Comparison to Latitude, Longitude, Terrain, and Crater Diameter

Craddock R. A.* Greeley R. Christensen P. R.
Evidence for an Ancient Impact Basin in Daedalia Planum, Mars

Frey H.* Schultz R. A.
Overlapping Large Impacts and the Origin of the Northern Lowlands of Mars

McGill G. E.*
Geologic Evidence Supporting an Endogenic Origin for the Martian Crustal Dichotomy

Craddock R. A.* Maxwell T. A.
Timing of Resurfacing Events in the Ammehes and Tyrrhena Cratered Highlands of Mars

Maxwell T. A.* Craddock R. A.
Mechanisms of Resurfacing in the Ammehes and Tyrrhena Cratered Highlands of Mars

Frey H.* Grant T. D.
Resurfacing in Coprates and Thickness of the Ridged Plains

Scott D. H.* Dohm J. M.
Chronology and Global Distribution of Fault and Ridge Systems on Mars

Golombek M. P.*
Geometry of Stresses Around Tharsis on Mars

POSTER PRESENTATIONS

Campos-Marquetti R. Jr. Robars J. Harrington M.
Geologic Map of the Ulysses Rupes Area of Mars Australe, Mars

Campos-Marquetti R. Jr.
A Dune Classification Scheme for Mars: Southern Hemisphere Eolian Bedforms

Craddock R. A. Zimbelman J. R.
Yorktown and Leyton as Viewed by the Viking I Lander

De Hon R. A.
Geologic Map of Maja Valles: MTM 20057, Northern Lunae Planum, Mars

Dimitriou A. M.
Geologic Evolution of the Highland/Lowland Transition Zone in the Ismenius Lacus Quadrangle, Mars

Melandez D. E.
The Geomorphology of Eastern Gangis Chasma Within Valles Marineris, Mars

Peulvast J.-P. Costard F. M.
1/500,000 Geomorphological Mapping of Mars: Mekas Chasma, Valles Marineris

Rice J. W., Jr.
The Geology of the Maja Valles Region, Mars (MTM 20052)

Rotto S. L. Tanaka K. I.
Faulting History of the Alba Patera-Ceraunius Fossae Region of Mars

Zimbelman J. R.
Erosional Outliers of Dust Along the Southern Margin of the Tharsis Region, Mars

Zimbelman J. R.
Geologic Mapping of Southern Mangala Valles, Mars

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Jöns H.-P.
Belts of Embryonic Collisional Mountain Ranges in the Vicinity of the TaNoVa-Updoming, Mars

Jöns H.-P.
Suspected Block/Plate Boundaries Within the Mega-Aureole of the TaNoVa-Updoming on Mars

Lancaster N. Greeley R.
Preliminary Estimates of Sediment Volume in the North Polar Sand Seas of Mars
Tuesday, March 14, 1989
BHOLOGHAI AND ANGRITE CONSORTIA PLUS PALLASITES
8:30 a.m. Gilruth Gym

Reid A. M.* Buchanan P.
The Bholghai Howardite: Petrography and Mineral Chemistry

Laul J. C.* Gosselin D. G. Smith M. R.
The Bholghai Consortium: Chemical Study of the Bholghai Howardite

Paul R. L. Wang M. S. Lipschutz M. E.*
Volatiles/Mobile Trace Elements in the Bholghai Howardite

Swindle T. D.* Hohenberg C. M. Nichols R. Olinger C. T.
Parentless Fission Xenon in the Meteorite Bholghai

Rogard D. D.* Garrison D. H.
"Ar" Ages of Aucrites: Did the HED Parent Body Experience a Long Period of Thermal Events Due to Major Impacts?

Nagashiet I. E.* Wiedmann H. Bansal B. Shih C.-Y.
Rh-Sr Age of an Eucritic Clast in the Bholghai Howardite and Initial Sr Composition of the Lewis Cliff 86010 Angrite

McKay G.* Le L. Wagstaff J.
Is Unique Achondrite LEW 86010 a Crystallized Melt?

Crozaz G.* McKay G.
Minor and Trace Element Microdistributions in Angara dos Reis and Lewis Cliff 86010: Similarities and Differences

Mittlefehldt D. W.* Lindstrom M. M. Lindstrom D. J.
Geochemistry of LEW86010 and Angara Dos Reis and Constraints on the Genesis of the Angrites

Lugman G. W. Galer S. J. G.* 12NO R.
Rh-Sr and Other Isotope Studies of the Angrite LEW86010

Sherman S. B.* Treiman A. H.
The Olivine-Diopside Equilibria: Experiments and Implications for Angrite Achondrites and Ca-M Chondrules

Righter K.* Arculus R. J. Delano J. W.
Redox Equilibria in Pallase Meteorites and the Eucrite Parent Body (LPH)

Davis A. M. Olsen E. J.*
The Origin of Phosphate Minerals in the Eagle Station and Springwater Pallasites

POSTER PRESENTATIONS

Zhang J. Williams D. B. Goldstein J. L.*
Tetraenite in the Phylite of the Iron Meteorite Carlton

Zolensky M. E.* Barrett R. A.
CI, C12 and C14 Isotopes in the Bholghai Howardite and the AL Ra"is Chondrite

PRESENTED BY TITLE ONLY

Kallemeijn G. W. Warren P. H.*
Geochemistry of the LEW86010 Angrite

Mayeda T. K. Clayton R. N.
Oxygen Isotopes in the Bholghai Howardite

McKay G.* Le L. Wagstaff J.
Redox Conditions During the Crystallization of Unique Achondrite LEW 86010

Tuesday, March 14, 1989
COSMIC DUNES II
8:30 a.m. Gilruth 206

Koehler C.* Haager E. H. Faure G.
Extraterrestrial Spherules from Glacial Sediment in Vostok: Internal Structure, Mineralogy, and Chemical Composition

Mauretta M.* Brownlee D. E. Schramm L. S.
Giant Micrometeorites from Vostok Blue Ice
Blake D. *, Fleming R. H., Bunch T. E.
Identification and Characterization of a Carbonaceous, Titanium Containing Interplanetary Dust Particle

Sutton S. R.*, Flynn G. J.
Trace Element Compositions of Interplanetary Dust and Terrestrial Particles Collected from the Stratosphere

Trace Element Compositions of Six "Chondritic" Stratospheric Dust Particles

Maurette M., Olinger C.*, Walker R., Hohenberg C.
Noble Gas Measurements of Extraterrestrial Particles from Polar Sediments

Nier A. O.*, Schlutter D. J.
Helium and Neon Isotopes in Stratospheric Particles

PRESENTED BY TITLE ONLY

Anufriev G. S., Boltenkov B. S., Kapitonov I. N.
He, Ne and Ar Isotopes in the Deep-Sea Oceanic Ferromanganese Nodules

Laurance M. R.
Intact Capture of Hypervelocity Particles in Aerogels

McDonald R. A., Tanner W. G., Alexander W. M.
A Description of a Possible Coupling Between Dust Grains and Water-Based Ions in Comet P/Halley

Maurette M., Jouret C., Bonny Ph., Bradley J. P., Germany M. S., Kohn Y.
Electron Microscope Studies of Carbon-rich Grains in a New Collection of Antarctica Micrometeorites

Maurette M., Pouchet M., Bonny Ph., de Angelis M., Siry P.
A New Collection of Micrometeorites. Extracted from 100 Tons of Artificially Melted Blue Ice. Near Cap-Prudhomme in Antarctica

Misawa K., Ma S. I., Yamakoshi K., Nogami K., Nakamura N.
Rare Earth Element Abundances in Individual Magnetic, Sill Oxide Spheres from Deep-Sea Sediments

Rietmeijer F. J. M., Albrecbt A.
Preparation of Cosmic Dust Analogs for Shock Metamorphism

Wu L., Chou P. C.
Finite Element Simulation of Intact Capture of Hypervelocity Particles in Multiple Films

Zolensky M., Burrell R., Herz I., Cardenas F., Davidson W., Haynes G., Criswell W., Koonz S.
The Utility of Silica Aerogel as a Cosmic Dust Capture Medium on the Space Station

Tuesday, March 14, 1989
INTERSTELLAR GRAINS/DUST
10:15 a.m., Gilruth 206

Clayton D. D. *,
Origin of Xe-HF and Supernova 1987A

Swan P. S., Walker R. M.*, Yuan J.
Location of Small SiC Crystals in Meteorites Using a Low-Voltage X-ray Mapping Technique

Clayton D. D., Lissman K., Scowen P. *
16O Anomalies in Interstellar Dust Size Fractions

Kerridge J. P. *
Deuterium Enrichments and Synthesis of Meteoritic Organic Matter

Reedy R. C. *
Cosmogenic-Nuclei Production Rates in Interstellar Grains

Harper C. L. *
Geochronological Investigations in Superstring Cosmology
Tuesday, March 14, 1989
MARS: WATER, CANYONS, AND LIFE
1:30 p.m. Gilruth 104

Clifford S. M.*
The Response of an Early Martian Groundwater System to the Onset of a Colder Climate

Oberbeck V. R. * Fogleman G.
On the Possibility of Life on Early Mars

Squyres S. W.*
Early Mars: Warm and Wet, or Just Wet?

Parker T. J.*
Channels and Valley Networks Associated with Argyre Planitia, Mars

Pieri D.* Schneeberger D.
Frazil Land Forms at Alba Patera

Shaller P. J.* Murray B. C. Albee A. L.
Subaqueous Landslides on Mars?

Davis P. A.* Golombek M. P.
Discontinuities in the Shallow Martian Crust

Robinson M. S. * Tanaka K. I.
Hydrology of a Flood Event in Kasei Valles, Mars

Costard F. M.*
Fluvioc-Thermal Erosion on Mars: A Silicic Analogs

Williams S. & W. Zippeimann J. R.
Origin of Pedris Elbow Material: Asmenius Locus, Mars

Schultz R. A.*
Structural Mapping and Interpretation of Valles Marineris, Mars

Lucefita B. K. Bertolini I.*
Interior Structures of Valles Marineris, Mars

Croft S. K.*
Canyon Structure in the Hebes-Juventae-Gangis Area, Mars

POSTER PRESENTATIONS

Cabrol N. A.
Morphological Variations and Evolution of Channels on Mars

De Hon R. A.
Flood Stages in Martian Outflow Systems: Episodic Flow

Gulick V. C. Baker V. R.
The Role of Hydrothermal Circulation in the Formation of Fluvial Valleys on Mars

Kochel R. C. Miller S. M. O.
Morphological Distinction of Sapping- and Runoff-Dominated Valley Networks on Earth and Mars

McGeoch K. A. Schumann S. A. Robinson R. S.
Martian Outflow Channel Formation by Water Erosion Under Nonequilibrium Conditions

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Costard F. M.
Asymmetric Distribution of Volatiles on Mars

Kuzmin R. O. Burba G. A. Robina N. N. Shashkina V. P. Zabalueva E. V.
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Fe-S-Ca-Al-Bearing Carbonaceous Veins in the Yamato-74130 Ureilite: Evidence for the Genetic Link to Carbonaceous Chondrites

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Trace Elements in Feldspathic Class in Polymict Ureilites

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Planetary Compositions - Clues from Small Bodies and the Sun

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Amaritic Meteorites: Anomalous Abundance of Ungrouped Irons

Rubin A. E.* Kaliemeyn G. W.
A Unique Chondrite Grouplet: Petrology and Chemistry of Carlisle Lakes 001 and Allan Hills 85151

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Grady M. M. Pillinger C. T.
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Gosselin D. C.* Laul J. C.
Chemistry of Allan Hills 85085: Characterization of a Unique Chondrite

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Unusual Meteorites LEW86010 and ALH85085 and Eleven Chondrites: Characterization from Cosmogenic and Trapped Noble Gases and Mineralogy

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Berkley J. L.
Precision Minor Element Analyses in Silicate Minerals in Ureilites

Bischoff K. Metzler K. Stoffler D. Palme H. Spettel B. Mineralogy and Chemistry of the Anomalous Chondritic Breccia ALH 85085

Cassidy W. A.
Estimating Relative Abundances of Meteorite Types


Miyamota M. Nishimura Y. Matsuda J. Ito K. Raman Spectra of Ureilite Diamonds

Saito J. Takeda H.
Mineralogical Study of LEW85328 Ureilite

Weisberg M. K. Prinz M. Nehru C. E. Evidence for a Relationship Between Benubbin, ALH85085 and CR Chondrites
Tuesday, March 14, 1989
LUNAR GEOLOGY, PROCESSES AND RESOURCES
1:30 p.m. Gilruth 206

Hood L. L.* Huang Z.
Effects on Ambient Magnetic Fields and Plasma of the Expanding Vapor Cloud Produced in Lunar Basin-Forming Impacts

Spudis P. D.* Hawke B. R. Lucey P. G.
The Lunar Crisium Basin: Geology, Rings, and Deposits

Clark P. E.*
The Relationship Between Orbital and Sample Data for Lunar Landing Sites

Jaumann R.* Neukum G.
Spectrophotometric Analysis of the Lunar Plinius Apollo 17-Region

Pieters C. M.*
Compositional Stratigraphy of the Lunar Highland Crust

Lucey P. G.* Hawke B. R.
Telescopic Thermal Infrared Measurements of the Silicate Mineralogy of Lunar Red Spots

Coombs C. R.* Hawke B. R.
Kauhako Crater and Channel, Kalaupapa, Molokai, Hawaii: A Terrestrial Analog to Lunar Sinuous Rilles

Oberst J.* Nakamura Y.
A New Estimate of the Meteoroid Impact Flux on the Moon

Haskin I. A.*
The Moon as a Practical Source of Hydrogen and Other Volatile Elements

Heiken G. H.* Vaniman D. T.
 Petrography of Lunar Ilmenite Resources

Hawke B. R.* Coombs C. R. Clark B.
Pyroclastic Deposits: an Ideal Lunar Resource

Oder R. R.* Taylor L. A. Keller R.
Magnetic Characterization of Lunar Soils

POSTER PRESENTATION

Chevrel S. Pinet P.
Lunar Mare-Highland Horizontal Spectral Variations from Telescopic CCD-Imaging

Clark P. F. Hawke B. R.
The Lunar Farside Revisited: East of Smythii and Beyond

Clarke C. F. Female F. P.
Galileo Spacecraft Encounters with the Earth/Moon System

Coombs C. R. Hawke B. R. Lucey P. G. Head J. W.
Geologic and Remote Sensing Studies of the Alphonsus Crater Region

Hawke B. R. Lucey P. G. Spudis P. D. Owensby P. D.
Impact Structures as Crustal Probes: A Summary of Recent Progress

Iume K. Peltonenemi J. L. Irvine W. M.
Derivation of an Average Single Particle Phase Function for the Lunar Regolith

Kozlowski R. W. Sprague A. L. Lebofsky L. A.
Comparison of the Thermal Emission Spectra from the Surfaces of Mercury and the Moon

Ledlow M. Burns J. Zhao J. H. Gisler G. Zenlik M. Baker D.
Earth-based Radio Observations of the Planet Mercury

Spectral Mixing Model Approach to the Analysis of the Spectra of Lunar Soils

Lucey P. G. Hawke B. R.
Imaging Spectroscopy of the Central Highlands from 3 to 100 μm

Lucey P. G. Nelson M. Granahan J. Hawke B. R.
The Dependence of Near-Infrared Spectral Parameters on Lunar Rock Type Composition
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Campbell R. A. Hawke B. R. Bell J. F. III Zisk S. H.
The Bessel Ray Region: Preliminary Analysis of Remote Sensing Data

Colson R. O. Haskin L. A.
Some Effects of Composition on Efficiencies for Production of O2 and Fe0 from Silicate Melts by Electrolysis

Houdashelt M. L. Bustin R. Gibson E. K. Jr.
Hydrogen Extraction from Lunar Soil: Methods Applicable to a Lunar Processing Facility

Pugacheva S. G.
Regionalization of the Moon's Surface Based on the Thermal Radiation in the IR Region of the Spectrum (10-12 Microns)

Rodionova Zh. F. Shevchenko V. V.
Distribution of Craters with Central Peaks and with Hills and Ridges at Bottom over the Lunar Surface

Tuesday, March 14, 1989
Opportunities in Solar System Exploration
8:00 p.m. Building 2 Auditorium

L. Fisk, NASA Headquarters
OSS Strategic Plans

V. Barsukov, Vernadsky Institute
and

S. Keller, NASA Headquarters
Review of Bi-lateral Discussions

Wednesday, March 15, 1989
Venus Geophysics
8:30 a.m. Gilruth 104

Fletcher R. C.*
Implications of Folding for the Rheological Structure of the Crust of Venus

Solomon S. C.* Head J. W.
Lithospheric Flexure Beneath the Freiia Mons Foredemp Venus: Constraints on Lithospheric Thermal Gradient and Heat Flow

Williams D. R.* Greeley R.
Stress Distribution on Tellus Regio, Venus. Inferred from Gravity and Topography

Smrekar S.* Phillips R. J.
Implications of Gravity Modelling for a Thermal Isostasy Hypothesis for Bell Region, Venus

Black M. T.* Zuber M. T. McAdoo D. C.
Comparison of Observed and Predicted Gravity Profiles over Aphrodite Terra, Venus

Sotin C.* Senske D. Head J. W. Parmentier E. M.
Analysis of Topography and Line of Sight (LOS) Accelerations over Western Aphrodite: Evaluation of a Spreading Center Model

Phillips R. J.*
Tectonic Response to Mantle Dynamics in Venus

Kiefer W. S.* Hager B. H.
The Role of Mantle Convection in the Formation of Highland Regions on Venus

McGovern P. J.* Solomon S. C.
Influence of Volatile Loss on the Mantle Temperature of Venus

Stofan E. R.* Head J. W.
Coronae of Mnemosyne Regio, Venus: Morphology and Origin

Schubert G.* Bercovici D. Thomas P. J. Campbell D. B.
Venus Coronae: Formation by Mantle Plumes

Hess P. C.* Head J. W. Parmentier E. M.
Melting of Venusian Mantle at Spreading Centers

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Bindschadler D. L. Parmentier E. M.
Mantle Flow Tectonics and a Weak Lower Crust: Implications for Formation of Large-scale Features on Venus
Wednesday, March 15, 1989
CAlS
8:30 a.m.  Gilruth Gym

Palme H.  Hutcheon I. D.  Spettel B.
The Bulk Composition of "Fremdlinge" from a Ca-Al-rich Allende Inclusion

Paquette J. M.*
Vanadium-rich Refractory Platinum Metal NODULES from a Fw Type Inclusion in Allende

Crozier G.  MacPherson G. J.*  Lundberg L. L.
Rare Earth Element Distribution in a Complex Type III Allende Inclusion, an Ion Microprobe Study (Revisited)

Zinner E. K.*  Caillet C.  El Gorey A.
Mg- and O-Isotopic Compositions of Periclase, Spinel, and Melilite from Vigarano CAI 4778

Ireland I. R.*  Fahey A. J.  Zinner E. K.
Isotopic and Chemical Constraints on the Formation of HAl-type Refractory Inclusions

Comparison of 26Al and Initial 87Sr/86Sr Systematics in Allende CAIs

Brigance G. A.*  Hutcheon I. D.  Wasserburg G. J.
A Petrographic and Isotopic Study of Major Phases and Opaque Assemblages in an Allende Fun Inclusion

Kennedy A.*  Hutcheon I. D.  Wasserburg G. J.
Chemical and Isotopic Constraints on the Formation and Evolution of 5A-1, a Basaltic CAI from Allende

Keller J. P.*  Ruseck P. R.
Alteration of Ca- and Al-rich Inclusions in Allende: A Transmission Electron Microscope Study

Fegley B. Jr.  Kong D.*
Mo and W Depletions in CAIs in Carbonaceous Chondrites: A Theoretical Study of the Effects of Nebular Total Pressure

Kuehner S. M.*  Laughlin J. R.  Grossman L.
Non-Equilibrium Trace Element Partitioning and Relict Grains in A Type BI CAI

Boctor N. Z.*  Hutcheon I. D.  Wasserburg G. J.
Petrology and Opaque Mineralogy of an Armalcolite-Bearing Basaltic CAI from the Allende Meteorite

Armstrong J. T.*
Evidence of Post-Accretional Alteration of CAIs in the Vigarano Carbonaceous Chondrite

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C2 Isotope Anomalies in Inclusions from Allende and Murchison Meteorites

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Hydrogen Isotope Abundances in Early Solar System Materials

Ulyanov A. A.  Ustinov V. I.  Kononkova N. N.  Shukolyukov Yu. A.
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NATURE AND EFFECTS OF IMPACT CRATERING
8:30 a.m.  Gilruth 206

Crawford D. A.*  Schultz P. H.  Srnka L. J.
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Vickery A. M.*
Jetting and the Origin of Tekites

Glass B. P.*  Wasson J. T.  Futrell D. S.
A Layered Moldavite Containing Baddeleyite
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Rh-Sr and Sm-Nd Signatures from the Montagnais and Popigai Impact Craters

Ivanov B. A.*
Z-Model with Shear Bulking and Gravity Anomalies Above Impact Craters

O'Keefe J. D.* Ahrens T. J.
Planetary Impacts: Effects of Gravity, Size and Velocity on the Scaling of Crater Geometry and the Transition from Simple to Complex Craters

Ryan E. V.* Davis D. R.
Collisional Disruption Experiments: Impact Strength Analysis and Velocity Distributions

Barlow N. G.*
Implications of the Inner Solar System Cratering Record for the Earth

Ryder G.*
Bombardment in the Moon-Earth System 4.5-3.8 Ga Ago: The Lunar Record of Early Quiet and Late Cataclysm

Schultz P. H.* Gault D. E.
Protracted Global Catastrophes from Oblique Impacts

Huffman A. R.* Crocket J. H. Gartner S.
The Cretaceous-Tertiary Boundary at Brazos River, East Texas

Hildebrand A. R.* Wolbach W. S.
Carbon and Chalcophile at a Nonmarine K/T Boundary: Joint Investigations of the Raton Section, New Mexico

Bohor B. F.* Betterton W. J.
Glaucophane Spherules and Shocked Quartz at the K-T Boundary in DSDP Site 603 B

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Dikov Yu. P. Gerasimov M. V. Yakovlev O. I.
Some Peculiarities of Refractory Elements Volatilization from Silicate Melts

Goles G. G. Schmitt R. A.
Pristine Shatsky Rise K/T Marine Carbonates Yield Negative Ce Anomalies Slightly Higher than Present Pacific Ocean, Implied a Slightly Lower pH of 8.0: IV.

Huffman A. R. Carter N. L. Officer C. B.
Are Shocked Minerals Unique to Impact?

Jin G.-Y. Schmitt R. A.
Pristine Shatsky Rise K/T Marine Carbonates Yield P/NET/P NET = Cl Chondritic Ratio: No Evidence for Fe from Terrestrial Crater Ejecta Rules out Direct Asteroid-Comet Impact; II. Correlations and Calculations

Jin G.-Y. Schmitt R. A.
Pristine Shatsky Rise K/T Marine Carbonates Yield F/NET/P NET = Cl Chondritic Ratio: No Evidence for Fe from Terrestrial-Crater Ejecta Rules out Direct Asteroid-Comet Impact, I. Observations

Jin G.-Y. Schmitt R. A.
Pristine Shatsky Rise K/T Marine Carbonates Exhibit Anomalous Mn/Al Ratios Relative to Normal Pacific Ocean Carbonates. III.

Liu Z. Peng H.
Discovery of Neogene Tektites Layer in the Core Collected from North Pacific

Matsuda J. Yajima H.
Noble Gases in Danvin Glass: Anomalous Neon Enrichment

Peng H. Liu Z.
A Discovery of Impact Craters on Deep-sea Cosmic Spherule

Peng H. Liu Z.
Discovery of a Peculiar Flanged Microtektite in Sediment Collected from North Pacific

Polosin A. V. Bychkov A. M. Borisov A. A.
Temperature-Induced Changes of the Structural State of Iron Ions in Silicate Melts (Mössbauer Study)

Schmitt R. A.
Cometary Explosions in Earth's Atmosphere (CEEA) and Steep Angle Cometary Crater (SACC) Events Cause Cretaceous/Tertiary (K/T) Extinction Phenomena. V.
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Wednesday, March 15, 1989
20TH ANNIVERSARY PLENARY REVIEW
1:30 p.m. Building 2 Auditorium

Wetherill G. W.*
Formation of the Moon in the Context of the Origin of the Solar System

Turner G.*
Lunar Chronology

Ryder G.*
Theories of Evolution: an Indefinite Biography of the Moon

Spudis P. D.*
Stratigraphy and Cratering History of the Moon: Our Understanding 20 Years After Apollo 11

Geiss J.*
Lunar Regolith and Solar History

Thursday, March 15, 1989
VENUS GEOLOGY
8:30 a.m. Gilruth 104

Kryuchkov V. P. Basilevsky A. T.*
Radar-Bright Flow-like Features as Possible Traces of the Latest Volcanic Activity on Venus

Schaber G. G.* Kozak R. C.
Morphologies of Ten Venusian Shields Between Lat 30° and 90° N

Roberts K. M.* Head J. W.
Lakshmi Planum Volcanism: Style, Origin, and Relation to Other Volcanic Deposits on Venus

Gaddis L. R.*
Estimates of Minimum Lava Flow Eruption Rates on Venus

Arvidson R. E. Plaut J. J.* Jurgens R. F. Saunders R. S. Slade M. A.
Geology of Southern Guinevere Planitia, Venus, Based on Analysis of Goldstone Radar Data

New Arcibo High-Resolution Radar Images of Venus: Preliminary Interpretation

Head J. W.*
Venus Tessera as Analog to Earth Oceanic Crust Formed at Spreading Centers

Vorder Bruegge R. W.* Head J. W.
Multi-Stage Tectonic Evolution of Eastern Ishtar Terra, Venus

Bindschadler D. L.* Head J. W.
Models of Venus Tectonics: Evaluation and Application to Tessera Terrain

Crumpler L. S.* Head J. W.
Eastern Aphrodite Terra, Venus: Evidence for Continuation of Divergent Plate Boundary Characteristics and Crustal Spreading from Diana Chasma to Atia Regio

Frank S. L.* Head J. W.
Spacing of Ridge Belts in the Plains-Ridge Belt Assemblage, Venus

Basilevsky A. T. Burba G. A. Batson R. M.*
Maps of Part of the Venus Northern Hemisphere: A Joint US/USSR Mapping Project

Ford J. P.*
Incidence Angle and Resolution: Potential Effects on Interpreting Venusian Impact Craters in Magellan Radar Images

POSTER PRESENTATIONS

Aubele J. C.
Characteristics and Geologic/Terrain Associations of Small Dome-like Hills on Venus

Campbell D. B. Hine A. A. Harmon J. K.
Venus: New Radar Images

Edmunds M. S.
Large Venusian Shields: Characterization and Comparisons
Gaddis I. R., Greeley R.
Volcanism in NW Ishtar Terra, Venus

Jurgens R. F., Ostro S. J., Goldstein R. M., Greiner W.
Polarization Radar Cross Sections of Mercury and Venus at 3.53 cm Wavelength

Kozak R. C.
Clotho Tessera, Venus: A Fragment of Fortuna Tessera?

Raitala J., Formanen V.
Coronae Chain on Venus: A Hot Spot Under a Moving Plate?

Senske D. A., Head J. W.
Syntheses of Venus Equatorial Geology: Variations in Styles of Tectonism and Volcanism and Comparison with the Northern High Latitudes

Wall S. D., van Zyl J. J., Saunders R. S.
Preliminary Investigation of Empirical and Model Relationships Between Surface Roughness and HH and VV SAR Returns: Implications for Magellan Data Analysis

Yewell S. B.
Anticipating Magellan: Interpreting Radar Images of Geological Features

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Abramov A. V., Grechishev A. V., Zherikhin N. V., Zheltikov I. A., Kresevsky M. A., Levechenko G. M.
Morozov A. A.
Scattering Properties of Venus Surface Derived from Venera-15, 16 Data

Basilevsky A. T., Kryuchkov V. P., Bobina N. N.
Areal Distribution of the Latest Volcanic Activity as a Key to Global Tectonic Style: Comparison of Northern Venus and the Pacific

Burba G. A.
Crater Density in the Northern Part of Venus: Areal and Topographic Patterns

Burba G. A., Bobina N. N., Shashkina V. P.
Geologic Mapping of the Northern Venus: A Progress Report

Burba G. A.
Venera 15 and 16 Cartographic Products: A Review

Frank S. L., Head J. W.
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Head J. W.
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Head J. W., Bruggge R. V., Crumpler L.
Architecture of Orogenic Belts and Convergent Zones in Western Ishtar Terra

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Results of a Training Exercise in Geological Mapping and Interpretation of Venus: Venera Map 12

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Kresevsky M. A., Basilevsky A. T.
Tentative Analysis of Reflectivity Map of Venus Surface Based on Venera 15, 16 Measurements: Comparison with Pioneer Venus Data

Kryuchkov V. P.
A System of Conjugate Strike-Slip Faults in the Ridge Belts on Venus

Marshall J. R., Fogleman G., Greeley R.
Gold Welding of Aeluran Materials in the Venusian Environments: Experimental and Theoretical Considerations

Sasaki S.
Off- Disk Implanatation of the Solar Wind and the Origin of Venusian Ar

Examination of Radar-bright Depots Associated with the Crater Voynich Using Venera 15/16 and Pioneer Venus Roughness, Reflectivity, Altimetry, and Imaging Data

Senske D., Head J. W.
Venus Equatorial Geologic Units
Radardinometry: Implications for the Morphology of Small Dome-like Hills on Venus

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Circulation of Small Dome-like Hills on Venus

Thursday, March 16, 1989

SNCs, HEDs AND FELLOW TRAVELERS

8:30 a.m. Gilruth Gym

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Jagouill E.
Is the Shergottite EETA 7900/ a Breccia?

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Rutherford M. J.
Papamastorou D. A.
Wasserburg G. J.

Diogenite Petrogenesis: Geochronometry and Petrology of Whole Rocks and Coarse-grained Separates

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H. C.
Tholen D. J.
Brown R. H.

Three Vesta-like Basaltic Asteroids and the Origin of Eucrites

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Lindstrom M. M.

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Pandoradson D. A.

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Micallef J.

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Parental Petrologies Among Eucrites in LEW85313 Hondoite

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Calcium Carbonate-Groundmass Mineralogy in the Nakhla Meteorite

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Solar Wind Gases in a Metal Separate from Lunar Soil 68501

Kerridge J. F.* Maru K.
Nitrogen, Xenon and Argon in Lunar Regolith Breccia 60016: A Study of Solar-wind Nitrogen and Measures of Antiquity

Korotcov R. L.*
Geochemical Stratigraphy of the 60009/60010 Core Apollo 16

McKay D. S.* Wentworth S. J.
Impact Glasses in Apollo 14 Regolith Breccias and the Origin of Soils

Basu A.* McKay D. S. Wentworth S.
Regolith Breccias as Precursors of Present Day Regolith on the Moon

Jéhanno C. Bodet D. Danon J Robin F. Rocchia R.*
Search for Debris of the Tunguska Meteor: Analytical Study of Spherules from the Explosion Site

Kashkarov L. L.* Genaeva L. I.
Regolith Stage of Meteorites: Track Studies of Preserved Acheulean

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Sprague A. L.
A Diffusion Source Mechanism for the Atmospheres of Mercury and the Moon

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Muinonen K. Lumme K. Irvine W. M.
Statistical Photoclinometry and Surface Topography of Asphereless Bodies

Rode Q. D. Yakovlev O. I. Romashova T. V.
Experimental Impacts: Analysis of Ejected Debris

Simon S. B. Papke J. J. Laul J. C. Hughes S. S. Schmit R. A.
Comparative Petrology and Chemistry of Apollo 17 Regolith Breccias

Wentworth S. J. Lindstrom D. J. Zolensky M. E. Lindstrom M. M. McKay D. S.
INAA of Glass Spheres from Ancient Apollo 16 Regolith Breccias

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COSMIC RAYS
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Rao M. N.* Padia J. T.
Proton to Neon Reaction in Ancient Solar Flares Based on Fayetteville and Kapoeta

Nichols R. H. Jr.* Hohenberg C. M. Olinger C. I. Goswami J. N.
Pre-Compaction Irradiation of Individual Grains from Meteorite Breccias: Exceedingly Long Regolith Histories or An Active Early Sun?

Michel R.* Cloth P. Dragovitsch P. Filges D.
On the Production of Cosmogenic Nuclides in Meteoroids by Galactic Protons

Mathew K. J. Rao M. N.* Michel R. Prescher K.
Production of Stable Xenon Isotopes from Barium by Low-Energy Protons

Mathew K. J. Rao M. N.* Michel R.
High Energy Spallation Xenon Spectrum from Barium Targets

Fireman E. L.* Beukens R. P.
Carbon-14 Production by 155-Mev Protons in Meteorites

Jull A. J. J.* Donahue D. J. Imbick F. W.
Trends in Carbon-14 Terrestrial Ages of Antartic Meteorites from Different Sites

Cosmogenic Radionuclides in the Antarctic HS-Chondrites 1 FW 85319 and 1 FW 85320
POSTER PRESENTATION

Jull A. J. T. Engler P. A. J. Donahue D. J. Reed y R. C. Lal D.
Cosmogenic Nuclide Production Rates: Carbon 14 from Neutron Spallation

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Alexeev V. A.
Distributions of Long-lived Cosmogenic Radionuclides in Meteorites

Reed y R. C. Nishisumi K. Arnold J. R.
Solar Cosmic Rays: Fluxes and Reaction Cross Sections

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ORIGIN AND CRYSTALLIZATION OF MARE BASALTS
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Apollo 15 Green Glass: The Range of Chemical Compositions in Individual Formational Events

Shearer C. K.* Papike J. J. Simon S. B. Galbreath K. C. Shimizu N.
A Comparison of Trace Element Characteristics of Picritic Glass Beads from the Apollo 14 and Apollo 17 Sites: Implications for Basalt Petrogenesis and Compositional Variability in the Lunar Mantle

Hughes S. S.* Delano J. W. Schmitt R. A.
Trace Element Signatures in Mare Volcanic and Impact-Melt Glasses from Apollo 14, 15, 16 and 17

Dasch F. J.* Ryder G. Shih C. Y. Wiesmann H. Bansal B. M. Nyquist L. E.
Time of Crystallization of a Unique A15 Basalt

Apollo 17 High-Ti Basalt Petrogenesis: An Integrated Approach Using Whole-Rock Major and Trace Element Analyses

Neal C. R.* Taylor L. A. Patchen A. D. Ballington M.
Mineralogy and Petrography of 28 New Apollo 17 Basalts

Brophy J. G. Basu A.*
Clinopyroxene Fractionation from an Initial Lunar Magma and Some Eu/Eu* Calculations

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Colson R. O. Haskin L. A.
Use of Stationary Electrode Polarography to Measure Reduction Potentials for Eu3+ in Melt of Diopside Composition

Engelhardt W. v.* Arndt F. Pankau H. G. Witzsche A.
Ahrich Pyroxenes: Metastable Formation in Supercooled Lunar Basaltic and Terrestrial Impact Melts

Neal C. R.* Taylor L. A.
Apollo 14 High-Alumina Basalt Petrogenesis: Isotope Evidence for Assimilation and Fractional Crystallization (AFC)

Trace Element Characteristics of Apollo 14 Volcanic and Impact-Generated Glass Beads

Vetter S. K. Shervais J. W.
A Dynamic Melting Model for the Origin of Apollo 15 Olivine-Normative and Quartz-Normative Mare Basalts

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Buoyancy-Driven Melt Segregation in the Earth's Moon

Farrand W. H.
Highland Contamination and Subsurface Topography in Southern Mare Serenitatis

Hughes S. S. Delano J. W. Schmitt R. A.
Trace Element Chemistry of 74241 and 79221 Mare Volcanic Glasses

Jin Y. Taylor L. A.
Volcanic and Impact Glasses from Mare Ferdinandii

Neal C. R. Taylor L. A.
Definition of a Pristine, Unadulterated urKREEP Composition Using the "K-Frac" REEP-Frac" Hypothesis
Neal C. R., Taylor L. A.
The Barium Problem in Silicate Liquid Immiscibility: Influence of Melt Composition and Structure on Elemental Partitioning

Neal C. R., Taylor L. A., Patchen A. D.
The "K-Fraction" REE-Fraction Hypothesis: Evidence for Both KREEP Components in 12033 Felsite with Post-SLI Fractionation of the REE-Fraction

Qi Q., Taylor L. A., Zhou X.
Unusual Mantle Xenoliths from Southeast China

Semenova A. S., Tarasov L. S., Kononkova N. N., Solovieva N. V.
VI.1.1 Basalts of Luna 16 and Luna 20: Petrography, Mineralogy and Petrogenesis

Shearer C. K., Papke J. J.
K Plagioclase Removal Responsible for the Negative Fe Anomaly in the Source Regions of Mare Basalts?

Shervais J. W., Netter-S. K.
Melt Rock Components in KREEPy Breccia 15205 — Petrography and Mineral Chemistry of KREEP Basalts and Quartz-Normative Mare Basalts

Shih C.-Y., Nyquist L. F.
Isotopic and Chemical Constraints on Models of Aluminous; Mare Basalt Genesis

Lunar Albedo-Color Diagram: Survey of South-West Part of Lunar Disk

Tarasov L. S., Kudryashova A. I., Semenova A. S., Baryshev, V. B., Zolotarev, K. V.
Geochemical Identification of VI.1.1 Basalts from Mare Facunditas and Apollo Region

Tarasov L. S., Kudryashova A. F., Ulyanov V. A., Baryshev V. B., Zolotarev K. V.
Geochemistry of Rare Elements in Various Types of Basaltic Rocks from Apollo 17 Samples

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ASTEROIDS AND SMALL BODIES
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Britt D. G.*, Pieters C. M.
Bidirectional Reflectance Characteristics of Black Chondrite Meteorites

Lebofsky L. A.*, Jones I. D.
The Nature of Low Albedo Asteroids from 3-µm Spectrophotometry

Vilas F.*, Gaffey M. J.
Weak Fe²⁺, Fe⁶⁺ Charge Transfer Absorption Features Seen in CM2 Carbonaceous Chondrites and Narrowband Reflectance Spectra of Primitive Asteroids

Gaffey M. J.*
The Abundance of Metal on S-Asteroid Surface: Indications from IRAS 12 and 25 Micron Flux Ratios

Bell J. F.*, Piscitelli J. R., Lebofsky L. A.
Dennov: Hydration State from Infrared Spectroscopy

Efford N. D.*
Integral Photometry of Phobos Using Hapke's Equation

Murchie S. L.*, Head J. W., Efford N. D.
Morphologic Classes of Grooves on Phobos

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Boice D. C., Huebner W. F., Lambert J. V.
A Three-Dimensional Computer Representation of the Nucleus of Comet Halley

Cloutis E. A.
Olivine-Metal Mixtures: Spectral Reflectance Properties and Phase Determinations

Harris A. W.
The H-G Asteroid Magnitude System: Mean Slope Parameters

McKay C. P., Barucci W. R., Kojiró D. R., Church I.
Shock Production of Organics During Cometary Impact

Paokhe P., Cellino A., Davis D.*, Farinella P., Zappalà V.
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Spohn T., Benkhoff J.
Sample Thermal History Models of KOS! Comet Nucleus Simulation Experiments

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Britt D. T., Pieters C. M., Webb R. S., Pratt S. F.
Relationship of C-Type Asteroids to Dark Meteorites: Evidence for Optical Alteration by Asteroidal Regolith Processes

Hartmann W. K., Tholen D. J., Meech K. J., Cruikshank D. P.
"Asteroid" 2060 Chiron: Status Report on Probable Cometary Activity

Hartmann W. K.
Phobos: Comparison of Small Craters on Phobos and the Moon

Helen E. F.
Interesting Dynamical Aspects of 1989h, a New Short-Period Comet

Hiroi T., Takeda H.
A Method of Converting Reflectance Spectra into Absorption Coefficient Spectra of Mineral Mixtures for Application to Asteroidal Surface Mineralogy

Lucey P. G., Bell J. F., Pizzetti J. R.
High Spectral Resolution Spectroscopy of the Martian Moons

Marov M. Ya., Kolesnichenko A. V., Skorov Yu. V.
The Model of Heat and Mass Transfer in the Cometary Atmosphere

Morgan T. H., Kessler D. S.
The Average Relative Velocity and Average RMS Relative Velocity of the Meteoroid Population

Possible Composition of Halley Comet Dust (St-poor Particles) According to the Data Obtained by Mass-Spectrometer Puma-2

Rajpan R. S., ReVelle D. O.
Identification of Iron meteorites in the Prairie Network Fireball Data

ReVelle D. O., Rajpan R. S.
Evaluation of Initial Properties of Iron Meteoroids Using Terrestrial Crater Signatures

Neutron Spectroscopy for Investigation of Small Bodies and Asteroids

Williams J. G., Shoemaker E., Wolfe R.
Structure in the Themis, Eos, and Koronis Families

Wilson L., Head J. W.
Dynamics of Groove Formation on Phobos by Ejecta from Sticker's

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CHEMICAL AND ISOTOPIC CHARACTERISTICS OF SOLAR SYSTEM MATERIAL
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Loss R. D.*, Lugmair G. W.
A Search for Zinc Isotope Anomalies in CAIs: First Results

Esat I. M.
Anomalously Cr Isotope Fractionation in Terrestrial Spinel Following High Temperature Distillation

Rotaru M., Birck J. L.*, Allegre C. J.
Chromium Isotopic Systematics in Carbonaceous Chondrites: 14Cr Deficits in Acid Soluble Phases of Orgueil

Stone J.*, Hutchison I. D., Epstein S., Wasserburg G. J.
Magnesium and Silicon Isotopic Compositions of Individual Oxide Grains from a Murchison Acid Residue: A Search for Exotic Material

Lin Y. T., El Goresy A.*, Hutchison I. D.
The First Meteoritic Silver Minerals in Peña Blanca Springs Enstatite Achondrite: Assemblages, Compositions and Silver Isotopes

Chen I. H.*, Wasserburg G. J.
The Pd-Ag Systematics in IVA and IWB Iron Meteorites and in Pallasites

Jones J. H.*, Experimental Constraints on the 26th Pb 206Pb Chronology of Iron Meteorites
Marti K. * Kim J. S. Lavielle B. Pellias P. Perron C.
A New Xenon Component in Chondritic Metal

Perron C. Bourot-Denise M. Pellias P. * Marti K. Kim J. S. Lavielle B.
Inclusions in Chondritic Metal Grants: A Clue to the Origin of FVM Xe?

Xia G. Thiemens M. H. *
Sulfur Isotope Ratio Measurements (δ 34S, δ 33S) in Meteoric Components

Bhattacharya S. K. Thiemens M. H. *
Oxygen Isotopic Fractionations in Symmetry Dependent Chemical Reactions

Hashimoto A. *
Kinetetics of Evaporation of MgO, SiO2, and MoSi2O4, and Their Effect on Isotope Mass Fractionations

Nagahara H. * Kushiro I.
Vaporization in the System Plagioclase Solid Solution - Hydrogen

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Robert F. Halbout J. Javoy M.
Non Mass Dependent Isotopic Fractionation: A Survey of Various Experimental Conditions

Tsuehiyama A.
Condensation Experiments in the System Mg-Si-O-H

Weather D. L. Hutcheon I. D. Graser H. Tombrello T. A. Wasserburg G. J.
Sputtering of Mo: Light Isotope Enrichment and Cosmochemical Implications

Thursday, March 16, 1989
PLANETARY PHYSICS
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Bills B. G.
Formation of Tharsis and the Obliquity History of Mars

Banerdt W. B. * Golombek M. P.
Long Wavelength Stress Models for Mars: New and Improved

Janes D. M. * Melosh H. J.
Planetary Response of Thick Lithospheres to Loading

Turcotte D. L. *
Thermal Evolution of Mars and Venus Including Irreversible Fractionation

Schubert G. * Bercovici D. Glattrmaier G.
Mantle Convection and the Thermal Evolution of Mars

Watts A. * Greeley R. Melosh H. J.
Formation of Antipodal Terrains on Icy Satellites

Hilgren V. J. * Melosh H. J.
The Importance of an Elastic Lithosphere for Crater Retention on Icy Bodies

McKinnon W. B. * Benner L. A.
Origin of Ithaca Chasma, Thetis, II: The Importance of the Lithosphere

Durham W. B. * Kirby S. H. Stern L. A. Ragain K. A.
Brittle and Ductile Behavior of Icy/Rock Mixtures

Fischer H. J. Spohn T. *
Thermal-Orbital History Models for a Visco-Elastic Io

Finney S. A. * Williams C. R. Sonett C. P.
The Lunar Orbit in the Late Precambrian

Ross M. N. Thomas P. J. *
Tidal Despinning and the History of Mercury

POSTER PRESENTATIONS

Odezhnyk M. I. Holloway J. R.
Carbonate Composition and Stability in the Martian Mantle: Preliminary Results
Zuber M. T.  Aist L. L.
Lithospheric Control in the Development of the Martian Plains Ridges

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Alexeev V. A.
Periodicity of Recent Terrestrial Volcanism

Koryakin E. D.
Mars: Gravity Field and Deep Structure of the Olympus Mons

Savrov L. A.  Kuchik E. K.
Covariance and Harmonic Analysis of the Interaction of Lunar Gravity and Its Surface Characteristics

Solomon S. C.*  Head J. W.

Friday, March 17, 1989
MAGMA EVOLUTION IN THE LUNAR HIGHLANDS
8:30 a.m.  Gilruth 104

Warren P. H.*  Haack H.  Rasmussen K. L.
Effects of Megaregolith Insulation on the Sm-Nd Coolings Ages of Deep-Crustal Cumulates from the Moon and Large Asteroids

Wänke H.*  Dreibus G.  Palme H.  Siefert S.  Spettel B.  Stöffler D.
Evolution of the Lunar Magma Ocean as Recorded by the Composition of Plagioclase

Bersch M. G.*  Taylor G. J.  Keil K.
Ferroan Anorthositess from an Evolving Magma Ocean

James O. B.*  Lindstrom M. M.  McGee J. J.
Studies of the Distribution of Rare-Earth Elements in the Minerals of Lunar Ferroan Anorthosites

Hess P. C.*  Horzempa P.  Rutherford M. J.
Fractionation of Apollo 15 KREEP Basalts

Longhi J.*
Is Natural Silicate Liquid Immiscibility Metastable?

Martinez R.*  Ryder G.
A Granite Fragment from the Apennine Front—Brother of QMD?

Lindstrom M. M.*  Marvin U. B.  Holmberg B. B.  Mittlefehldt D. W.
Geochemistry and Petrology of Recrystallized Gabbro Breccias from the Apollo 15 Site

Jolliff B. L.*  Haskin L. A.  Korotev R. L.
Geochemistry of 2-4 mm Particles from 14161 and Implications Regarding Compositional Systematics

Premo W. R.*  Tatsumoto M.
Pb Isotopes in Anorthositic Breccia 67075, Revisited: Evidence of a Mare Basalt-Age Component

Compston W.*  Williams I. S.  Meyer C.
The Problem of Lunar Initial Pb

Meyer C.*  Williams I. S.  Compston W.
$^{207}$Pb/$^{206}$Pb Ages of Zircon-Containing Rock Fragments Indicate Continuous Magmatism in the Lunar Crust from 4350 to 3900 Million Years

POSTER PRESENTATIONS

Delaney J. S.  Sutton S.  Smith J. V.
Trace Elements in Plagioclase from Three Apollo 16 Breccias

Heavilon C. F.  Crotaz G.
REE and Selected Minor and Trace Element Microdistributions in Some Pristine Lunar Highlands Rocks

Jolliff B. L.
Lithologic Distribution and Classification of 2-4 mm Particles from Apollo 14 Soil 14161

Longhi J.
Fractionation Trends of Evolved Lunar Magsas
McGee J. J.
Mineralogy of the Ferroan Anorthosite Suite: Clues to the Parent Magma Puzzle

Unique Isotopic Signatures of Eclogite Xenoliths as Evidence of Ancient Plate Tectonics

Niedermann S. Eugster O.
Terrestrial Kr and Xe Contamination in Lunar Anorthosite 60018: Evidence for an Anomalous Adsorption Process

Phinney W. C. Morrison D. A.
REE Distribution Coefficients for Plagioclase: Implications for Anorthosite Melts

Ryder G.
Petrogenesis of Apollo 15 KREEP Basalts

Salpas P. A. Moss B.
A Preliminary Compositional Study of Anorthosite and Related Rocks from the Lower Banded Series of the Stillwater Complex

Shih C.-Y. Nyquist L. E. Dasch E. J. Bansal B. M. Wiesmann H.
Ages of Pristine Lunar Plutonic Rocks and Their Petrographic Implications

Vaniman D. T. Bish D. L. Chipcha S. J.
A New Ca-Al-Silicate Mineral from the Moon

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Lindstrom M. M. Moss B. Mittlefehldt D. W.
Geochemistry of 15205 KREEP Basalt Clasts

McCallum I. S. Rattray G. W.
The Oxygen Fugacity of the Stillwater Complex Magma

Takeda H. Miyamoto M. Mori H.
Mineralogical Resemblance of the Y86032-Type Lunar Meteorites to Feldspathic Fragmental Breccia 67016

Friday, March 17, 1989
PLANETARY ACCRETION
8:30 a.m. Gilruth Gym

Boss A. P. * Surface Density and Temperature Profiles in the Early Solar Nebula

Spaute D. S. * Davis D. R. Weidenschilling S. J.
Planetary Accretion Studies: Effects of Numerical Parameters

Cuzzi J. N. * Champney J. Coakley T. Dobrovolskis A.
Particle-Gas Dynamics in the Protoplanetary Nebula

Cameron A. G. W. * Benz W.
Possible Scenarios Resulting from the Giant Impact

Melosh H. J. * Kipp M. T.
Giant Impact Theory of the Moon’s Origin: First 3.1D Hydrocode Results

Malcuit R. J. * Mehrlinger D. M. Winters R. R.
Intact Planetoid Capture: Application to Planets Venus and Earth

Ward W. R. * Disc Tides and the Formation of Giant Planet Cores

Stewart G. R. *
Planetary Swarms Perturbed by a Distant Protoplanet

Patterson C. W. *
Gravitational Stirring of Planetesimals by a Planetary Embryo: Implications for Runaway Growth

Namiki N. * Matsui T.
Numerical N-Body Simulation of the Accretional Process of the Terrestrial Planets

Mukhin I. M. * Gerasimov M. V. Safonova F. N.
Hypervelocity Impacts of Planetesimals as a Source of Organic Molecules and of Their Precursors on the Early Earth

Finney S. A. * Tonks W. B. Melosh H. J.
Statistical Evolution of Impact Ejecta from Earth—Implication for Transfer to Other Solar System Bodies
Thomas P. J.* Chyba C. F. Brookshaw L. Sagan C.

Impact Delivery of Organic Molecules to the Early Earth and Implications for the Terrestrial Origins of Life

POSTER PRESENTATION

Sasaki S.
Gas Capture of Outer Jovian Planets...Critical Mass for Core Instability

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Celotto E. Marzari F. Vanzani V.
Runaway Growth of Giant Protoplanets

Kato T. Ringwood A. E.
Was the Moon Formed from the Mantle of a Martian-sized Planetesimal?

Makarkin A. B. Dorofeeva V. A.
Preplanetary evolution and Protomatter of Venus

Ohtsuki K. Nakagawa Y. Nakazawa K.
Numerical Accuracy in Solving Coagulation Equation for Planetary Accumulation

Ziglina I. N.
Masses of Preplanetary Bodies at the Final Stage of Accumulation Evaluated from the Eccentricities and Inclinations of Orbits of the Terrestrial Planets

Friday, March 17, 1989
OUTER SOLAR SYSTEM
8:30 a.m. Gilruth 206

Stansberry J. A.* Tomasko M. G. Lunine J. I.
Photochemical Haze on Triton

Brown R. H.* Matson D. L.

Eluszkiewicz J.* Stevenson D. J.
Regolith Thickness on Large Icy Satellites

Kargel J. S.*
Can We Radiometrically Date Cryovolcanic Flows on Icy Satellites

Thomas P. J.* Squyres S. W.
Formation of Ganymede's Crater Palimpsests

Schenk P. M.*
Fluid Volcanism on Miranda and Ariel

Hogenboom D. L. Winebake J. Consolmagno G. J.* Dalrymple W. III
Preliminary Densities and Phase Diagram of the Water/NH3 System at P-T Conditions Relevant to the Icy Moons of the Outer Planets

Helfenstein P.* Hillier J. Veverka J. Moersch J. Weitz C.
Uranus Satellites: Albedo and Color Maps from Voyager Imaging

Zent A. P.*
The Effect of Albedo on Sublimation-Driven Flow of SO2 on Io

Nash D. B.* Gooding J. I.
Vacuum-Weathered Sulfur: Calorimetric Evidence for Unusual Phase Composition

Stern S. A.* Steward G. R.
The Thermodynamical Destruction of Ice Grains in Planetary Rings

Torbett M. V.*
Chaotic Motion in the Kuiper Belt of Comets: The Delivery of Short-Period Comets

POSTER PRESENTATIONS

Croft S. K.
New Geologic Maps of the Uranian Satellites Titania, Oberon, Umbriel and Miranda

DeHon R. A. Leith A. C. McKinnon W. B.
A Geologic Map and Phomomosaic of the Jg-15 Quadrangle of Ganymede
Kargel J. S.  Croft S. K.
*Rheological Extremes of Cryogenic Liquids on Icy Satellites*

Pozio S.  Kargel J. S.
*The Tectonic and Igneous Evolution of Enceladus*

Mulholland J. D.  Calame O.  Head J.-J.  Maury A.  Pollas C.
*Simultaneous Positional Observations of the System of Faint Satellites of Jupiter*

Murchie S. L.
*The Volcanic and Tectonic History of Ganymede*

Nyffenegger P. A.  Consolmagno G. J.
*Tectonic Features on Ariel: Evidence for Collapse of a Tidal Bulge*

Schenk P. M.
*Mimas Grooves, the Herschel Impact, and Tidal Stresses*

Stern S. A.
*The Effects of Stellar Perturbations on the Orbits of the Outer Planets and Objects in the Kuiper-Duncan Disk*

Wagner R.  Jaumann R.  Neukum G.
*Preliminary Geologic Map of the ETANA Region Quadrangle (JG-1) of Ganymede*

**PRESENTED BY TITLE ONLY**

Dolginov Sh. Sh.
*On the Problem of the Magnetic Fields of Neptune and Uranus*

Lejkin G. A.  Sanonie A. N.
*On the Formation of Valhalla Basin (Callisto)*

Murchie S. L.  Head J. W.  Plescia J. B.
*The Cratering Record of Ganymede and Callisto: Evidence for the Character of the Crater-forming Impactor Populations*

Pappalardo R.  Greeley R.
*Diapiric Walls as a Model for Bulge and Trough Terrain on Icy Satellites*

O'Shaughnessy M.  Heikenstein P.  Veverska J.
*Post-Eclipse and Darkside Brightness Variations on Io*

Stooke P. J.
*Geology of Mimas*

Stooke P. J.
*Tethys: Volcanic and Structural Geology*

Stooke P. J.
*Volcanism on Callisto*

Walker A. S.
*The Nexus of the Flexus*
Haines E. L.

Grun E.

Gulick V. C.

Guzhova A. Y.

Grossman L.

Grimm R. E.

Griswold E. B.

Grotzheuser T. J.

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Kuchik E. K.
Kudrin L. V.
Kudryashova A. F.
Kuiper G. M.
Kurat G.
Kushiro J.
Kurucz R. O.
Lal D.
Lai D.
Lambert J. V.
Lancaster N.
Langevin V.
Lasutina E. P.
Laughlin J. R.
Lau J. C.
Lau J. K.
Lau J. C.
Lawrance M. R.
Lavielle B.
Lavrikhina A. K.
Lavrikhina A. K.
Le L.
Lebofsky L. A.
Lebofsky L. A.
Leedlow M.
Lee S. W.
Lehner M.
Leith A. C.
Leith A. C.
Levchenko G. M.
Lewis R. S.
Liffman M.
Liffman K.
Lin Y. T.
Lintott D. J.
Lindstrom D. J.
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Lin T. W.
Lipschutz E.
Lipschutz E.
Liu Y.-G.
Liu Y.-G.
Lofgren G. E.
Longhi J.
Loss S.
Lobanov D. R.
Lucchitta B. K.
Lucey P. G.
Lucey P. G.
Lucey P. G.
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Lucey P. G.

Planetary Physics, Thurs. p.m., Rm. 206
Venus Geophysics, Wed. a.m., Rm. 104
Origin & Crystallography, Thurs. p.m., Rm. 104
CAL's, Wed. a.m., Gym
Chondrules and Ordinary Chondrites, Mon. a.m., Gym
Chemical & Isotopic Characteristics, Thurs. p.m., Gym
Mars: Water, Canyons, & Life, Thurs. p.m., Rm. 104
Cosmic Rays, Thurs. a.m., Rm. 206
Shock Metamorphism & Terres. Craters, Mon. p.m., Rm. 206
Asteroids & Small Bodies, Mon. p.m., Rm. 104
Mars Geology, Tues. a.m., Rm. 104
Mars Remote Sensing, Mon. a.m., Rm. 104
CAI's, Wed. a.m., Gym
Mars Remote Sensing, Mon. a.m., Rm. 104
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Chemical & Isotopic Characteristics, Thurs. p.m., Gym
Asteroids & Small Bodies, Thurs. p.m., Rm. 104
Mars Remote Sensing, Mon. a.m., Rm. 104
Regolith, Thurs. a.m., Rm. 206
Asteroids, Ungrouped Chondrites, Tues. p.m., Gym
Cosmic Dust II, Tues. a.m., Rm. 206
Chemical & Isotopic Characteristics, Thurs. p.m., Gym
Carbonaceous Chondrites, Mon. p.m., Gym
Mars: Remote Sensing/Volcanism, Mon. p.m., G104
Bhohgati & Angrite Consortia, Tues. a.m., Gym
Asteroids & Small Bodies, Thurs. p.m., Rm. 104
Lunar Geology, Processes & Resources, Tues. p.m., Rm. 206
Mars Remote Sensing, Mon. a.m., Rm. 104
Outer Solar System, Fri. a.m., Rm. 104
Mars Remote Sensing, Mon. a.m., Rm. 104
Venus Geology, Thurs. a.m., Rm. 104
Chemical & Isotopic Characteristics, Thurs. p.m., Gym
Carbonaceous Chondrites, Mon. p.m., Gym
Magma Evolution in the Lunar..., Fri. a.m., Rm. 104
Mars Remote Sensing, Mon. a.m., Rm. 104
Mars Remote Sensing/Volcanism, Mon. p.m., G104
Chondrules and Ordinary Chondrites, Mon. a.m., Gym
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Planetary Accretion, Fri. a.m., Gym
Planetary Accretion, Fri. a.m., Gym
Planetary Accretion, Fri. a.m., Gym
Planetary Accretion, Fri. a.m., Gym
Mckay D. S.
Mckay G.
McKinney W. B.
McKinnon W. B.
McScWen H. Y., Jr.
Meche K. J.
Mehegan D. M.
Melandez D. E.
Melosh H. J.
Melosh H. J.
Merkle R. K. W.
Metzger A. E.
Netzer K.
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Meyer C.
Michel R.
Meech K. J.
McKinnon W. B.
Mehringer D.
Melosh H. J.
Mellish D. f.
Hougainis -Hark P.
Hetzler K.
Metzler K.
Morrison D. A.
Horris R. V.
Horris R. Y.
Horozov A. A.
Moroz V.
Miyamoto
Miura Y.
Miura Y.
Heyer C.
Hori H.
Moore H. J.
Miyamoto M.
Higdisova L. F.
Hikli shansky A. Z.
Hittl efehldt O.
Hiller S. M. O.
Murchie S.
Murali A. V.
Mulholland J. D.
Murati A. V.
Murchie S. L.
Murray B. C.

Regolith, Thurs. a.m., Rm. 206

Bholghati & Angrite Consortia ...., Tues. a.m., Gym
Outer Solar System, Fri. a.m., Rm. 206
Planetary Physics, Thurs. p.m., G104
Carbonaceous Chondrites, Mon. p.m., Gym
Asteroids & Small Bodies, Thurs. p.m., Rm. 104
Planetary Accretion, Fri. a.m., Gym
Cosmic Dust II, Tues. a.m., Gym
Lunar Geology, Processes & Resources, Tues. p.m., Rm. 206
Planetary Accretion, Fri. a.m., Gym
Asteroids & Ordinary Chondrites, Mon. a.m., Gym
Cosmic Dust II, Tues. a.m., Gym
Asteroids & Ordinary Chondrites, Mon. a.m., Gym
Nature & Effects of Impact ..., Wed. a.m., Rm 206
Bholghati & Angrite Consortia ..., Tues. a.m., Gym
Magma Evolution in the Lunar ..., Fri. a.m., Rm 104
Asteroids & Ordinary Chondrites, Mon. a.m., Gym

Musselwhite D. S.
Mustard J. F.
Nagahara H.
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Nakagawa Y.
Nakamura N.
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Nakazawa K.
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Nash D. B.
Nazarov M. A.
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Neal C. R.
Nehre C. E.
Nelson M. L.
Neukum G.
Neukum G.
Neukum G.
Newsom H. E.
Newsom H. E.
Hgo H. H.
Nichols R. H., Jr.
Nichols R. H., Jr.
Niedermann S.
Niedermann S.
Nishitani K.
Nishitani K.
Mars Remote Sensing, Mon. a.m., Rm. 104
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Planetary Physics, Thurs. p.m., Rm. 206

Mars Remote Sensing, Mon. a.m., Rm. 104
Chemical & Isotopic Characteristics ..., Thurs. p.m., Gym
Asteroids, and Ordinary Chondrites, Mon. a.m., Gym
Planetary Accretion, Fri. a.m., Gym
Chondrules and Ordinary Chondrites, Mon. a.m., Gym
Cosmic Dust II, Tues. a.m., Gym
Lunar Accretion, Processes & Resources, Tues. p.m., Rm. 206
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Asteroids & Ordinary Chondrites, Mon. a.m., Gym
Carbonaceous Chondrites, Mon. p.m., Gym
Chondrules and Ordinary Chondrites, Mon. a.m., Gym

Mars Remote Sensing, Mon. a.m., Rm. 104
Planetary Physics, Thurs. p.m., Rm. 206
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Planetary Accretion, Fri. a.m., Gym
Asteroids & Ordinary Chondrites, Mon. a.m., Gym

Mars Remote Sensing, Mon. a.m., Rm. 104
Chemical & Isotopic Characteristics ..., Thurs. p.m., Gym
Asteroids, and Ordinary Chondrites, Mon. a.m., Gym
Planetary Accretion, Fri. a.m., Gym
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Cosmic Dust II, Tues. a.m., Gym
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Planetary Accretion, Fri. a.m., Gym
Asteroids & Ordinary Chondrites, Mon. a.m., Gym
Carbonaceous Chondrites, Mon. p.m., Gym
Chondrules and Ordinary Chondrites, Mon. a.m., Gym
Stecher G. M.
Steele A. M.
Steele I. M.
Sterr P. F.
Stern A. J.
Stevenson D. J.
Steffen L. A.
Stewart G. R.
Steward G. R.
Stern S.
Stern L. A.
Strickland E. L. I.
Strom R. G.
Sueno S.
Sukhanov A. L.
Sunshine J. M.
Suponiche I. V.
Surkov Yu. A.
Sutton S. R.
Swann P. W.
Swann J. D.
Swindle T. O.
Swindle T. D.
Taga T.
Takahashi T.
Takeda H.
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Tananaka K. L.
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Tanner G. W.
Tarasov L. S.
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Taylor G. J.
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Tayefi K.
Thiemens M. H.
Thiervers S. L.
Tholen D. J.
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Thompson D. W.
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Schultz P. H. & C. S. | Shock Metamorphism & Terrae... Mon. p.m., Rm. 206
Schultz R. | Mars: Water, Canyons, & Life, Tues. p.m., Rm. 104
Scott D. H. | Mars Geology, Tues. a.m., Rm. 104
Scott E. R. | Ureilites, Ungrouped Chondrites... Tues. p.m., Gym
Scott E. R. | Interstellar Grains/Dust, Tues. a.m., Rm. 206
Sears D. W. G. & T. H. Shoemaker E. H. | Chondrules and Ordinary Chondrites, Mon. a.m., Gym
Shall E. P. | Mars: Water, Canyons, & Life, Tues. p.m., Rm. 104
Sharpton V. L. | Shock Metamorphism & Terrae... Mon. p.m., Rm. 206
Shearer C. K. | Origin & Crystallization... Thurs. p.m., Rm. 104
Sherman S. B. | Bholghati & Angrite Consortia... Tues. a.m., Gym
Sherwood E. M. | Shock Metamorphism & Terrae... Mon. p.m., Rm. 206
Skinner W. R. | Chondrules and Ordinary Chondrites, Mon. a.m., Gym
Skyeck A. | Mars Geology, Tues. a.m., Rm. 104
Smrekar S. | Venus Geophysics, Wed. a.m., Rm. 104
Solomon C. C. | Venus Geophysics, Wed. a.m., Rm. 104
Sotin C. | Venus Geophysics, Wed. a.m., Rm. 104
Spaute O. S. | Planetary Accretion, Fri. a.m., Gym
Spohn T. | Planetary Physics, Thurs. p.m., Rm. 206
Spudis P. | 20th Anniversary Plenary Review, Wed. p.m., Bldg. 2
Spudis P. | Lunar Geology, Processes & Resources, Tues. p.m., Rm. 206
Stansberry J. A. | Mars: Water, Canyons, & Life, Tues. p.m., Rm. 104
Stecher O. | Outer Solar System, Fri. a.m., Rm. 206
Steele A. M. | Nature & Effects of Impact... Wed. a.m., Rm. 206
Steele I. M. | Carbonaceous Chondrites, Mon. p.m., Gym
Stern A. S. | Outer Solar System, Fri. a.m., Rm. 206
Stewart G. R. | Planetary Accretion, Fri. a.m., Gym
Stoffler D. | Venus Geophysics, Wed. a.m., Rm. 104
Stone J. | Venus Geophysics, Wed. a.m., Rm. 104
Strickland E.L. | Planetary Accretion, Fri. a.m., Gym
Strom R. G. | Shock Metamorphism & Terrae... Mon. p.m., Rm. 206
Sutton S. | Cosmic Dust II, Tues. a.m., Rm. 206
Swindle T. D. | Bholghati & Angrite Consortia... Tues. a.m., Gym
Swindle T. D. | SNC's, HED's, & Fellow Travelers, Thurs. a.m., Gym
Takeda H. | SNC's, HED's, & Fellow Travelers, Thurs. a.m., Gym
Takeda H. | Ureilites, Ungrouped Chondrites... Tues. p.m., Gym
Taylor G. J. | Planetary Differentiation, Mon. p.m., Bldg. 30
Tera F. | SNC's, HED's, & Fellow Travelers, Thurs. a.m., Gym
Thiemens M. H. | Chemical & Isotopic Characteristics... Thurs. p.m., Gym
Thomas P. J. | Mars Remote Sensing, Mon. a.m., Rm. 104
Thomas P. J. | Shock Metamorphism & Terrae... Mon. p.m., Rm. 206
Thomas P. J. | Cosmic Dust I, Mon. a.m., Rm. 206
Tomeoka K. | Planetary Accretion, Fri. a.m., Gym
Tonks W. B. | Ureilites, Ungrouped Chondrites... Tues. p.m., Gym
Tonks W. B. | Planetary Accretion, Fri. a.m., Gym
Torbert M. V. | Planetary Differentiation, Mon. p.m., Bldg. 30
Traub S. G. | Mars Remote Sensing, Mon. a.m., Rm. 104
Treiman A. H. | SNC's, HED's, & Fellow Travelers, Thurs. a.m., Gym
Tsou P. | Planetary Physics, Thurs. p.m., Rm. 206
Turner C. | Planetary Differentiation, Mon. p.m., Bldg. 30
Tyburczy J. A. | Planetary Differentiation, Mon. p.m., Bldg. 30
Vickery A. M. | Nature & Effects of Impact... Wed. a.m., Rm. 206
Vilas F. | Asteroids & Small Bodies, Thurs. p.m., Rm. 104
Virag A. | Carbonaceous Chondrites, Mon. p.m., Gym
Vogt S. | Cosmic Rays, Thurs. a.m., Rm. 206
Walker R. M. | Interstellar Grains/Dust, Tues. a.m., Rm. 206
Manke H. | Magma Evolution in the Lunar... Fri. a.m., Rm. 104
Ward W. R. | Planetary Accretion, Fri. a.m., Gym
Warren P. H. | Magma Evolution in the Lunar... Fri. a.m., Rm. 104
Warren P. H. | Planetary Differentiation, Mon. p.m., Bldg. 30
Wasson J. T. | Ureilites, Ungrouped Chondrites... Tues. p.m., Gym
Weinbruch S. | Carbonaceous Chondrites, Mon. p.m., Gym
Weisberg M. K. | Martian Geology, Tues. a.m., Gym
Wentworth S. J. | SNC's, HED's, & Fellow Travelers, Thurs. a.m., Gym
Wetherill G. V. | 20th Anniversary Plenary Review, Wed. p.m., Bldg. 2
Wichman R. | Shock Metamorphism & Terrae... Mon. p.m., Rm. 206
Wieler R. | Mars Geology, Tues. a.m., Rm. 104
Williams I. | Venus Geophysics, Wed. a.m., Rm. 104
Williams S. H. | Mars: Water, Canyons, & Life, Tues. p.m., Rm. 104
Wood J. A. | Chondrules and Ordinary Chondrites, Mon. a.m., Gym
Zent A. P. | Outer Solar System, Fri. a.m., Rm. 206
Zolensky M. | Carbonaceous Chondrites, Mon. p.m., Gym
Zolensky M. | Cosmic Dust II, Tues. a.m., Rm. 206