LUNAR AND PLANETARY SCIENCE CONFERENCE XIX

14-18 March 1988

The NINETEENTH LUNAR AND PLANETARY SCIENCE CONFERENCE will begin Sunday, March 13, at 6:00 p.m. with registration and an open house at the Lunar and Planetary Institute. The registration fee for the conference will be $40.00; students with student IDs may register for $20.00. A shuttle bus will run between NASA area hotels and the LPI from 5:45 to 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 record total of 678 abstracts accepted for publication in Lunar and Planetary Science XIX, the Program Committee has constructed 29 technical sessions and one special session. The general structure of the program is as follows:

**MONDAY AM, MARCH 14**
- Mars: Geology and Remote Sensing
- Cosmic Dust
- HEDs, Irons, Aubrites

**MONDAY PM, MARCH 14**
- Mars: Water and Ice
- Orbital Collection of Cosmic Dust and Cosmic-Ray Produced Nuclides
- Regoliths and Mesosiderites
- Exploring Mars and Phobos (Poster & Print Only)

**TUESDAY AM, MARCH 15**
- Venus Geophysics
- Carbonaceous Chondrites and Refractory Inclusions I
- Planetary Atmospheres and Related Topics

**TUESDAY PM, MARCH 15**
- Geology of Venus
- Planetary Accretion: Fluffy Aggregates to Giant Impactors
- Planetary Physics

**TUESDAY EVENING, MARCH 15, SPECIAL SESSION**
- Noble Gases and Solar System History (John Reynolds' 65th Birthday Celebration)

**WEDNESDAY AM, MARCH 16**
- Impact Flux and Terrestrial Cratering
- Chondrules
- Remote Sensing of Planetary Surfaces

**WEDNESDAY PM, MARCH 16**
- Impact Glasses: Formation and Sources
- Non-Carbonate Chondrites and ALH 85085
- Geologic and Remote Sensing Studies of the Moon

**THURSDAY AM, MARCH 17**
- Outer Solar System
- Chemical and Isotopic Characteristics of Primitive Materials: Inherited vs. Homegrown
- Lunar Highlands

**THURSDAY PM, MARCH 17**
- The K-T and Related Events and Impact: Theory and Experiments
- Ureilites and ADOR and LEW 86010
- Tectonic Features on the Terrestrial Planets

**FRIDAY AM, MARCH 18**
- Lunar and Meteorite Basalts
- Refractory Inclusions II
- Asteroids/Comets

The preliminary program included in this issue reflects plans for the conference as they exist early in February. Minor changes may occur before the conference (see Appendix).
CONFERENCE HIGHLIGHTS

POSTERS entered in the Technical Poster Session will be highlighted Monday through Thursday in the Gilruth Center. Approximately 20-30 posters will be displayed each day. Presenters of the day’s display will have the opportunity to present and discuss their material during an informal cash bar session from 5:00-6:30 p.m. each evening.

The LPI Image Processing Facility will conduct an open house throughout the conference in McGetchin Hall at the LPI. Check the registration desk for times. For additional information contact Mr. Kin Leung at 713-486-2165 or Ms. Sharon Allen at 713-486-2181.

The on-line and remote access capabilities of the LPI Geophysical Data Facility will be demonstrated at the LPI Exhibit in the coffee area at the Gilruth Center during the regular conference hours.

The Combined Publishers Exhibit will be on display in the coffee area of the Gilruth Center from Monday through Friday. Several publishers have already indicated an intent to participate, including Annual Reviews, Inc., Plenum-Verlag, and University of Arizona Press.

Tuesday - March 15
Tuesday evening’s special session on Noble Gases and Solar System History will be in honor of John Reynolds’ 65th birthday. It will be held in Room 104 at the Gilruth Center.

Wednesday - March 16
A JSC Astronomers Brownbag Lunch Club seminar will be held in the Conference Room, Room 193, Building 31 at noon. The topic for discussion will be announced later.
A special session outlining NASA’s Program for Future Exploration will be held in the JSC Building 2 Auditorium at 8:00 p.m.

Thursday - March 17
The Lunar and Planetary Science Conference Forum convened by the Planetary Meetings Steering Committee (PMSC) will be held immediately following the last session in the Gilruth Center Auditorium. 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 LPSC Forum, LPI Projects Office, so that they can be included in the summary and agenda for the Forum.
Thursday evening is Tex-Mex Fiesta time. Continuing the tradition begun last year, this social event will be held on the grounds of the LPI from 6:30 to 10:00 p.m. Activities will include beer and nacho appetizers, a Tex-Mex fiesta dinner, a Country Western Band, and other entertainment. Paid registrants at the conference are welcomed at the Fiesta. Tickets for guests and other nonconference registrants will be available at the registration desk during the conference.

ABSTRACTS—
Lunar and Planetary Science XIX
A staple-bound copy of abstracts will be sent before the conference to the correspondence authors of abstracts (including those residing in foreign countries). Due to time constraints in our printing schedule and to budgetary constraints on postage, a limited number of copies 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 conference attendees who have paid the $40.00 registration fee. For 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. Note: New prices are in effect for mail orders on the LPSC abstracts. Please be sure to refer to the order form included in this bulletin and mail with payment to the LPI Order Department.
Summaries of the main topics discussed at the conference will be published in the June issue of Geotimes.

ON-LINE 19th LPSC PROGRAM
To access the on-line program, you may use either the NASA SPAN network, NASA NPSS (NASA Packet Switching System) access, or dial in direct (see the November issue of the LPIB for detailed instructions) NASA/SPAN 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.

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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 almost at the same time it is formed will assist you in planning your travel arrangements, and other appointments that you may wish to make. If you have difficulty in accessing the LPI computer, please call Kinpong Leung, LPI Computer Systems Manager at 713-486-2165 or [KLEUNG/NASA] on NASAMAIL, or LPI LEUNG (on SPAN).
PUBLICATION OF 19TH PROCEEDINGS

The Proceedings of the Nineteenth LPSC will be published as a hardcover book as 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 Nineteenth Proceedings is May 31, 1988. Full information, including detailed instructions for prospective authors, will be available at the registration desk. Please contact LPI Publications at 713-486-2143 for more detailed information if you need it before mid-March.

18TH PROCEEDINGS ORDERING INFORMATION

The Proceedings of the 18th Lunar and Planetary Science Conference 1987 are co-published this year by the Lunar and Planetary Institute and Cambridge University Press. The Proceedings comprise some 64 papers that outline current developments in our understanding of planetary geology and petrology, particularly of the Moon and the solid planets in the solar system. The papers range from giving details of lunar samples to proposing theoretical models of processes in the early solar system. A number of papers deal with the important ongoing work to understand the origin and evolution of the Moon. The papers are organized under eight general headings as follows: petrogenesis and chemistry of lunar samples, geology and applications, cratering records and cratering effects, differentiated meteorites and related studies; chondritic meteorites and asteroids; extraterrestrial grains; Venus, Mars, and icy satellites. The book also contains several useful indices, including author, subject, sample, and meteorite. The Proceedings should be an indispensable reference for those engaged in research in planetary science, astronomy, geochemistry, petrology, and geology.

The Proceedings will be available from Cambridge University Press in March 1988 as a single, hardcover volume. The list price is $65.00. We suggest that libraries and individuals may wish to place an order immediately to insure the continuity of the series in their collections. To order, write:

Order Department
Cambridge University Press
510 North Avenue
New Rochelle, NY 10801
or call: 800-431-1580 or 914-235-0300


Proceedings of the Eighteenth
Lunar and Planetary Science Conference
1988 8 1/2 X 11 in. 768 pp.
485 figures and halftones and 3 color plates

A 20% discount will apply if you return a copy of this page with your order or, if ordering by telephone, you mention this Bulletin. Orders must be prepaid (sales tax applicable in New York and California).

LPI ANNOUNCES TWO CONFERENCES FOR 1988

Origin of the Earth
November 30–December 3, 1988
Napa Valley, CA

The Lunar and Planetary Institute announces a conference on the origin of the Earth and its differentiation into the physical and chemical reservoirs that are observed today. The focus of the conference will be on outstanding problems that are crucial to our understanding of the formation of the Earth and its earliest history. Conference discussion should range from astrophysics to petrology—from the theoretical aspects of accretion to the constraints placed by the rocks we sample today. Co-conveners of the conference are John J. Jones (NASA-Johnson Space Center) and Horton Newsom (University of New Mexico).

To encourage attendance from both the geological and planetary science communities, the conference is scheduled for the week preceding the 1988 fall AGU meeting in San Francisco. The exact location of the conference has not yet been determined, but will probably be in the Napa Valley.

For further information on the conference, please contact:
Pamela Jones, Conference Coordinator
Lunar and Planetary Institute
3303 NASA Road One
Houston, TX 77058-4399
713-486-2150

Global Catastrophes in Earth History: An Interdisciplinary Conference on Impacts, Volcanism, and Mass Mortality
Snowbird, Utah
October 20–23, 1988

Catastrophic events are now generally recognized as likely to have been involved in the mass mortality at the Cretaceous-Tertiary boundary. A milestone in the recognition of this exciting idea was the 1981 Conference on Large Body Impacts held at Snowbird, Utah, and the subsequent publication of the Proceedings as Geological Society of America Special Paper No. 190. Since the conference and the publication
of its proceedings, research on global catastrophes (and mass mortalities) has so proliferated that it is time to review progress and take stock of the new data and new ideas. To meet that need, the National Academy of Sciences and the Lunar and Planetary Institute have again joined together to organize a conference.

The purpose of the conference is to review progress and to expand consideration of global catastrophes through interdisciplinary exchanges. To achieve this end, the organizing committee is inviting a series of papers that will summarize major advances since 1981. These papers, and the ample discussion periods that follow them, will provide a starting point for interdisciplinary exchanges. A second and equally important element of the conference will be contributed posters. No simultaneous sessions are planned. The proceedings of the conference will be published; all submitted texts, both invited papers and contributions related to posters, will be considered for inclusion by an editorial board.

The session topics have been identified as follows:

I. Catastrophic Impacts, Volcanism, and Mass Mortality
II. Geological Signatures of Impacts
III. Environmental Effects of Impacts
IV. Patterns of Mass Mortality
V. Volcanism and Its Effects
VI. Case Histories of Mass Mortalities
VII. Events and Extinctions at the Cretaceous-Tertiary Boundary

The conference is open to researchers, university faculty, and graduate students. To make maximum interaction among participants possible, the organizing committee may need to limit attendance (to about 200). The first circular for this meeting was distributed in December 1987. If you wish to receive information about this conference, please contact LPI Projects Office at 713-486-2150.

MORE MEETINGS ON MARS
MARS BOOK AND CONFERENCE PROPOSED

Dr. Hugh Kieffer is proposing a book and conference on Mars. The book would appear as a volume in the Space Science Series of the University of Arizona Press, and it would be designed as a source book for researchers and a text for advanced graduate students.

Two major Mars conferences have been held since the Viking mission, but the last of these was in 1981. This conference would be held in about one year, before the next flurry of Mars exploration, which starts with the Phobos launch in late 1988 and should continue through 1994.

The proposed conference would include both reviews and new research results. Arrangements will be sought for a special issue of Icarus or JGR (red) for contributed papers. The book would be composed of major review chapters that include summaries of material presented at the conference. Although much of the available telescopic and spacecraft data have been studied intensively, there remain many substantial debates about the history of Mars. Now is an excellent time to attempt to come to grips with alternative hypotheses and to identify the critical observations or interpretations that separate them. To this end, co-authored chapters will be encouraged.

The proposed concept is straightforward: a comprehensive research source book on Mars based on knowledge as of early 1989. Dr. Kieffer has prepared an outline and questionnaire relating to this conference and book. For more information, contact him at the following address:

U.S. Geological Survey
2255 North Gemini Drive
Flagstaff, AZ 86001

MEVTV - LPI WORKSHOP:
"EARLY TECTONIC AND VOLCANIC EVOLUTION OF MARS"

The second “Mars: Evolution of Volcanism, Tectonism and Volatiles“ Project workshop is scheduled for Wednesday-Friday, October 5-7, 1988. The workshop will be held near the Washington, DC area.

The subject of this workshop is The Early Tectonic and Volcanic Evolution of Mars. Major topics to be discussed will include:

(1) Origin and nature of the martian crustal dichotomy
(2) Role of large (and very large) impacts in the evolution of the martian crust
(3) Early thermal state and dynamics of the martian interior
(4) State of stress in the early crust
(5) Conditions leading to the formation of Elysium and Tharsis.

The format of this meeting will differ somewhat from that of the first MEVTV workshop. In addition to invited tutorials, time will be allocated for contributed oral presentations and for introductions (with one or two slides) of contributed poster papers. The goals of the workshop are to discuss critically our present understanding (or lack thereof) of the early evolution of Mars and to encourage further data analysis and theoretical work.

The first announcement of this workshop was mailed in December 1987. If you wish to obtain more information, please contact the LPI Projects Office at 713-486-2150.
OTHER MEETINGS—HERE AND THERE

Thirteenth Symposium on Antarctic Meteorites

The Thirteenth Symposium on Antarctic Meteorites will be held at the National Institute of Polar Research (NIPR), Japan, on June 7-9, 1988. The aim of this symposium is to present the recent outcome of research on the Antarctic meteorites, in particular, the Yamato meteorites and others retrieved from Victoria Land. New data from non-Antarctic meteorites and planetary researchers will also be included.

Most of the Japanese participants are the recipients of samples of Yamato meteorites, Belgica meteorites, and Victoria Land meteorites, and participation by recipients from other countries will be a great contribution to this symposium. All presented papers will be published as the Proceedings of this Symposium by the National Institute of Polar Research.

For additional information, please contact:

Tatsuro Matsuda
Director-General
National Institute of Polar Research
9-10, Kaga 1-Chome, Itabashi-Ku
Tokyo 173, Japan

INTERNATIONAL ASTRONOMICAL UNION COLLOQUIUM NO. 110
Library and Information Services in Astronomy (LISA)

IAU Colloquium No. 110 sponsored by IAU Commission 5 - Documentation and Astronomical Data, is being organized by the U.S. Naval Observatory and will be held at the Dupont Plaza Hotel in Washington, DC, July 28-August 1, 1988.

Topics to be discussed are: publishing of astronomical books and journals; international acquisitions; union lists of astronomy serials; Astronomy and Astrophysics Abstracts; commercial databases available; thesauri and keyword lists; classification schemes; astronomical networks; preprints, nonprint materials, and observatory publications; rare books, conservation and archives; astronomers as library administrators; resource sharing and future cooperative activities; astronomical data centers; and use of computers in libraries.

Most of the information will be presented in the form of short papers or panel discussions, with adequate time for questions and comments by participants. It is hoped that much of this Colloquium can be in a workshop format so that attendees can participate and share information.

For more information, please contact:

Brenda G. Corbin, Librarian
IAU Colloquium 110
U.S. Naval Observatory
Washington, DC 20392-5100

TEAM TO STUDY MANSON STRUCTURE

The Manson impact structure, in northwest-central Iowa, is about 35 km in diameter and the largest such structure known in the United States. Scientific interest in the Manson structure increased sharply last year when preliminary \(^{40}\)Ar/\(^{39}\)Ar data indicated a time for the impact of less than (but not much less than) 70 m.y. That age is temptingly close to the time established for the Cretaceous/Tertiary (K/T) boundary, about 66 m.y. ago, and allows the possibility of a connection between the Manson impact and mass extinctions produced by the K/T boundary event.

The Manson structure was recognized as an impact site before 1968, but little work has been done on the structure because it lies buried beneath tens of meters of glacial deposits. The unusual occurrence of a granitic central uplift and surrounding disturbed Cretaceous sediments was recognized based on study of water-well cuttings and limited drill core.

At a meeting at the U.S. Geological Survey (USGS) offices in Denver on October 5, 1987, a steering group was formed to organize a Manson Impact Study Team (MIST). The goal of the team is to obtain new information about the Manson impact and to coordinate efforts to recover appropriate samples for new research on the Manson structure. Group members are Eugene Shoemaker (USGS, Flagstaff), chairman; Raymond Anderson (Iowa Department of Natural Resources, Iowa City); Jack Hartung (Lunar and Planetary Institute, Houston); Thomas Hildenbrand (USGS, Denver); Richard Hoppin (State University of Iowa, Iowa City); Glen Izett (USGS, Denver); David Roddy (USGS, Flagstaff).

Drilling projects proposed for the Manson structure include shallow (about 60 m), intermediate (150-600 m), and deep (600-6000 m) drilling for different objectives. Shallow holes spaced at about 1.5-km (1-mile) intervals would provide data for a map of the structure beneath the glacial drift. Options for accomplishing this drilling are under study by Roddy and Buck Sharpton (Lunar and Planetary Institute). Intermediate depth holes would define the shallow structure of the crater and stratigraphic units affected by the impact and would enable recovery of samples of a melt sheet, if one is present. Deep holes would help define the amount of structural uplift at the center of the crater and could penetrate the Proterozoic section in the structural trough underlying the southeast part of the structure.

Another meeting of the Manson Impact Study Team was held on February 2, 1988, in Iowa City.

Those wishing to participate in the study, or learn more about it, should contact Hartung (Lunar and Planetary Institute, Houston, TX 77058, 713-486-2153), or any other group member.
EARTH SCIENCE AND APPLICATIONS DATA SYSTEMS
FY '88 User Benchmark Questionnaire

The Earth Science and Applications Data Systems (ESADS) User Benchmark Questionnaire was developed to be used as a management tool with which to measure the progress of the ESADS Initiative in improving user access to NASA's Earth science data and improving the utility of such data to users.

Earth science data systems user input is the critical element in evaluating data handling capabilities that are responsive to the needs of the Earth science research community. Therefore, responses to the Questionnaire will not only guide future ESADS activities, but the responses will also help define near- and long-term data handling goals. To achieve this, we will be making objective analyses of system performance/improvement based on the tabulated results of questionnaire responses.

Earth science data systems users interested in participating in this valuable information survey may contact the ESADS Ombudsman (Carolyn Robinson) at 301-794-5211, or TELEMAIL: OMBUDSMAN. Please respond by February 28, 1988.

Your participation will contribute toward improving the Earth science data system to better serve your needs.

MIR WATCH HOTLINE

Anyone in the continental U.S. can now call the National Space Society's MIR Watch Hotline at 202-546-6010 between the hours of 9:30 a.m. and 4:30 p.m. EST to find out the best time to see the Soviet space station MIR pass over his or her town.

Currently the world's only permanently manned space station, MIR orbits the Earth every 90 minutes carrying two cosmonauts and will accommodate at least two more occasional visits.

The core MIR vehicle has already been expanded with an astrophysics module called Kvant (quantum). MIR is scheduled to serve the Soviet Union as a base for Earth observation, scientific research, and industrial manufacturing for the next ten years.

The MIR Watch Hotline is a free public service of the National Space Society, a nonprofit educational organization supported by membership dues.

NEW PUBLICATIONS

Some of the following publications are available from the Superintendent of Documents, Government Printing Office, Washington, DC 20402. Although this agency requires prepayment on all orders, they will accept Mastercard or VISA. Just include the account number and expiration date on your order to them. Some of the publications may be available from the GPO bookstores in major cities around the U.S. Check your city directory for a local listing. Several of the GPO publications are being offered by other distributors at widely varying prices. It pays to shop and compare.

Some of the NASA documents cited here are only available from the National Technical Information Service, Springfield VA 22161. This agency also requires prepayment. Note also that the paper copy supplied by this agency is often a photocopy produced from a microfilm. Consequently quality is not always consistent. PLEASE do not send orders for these publications to the LPI. We are not a distribution center for SOD or NTIS documents and this will only delay your order. If you are interested in obtaining any of the items in the New Publications List do contact the publisher or supplier as given with each item.

NEW FROM A.S.P.

Several new items have been released by the Astronomical Society of the Pacific. This nonprofit organization is noted for its excellent and informative educational materials in astronomy.

VIDEO ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE

A new video program on the scientific search for intelligent life beyond the Earth has just been released. Produced for the SETI Institute, the videotape is narrated by Dr. Jill Tarter, an astronomer at NASA's Ames Research Center. The program includes commentary by Carl Sagan, Frank Drake, Philip Morrison, Bernard Oliver, and other scientists who are actively working in this field.

Full of clear explanations and good analogies, the 32-minute color program is ideal for classroom or home viewing. It is produced in VHS format only and comes with a detailed reading list. Copies are available for $30.50 (including postage and handling). Add $4.00 for orders outside U.S.

"MARS KIT"

A kit of slides, background material, captions, activities, and resources about the red planet Mars has been announced. The six slides include the very best color views of Mars from space and from the surface, sent back by the Viking probes. Several are new composite images, just recently released, in which new computerized processing techniques have produced greater clarity and finer detail.
The slides are accompanied by a 36-page booklet, giving a nontechnical introduction to the planet and its most interesting “tourist attractions.” There are also detailed captions for each slide, a set of eight activities for class or home, and a thorough list of readings and audio-visual aids about Mars. These materials will be of special interest as Mars makes one of its closest approaches to Earth in the fall of 1988.

The kit comes in a handy transparent folder and is available for $11.50 (which includes postage and handling). Add $2.50 for orders outside U.S.

**“WORLDS IN COMPARISON” SLIDE AND ACTIVITY KIT**

A new slide set of 20 “visual analogies” comparing the sizes of worlds and geologic features in the solar system has been designed by former NASA Visual Information Specialist Stephan Meszaros. The slides use the best spacecraft and radar images to give the viewer a sense of the scale of the other planets and moons. They include:
- the Earth projected on (and dwarfed by) Jupiter’s red spot and Saturn’s rings
- a map of the U.S. superimposed on the “Grand Canyon” of Mars (which would stretch from New York to San Francisco)
- a comparison of volcanoes on Earth, Mars, and Jupiter’s bizarre moon, Io
- radar images of mountain ranges and continents on the surfaces of Venus and the Earth.

The slide set comes in a protective display folder with a 20-page guide that features detailed captions, introductory tables giving the main characteristics of all known planets and moons in the solar system, a summary of all U.S. and Soviet planetary missions, several pages of classroom or home activities and projects, and a thorough nontechnical reading list.

The full kit is available for $22.50 (which includes postage and handling). Add $4.00 for orders outside U.S.

**PACKET DEBUNKING ASTROLOGY**

An information packet that debunks the popular superstition called astrology is being made available to the public. Included are several articles explaining the dozens of careful scientific tests that have now shown that astrology simply does not work.

Designed to provide students, teachers, librarians, and the general public with clear, specific information about this controversial subject, the packet also includes an annotated bibliography of further readings, and an interview with astronomer George Abell, who spent considerable time examining and exposing the tenets of astrology.

Copies of the packet may be obtained by sending a donation of $3.00 (to cover printing, handling, and mailing).

**SLIDE SET ON SUPERNOVA 1987A**

A new slide set and information booklet on Supernova 1987A, the exploding star in a nearby galaxy that created such a shockwave of excitement among astronomers last year, has been prepared by A.S.P.

The six slides include two beautiful color photographs of the supernova and its environment, a photo showing the star before it exploded, a graph showing the dramatic changes in the supernova’s light, and a computer display showing the detection of one of the ghostly subatomic particles called neutrinos from the explosion.

A 24-page booklet accompanies the set, giving thorough background information, detailed captions, and a reading list. This material is designed so that the nonspecialist can appreciate why this supernova, and supernovae in general, cause such a stir.

The slides and booklet are packaged in a clear plastic folder for easy storage and display. To obtain a copy send $10.50, which includes postage and handling. Orders outside U.S. add $3.00.

Orders for the A.S.P. publications listed here should be sent to:

A.S.P.
1290 24th Avenue
San Francisco, CA 94122

**NEW NASA PUBLICATION**

**GEOMORPHOLOGY FROM SPACE**

This NASA Special Publication 486 is edited by Nicholas M. Short and Robert W. Blair, Jr.

Under the auspices of the National Aeronautics and Space Administration, Geomorphology from Space has been prepared by a group of geoscientists to fulfill three purposes: first, to serve as a stimulant in rekindling interest in descriptive geomorphology and in quantitative landform analysis at the regional scale; second, to introduce the community of geologists, geographers, and others to the practical value of space-acquired remotely sensed data in carrying out their research and applications; and third, to foster more scientific collaboration between terrestrial geomorphologists and astrogeologists, thereby strengthening the growing field of comparative planetology. Still another objective emerged as the book evolved during preparation, namely, to use pictures and text to summarize in broad terms continental surface geology over the globe.

Geomorphology from Space serves more than the research community. Teachers of Earth science at all levels should find it an exciting adjunct to their customary texts. The lay person, too, can share the wonderment and beauty of the Earth as seen by our space eyes. To do so can but enhance one’s sensitivity to the need to nurture our one and only Planet Earth.
This 716-page book contains 1178 photographs, nearly 100 of which are in color. Many appear as individual Plate images acquired by Landsat, Seasat, SIR-A, and the HCMM sensor systems and by the Large Format Camera on the Space Shuttle, together with 2-4 or more ancillary views from space and from aerial or ground positions. As arranged by geomorphic theme in the Gallery section (Chapters 2-10) the 237 Plates encompass examples of geomorphic phenomena observed in 59 countries.

This book is available exclusively from the Government Printing Office at a price of $41.00 per copy (order number S/N 033-000-00994-1).

NEW USGS PUBLICATION

GEOLeGIC HISTORY OF THE MOON

This USGS Professional Paper P1348 is written by D. E. Wilhelms with sections by John F. McCauley and Newell J. Trask. It is a large format, 302-page book that through informative text and the use of many photographs gives a comprehensive review of lunar science and evolution from the viewpoint of historical geology, based on data from both photogeologic observation and lunar sample analysis.

This volume presents a model for the geologic evolution of the Moon that has emerged mainly from this integration of photogeologic stratigraphy and sample analysis. Other aspects of the vast field of lunar science are discussed here only insofar as they pertain to the evolution of visible surface features. Chemical data obtained by remote sensing supplement the photogeologic interpretations of some geologic units (see Chapter 5), and geophysical data obtained both from lunar orbit and on the surface constrain hypotheses of the origin of many internally generated structures and deposits.

This volume is written primarily for geoscientists and other planetologists who have examined some aspect of lunar or planetary science and want a review of lunar science from the viewpoint of historical geology. It should also provide a useful summary for the advanced student who is conversant with common geologic terms. It may, furthermore, interest the geologist who has not studied the Moon, but who wishes to see how his methodology has been applied to another planet.

The volume has an extensive bibliography (p.283-293), an index, and a series of plates that graphically index such items as photographic illustrations, geologic maps of ringed basins, maria, and the present Moon, and paleogeologic maps of different ages of the Moon. The book is available for $33.00 from:

U.S. Geological Survey, Books and Open-File Reports, Federal Center, Box 25425 Denver, CO 80225

WORTHY OF NOTE

CYCLES OF FIRE: STARS, GALAXIES AND THE WONDER OF DEEP SPACE

Text by William K. Hartmann, paintings by William K. Hartmann and Ron Miller.

"This is the third in a trilogy of illustrated books about the universe. In the first, The Grand Tour, we described the planets, moons and small interplanetary bodies circling our sun. In the second, Out of the Cradle, we explored what humanity may be able to do in this planetary system in the next fifty years or so. These two books were limited to the basic geography of the solar system. They covered only the tiniest fraction of the universe.

"The starry universe beyond the solar system gives new opportunities to painters as well as scientists. When we depicted the solar system in our earlier books, we knew a lot of specifics about the individual worlds: colors, types of surface materials, presence of clouds and rings, and so on. To help us, we had photos taken on the surface of the moon, Venus and Mars, as well as 'aerial' photos of seven planets and more than a dozen moons.

"In the case of distant star systems, there are no closeup photos. Astronomical research during the last century told us the colors and sizes of the various types of stars, as well as the colors and shapes of gas clouds and galaxies.

"The plausibility of planets near at least a few other stars is terribly provocative for an astronomical artist! It gives us a place to stand. It gives us a landscape. It gives us . . . endless possibilities. There are only a finite number of sizable worlds in our solar system, but if there are planets around even one-half of one percent of all the stars, then there are a hundred million planets in our galaxy alone. Each offers its own potential for weird skies, sunsets, rock formations, volcanoes, Grand Canyons, Yellowstone Parks, fogs, fjords and fires, as well as for pterodactyls, platypuses, porpoises and people—or what passes for people on, let us say, Epsilon Eridani IV. Regardless of the likelihood of finding alien life, the possibilities for landscapes on far distant planets are enough to excite our imagination. In this book we try to be conservative about lifeforms (it's hard!), because they involve more speculation than planets do.

"Landscapes on Earth have kept artists inspired for 500 years, and known landscapes in the solar system have offered us even further inspiration. But unknown landscapes of other stars and galaxies . . . ? What can we say? Only that we offer you here some realistic possibilities. We have constrained ourselves by known physical principles and have tried to act on known scientific findings. Thus, our book depicts blue and orange and red stars; condensation of dust grains near them; aggregation of planets out of that dust; planetary heating, expansion, fracturing, volcanism, collision, cratering, erosion, cooling, contracting, glaciation, faulting, planets with and without atmospheres, with rings, with moons, with oceans of different condensed liquids (water isn't the only candidate).
The universe contains far more real places than we know...  
("A Word from the Author," p. 10-11.)

Workman Publishing, New York. 189 pp., many color illustrations. $27.50; paper $14.95. A local bookstore should be able to supply.

ISAAC ASIMOV'S LIBRARY OF THE UNIVERSE

Gareth Stevens, Inc. has announced the publication of a 32-volume series, authored by Isaac Asimov. Greg Walz-Chojnacki, Associate Editor of Odyssey Magazine is technical editor of the series.

Isaac Asimov's Library of the Universe is written for children in grades 3-4, but should interest children whose ages range from 6-12. Asimov's friendly and insightful text is marvelously clear. Young readers are introduced to a full spectrum of science facts and concepts through simple, thoughtful language.

The series covers 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, pulsars, black holes — to astronauts — to rockets, probes and satellites — to UFOs — to future homes for human beings in space. These books will prepare children for a future that will include much more interaction with space than that of their parents.

The illustrations for the series are outstanding. Working with the various space organizations throughout the United States and other nations of the world, powerful, instructive, and beautiful imagery have been acquired. In addition, a network of space artists and photographers in the United States and England have been commissioned to create illustrations for each book in the series. Not satisfied to use only standard press releases of NASA and JPL, other planetary data resources have been accessed where pictures not previously seen by the public have been acquired.

Additionally, each book contains Asimov's 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. Also, each book contains a glossary, a guide for further reading, and places to visit and write for children who wish to learn more. An index appears in each book as well, and Volume 33 will be a comprehensive index for the entire series.

The premier volume in the series Did Comets Kill the Dinosaurs? is beautifully illustrated and written to stimulate a child's inquiring mind... to examine the possible reasons behind the mass extinction of our prehistoric reptiles.

The volume is available for $9.95 (reinforced library binding) from the publisher: Garth Stevens, Inc., 7221 West Green Tree Road, Milwaukee, WI 53223. Phone 414-466-7550. Call or write for their catalog describing this series more fully, a series which would be very useful in any elementary school or public or planetarium library.

LPI ANNOUNCES NEW SLIDE SET

STONES, WIND, AND ICE

Stones, Wind, and Ice: A Guide to Martian Impact Craters is the title of the second slide set in the Mars series. This set of 30 slides, compiled largely from Viking Orbiter and Lander images, illustrates both the diversity of impact craters on Mars and the significance of these features in understanding the geological evolution of this complex planet. Unlike the other small terrestrial planets, Mars shows abundant evidence of the actions of surface water and wind. Many of the landforms produced by the interaction of the cratering process with the Martian environment are seen virtually nowhere else in the solar system. Impact craters also provide a means of deducing the sequence and timing of events that have shaped the Martian surface.

This set was compiled by Dr. Virgil Sharpton and Dr. Nadine Barlow of the LPI staff and can be ordered from the LPI Order Department for $13.00 plus shipping and handling (see order form in centerfold of this bulletin).

CORRECTIONS—

LPI TELEPHONE NUMBERS

Please make the following corrections to the LPI telephone list that was published in the November issue of the LUNAR AND PLANETARY INFORMATION BULLETIN:

SCIENTISTS/VISITING FELLOWS

| de Silva, Shanaka   | 2114 |
| Williams, Steven   | 2113 |

The LUNAR AND PLANETARY INFORMATION BULLETIN is published by the Lunar and Planetary Institute. There are usually three issues per year. It is distributed free on request to lunar and planetary scientists, educators, students, and their institutions.

The next issue will be in MAY. Copy deadline is APRIL 22, 1988. If you have any announcements that you would like to have printed in the BULLETIN, please send them to the Editor. We reserve the right to select and edit copy.

Editor: Frances B. Waranius
Lunar and Planetary Institute
3303 NASA Road One
Houston, TX 77058-4399
EMAIL: NASA/SPAN LPI:BULLETIN
TELEMAIL: [FWARANIUS/NASA]
Phone: 713-486-2135
NOTE TO OUR READERS:

Please let us know when you move. Each change of address that we get through the postal service costs us $0.30 - $0.80 in return postage costs. Because of the high costs of postage, we will make the address change on our list, but we will no longer mail another copy of the LPIB issue or whatever was contained in the envelope that we get back. Since the same mailing list is used for conference announcements and other LPI mailings, you will miss whatever is mailed from the LPI in the interval that we do not have your address change.

If you want to be sure that you get all of your mailings from the Institute promptly, be sure to send a change of address to: Mailist, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77058-4399. It often takes the postal service 60-90 days to return an item to us with the address correction. We also often receive a notice on the returned envelope that the "forwarding order is expired." Under that circumstance, we have no alternative but to delete the name from the mailing list. Do yourself and us a service. Remember the LPI Mailing List when you move. Thanks.

YE EDITOR

CALENDAR

1988

March 8-11  Asteroids II: Book and Colloquium, Tucson, Arizona.
M. S. Matthews
Lunar and Planetary Laboratory
Space Sciences Building
University of Arizona
Tucson, AZ 85721
Phone: 602-621-2902

MARCH 14-18  XIX LUNAR AND PLANETARY SCIENCE CONFERENCE
Houston, Texas.
Projects Office
Lunar and Planetary Institute
3303 NASA Road One
Houston, TX 77058-4399
Phone: 713-486-2150

April 5-7  Lunar Bases and Space Activities II, Houston, Texas.
Barney B. Roberts
Mail Code: ED13
NASA Johnson Space Center
Houston, TX 77058
Phone: 713-483-6605

April 7-9  Second International Symposium on Experimental Mineralogy, Petrology, and Geochemistry, Bochum, F.R. Germany.
The Bochum Symposium
Institut für Mineralogie
Ruhr-Universität
Postfach 102148
D-4630 Bochum 1, F.R. Germany

April 7-22  NATO Advanced Study Institute on Geomagnetism and Palaeomagnetism, University of Newcastle upon Tyne, England.
Anne Codling
Dept. of Geophysics and Planetary Physics
School of Physics
University
Newcastle upon Tyne NE1 7RU
England

April 11-14  Fiber Optics in Astronomy, Tucson, Arizona.
Sam Barden
NOAO/KPNO
P.O. Box 26732
Tucson, AZ 85726-6732
Phone: 602-325-9263
<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
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<th>Organizer/Contact Information</th>
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<tr>
<td>April 23</td>
<td><strong>ASTRONOMY DAY</strong></td>
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<td>Gary E. Tomlinson, Coordinator Astronomical League c/o Chaffee Planetarium 54 Jefferson Avenue S.E. Grand Rapids, MI 49503 Phone: 616-456-3985</td>
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<tr>
<td>May 11-12</td>
<td><strong>MECA Workshop: Polar Processes on Mars</strong>, Sunnyvale, California.</td>
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<td>Dr. Robert M. Haberle Space Sciences Division, 245-3 Ames Research Center Moffett Field, CA 94035 Phone: 415-694-5491</td>
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<td>May 11-13</td>
<td><strong>V. M. Goldschmidt Conference for Geochemistry</strong>, Baltimore, Maryland.</td>
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<td>Goldschmidt Conference Coordinator Pennsylvania State University 410 Keller Building University Park, PA 16802</td>
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<td>May 16-20</td>
<td><strong>American Geophysical Union, Spring Meeting</strong>, Baltimore, Maryland.</td>
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<td>Spring Meeting American Geophysical Union 2000 Florida Avenue NW Washington, DC 20009 Phone: 202-462-6903</td>
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<td>May 23-25</td>
<td><strong>Geological Association of Canada/Mineralogical Association of Canada/Canadian Society of Petroleum Geologists — Joint Annual Meeting</strong>, St. John’s, Newfoundland.</td>
<td></td>
<td>John Fleming, Chairman St. John’s 88 P.O. Box 13577, Postal Station A St. John’s, Newfoundland Canada A1B 4B8 Phone: 709-576-2768</td>
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<tr>
<td>June 7-9</td>
<td><strong>Thirteenth Symposium on Antarctic Meteorites</strong>, Tokyo, Japan.</td>
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<td>Tatsuro Matsuda, Director-General National Institute of Polar Research 9-10 Kaga 1-Chome, Itabashi-Ku Tokyo 173, Japan</td>
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<td>June 13-Aug 19</td>
<td><strong>LPI Summer Intern Program</strong>, Houston, Texas</td>
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<td>Ms Pamela Jones Summer Intern Program Lunar and Planetary Institute 3303 NASA Road One Houston, TX 77058 Phone: 713-486-2150</td>
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<td>June 27-30</td>
<td><strong>GOES 1-M Symposium/Workshop</strong>, Bethesda, Maryland</td>
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<td>Mr. Wayne D Lasch Greenhorne &amp; O’Mara, Inc. P.O. Box T College Park, MD 20740 Phone: 301-982-2857</td>
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<td>June 28–30</td>
<td><strong>Uranus Colloquium</strong>, Pasadena, California.</td>
<td>Jay T. Bergstralh, Jet Propulsion Laboratory, or M. S. Matthews, Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ 85721. Phone: 602-621-2902</td>
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<td>June 29–July 2</td>
<td><strong>Universe '88</strong>, University of Victoria, Victoria, British Columbia.</td>
<td>Summer Meeting, A.S.P., 1290 24th Avenue, San Francisco, CA 94122. Phone: 415-661-8660</td>
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<td>July 18–22</td>
<td><strong>51st Annual Meeting of the Meteoritical Society</strong>, University of Arkansas, Fayetteville, Arkansas.</td>
<td>Derek Sears, Cosmochemistry Group, Department of Chemistry and Biochemistry, University of Arkansas, Fayetteville, AR 72701.</td>
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<td>July 28–Aug. 1</td>
<td><strong>IAU Colloquium 110: Library and Information Services in Astronomy (LISA)</strong>, Washington, DC.</td>
<td>Brenda G. Corbin, IAU Colloquium 110, U.S. Naval Observatory, Washington, DC 20392-5100</td>
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<td>August 2–11</td>
<td><strong>XXth General Assembly of the International Astronomical Union</strong>, Baltimore, Maryland.</td>
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<td>August 24–Sept 3</td>
<td><strong>Joint Varenna-Abastumani Workshop on Plasma Astrophysics</strong>, Varenna, Italy.</td>
<td>Prof. E. Sindoni, International School of Plasma Physics, 16, Via Celoria, I-20133 Milano, Italy. Phone: (2) 2392267-2665005</td>
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<td>August 29–31</td>
<td><strong>Space 88 Conference: Engineering, Construction, and Operations in Space</strong>, Albuquerque, New Mexico.</td>
<td>R. S. Leonard, c/o Ad Astra Ltd., Rt. 1, Box 92LL, Santa Fe, NM 87501. Phone: 505-455-3484</td>
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<td>September 21–23</td>
<td><strong>MECA LPI Workshop “Dust on Mars III”</strong>, Stanley Hotel, Estes Park, Colorado.</td>
<td>Rebecca Turner, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77058-4399. Phone: 713-486-2158</td>
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<td>September 25–30</td>
<td><strong>Spectroscopic Methods for Mineral and Mineral Surface Characterization</strong>, Los Angeles, California</td>
<td>Lelia M. Coyne, Mail Stop 239-4, NASA Ames Research Center, Moffett Field, CA 94035</td>
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<td><strong>October 5-7</strong></td>
<td><strong>MEVTV - LPI Workshop: Early Tectonic and Volcanic Evolution of Mars</strong>,  Washington, DC area</td>
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<td><strong>October 20-23</strong></td>
<td><strong>Global Catastrophes in Earth History: An Interdisciplinary Conference on Impacts, Volcanism, and Mass Mortality</strong>, Snowbird, Utah</td>
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<td><strong>October 31-November 3</strong></td>
<td><strong>Geological Society of America Annual Meeting</strong>, Denver, Colorado.</td>
<td>Jean Kinney</td>
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<td><strong>November 15-18</strong></td>
<td><strong>Interior and Atmosphere of the Sun</strong>, Tucson, Arizona</td>
<td>M. S. Matthews</td>
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<td><strong>November 30-December 3</strong></td>
<td><strong>Origin of Earth</strong>, Napa Valley, California</td>
<td>Pamela Jones, Conference Coordinator</td>
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LUNAR AND PLANETARY BIBLIOGRAPHY

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THE MOON

BALDYIN, R.B.
ON THE RELATIVE AND ABSOLUTE AGES OF SEVEN LUNAR FRONT FACE BASINS. II. FROM CRATER COUNTS
ICARUS VOL. 71, 19-19 (1987)
OLIVER MACHINERY COMPANY, GRAND RAPIDS, MI 49503

BALDYIN, R.B.
ON THE RELATIVE AND ABSOLUTE AGES OF SEVEN LUNAR FRONT FACE BASINS. I. FROM VISCOSITY ARGUMENTS
ICARUS VOL. 71, 1-18 (1987)
OLIVER MACHINERY COMPANY, GRAND RAPIDS, MI 49503

BELL, J.F. + HAWKE, B.R.
RECENT COMET IMPACTS ON THE MOON: THE EVIDENCE FROM REMOTE-SENSING STUDIES
ASTRONOMICAL SOCIETY OF THE PACIFIC. PUBLICATIONS VOL. 99, 862-867 (1987)
PLANETARY GEOSCIENCES DIV., HAWAII INST. OF GEOPHYSICS, UNIV. OF HAWAII, HONOLULU, HI 96822

BENZ, W. + SLATTERY, W.L. + CAMERON, A.G.W.
THE ORIGIN OF THE MOON AND THE SINGLE-IMPACT HYPOTHESES, II
ICARUS VOL. 71, 30-35 (1987)
THEORETICAL ASTROPHYSICS GROUP, T-6
MS 8288,
LOS ALAMOS NATIONAL LAB., LOS ALAMOS, NM 87545

BRANDL, H.
EARTH AND MOON TOGETHER
ASTRONOMY VOL. 15(10) 20-22 (1987)

EVSYUKOV, N.N.
(RS) THE THREE-PARAMETER OPTICAL DIVISION OF THE LUNAR SURFACE INTO DISTRICTS
ASTRONOMICHESKI ZHURNAL VOL. 64, 627-638 (1987)

GRAHAM, F.G.
A SEARCH FOR LUNAR SODIUM
ASTRONOMISHE NACHRICHTEN VOL. 308, 227 (1987)
UNIV. OF PITTSBURGH, DEPT. OF GEOLOGY, 321 OEH, PITTSBURGH, PA 15260

HERMAN, J.K. + BARGER, M.S.
THE MOON ON A SILVER PLATE
ASTRONOMY VOL. 15(10) 98-103 (1987)

TAYLOR, S.R.
THE ORIGIN OF THE MOON
AMERICAN SCIENTIST VOL. 75, 468-477 (1987)
RESEARCH SCHOOL OF EARTH SCIENCES, AUSTRALIAN NATIONAL UNIV., CANBERRA 2601, AUSTRALIA

YAKOVLEV, O.I. + MARKOVA, O.M. + MANZON, B.M.
ROLE OF PROCESSES OF VAPORIZATION AND DISSIPATION IN FORMATION OF THE MOON
GEOKHIMIYA VOL. 1987(4) 467-482 (1987)

PLANETS (ARTICLES ABOUT MORE THAN ONE BODY)

ALESHKIN, E.Y. + KRANSINSK, G.A. + PITEVA, E.V. + SVESHNIK, M.L.
(RS) EXPERIMENTAL-VERIFICATION OF RELATIVISTIC EFFECTS AND ESTIMATION OF THE MAGNITUDE OF CHANGE IN THE GRAVITATIONAL CONSTANT ACCORDING TO OBSERVATIONS OF THE INNER PLANETS AND THE MOON
USPENKHI FIZICHESKIH NAUK VOL. 151, 720-724 (1987)

BATSON, R.M.
DIGITAL CARTOGRAPHY OF THE PLANETS: NEW METHODS, ITS STATUS, AND ITS FUTURE
PHOTOGRAHMETERIC ENGINEERING AND REMOTE SENSING VOL. 53, 1211-1218 (1987)
U.S. GEOLOGICAL SURVEY, 2255 NORTH GEMINI DRIVE, FLAGSTAFF, AZ 86001

CLAIREMIDI, S.
PLANETESIMAL ROTATION INDUCED BY COLLISIONS
FACULTE DES SCIENCES ET DES TECHNIQUES ET OBSERVATOIRE DE BESANCON, FRANCE

EDWARDS, K.
GEOMETRIC PROCESSING OF DIGITAL IMAGES OF THE PLANETS
PHOTOGRAHMETERIC ENGINEERING AND REMOTE SENSING VOL. 53, 1219-1222 (1987)
U.S. GEOLOGICAL SURVEY, BRANCH OF ASTROGEOLOGY, 2255 NORTH GEMINI DRIVE, FLAGSTAFF, AZ 86001

HOOD, L.L.
MAGNETOSPHERIC ENVIRONMENTS OF OUTER PLANET RINGS: INFLUENCE OF SATURN'S AXIALLY SYMMETRIC MAGNETIC FIELD
ICARUS VOL. 71, 115-136 (1987)
LUNAR AND PLANETARY LAB., UNIV. OF ARIZONA, TUCSON, AZ 85721

IPATOV, S.I.
ACCUMULATION AND MIGRATION OF THE BODIES FROM THE ZONES OF GIANT PLANETS
M.V. KELDYSH INST. OF APPLIED MATHEMATICS, USSR ACADEMY OF SCIENCES, MOSCOW, USSR

KRAMER, E.N. + SHESTAKA, I.S.
ODessa ASTRONOMICAL OBSERVATORY

LITZROTH, E.
THE STRUCTURE OF THE PLANETARY MULTIPLE SYSTEMS
BEITRAGE ZUR GEOPHYSIK VOL. 96(S) 34-43 (1987)
JENAER STRASSE 69, ERFURT, DDR-5084

MCComAS, D.J. + GosLING, J.T. + RUSSELL, C.T. + SLAVIN, J.A.
MAGNETOTAILS AT UNMAGNETIZED BODIES: COMPARISON OF COMET GIACOBINI-ZINNER AND VENUS
JOURNAL OF GEOPHYSICAL RESEARCH VOL. 92, 10,111-10,117 (1987)
LOS ALAMOS NATIONAL LAB., MS 0438, LOS ALAMOS, NM 87545
PHILIP,J.R.
ATMOSPHERIC PRESSURE AND POLAR CO2 CAPS ON MARS
SEARCH VOL. 18, 40-42 (1987)
CSIRO, DIV. OF ENVIRONMENTAL MECHANICS, GPO BOX 821, CANBERRA, ACT, 2601
AUSTRALIA

POLLACK,J.B. + KASTING,J.F. + RICHARDSON,S.M. + POLIAKOFF,K.
THE CASE FOR A WET, WARM CLIMATE ON EARLY MARS
ICARUS VOL. 71, 203-224 (1987)
NASA AMES RESEARCH CENTER, MOFFETT FIELD, CA 94035

RAVA,B. + HAPKE,B.
AN ANALYSIS OF THE MARINER 10 COLOR RATIO MAP OF MERCURY
ICARUS VOL. 71, 397-429 (1987)
DEPT. OF GEOLOGY AND PLANETARY SCIENCE, UNIV. OF PITTSBURGH, PA 15260

ROBERTSON,D.F.
SOVIET PHOBOS MISSION TO PROBE MOONS OF MARS
ASTRONOMY VOL. 15(11) 29-32 (1987)

RUDY,D.J. + MUHLEN,0.O. + BERGE,G.L. + JAKOSKY,B.M. + CHRISTENSEN,P.R.
MARS: VLA OBSERVATIONS OF THE NORTHERN HEMISPHERE AND THE NORTH POLAR REGION
AT WAVELENGTHS OF 2 AND 6 CM
ICARUS VOL. 71, 159-177 (1987)
DIV. OF GEOLOGICAL AND PLANETARY SCIENCES, CALIFORNIA INST. OF TECH., PASADENA,
CA 91125

NO AUTHOR CITED
U.S. MARS OBSERVER SEeks GLOBAL PICTURE

ZENT,A.P. + FANALE,F.P. + POSTAWKO,S.E.
CARBON DIOXIDE: ADSORPTION ON PALAGONITE AND PARTITIONING IN THE MARTIAN
REGOLITH
ICARUS VOL. 71, 241-249 (1987)
PLANETARY GEOSCIENCES DIV., HAWAII INST. OF GEOPHYSICS, UNIV. OF HAWAII,
HONOLULU, HI 96822

ZIMBELMAN,J.R.
SPATIAL RESOLUTION AND THE GEOLOGIC INTERPRETATION OF MARTIAN MORPHOLOGY:
IMPLICATIONS FOR SUBSURFACE VOLATILES
ICARUS VOL. 71, 257-267 (1987)
LUNAR AND PLANETARY INST., 3303 NASA ROAD #1, HOUSTON, TX 77058

MERCURY
ANDERSON,J.D. + COLOMBO,G. + ESPSITIO,P.B. + LAU,E.L. + TRAGER,G.B.
THE MASS, GRAVITY FIELD, AND EPHEMERIS OF MERCURY
ICARUS VOL. 71, 337-349 (1987)
JET PROPULSION LAB. (301-230K), CALIFORNIA INST. OF TECH., PASADENA, CA 91109

CHENG,A.F. + JOHNSON,R.E. + KRIMIGIS,S.M. + LANZEROTTI,L.J.
MAGNETOSPHERE, EXOSPHERE, AND SURFACE OF MERCURY
ICARUS VOL. 71, 430-440 (1987)
JOHNS HOPKINS UNIV., APPLIED PHYSICS LAB., LAUREL, MD 20707

CRISTON,S.P.
A COMPARISON OF THE MERCURY AND EARTH MAGNETOSPHERES: ELECTRON MEASUREMENTS
AND SUBSTORM TIME SCALES
ICARUS VOL. 71, 448-471 (1987)
JOHNS HOPKINS UNIV., APPLIED PHYSICS LAB., LAUREL, MD 20707

ENGRUEL,R + LANDAU,R. + COYNE,G.V.
MERCURY: WAVELENGTH AND LONGITUDE DEPENDENCE OF POLARIZATION
ICARUS VOL. 71, 386-396 (1987)
SPACE SCIENCES BUILDING, UNIV. OF ARIZONA, TUCSON, AZ 85721

IP, W.H.
DYNAMICS OF ELECTRONS AND HEAVY IONS IN MERCURY'S MAGNETOSPHERE
ICARUS VOL. 71, 441-447 (1987)
MAX-PLANCK-INSTITUT FUR AERONOMIE, D-3411 KATLENBURG-LINDAU, FRG

LEAKE,M.A. + CHAPMAN,C.R. + WEIDENSCHELLING,S.J. + DAVIS,D.R. + GREENBERG,R.
THE CHRONOLOGY OF MERCURY'S GEOLOGICAL AND GEOPHYSICAL EVOLUTION: THE
VULCANOID HYPOTHESIS
ICARUS VOL. 71, 350-375 (1987)
PLANETARY SCIENCE INST., 2030 EAST SPEEDWAY, SUITE 201, TUCSON, AZ 85719

MINK,D.J.
APPULES AND OCCULTATIONS OF SAO STARS BY MERCURY: 1987-1995
ICARUS VOL. 71, 478-481 (1987)
HARVARD-SMITHSONIAN CENTER FOR ASTROPHYSICS, 60 GARDEN ST., CAMBRIDGE, MA 02138

POTTER,A.E. + MORGAN,T.H.
VARIATION OF SODIUM ON MERCURY WITH SOLAR RADIATION PRESSURE
ICARUS VOL. 71, 472-477 (1987)
NASA JOHNSON SPACE CENTER, HOUSTON, TX 77058

WORONOW,A. + LOVE,K.M.
MERCUERAN CRATER-FILLING CLASSES CONSTRAINT THE EMPLACEMENT PROCESS OF THE
INTERCRATER PLAINS MATERIAL
ICARUS VOL. 71, 376-385 (1987)
GEOSCIENCES DEPT., UNIV. OF HOUSTON, HOUSTON, TX 77004

SATLIELLES OF NEPTUNE
KOHLHASE,C.E.
AIMING AT NEPTUNE
ASTRONOMY VOL. 15(11) 6-15 (1987)
JET PROPULSION LAB., CALIFORNIA INST. OF TECH., PASADENA, CA 91109

PLUTO
ALMANN,H.H. + WALKER,R.G.
IRAS OBSERVATIONS OF THE PLUTO-CHARON SYSTEM
ASTRONOMICAL JOURNAL VOL. 94, 1088-1091 (1987)
JET PROPULSION LAB., CALIFORNIA INST. OF TECH., PASADENA, CA 91109
BEATTY, J.K.
PLUTO AND CHARON: THE DANCE GOES ON
SKY AND TELESCOPE VOL. 74, 248-251 (1987)
CROSWELL, K.
A MISSION TO PLUTO
EBERHART, J.
PLUTO: LIMITS ON ITS ATMOSPHERE, ICE ON ITS MOON
SCIENCE NEWS VOL. 132, 207 (1987)
LACHIEZ-REY, M.
(FF) PLUTO AND CHARON, A MYSTERIOUS COUPLE
LA RECHERCHE VOL. 18(191), 1118-1119 (1987)
NO AUTHOR CITED
PLUTO HAS ICE CAPS AND THIN AIR
NEW SCIENTIST VOL. 116(1580) 30 (1987)
SATELLITES OF PLUTO
BUIE, M.W. + CRUIKSHANK, D.P. + LEBOSKY, L.A. + TEDESCO, E.F.
WATER FROST ON CHARON
NATURE VOL. 329, 522-523 (1987)
EBERHART, J.
PLUTO: LIMITS ON ITS ATMOSPHERE, ICE ON ITS MOON
SCIENCE NEWS VOL. 132, 207 (1987)
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NO AUTHOR CITED
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SATELLITES OF PLUTO
BUIE, M.W. + CRUIKSHANK, D.P. + LEBOSKY, L.A. + TEDESCO, E.F.
WATER FROST ON CHARON
NATURE VOL. 329, 522-523 (1987)
INST. FOR ASTRONOMY, 2680 WOOLLAWN DRIVE, HONOLULU, HI 96822
MARCIALIS, R.L. + RIEKE, G.H. + LEBOSKY, L.A.
THE SURFACE COMPOSITION OF CHARON: TENTATIVE IDENTIFICATION OF WATER ICE
SCIENCE VOL. 237, 1349-1351 (1987)
LUNAR AND PLANETARY LAB., UNIV. OF ARIZONA, TUCSON, AZ 85721
SATURN
RICHARDSON, J.D. + EVIATAR, A.
LIMITS ON THE EXTENT OF SATURN'S HYDROGEN CLOUD
GEOPHYSICAL RESEARCH LETTERS VOL. 14, 999-1002 (1987)
CENTER FOR SPACE RESEARCH, 37-655, MIT, CAMBRIDGE, MA 02139
VASUNDHARA, R. + BHATTACHARYYA, J.C.
A POSSIBLE EXPLANATION OF THE ASYMMETRY IN THE IMMERSION AND EMERSION LIGHT
CURVES AT 12.5 SATURN RADII
BEITRAGE ZUR GEOPHYIK VOL. 96(S), 52-55 (1987)
INDIAN INST. OF ASTROPHYSICS, BANGALORE 560034, INDIA
SATELLITES OF SATURN
SPAHN, F.
SCATTERING PROPERTIES OF A MOONLET (SATELLITE) EMBEDDED IN A PARTICLE RING:
APPLICATION TO THE RINGS OF SATURN
ICARUS VOL. 71, 69-77 (1987)
INSTITUT FUR KOSMOSFORSCHUNG, RUDOVER CHAUSSEE 5, 1199 BERLIN, GDR
URANUS
CARLSON, B.E. + PRATHER, M.J. + ROSSNOW, W.B.
THE ROLE OF AQUEOUS CHEMISTRY IN DETERMINING THE COMPOSITION AND CLOUD STRUCTURE
OF THE UPPER TROPOSPHERE ON URANUS
NASA/GODDARD INST. FOR SPACE STUDIES, 2880 BROADWAY, NEW YORK, NY 10025
ELLIO T, J. + GLASS, I.S. + FRENCH, R.G. + KANGAS, J.A.
THE OCCULTATION OF KME 17 BY URANUS AND ITS RINGS
ICARUS VOL. 71, 91-102 (1987)
DEPT. OF EARTH, ATMOSPHERIC, AND PLANETARY SCIENCES, MIT, CAMBRIDGE, MA 02139
HERBST, T.M. + SKRUTSKIE, M.F. + NICHOLSON, P.D.
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THE RAND CORP., 1700 MAIN ST., P.O. BOX 2138, SANTA MONICA, CA 90406-2138
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A SEMI-ANALYTICAL SOLUTION FOR THE ECCENTRICITIES AND LONGITUDES OF THE
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ASTRONOMY AND ASTROPHYSICS VOL. 182, 150-158 (1987)
CNPQ-OBSERVATORIO NACIONAL, RUA GENERAL BRUCE, 586, 20921, RIO DE JANEIRO, BRAZIL
VEIGA, C.H. + MARTINS, R.V. + VEILET, C. + LAZZARO, D.
POSITION OBSERVATIONS OF THE FIVE GREATEST URANIAN SATELLITES AND COMPARISON
WITH THEORY
ASTRONOMY AND ASTROPHYSICS. SUPPLEMENT SERIES VOL. 70, 325-334 (1987)
CNPQ-OBSERVATORIO NACIONAL-DEA, RUA GENERAL BRUCE 586, 20921 RIO DE JANEIRO, BRAZIL
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VENUS GRAVITY: A HARMONIC ANALYSIS
JOURNAL OF GEOPHYSICAL RESEARCH VOL. 92, 10,335-10,351 (1987)
LUNAR AND PLANETARY INST., 3303 NASA ROAD #1, HOUSTON, TX 77058
BREUS, T.K. + KRYMSKI, A.M. + MITNITSKII, V.Y.
EFFECT OF AN EXTENDED NEUTRAL ATMOSPHERE ON THE INTERACTION OF THE SOLAR
WIND AND THE NONMAGNETIC BODIES OF THE SOLAR SYSTEM. I. VENUS
COSMIC RESEARCH VOL. 25, 107-114 (1987)
WEBSTER, W. J., JR.
ON THE SIMPLE MODELS FOR THE INTERPRETATION OF CENTIMETER-WAVELENGTH RADIO OBSERVATIONS OF ASTEROIDS
GEOPHYSICS BRANCH, NASA-GOUDARD SPACE FLIGHT CENTER, GREENBELT, MD 20771

COMETS

ALLEN, D. A. + WICKRAMASINGHE, D. T.
DISCOVERY OF ORGANIC GRAINS IN COMET WILSON
NATURE VOL. 329, 615-616 (1987)
ANGLO-AUSTRIAN OBSERVATORY, EPPING, NSW 2121, AUSTRALIA

BAILEY, M. E. + WILKINSON, D. A. + WOLFENDALE, A. W.
CAN EPISODIC COMET SHOWERS EXPLAIN THE 30-MYR CYCLICITY IN THE TERRESTRIAL RECORD?
ROYAL ASTRONOMICAL SOCIETY. MONTHLY NOTICES VOL. 227, 863-885 (1987)
DEPT. OF ASTRONOMY, UNIV. OF KANZAS, M13 9PL, MANCHESTER, UK

BAJAJA, E. + MORAS, R. + POPPEL, W. G. L. + CERSOSIMO, J. C. + MARJIN, M. C. + KAZZARO, J.
OBSERVATION OF THE OH 1667 MHZ LINE TOWARD COMET HALLEY FROM THE SOUTHERN HEMISPHERE
INSTITUTO ARGENTINO DE RADIOASTRONOMIA, C.C. 5, 1984 VILLA ELISA, BUENOS AIRES, ARGENTINA

BRANDT, J. C.
THE NATURE OF COMETS
ROYAL SOCIETY OF LONDON. PHILOSOPHICAL TRANSACTIONS A VOL. 323, 437-446 (1987)
LAB. FOR ASTRONOMY AND SOLAR PHYSICS, NASA-GOUDARD SPACE FLIGHT CENTER, GREENBELT, MD 20771

CHEM, D. + ZHENG, X.
FOUNTAIN MODEL AND THE ROTATION OF COMETARY NUCLEI
SCIENTIA SINICA A VOL. 30, 860-867 (1987)
PURPLE MOUNTAIN OBSERVATORY, ACADÉMIA SINICA, NANJING, CHINA

CHYBA, C. + SAGAN, C.
COMETARY ORGANICS BUT NO EVIDENCE FOR BACTERIA
NATURE VOL. 329, 208 (1987)
LAB. FOR PLANETARY STUDIES, CORNELL UNIV., ITHACA, NY 14853

COWLEY, S. W. H.
ICE OBSERVATIONS OF COMET GIACOBINI-ZINNER
ROYAL SOCIETY OF LONDON. PHILOSOPHICAL TRANSACTIONS A VOL. 323, 405-420 (1987)
BLACKETT LAB., IMPERIAL COLLEGE, LONDON SW7 2BZ, UK

CRAVENS, T. E.
ION ENERGETICS IN THE INNER COMA OF COMET HALLEY
GEOPHYSICAL RESEARCH LETTERS VOL. 14, 983-986 (1987)
SPACE PHYSICS RESEARCH LAB., UNIV. OF MICHIGAN, ANN ARBOR, MI 48109

EBERHART, J.
A BUNCH OF LITTLE COMETS -- BUT JUST A LITTLE BUNCH
SCIENCE NEWS VOL. 132, 132 (1987)

EBERHART, J.
HALLEY'S WHISKERS: FIRST SPACE POLYMER DETECTED
SCIENCE NEWS VOL. 132, 100 (1987)

ENCRENZAT, T.
COMET HALLEY: THE GAS COMPOSITION DERIVED FROM SPACE MISSIONS
ROYAL SOCIETY OF LONDON. PHILOSOPHICAL TRANSACTIONS A VOL. 323, 391-401 (1987)
OBSERVATOIRE DE PARIS-MEUDON, SECTION D'ASTROPHYSIQUE, 92190, MEUDON, FRANCE

FULLE, M.
METEOROIDS FROM COMET BENNETT 1970II
ASTRONOMY AND ASTROPHYSICS VOL. 183, 392-396 (1987)
INTERNATIONAL SCHOOL FOR ADVANCED STUDIES, STRADA COSTIERA, 11, I-34014 TRIESTE ITALY

GALVEY, A. A. + POLYUDOV, A. N. + SAGDEEVE, R. Z. + SHEVCHEN, V. I.
(IR) MAGNETOHYDRODYNAMIC TURBULENCE IN SOLAR-WIND INTERACTING WITH A COMET
ZHRNALS EKSPERIMENTALNOI I TEORETICHESKOI FIZIKI VOL. 92, 2090-2105 (1987)
INST. OF SPACE RESEARCH, ACADEMY OF SCIENCES OF THE USSR, MOSCOW V-71, USSR

GEBALLE, T. R.
ORGANIC CHEMICALS IN COMETS
NATURE VOL. 329, 583 (1987)
UNITED KINGDOM INFRARED TELESCOPE, 665 KOMOHANA STREET, HILO, HI 96720

HECHT, J.
COMETS MAKE A SMALLER IMPACT
NEW SCIENTIST VOL. 115(1573) 29 (1987)

HERMAN, G. + SALO, H.
LIGHT SCATTERING IN COMETARY DUST COMAE
EARTH AND SPACE SCIENCES DIV., JET PROPULSION LAB., PASADENA, CA 91109
MAURETTE, M. + JEHANNO, C. + ROBIN, E. + HAMMER, C.
CHARACTERISTICS AND MASS DISTRIBUTION OF EXTRATERRESTRIAL DUST FROM THE
GREENLAND ICE CAP
NATURE VOL. 328, 699-702 (1987)
LABORATOIRE RENE BERNAS, 91406 ORSAY, FRANCE

MCKEEGAN, K.D.
OXYGEN ISOTOPES IN REFRACTORY STRATOSPHERIC DUST PARTICLES: PROOF OF
EXTRATERRESTRIAL ORIGIN
SCIENCE VOL. 237, 1468-1471 (1987)
MAIL STOP L-396, LAWRENCE LIVERMORE NATIONAL LAB., LIVERMORE, CA 94550

MONASTERSKY, R.
TAKING A VACUUM TO EXTRATERRESTRIAL DUST
SCIENCE NEWS VOL. 132, 133 (1987)

NO AUTHOR CITED
SPARKLERS FROM OUTER SPACE
NEW SCIENTIST VOL. 115(1577) 36 (1987)

BARNSKY, C.W.
FISSION-TRACK DATING OF HAUPTON ASTROBLEME AND INCLUDED BIOTA, DEVON ISLAND,
CANADA
SCIENCE VOL. 237, 1603-1605 (1987)
DEPT. OF GEOLOGY, UNIV. OF PENNSYLVANIA, PHILADELPHIA, PA 19104

PILLINGER, C.T.
STABLE ISOTOPE MEASUREMENTS OF METEORITES AND COSMIC DUST GRAINS
ROYAL SOCIETY OF LONDON. PHILOSOPHICAL TRANSACTIONS A VOL. 323, 313-322 (1987)
PLANETARY SCIENCES UNIT, DEPT. OF EARTH SCIENCES, THE OPEN UNIV., MILTON KEYNES
MK7 6AA, UK

SMITH, D.
INTERSTELLAR MOLECULES
ROYAL SOCIETY OF LONDON. PHILOSOPHICAL TRANSACTIONS A VOL. 323, 269-286 (1987)
DEPT. OF SPACE RESEARCH, UNIV. OF BIRMINGHAM, P.O. BOX 363, BIRMINGHAM
B15 2TT, UK

ZOLENSKY, M.E.
REFRACTORY INTERPLANETARY DUST PARTICLES
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19th Lunar and Planetary Science Conference
Monday, March 14, 1988
MARS GEOLOGY AND REMOTE SENSING
8:30 a.m. Gilruth 104

Frey H.* Semeniuk J.
Extent of Buried Cratered Terrain Underlying the Highland/Lowland Transition Zone in Eastern Mars

Grant T. D.* Frey H. Semeniuk J. A.
Resurfacing Events in the Tempe Terra Region of Mars

Crown D. A.* Greeley R. Sheridan M. F.
Consideration of Hydromagnetic Origins for Hadriaca Patera and Tyrrhena Patera

Edgett K. S.* Greeley R. Christensen P. R.
Herschel Basin Ejecta and Some Implications for Deciphering the Geologic History of the Martian Cratered Highlands

Pieri D.* Schneeberger D.
Morphology of Lava Flows at Alba Patera

Swann G. A.*
Geology of North-Central Tempe Terra, Mars

Sullivan R.* Greeley R.
Comparison of Aeolian Surface Roughness Measured in a Field Experiment and in a Wind Tunnel Simulation

Guinness E. A.* Arvidson R. E.
Aeolian Control of Materials Exposed in the Equatorial Region of Mars

Fink J. H.* Zimbelman J. R.
A Comparison of Lava Flow Rheology Calculations for High-Resolution Data Sets from Hawaii and Mars

Regner P.* Kamp L. Neukum G.
Multispectral Photometric Classification and Mapping of the Martian Surface in the Oxia Palus Region

Morris R. V.* Agresti D. G. Shelfer T. D. Adams J. B.
Mossbauer Mineralogy of a Martian Spectral Analogue (Hawaii 34): Implications for the Iron Oxide Pigment of Mars

Wing D. W.* Morris R. V. Bernhard R. P. Adams J. B.
Mineralogy of a Suite of Martian Analog Soils from Hawaii

Blaney D.* McCord T. B.
Constraints on the Origin of the 3.8 Micron Mars Absorption Feature

Strickland E. L.*
Thermal Properties of Martian Surface Material Analogues: Another Look

Strickland E. L.*
Non-Ideal Thermal Behavior of Mars: Observations, Models, and Interpretations

POSTER PRESENTATIONS

Chapman M. G. Scott D. H.
North Kasei Valles - Geology and Hydrology

Dale-Bannister M. A. Arvidson R. E. Moore H. J.
On the Presence of Unweathered Lithic Fragments in Viking Lander 1 Soil

Parker T. Saunders R. S.
Origin of Martian Plains

Zimbelman J. R.
Preliminary Photogeologic Mapping in the Memnonia Region of Mars

Zimbelman J. R.
High Resolution Viking Orbiter Images of Mars: Location and Distribution

Banin A. Margulis L. Ben-Shlomo T. Carle G. C. Coyne L. M. Orenberg J. B. Scattergood T. W.
Constraining Mars Soil Mineralogical Composition: Palagonite Vs. Iron Enriched Smectite Clays

Wu S. S. C. Garcia P. A. Howington-Kraus A. Kelly C. T.
Quantitative Analysis of the Tharsis Dome of Mars

Williams S. H.
Tharsis Aureole Deposits: An Alternative Origin

Thompson T. W. Moore H. J.
Model for Mars Depolarized Radar Echoes

Barlow N. G.
The Martian Cratering Record and its Implications for the Early History of the Planet

PRESENTED BY TITLE ONLY

Heslop S. E. Wilson L.
Pyroclast Sizes in Terrestrial and Martian Ignimbrites

Parfitt E. A. Wilson L.
Episodic Magma Motion in Shield Volcano Rift Zones

Raitala J. Kauhanen K.
Volcanic Vents of Alba Patera on Mars
Monday, March 14, 1987
COSMIC DUST
8:30 a.m. Gilruth Gym

Wier A.* Schlutter D. Brownlee D. E.
Helium and Neon in Individual Extraterrestrial Particles

Blanford G. E.* Thomas K. L. McKay D. S.
Microbeam Analysis of Chondritic Interplanetary Dust Particles
for Carbon, Oxygen, and Major Elements

Schramm L. S.* Brownlee D. E. Wheelock M. M.
The Elemental Composition of Interplanetary Dust

Rietmeijer F. J. M.*
A Quantitative Comparison of Fine-Grained Chondritic Interplanetary
Dust and Comet Halley Dust

Germani M. S.* Bradley J. P.
Automated Point Count Analysis of Interplanetary Dust Particle
Thin-sections

Bradley J.* Germani M. S. Brownlee D. E.
A Comparison of Pyroxene Versus Olivine Rich Interplanetary
Dust Particles (IDPs) in Thin-section

Klock W.* McKay D. Thomas K.
Unusual Mineral Chemistry of Extra-Terrestrial Dust Particles

Blake D.* Bunch T. E. Reilly T. Fleming R.
Characterization of Interplanetary Dust by Low Voltage
Scanning Electron Microscopy

Maurette M. Hammer C. Courchet M. Brownlee D. E.*
The "Blue Lake II" Expedition of July-August 1987 in Greenland
and the Search for Millimeter-Size Unmelted Extraterrestrial
Particles

Pun A.* Zolensky M. E. Thomas K.
Titanium Carbide and Titania Phases in Particles of Probable
Extraterrestrial Origin, Found Within Old Antarctic Ice

Eberhardt A. Eberhardt P.*
Extraterrestrial Dust in Antarctic Firn

Koeberl C.* Hagen E. Faure G.
Chemical Composition and Morphology of Meteorite Ablation Spherules
in Neogene Till in the Dominion Range, Transantarctic Mountains

Sutton S. R.* Flynn G. J.
Micrometeorite Component of Halogens and Sulfur in the
Lower Stratmosphere
The Discovery and Study of Cosmic Dust in Granites

POSTER PRESENTATIONS

Witkowski R. E. Cassidy W. A. Penney G. W.
Sampling the South Pole Atmosphere for Cosmic Dust by Electrostatic Precipitation

Flynn G. J.
Atmospheric Heating of Cosmic Dust

Blanford G. E. Gibson E. K., Jr.
Laser Extracted Volatiles from Chondritic Interplanetary Dust Particles

PRESENTED BY TITLE ONLY

de Angelis M. Pourchet M. Maurette M.
Assessment of Biases in Collections of Greenland Micrometeorites: The "Blue Ice II" Project of January 1988 in Antarctica

Bonny P. Balageas D. Devezeaux D. Maurette M.
Atmospheric Entry of Micrometeorites Containing Organic Materials

Kozul J.* Hewins R. H.
Lew 85300,02,03 Polymict Eucrite Consortium -I: Petrology of Igneous Clasts

Kozul J.* Hewins R. H.
Lew 85300,02,03 Polymict Eucrites Consortium -II: Breccia Clasts, CM Inclusion, Glassy Matrix and Assembly History

Wittkefeldt D. W.* Lindstrom M. M.
Geochemistry of Diverse Lithologies in Antarctic Eucrites

Warren P. H.* Jerde E. A.
Pomozdino: An Anomalous, Magnesian yet REE-rich, Eucrite

Carlson R. W.* Tera F. Boetor N.
Radiometric Geochronology of the Eucrites Nuevo Laredo and Bereba

Delaney J. S.* Sutton S. R.
Trace Element Content of Feldspar from Achondrites and Lunar Breccias

Hewins R. H.*
Equilibration of Foreign Clasts in the Peckelsheim Diogenite

Berkley J. L.*
LEU85313 Howardite: Clues to the Diogenite-Cumulate Eucrite Connection?

Olsen E. J.* Fredriksson K. Rajan R. S.
Investigating the C.I.A.

Paul R. L. Sack R. D. Kruse W. Lipschutz M. E.*
Simple and Not-So-Simple Mixing in the Howardite-Eucrite-Diogenite (M.E.D) Parent Body (4 Vesta)

Makjanic J.* Van der Staph C. A. H. Vis R. N.
Verheul H. Heymann D.
Carbon Contents of High-Nickel Areas of the Toluca and Algarrobo Iron Meteorites

Chen J. H.* Wasserburg G. J. Wang D. W.
Ningbo: A New Iron Meteorite with Isotopically Anomalous Ag

Taylor G. J.* Keil, K. Newsom H. Okada A.
Magmatism and Impact on the Aubrite Parent Body: Evidence from the Norton County Enstatite Achondrite

Steele I. M.*
Minor Elements and Cathodoluminescence of Enstatite in Cumberland Falls Enstatite Achondrite

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Cisowski S. M.
Paleomagnetism of Unbrecciated Eucrites

Mittlefehldt D. W.
Petroleology of an OPX-OLIV Porphyritic Mg-Basalt Clast in Kobaeta

Teng R. T. D. Fehn U. Elmore D. Kubik P. W.
Hemmick T. Gove H. E.
Determination of Osmium Isotopes and Re/Os Ratios in Iron Meteorites Using Accelerator Mass Spectrometry

PRESENTED BY TITLE ONLY

Migdisova L. F. Kononkova N. N. Zaslavskaya N. I.
Euclite Pomozdino: Mineral Chemistry

Yaroshevsky A. A. Migdisova L. F. Kononkova N. N.
Eucrite Pomozdino: Chemical and Mineral Composition of Clasts and Matrix

Petaev M. I. Ustinov V. I. Zaslavskaya N. I.
GavriloV E. Ya. Shukolyukov Yu. A.
Oxygen Isotopes in Pomozdino Meteorite

Hewins R. H.
Process Identification for Eucrites

Malvin D.
Assimilation-Fractional Crystallization Modeling of Magmatic Iron Meteorites

Moroz L. V. Ustinov V. I. Kononkova N. N.
Zaslavskaya N. I. Shukolyukov Yu. A.
Oxygen Isotopes of Chromite and Chemical Composition of the Minerals from Polymineral Nodules in Sikhote-Alin Meteorite

Steele I. M.
Minor Elements in Forsterite of Cumberland Falls Enstatite Achondrite

Ntafos T. Keil K. Newsom H. E.
Khor Teniki: An Enstatite Achondrite with Evidence of Mixing of Metal and Sulfides from Separate Sources

Fogel R. A. Hess P. C. Rutherford M. J.
The Enstatite Chondrite-Achondrite Link

Schultz P. H.*
Impact Vaporization of Volatile-rich Targets; Experimental Results and Implications

Bradley T. L.* Barlow N. G.
Martian Crater Interiors: Relationships with Ejecta, Diameter, Latitude, and Terrain

Barlow N. G.*
Parameters Affecting Formation of Martian Impact Crater Ejecta Morphology

Clifford S. M.* Zimbelman J. R.
Softened Terrain on Mars: The Ground Ice Interpretation Reconsidered

Zimbelman J. R.* Clifford S. M. Williams S. H.
Terrain Softening Revisited: Photogeological Considerations

Williams S. H.* Zimbelman J. R.
Aeolian Gradation on Mars: Widespread and Ancient

Postawko S. E.* Fanale F. P. Zent A. P.
Effects of Epochal Vs. Episodic Release of SO2 by Volcanoes on Mars

Zent A. P.* Fanale F. P. Roth L. E.
The Goldstone Mars Data: Is There Really Evidence for Melting?

Jakosky B. M.* Haberle R. M.
Stability and Instability of the South Polar Caps on Mars

Jakosky B. M.*
Mars Atmospheric D/H: Consistent with Polar Volatile Theory?

MacKinnon D. J.* Tanaka K. L.
A Two-Layer Hydrologic Model for the Impacted Martian Crust

Grant J. A.* Schultz P. H.
The Degradational History of Etched/Channeled Terrains West and Northwest of Isidis

De Hon R.*
Ephemeral Martian Lakes: Temporary Ponding and Local Sedimentation

Tanaka K. L.*
Chaotic Material and Debris Flows in the Simud-Tiu Valles Outflow System of Mars
Costard F. M.*
Thickness of Sedimentary Deposits at the Mouth of Outflow Channels

Lucchitta B. K.*
Kasei Valles, Mars: Formed by Flood or Ice?

Jons H.-P.*
Festoon-like Migration Fronts of Mud and Debris in the Vicinity of Olympus Mons, Mars

POSTER PRESENTATIONS

Kochel R. C. Phillips M. A.
Preliminary Investigation of Geological Controls on Valleys Influenced by Groundwater Sapping, Southern Colorado Plateau, Arizona and Utah

Henry L. Y. Zimbelman J. R.
Physical Properties of Channels and Aeolian Features in the Oxia Palus and Margaritifer Sinus Quadrangles of Mars

Craddock R. A. Greeley R. Christensen P. R. Aldrich F. T.
Martian Channel Materials and the Formation of Channel Winds

Gulick V. Baker V. Marley M.
Hydrothermally Supplied Ground Water: A Mechanism for the Formation of Small Martian Valleys

Davis P. A. Tanake K. L.
Morphometric Analysis of Some Canyons in Noctis Labyrinthus, Mars: Comparison with Hawaiian Runoff and Sapping Channels

Scott D. H.
An Unusual Martian Channel

PRESENTED BY TITLE ONLY

Kuzmin R. O. Bobina N. N. Zabelueva E. V. Shashkina V. P.
Mars: Estimation of the Relative Ice Content in Upper Layers of the Permafrost

Kuzmin R. O. Bobina N. N. Zabelueva E. V. Shashkina V. P.
Inhomogeneities in the Upper Levels of the Martian Cryolithosphere

Horner V. M. Barlow N. G.
Martian Craters: Changes in the Diameter Range for Ejecta Fluidization with Latitude

Rice J. W. Archibald S. M. De Hon R. A.
Lower Maja Vallis

De Hon R.
Valley Terminal Deposits: The Martian Sedimentary Record

Matsui T. Tajika E. Abe Y.
Climate and Impact: Climatic Change in Mars Caused by Impact Basin Formation

Jons H.-P.
Surface and Near-Surface Thawing of Permafrost and/or Ground Ice on Mars
Monday, March 14, 1988

ORBITAL COLLECTION OF COSMIC DUST
1:30 p.m. Gilruth Gym

Bibring J.-P. Borg J. Katchanov A. Langevin Y. Salvetat P. Surkhov Y. A. Vassent B.
The Comet Experiment: First Results

Barrett R. A.* Bernhard R. P. McKay D. S.
Impact Holes and Impact Flux on Returned Solar Max Louver Material

Bernhard R. P.* McKay D. S.
Micrometer-sized Impact Craters on the Solar Maximum Satellite: The Hazards of Secondary Ejecta

Warren J Zook H. Allton J.*
Optical Observations of Impact Features on Solar Max Thermal Blankets and Louvers

Tsou P.* Brownlee D. E. Laurance M. R. Hubesh L. Albee A. L.
Intact Capture of Hypervelocity Micrometeoroid Analogs

Flynn G. J.*
Is the Stratospheric Cosmic Dust an Unbiased Sample of the Interplanetary Dust Clouds at 1 AU?

Jackson A. A.* Zook H. A.
A Solar System Dust Ring: The Earth as Its Shepherd

POSTER PRESENTATION

Laurance M. R.
Experimentally Produced Hypervelocity Impact Craters in Gold: Some Preliminary Results

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Rietmeijer F. J. M.
Preliminary Analytical Electron Microscope (AEM) Results of Natural "Graphite" Shocked at 20.7, 31.4, 40.4 and 59.1 GPa

COSMIC-RAY-PRODUCED NUCLIDES
3:15 p.m. Gilruth Gym

Aylmer D. Tuniz C.* Guyton M. Herzog G. F. Maras A. Middleton R. Klein J.
Beryllium-10 and Aluminum-26 Contents of Bur Ghelui

Beryllium-10 and Aluminum-26 Contents of Lunar Rock 74275

Nishizumi K.* Kubik P. W. Elmore D. Reedy R. C. Arnold J. R.
Cosmogenic 36Cl Production Rates in Meteorites and the Lunar Surface

Eugster O.*
Cosmic-Ray Production Rates for 3He, 21Ne, 38Ar, 83Kr, and 126Xe in Chondrites Based on 81Kr-Kr Exposure Ages

Begemann F. Schultz L.*
The Influence of Bulk Chemical Composition on the Production Rate of Cosmogenic Nuclides in Meteorites

Englert P.* Tull A. Donahue D. Reedy R.
Cosmogenic Nuclide Production Rates: Depth Dependence of 14C Production

Klein J.* Nishizumi K. Reedy R. C.* Englert P. Middleton R.
Simulation of Cosmic-ray Production of 26Al and 10Be

Finney S. A.* Sonett C. P.
High Resolution Spectral Analysis of Irish Oak Radiocarbon Record

POSTER PRESENTATION

Angelo J.* Madonna R. Quam W.
Radiation Protection Issues and Techniques in Support of Lunar Base Operations

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Reedy R. C.
Neutron Production by Cosmic Rays: Dependence on Proton Energy and Spectra

Alexeev V. A.
Cosmogenic Radionuclides in Antarctic and Non-Antarctic Meteorites. II. Manganese-53

Alexeev V. A.
Cosmogenic Radionuclides in Antarctica and Non-Antarctic Meteorites. I. Aluminum-26
Monday, March 14, 1988
REGOLITHS AND MESOSIDERITES
1:30 p.m. Gilmour 206

Pedroni A., Baur H., Wieler R., Signer P.*
T-Tauri Irradiation of Kapoeta Grains?

Wieler R., Pedroni A., Signer P.*
Excess of GCR-Ne in the Solar-Gas-rich Matrix of the
Chondrite Fayetteville

Lavielle B.*, Marti K.
Trapped Xe in the Chondrite Forest Vale (M4)

Rajan R. S.*, Lugmair G. W.
Solar Flare Tracks and Neutron Capture Effects in Gas-Rich
Meteorites

Rubin A. E.*, Jerde E. A.
Basantic and Gabbroic Clasts in Mesosiderites: Implications
for Pervasive Impact-Melting on the Mesosiderite Parent Body

Bogard D.*, Mittelheildt D., Jordan J.
39Ar-40Ar Dating of Mesosiderites: A Case for Major Parent
Body Disruption Less Than 4.0 Gy Ago?

Mittelheildt D. W.*
Petrogenesis of the Mesosiderite Regolith

Pavri B., Greenberg R., Broadhurst C., Drake M.
Formation of Stony-Iron Meteorites: Laboratory Simulations

Cintala M. J.*, Horz F.
Regolith Evolution in the Laboratory: Scaling
Dissimilar Experiments

Veisman D. T.*, Heiken G., Warren P. H., Jerde E.
Glasses and a *HASP*-Mimicking Mineral or Mineral
Intergrowth in Apollo 14 Regolith Breccias

Basu A.*, Bangs C.
Estimation of Recycled Proportion of Monomineralic and
Crystalline Lithic Particles in Lunar Soils

McKay D. S.*, Wentworth S. J., Basu A.
Core 79001/2: An Example of Extreme Mixing in
the Lunar Regolith

Stone J.*, Clayton R. N.
Nitrogen Isotopes in the Lunar Regolith: Results
from Double Drive Tube 79002/79001

Gibson E. K. Jr., Bustin R., Mannion P.*
Hydrogen Abundances in Apollo 16 and 17 Deep Drill
Core and 79001/2 Core Samples

POSTER PRESENTATIONS

Schwarz C.
Preliminary Description of Drive Tube 15009

Sadow J. C.
A Quantitative Petrographic View of Lunar Chondrules and
Chondrule-Like Objects

Basu A.
Is Bedding and/or Size-Grading Present in Lunar
Regolith Breccias?

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Solar He, Ne and Ar in Regolith Minerals: All Are Mixtures of
Two Components

Korotev R. L.
Geochemical Stratigraphy of the 79001/2 Core, Van Serg Crater,
Apollo 17

Korotev R. L.
New Compositional Data for Regolith Samples from the South
Massif and Light Mantle at Apollo 17

Simon S. B., Papike J. J., Hughes S. S., Schmitt R. A.
Laul J. C.
Apollo 14 Regolith Breccias and Soils: Comparative Petrology
and Chemistry

Wentworth S. J., McKay D. S.
The Significance of Glass Fragments in Feldspathic
Fragmental Breccia 67016
Monday, March 14, 1988
EXPLORING MARS AND PHOBOS
5:00 - 6:30 p.m. Gilruth 205

POSTER PRESENTATIONS

Moore H. J. Jakosky B. M.
Viking Landers and Remote Sensing

Francis P. W.
Preparing for Mars: Loess, and Why We Should Study It

Burt D. M.
Iron-Rich Clay Minerals on Mars: Potential Sources or Sinks
for Hydrogen and Indicators of Hydrogen Loss Over Time

Clark B. C.
Exploration on the Surface of Mars

Neukum G. Greeley R.
Mars Sample Return and Cratering Chronology Models: Consequences
for the Martian History and Site Selection

Scott D. H.
Mars Sample Return: A General Philosophy for Site Selection

Masursky H. Dial A. L. Jr. Strobell M. E. Applebee D. J.
Recent Progress in the Study of MRSR (Mars Rover Sample Return)
Candidate Landing Sites

Wu S. C. * Schafer F. J. Garcia P. A.
Howington-Kraus A. Jordan R.
The Size, Shape, and Topography of Phobos

Williams B. G. Duxbury T. C. Hildebrand C. E.
Improved Determination of Phobos and Demos Masses from Viking Fly-bys

Duxbury T.
Harmonic Expansion Model for the Phobos Figure

Hovestadt D. Andreichikov B. Bruckner J.
Economou T. Klecker B. Kunneht E. Laeverenz P.
Mukhin L. Prilutskii A. Radchenko V. Reppin C.
Rieder R. Sageev R. Sastri C. S. Turkevich A.
Vasilev V. Manke H.
In-situ Measurement of the Surface Composition of the Mars Moon
Phobos: The ALPHA-X Experiment on the Phobos Mission

Surkov Yu. A. * Moskaleva L. P. Manvelyan O. S.
Kharyukova V. P.
Remote Gamma-Spectrometry of Mars and Phobos

Kemurzhian A. L. * Gromov V. V. Sologub P. S.
Surkov Yu. A. Kirnozov F. F.
Studies of the Surface of Phobos from a Rover

Bibring J-P * Cazes S. Combos M. Guyot G. Gondet B.
Languevin Y. Puget P. Roccard F. Soufflot A.
The Infrared Observation of Mars and Phobos

PRESENTEO BY TITLE ONLY

Ciesla T. M.
Field Research in the Extraterrestrial Environment: Implications for Planetary Scientists
Kaula W. M.*
Thermal Effects on the Tectonics of Venus

Turcotte D. L.*
A Heat-Pipe Mechanism for Volcanism and Tectonics on Venus

Sjogren W. L.*
Correlation of Pioneer Venus Orbiter Gravity Data with Venera 15 and 16 SAR Imaging

Banerdt W. B.*
Global Dynamic Stress Modelling on Venus

Smekek S.* Phillips R. J.
Thin-Skinned Gravity-Driven Deformation on Venus

Williams D. R.*
Regional Models of Topographic Support on Venus from Admittance Analysis of Topography and Calculated Vertical Gravity

Grimm R. E.* Solomon S. C.
Generation and Evolution of Crust on Venus: Implications of Viscous Relaxation Models

Kiefer W. S.* Hager B. H.
Mantle Plumes on Venus: A Model for the Equatorial Highlands and a Possible Connection with the Ovoids

Parmentier E. M.*
Buoyancy and Extension in Rifting: Implications for the Along-Axis Distribution of Volcanism

Sotin C.* Head J. W. Parmentier E. M.
Terrestrial Spreading Centers under Venus Conditions: Effects on Thermal Structure and Crustal Thickness

Bindschadler D. L.* Head J. W.
Models for the Origin of Tessera Terrain on Venus

Ashwal L. D. Burke K.* Sharpton V. L.
Lithospheric Delamination on Earth and Venus

Schaber G. G.*
Elevations of Venusian Shields as Indicators of Lithospheric Thickness

POSTER PRESENTATIONS

Herrick R. R.* Bills B. G.
Analysis of Gravity Data over Aphrodite Terra, Venus

Slade M. A.* Zohar S. Jurgens R. F.
Venus Spin Vector: 1980-82 Goldstone Radar Additions

Campbell B. A. Kozak R. C.
Gravity Analysis of Bell Regio, Venus, from Pioneer-Venus and Venera Data

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Vorder Bruegge R. W. Head J. W.
Topography of Geomorphic-tectonic Units in Fortuna Tessera, Venus: Evidence of Crustal-Thickening and Deformation

Ivanov B. A.
Simple Hydrodynamic Model of Atmospheric Breakup of Hypervelocity Projectiles

Ivanov B. A.
On the Breakup Diameter of Meteoroids in the Venusian Atmosphere

Grimm R. E. Solomon S. C. Crumpler L. S. Head J. W.
Tests of Crustal Divergence Models for Venus

Nikishin A. M. Crumpler L. S.
Tectonic and Magmatic Models for the Origin of Cleopatra Patera, Maxwell Montes, Venus
Tuesday, March 15, 1988
CARBONACEOUS CHONDRITES
8:30 a.m. Gilruth Gym

Mackinnon I. D. R.* Kaser S. A.
The Clay-Size Fraction of CI Chondrites Alais and Orgueil: An
AEM Study

Tomooka K.* Buseck P. R.
Transmission Electron Microscopy of the Orgueil CI
Carbonaceous Chondrite

Water and the Thermal History of the CM Carbonaceous
Chondrite Parent Body

Keller L. P.* Buseck P. R.
HRTEM Study of the Matrix Mineralogy of the Lance CO(3)
Chondrite

Morgan J. W.* Walker R. J.
Rhenium and Osmium Isotopic Systematics in Carbonaceous Chondrites

Bunch T. E.* Chang S. Blake D. Cassen P. Reynolds R.
Podolak M. Erlichman J.
Thermal Processing of Allende Components in a Transient Parent
Body Atmosphere

Palme H.* Wark D. A.
CV-chondrites: High Temperature Gas-Solid Equilibrium vs. Parent
Body Metamorphism

Engster O.* Michel T. Niedermann S. Burger M.
Kraehnbaum U.
Guangnan (L6) and Wingquang (CV3): Exposure Ages, Radiogenic
Ages and Chemical Abundances

POSTER PRESENTATION

Blanford G. E.* Gibson E. K., Jr.
Laser Extracted Volatiles from Carbonaceous Chondrites

Ivanov A. V. Khisina N. V. Kononkova N. N.
Petushkova L. V.
Iron Crystals in the Kaidum Meteorite: Process of New Type?

Weinbruch S. Palme H. Muller W. F. El Goresy A.
Fayalitic Rims and Halos in Forsterites in Allende: New
Evidence Against a Metamorphic Origin

Liu Y.-G. Schmitt R. A.
The Relative Nebular Locations for the Formation of Parental
Components in the CV3 Chondrites KABA, Mokoia and Allende

Metzler K. Bischoff A. Stoffler D.
Characteristics of Accretionary Dark Rims in Carbonaceous Chondrites

Heymann D.* Makjanic J. Van der Stap C. C. A. M.
Vis R. D. Verheul H.
Carbon, Oxygen, Silicon, Sulphur, Calcium and Iron in Twenty-Four
Clasts and One Dark Inclusion of the Allende Meteorite

Bischoff A. Palme H. Spettel B. Clayton R. N. Mayeda T. K.
The Chemical Composition of Dark Inclusions from the
Allende Meteorite

Kashkarov L. L. Fisenko A. V. Lavrukhina A. K.
Pu/U-Ratio on Fission Track Studies of Efremovka
CV Chondrite CAIs

Fisenko A. V. Devirits A. L. Lagutina E. P.
Semjonova L. F. Lavrukhina A. K. Shukolyukov Yu. A.
The Isotopic Composition of Hydrogen in Acid-Insoluble Residues
of Efremovka CV Chondrite

REFRACTORY INCLUSIONS I
10:30 a.m Gilruth Gym

McGuire A. V.* Hashimoto A.
Origin of Zoned Allende Fine-Grained Inclusions

Doctor N. Hutcheon I. D. Wassenburg G.
Petrology of a Plagioclase-Rich Forsterite-Bearing Allende
Inclusion

Woolum D. S.* Johnson M. L. Burnett D. S. Sutton S. R.
Refractory Lithophile Partitioning in Type B CAI Materials

Beckett J. R.* Spivack A. J. Hutcheson I. D.
Wassenburg G. J. Stolper E. M.
The Partitioning of Trace Elements Between Melilitc and Liquid: An
Experimental Study with Applications to Type B CAIs
Tuesday, March 15, 1988
PLANE TARY PHYSICS
1:30 p.m. Gilruth 206

Durham W. B.* Kirby S. H. Stern L. A.
Rheology of Water-Ammonia Ice: First Results

Eluszkiwicz J.*
Compaction of Icy Satellites

Wells W. J. Hamilton D. C.* Holmes N. C. Radowsky H. B.
Ree F. H. Mitchell A. C. Nicol M.
Planetary Ices at High Dynamic Pressures and Temperatures and the
Magnetic Field of Uranus

Geissler P.* Croft S.
Dispersion Hardening of Ice: Implications for Topographic
Relaxation on the Icy Satellites

Kargel J. S.*
Liquidus Phase Relations and Liquid Properties in the System
H2O-NH3-CO2-H2CO

Mao H. K.* Wu Y. Jephco A. P. Hemley R. J.
Bell P. M. Bassett W. A.
Crystal Structure and Density of Helium up to 232 Kbar

Matson D. L.* Brown R. H.
Solid State Greenhouses: Approaches for Temperature Measurement

Brown R. H.* Matson D. L.
Solid-state Greenhouses and Their Role on Icy Satellites

Matsui T.* Ishiwatari M. Abe Y.
A Possible Scenario for Atmospheric Evolution: Steam Atmosphere
to Present One

Malcuit R. J.* Mehringer D. M. Winters R. R.
Computer Simulation of "Intact" Gravitational Capture of a Lunar-Like
Body by an Earth-Like Body

Radler K.-H.* Ness W. F.
Comments on the Symmetry Properties of Planetary
Magnetic Fields

Kirk R. L.* Stevenson D. J.
The Role of Differentiation in the Stress Histories of the
Terrestrial Planets: Implications for the Moon and Mars

Ross M. N.* Schubert G.
Coupled Thermal-Dynamic Evolution of the Earth-Moon System

Cisowski S. M.* Fuller M.
Rock Magnetic Criteria for Distinguishing Lunar
Samples as Suitable Paleomagnetic Recorders

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Solomon S. C. Meinke L.
Longevity of Impact-Induced Faults as Preferred Sites
for Later Tectonic Activity: A Further Terrestrial Test

Kochemasov G. G.
What in Common Between Grimaldi Crater (Moon), Cleopatra Crater
(Venus) and St. Helena Island or Afar (Earth)?

Kochemasov G. G.
Relationship of Congo and Indian Cratons to
Anomalies of Geoid

Wilson L.* Head J. W., III
The Influence of Gravity on Planetary Volcanic Eruption Rates
Tuesday, March 15, 1988
NTOLE GASES AND SOLAR SYSTEM HISTORY
(John Reynolds's 65th Birthday Celebration)
7:30 p.m. Gilruth 104

Lewis R. S.* Anders E.
Xenon-HL in Diamonds from the Allende Meteorite - Composite Nature

Ott U.* Begemann F. Yang J. Epstein S.
S-Process Kr and 22Ne in Murchison: A Correlation

Olinger C. T.* Garrison D. H. Hohenberg C. H.
Laser Extraction of Cosmogenic Neon from Microgram Size Grains

Posock F. A.* Brannon J. C.
Ca Isotopic Anomalies in Murchison Hilonites Observed by Thermal Emission Spectrometry

Phinney D.*
Lithium Abundances in Natural Diamonds: An Exploratory Ion-Microprobe Study

Garrison D. H.* Olinger C. T. Hohenberg C. M. Caffee M. W.
Noble Gases in Grain-size Separates from Pesyanoe: A Study in Anomalous Acquisition of Terrestrial Xenon

Broadhurst C. L.* Drake M. J. Hagee B. E. Bernatowicz T. J.
Solubilities and Partitioning of Noble Gases in Mineral-Melt Systems -II. Synthesis Experiments for Ne, Ar, Kr and Xe in Anorthite, Diopside, Fosterite, and Coexisting Melts

Ferreira M. P.* Macedo C. R. Ferreira J. F.
K-Ar Geochronology in the Selvagens, Porto Santo and Madeira Islands (Eastern Central Atlantic): A 30 M.Y. Spectrum of Submarine and Subaerial Volcanism

Barraclough B. L.* Marti K.
Noble Gas Components in the Mantle: Which Reservoirs Do MORBs Actually Sample?

Caffee M. Hudson G. Velski C. Alexander E., Jr.* Huss G. Chivas A.
Non-Atmospheric Noble Gases from CO2 Well Gases

Presented by Title Only

Wednesday, March 16, 1988
IMPACT FLUX AND TERRESTRIAL CRATERING
8:30 a.m. Gilruth 104

Wells G. L.* Zolensky M. E.
A New Estimate of the Global Frequency of Meteorite Falls

Neukum G.*
The Cratering Rate in the Earth-Moon System over the Past 3.109 Years and in Recent Time

Strom R. G.*
Implications for the Origin of the Objects Responsible for the Period of Late Heavy Bombardment from the Terrestrial Planet Cratering Record

Lowe D. R.* Asaro F. Byerly G. R.
Iridium Anomalies Associated with Early Archean Spherule Layers, South Africa and Western Australia

Lowe D. R.* Byerly G. R.
Identification and Effects of Large, Early Archean, Terrestrial Meteorite Impacts: A Geological Perspective on Late Accretion

Byerly G. R.* Lowe D. R. Asaro F.
Chemistry and Mineralogy of Early Archean Impact Deposits, Fig Tree Group, Barberton Greenstone Belt, South Africa

French B. M.*
Iridium in the Vredefort Bronzite granophyre: Impact Melting and Limits on a Possible Extraterrestrial Component

French B. M.*
Vredefort Bronzite Granophyre: Chemical Evidence for Origin as an Impact Melt

Deutsch A.* Buhl D. Lakomy R.
A Small Scale Sr-Nd Study of the Footwall Breccia (Sudbury, Canada) - A Case Study for Isotope Systematics of Polymict "Granulitic" Breccias

Ekelund A.* Engstrom E. U.

Sharpton V. L.* Nielsen D. C.
Is the Bee Bluff Structure in S. Texas an Impact Crater?

Garvin J. B.* Grieve R. A. F. Schnetzler C. Honey F.
Geologic Remote Sensing of Terrestrial Impact Craters

McCormick K.* Taylor G. J. Keil K. Spudis P. D.
Grieve R. A. F. Ryder G.
Sources of Clasts in Impact Melts
Gratz A.* Tyburczy J. A. Christie J. Ahrens T. J. Pongratz P.
Shock of Deformed Quartz

Heymann D.*
Luminescence of Experimentally Shocked Plagioclase Feldspar

Castano J. R.*
Drilling for Abiogenic Gas in the Siljan Impact Structure,
Sweden: A Progress Report

POSTER PRESENTATIONS

Wood C. A. Grieve R. A. F.
Surface Morphology of Terrestrial Impact Craters as Viewed from Orbit

Hartung J. B. Anderson R. R.
A Summary of Data on the Manson Impact Structure

Seeger C. R. Asaro F. Michel H. Noland A. V.
The Search for Jeptha Knob Iridium, Continued

Roddy D. J. Shoemaker E. M. Shoemaker C. S. Roddy J. K.
Aerial Photography and Geologic Studies of Impact Structures in Australia

Roddy D. J. Shoemaker C. S. Roddy J. K.
The Boxhole Meteorite Crater, Northern Territory, Australia

McHone J. F. Knauth L. P.
Barringer Crater Stishovite: Oxygen-18 Rich Relative to Bulk Target Rock

Ferguson H. M. Lucchitta B. K.
Ganymede: "Moat" Craters Compared with Palmipede and Basins

Schenk P. M.
Crater Depth/Diameters on Uranian and Saturnian Satellites: The Frictional Strength of Ice

Matsui T. Namiki N.
Numerical Simulation of Planetary Ring Formation

O’Keefe J. D. Ahrens T. J.
Large Scale Impact on the Earth with an Atmosphere

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Milstein R. L.
Impact Origin of the Calvin 28 Cryptoexplosive Disturbance, Cass County, Michigan

Shoemaker E. M. Shoemaker C. S.
Impact Structures of Australia (1987)

The Roter Kamm Crater Structure in SWA/Namibia

Campbell K. E. Grieve R. A. F. Pacheco J. Garvin J. B.
A Possible Impact Structure in Amazonian Bolivia

Wu S.
The Shanghewan Impact Crater, China

Sengupta D. Bhandari N.
Formation Age of the Lunar Crater

Vrana S.
The Bohemian Moldavitite Strewnfield: Accumulation and Conservation of the Ries-related Tektite in the Erosional Cavity of the Sevetin Impact Structure

Feldman V. I. Sazonova L. V. Kononkova N. N.
Chemism of Diaplectic Transformation in Garnet, Biotite and Staurolite

Sazonova L. V. Feldman V. I.
Diaplectic Transformation of Dark-Colored Minerals

Reshetnyak N. B. Raikhlin A. I.
Raman Spectra of Impact Glasses and Tektites

Kashkarov L. L. Gencheva L. I. Kashkarova V. G. Isokh E. P.
Track and Thermoluminescence Dating of the Impact Glasses from Meteoritic Crater Zhmanskine

Nyquist L. Bansal B. Wiesmann H. Shih C.-Y. Horz F.
Isotopic Studies of Shock Metamorphism: II. Sm-Nd

Matsuda J. Nagao K.
Noble Gas Enrichment in the Shock-produced Diamond

Mironov Y. V. Ledyguin V. M.
Weak Shock Metamorphism in Basalts of the Logancha Astrobleme

Reimold W. U.
Shock Experiments with Preheated Witwatersrand Quartzite and the Vredefort Microdeformation Controversy

Feldman V. I. Rjabchovski V. M.
Compositional Relationships of Target and Melt on Zhmanskine Astrobleme

Kapustkina I. G. Feldman V. I.
Some Geochemical Aspects of Projectile Reconstruction

Pierazzo E. Sartori S. M. Vanzani V.
Terrestrial Impact Cratering Record Revisited by Vector Fourier Analysis

Hartmann W. K.
Crater Saturation Equilibrium in the Solar System: New Evidence

Sazonova L. V.
Shock Metamorphism of Ilmenite in Janisjarvi Astrobleme (Karelia, USSR)
Chondrule Sizes and Chemical Fractionations Among Chondrites may have both Resulted from Protosolar Eruptions

The Mineralogy of Type IA Chondrules in Semarkona (LL3.0): Disentangling the igneous and Metamorphic Histories of Type 3 Ordinary Chondrites

Iodine-Xenon and Petrographic Studies of Semarkona Chondrules

Evidence of the In-situ Decay of 26Al in a Semarkona Chondrule

The Mineralogy of Type IA Chondrules in Semarkona CLL3.0): Disentangling the Igneous and Metamorphic Histories of Type 3 Ordinary Chondrites

Alteration History of Chondrules in the Semarkona Ordinary Chondrite

Chondrules and Matrix in the Sharps H3.4 Chondrite

Grain Size and Texture of Chondrule Populations in Mezo-Madaras

Electron-microprobe and Cathodoluminescent Studies of Unequilibrated Ordinary Chondrites, II. Chondrule Mesostases in ALHA77214 and DHAJALA.

Metamorphism of Ordinary Chondrites---Information from a Study of Al-rich Chondrules

Bulk Composition of Matrix and Chondrule Rims for Four Carbonaceous Chondrites

Dynamic Crystallization Experiments on Chondrule Melts of Porphyritic Olivine Composition: Comparison of Olivine Compositions from Natural and Experimentally Produced Chondrules

Chondrule Texture: The Influence of Bulk Composition and Heating Time for Uniform Thermal Conditions

Composition of Chondrules and Parent Materials

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Misawa K. Nakamura N.
Rare Earth Elements in Chondrules and CAI from the Felix (CO3) Chondrite

Noda S. Nagamoto H. Nishikawa Y. Misawa K. Nakamura N.
Chondrule Cores and Rims from the Tieschitz (H3.6) Chondrite

Skrinik A. Y.
Accretion Structures-I. Their Relicts in Chondrites and Chondrule Formation Model

Skrinik A. Y.
Accretion Structures-II. Constitution of Different Types of Meteorites and Implications for Their Origins

Makjanic J. Vis R. D.* Touret J. L. R. Verhey A.
Raman Spectroscopy of Some Glass Inclusion in Chondrules of Allende

Bischoff A. Palme H.
Formation of Al-rich Chondrules by Chondrule Collision and Splashing

Kashkarov L. L. Korotkova N. N. Kashkarova V. G.
Thermoluminescence of the Allende Chondrule Olivines with the Different Irradiation History

Kashkarov L. L. Kalinina G. V. Kashkarova V. G.
Baryshnikova G. V. Lavrukhina A. K.
Track and Thermoluminescence Studies of the Radiation and Thermal Histories for the Ordinary Chondrite Elenovka L5 Chondrules

Lavrukhina A. K.
Origin of Chondrules

Specifics of the Composition of the Fe, Ni-phase in the Chondrules of Chondrites of Different Chemical Groups

Lang B. Franaszczuk K.
Chondrules: Are They Fractals?
Wednesday, March 16, 1988
REMOTE SENSING OF PLANETARY SURFACES
8:30 a.m. Gilruth 206

Williams A.* Hapke B.
Light Scattering by Single Particles

Nelson M. L.* Clark R. N.
Application of Radiative Transfer Theory to the Spectra of Mineral Mixtures

Efford N. D.* Wilson L.
Photometric Characterisation of the Lunar Surface Using Hapke's Equation

Hapke B.*
Thermal Emission and Reflectance Spectroscopy

Salisbury J. W.* Walter L. S.
Thermal Infrared (8- to 14-um) Spectroscopic Remote Sensing of Rock Type on Particulate Planetary Surfaces

Vogler K. J.* Johnson P. E. Shorthill R. W.
Improved Thermal Models for Solid Planetary Bodies

Mustard J. F.* Pieters C. M.
Predicting Mineral Abundances from Reflectance Spectra: Laboratory Tests

Rivard B.* Arvidson R. E. Sultan M.
Mapping of Ophiolitic Melanges of the Wadi Ghadir Area, Nubian Shield of Egypt Using a Linear Mixing Model Applied to Landsat Thematic Mapper Data

Christensen P. R.* Malin N. C.
High Resolution Thermal Imaging of Mars

Bell J. F., III* McCord T. B.
Mars: Near-Infrared Comparative Spectroscopy During the 1986 Opposition

Correlation of Radar Backscatter and Aeolian Roughness: Implications for Venus

Gaddis L.*
Geologic Analysis of SIR-B Data for Kilauea Volcano, HI: Implications for Interpretation of Venera 15/16 and Magellan Data of Volcanic Centers on Venus

Garvin J. B.* Williams R. S., Jr.
Remote Sensing of Planetary Analogue Landforms in SW Iceland

POSTER PRESENTATION

Mardon A. A.
Low Level Remote Sensing to Directly Detect Antarctic Surficial Blue Ice Meteorites

Pieters C. M. Taylor G. J.
Millimeter Petrology and Kilometer Mineralogical Exploration

Sunshine J. M. Pieters C. M. Pratt S. F.
Gaussian Analysis of Pyroxene Reflectance Spectra

Singer R. Geissler P.
An Independent Assessment of Derivative Analysis of Reflectance Spectra

Lucey P. G.
Ground-based Imaging Spectroscopy of the Moon: On the Threshold

Tellez J. R. Whitford-Stark J. L.
SMIRR Data Analysis of West Texas: Enhancement of Lithologic Signatures

Melendrez D. E. Zimbelman J. R. Francis P. W.
Digital Photomosaic of Viking Images 14A29-14A35: A Preliminary Look at Gangis Chasma, Mars

Blount G. Greeley R. Christensen P. R. Lancaster W.
Interpreting the Geologic History of Aeolian Sand Bodies from Remote Sensing Data

PRESENTED BY TITLE ONLY

Garvin J. B. Ulaby F. T. Webster W.
Dielectric Properties of Meteorites: Implications for Radar Observations of Phobos

Smith M. O. Adams J. B.
Telescopic Spectra of Mars Linked to Viking Lander Multispectral Images and Laboratory Analogs

Hurtak J.
The Use of Remote Sensing and Electromagnetic Sound Penetration in the Study of Fault Zones

Miyamoto M.
Infrared Diffuse Reflectances of Some Hydrous Minerals: Absorption Bands Near 3 um
IMPACT GLASSES: FORMATION AND SOURCES

Wednesday, March 16, 1988

1:30 p.m. Gilruth 104

Murali A. V.* Zolensky M. E. Underwood J. R.
Giegengack R. F.
Formation of Libyan Desert Glass

See T. H. Horz F.* Murali A. V.
Two Types of Impact Melt from the Wabar Crater, Saudi Arabia

Murali A. V. See T. H. Blanchard D. P.
Precursor of the Wabar Crater Glasses?

Johnson P. H.* Bogard D. D. Horz F.
Shock-Implanted Noble Gases in Samples from the Wabar Impact
Crater: Implications for Other Terrestrial Craters and the
Surface of Mars

Ahrens T. J.*
A New Theory for the Shock Production of Glasses and
High Pressure Phases in Planetary Silicates

Jansa L. F.* Pe-Piper G. Robertson B. Friedenreich O.
Meteorite Impact Crater on the North Atlantic Shelf

Glass B. P.*
Montagnais Impact Crater: Possible Source of the North American
Tektite Strewn Field

Borbor B. F.* Betterton W. J. Foord E. E.
Coesite, Glass, and Shocked Quartz at DSDP Site 612: Evidence for
Nearby Impact in the Late Eocene

Koeberl C.*
Extension of the North American Tektite Strewn Field

Stecher O.* Ngo H. H. Papenastassiou D. A. Wasserburg G. J.
Rb-Sr and Sm-Nd Evidence for the Origin of the Late Eocene
Microtectites

Wildebrand A.*
Oblique Impact as the Source of the Australasian Tektites

Futrell D.*
The Importance of Closed Folds in Muong Nong-Type Tektites

O'Keefe J. D.* Ahrens T. J.
Impact Produced Condensate and Droplet Size Distributions

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Miura Y.
Amorphous Impact Materials in the Planetary Surfaces

Feldman V. I. Fedosova S. P. Kirillova O. P. Kopylova M. G.
Refractive Index of Natural Glasses as a Criterion for Distinction
of Vulcanites and Impactites

Feldman V. I. Bindeman I. M. Sazonova L. V.
Rate of Impact Melts Cooling and Mineral Compositions

Masaitis V. L. Ivanov M. A. Ezersky V. A. Kozlov V. S.
Reshetnyak N. B.
Finds of Tektite Glasses in West Siberia

Yan Z. Zhang Q.-W. Ye L.-F. Xu D.-Y.* Sun Y.-Y.
Fission Track Ages and Stable Oxygen Isotope Composition of the
Tektites (Leigongmo) from Hainan Island, China
Wednesday, March 16, 1988
NON-CARBONACEOUS CHONDRITES
1:30 p.m. Gilruth Gym

Wasson J. T.* Kallenbach G. W. Rubin A. E. Wang D.
The Continuous Redox Fractionation Sequence Among Ordinary
Chondrites

Brearley A. J.*
Nature and Origin of Matrix in the Unique Chondrite Kakangari: A
TEM Investigation

Gooding J. L. Jull A. J. T.* Cheng S. Velbel M. A.
Mg-Carbonate Weathering Products in Antarctic Meteorites
Isotopic Composition and Origin of Wesqueheonite from LEW 85320

Pellas P.* Fieni C.
Thermal Histories of Ordinary Chondrite Parent Asteroids

Cashore J.* McKinney M. L. McSween H. Y.
No Evidence for Different Parent Bodies of Antarctic and Non-Antarctic
H Chondrites: A Multivariate Study

Hasan F. A.* Sears D. W.
Thermoluminescence Evidence for a Terrestrial Age Difference Between
Allan Hills and Lewis Cliff Meteorites

Takagi Y.* Mizutani H.
Ablation Rates of Falling Meteorites in the Terrestrial Atmosphere

Shaw D. M.* Higgins M. D. Truscott M. G. Middleton T. A.
Hinton R. W.
Boron in Chondritic Meteorites

Lavielle B.* Marti K. Pellas P.
Evidence for Extinct 248Cm in Meteorites?

POSTER PRESENTATIONS

Britt D. T. Pieters C. M. Patyev M. I. Zaslavskaya N. I.
Tsarev: Petrology and Bidirectional Reflectance Characteristics
of a Black Chondrite

Bhandari N. Sengupta D.
Terrestrial Ages of Antarctic Meteorites Based on Thermoluminescence
Levels in Their Fusion Crust

Schutt J. Fessler B. W. Cassidy W. A.
Thematic Maps of Antarctic Meteorites

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Bonneau P. Shaffer N. Basu A.
First Report of a New Meteorite Find from Seymour, Indiana

Alteration Products on the LEW 85320 H5 Chondrite

Solberg T. C. Burns R. G.
Mossbauer Spectra of Weathered Stony Meteorites Relevant to
Oxidation on Mars: I. Chondrites

Korotkova N. N. Skripnik A. Ya. Lavrukhina A. K.
Solar Flare Track Records in Nikol'skoe L4-5 Chondrite

Korotkova N. N. Skripnik A. Ya. Lavrukhina A. K.
Track Study of Bjurbolle L4, Ochansk H4 and Nikol'skoe L4-5
Chondrite Olivines

ALH 85085
3:45 P.M. Gilruth Gym

GrosSNn J. N.* Rubin A. E. MacPherson G. J.
Allan Hills 85085: An Out-of-the-Ordinary, Enstatite-rich
Carbonaceous Chondrite

Scott E. R. D.*
A New Kind of Primitive Chondrite: Allan Hills 85085

Weisberg M. K.* Prinz M. Nehru C. E.
ALH85085: A Unique Unequilibrated Chondrite

Wasson J. T.*
A Non-Nebular Origin for the Allan Hills 85085 Subchondritic
Meteorite

LP1B No. 49 Appendix - Program - Wednesday
Wednesday, March 16, 1988
GEOLOGIC AND REMOTE SENSING STUDIES OF THE MOON
1:30 p.m. Gilruth 206

Svitek T.* Murray B. C. Lunar Polar Ice - A Reappraisal

Pieters C. M.* Water on the Moon? Potential Detection of Recent Cometary Impacts in the Earth/Moon Environment Using LGO/VIMS

Hood L. L. * Williams C. R. The Lunar Far Side Swirls: Distribution and Possible Origins


Jaumann R.* Neukum G. Hawke B. R. Quantitative Determination of the Geochemical Composition of Lunar Surface Materials from Telescopic Reflectance Data

Metzger A. E.* The Identification of Lunar Rock Types via Orbital Gamma Ray Spectroscopy

O'Keefe J. A.* Lechatelierite in Moldavites

Coombs C. R.* Hawke B. R. Owensby P. D. A Recent Survey of Localized Lunar Dark Mantle Deposits

Swann G. A.* Toward a Classification of Lunar Sinuous Rilles

Zisk S. H.* High-resolution (30 M) Lunar Radar Observations

Campbell B. A.* Zisk S. H. Mouginis-Mark P. J. Lunar Surface Scattering from New 3-cm Polarization and Phase Radar Data

Morgan T. H.* Zook H. A. Potter A. E. Production of Sodium and Potassium Vapor from the Lunar Regolith

Garvin J. B.* Zuber M. T. Bultan J. L. Lunar Observer Laser Altimeter: Geoscience Applications

POSTER PRESENTATIONS


Coombs C. R. Hawke B. R. Kauhako Crater and Channel, Kalapana, Moloka'i: A Preliminary Look at a Possible Analog to Lunar Sinuous Rilles

Spudis P. D. Davis P. A. Pattanaborwornsak B. The Fe-Al Relations of Lunar Soils and Orbital Chemical Data: Implications for Al Abundances Estimated from Apollo Orbital Gamma-Ray Data

PRESENTED BY TITLE ONLY

Thompson T. W. Ultra-high Resolution Radar Mapping of the Moon at 70 CM Wavelength

Rodionova Zh. F. Shevchenko V. V. Karlov A. A. Smolyakova T. P. The Creation of Maps of the Density Distribution of Lunar Craters
Thursday, March 17, 1988
OUTER SOLAR SYSTEM
8:30 a.m. Gilruth 104

Wood C. A.*
Satellite Systematics


Nelson R. M. Morrison D.
10: Leading Side Volcanism in 1986

Gradie J.* Moulis-Mark P. Hayashi J. Flynn L.
Temperature and Variability of an Active Lava Lake: Lessons to be Applied to Io

Davies A. G.* Wilson L.
Silicate-Sulphur Interactions on Io--Implications for Pele Type Plumes

Murchie S. L.* Head J. W. Plescia J. B.
Tectonic and Volcanic Evolution of Dark Terrain and Its Implications for Internal Structure and Evolution of Ganymede

Croft S. K.*
Crater Depth/Diameter/Morphology Relationships on the Icy Satellites: Implications for Ice Rheology

Lissauer J. J.* Squyres S. W. Hartmann W. K.
Bombardment History of the Saturn System

Thomas P. J.* Squyres S. W.
On the Relaxation of Herschel Basin and Mimas’ Tidal Bulge

Ross M. N. Schubert G.*
Viscoelastic Models of Tidal Heating in Enceladus

Helfenstein P.* Veverica J.
Early Resurfacing of Umbriel: Evidence from Voyager II Photometry

Nyffenegger P.* Consolmagno G. J.
Tectonic Episodes on Ariel: Evidence for an Ancient Thin Crust

McKinnon W. B.* Mueller S.
Pluto Structure and Composition: Evidence for a Solar Nebula Origin

POSTER PRESENTATIONS

Golanbek M. Banerdt B.
Constraints on the Subsurface Structure of Europa

Jakosky B. M.
Observational Constraints on the Efficacy of a Solid-State Greenhouse on the Galilean Satellites

Nicol M. Boone S. Koumakakis A.
Ammonia-Water Mixtures at High Pressures: Applications to Icy Satellites

Ruzicka A.
The Geology of Ariel

Kargel J.
The Geology of Ariel, I: Trans-Tensional Block Tectonics

Croft S. K.
Miranda’s Inverness Corona Interpreted as a Cryovolcanic Complex

Schafer M. W. Schafer E. E.
Large-amplitude Photometric Variations of Nereid

PRESENTED BY TITLE ONLY

Philpott R.
Formation of Sulci, Grooves and Associated Stress Regimes on Ganymede

Philpott R.
The Tectonic History of Ganymede

Philpott R.
Geological, Chronological and Structural Mapping of Ganymede

Philpott R. Moore V. Godfrey D. A. Baker W.
Construction of Digital and Photomosaics of Ganymede

Dalrymple W., III Hogenboom D. L. Consolmagno G. J.
The Density of Ammonia-Water Solution to 400 MPa (4 Kilobars)

Murchie S. L. Head J. W.
The Evolution of Volcanism on Ganymede: Possible Importance of a Low Melting-point Volatile

Sotin C. Murchie S. L.
Internal Dynamics of a Differentiated Ganymede: Constraints from Experimental Data

Croft S. K.
Crater Ejecta Facies on Ganymede

Croft S. K. Duxbury E. D.
Crater and Crater Forming Populations on Ganymede and Callisto
Crater-Densities and Crater-Ages of Different Terrain Types on Ganymede

Crater Populations on the Uranian Satellites

Nuth J. A.* Moore M. H.
Proton Irradiation of SiH$_4$-Fe(CO)$_3$-H$_2$O Ices and the Production of Refractory Silicates: Implications for the Solar Nebula

Blake D.* Freund F. Bunch T. Chang S. Tielens A. Greiner W. R.
A Comparison of Allende Diamond with Diamond from Detonation Soot

Tang M. Anders E. Zinner E.*
Noble Gases, C, N and Si Isotopes in Interstellar SiC from the Murchison Carbonaceous Chondrite

Clayton D. D.*
New Cosmic-Chemical-Memory Mechanism for Isotopic Anomalies

Wood J.* Hashimoto A.
The Condensation Sequence Under Non-Classic Conditions (P<10$^{-3}$ ATM, Non-Cosmic Compositions)

Thiemens M. H.* Jackson T.
The Single-Stage, Mass Independent Fractionation Factor in Ozone

Robert F.* Halbout J.
A Non Mass Dependent Isotopic Fractionation Effect: A Hydrogen-Deuterium Exchange Experiment

Bhattacharya S. Thiemens M.*
Oxygen Isotope Studies in O + CO Reaction: Energy Constraints in Symmetry Selective Fractionation

Stability of Hibonite and CaAl$_4$O$_7$ in the Solar Nebula

Hashimoto A.*
Evaporation Kinetics of REE Oxides

Halbout J.* Robert F. Javoy M.
Oxygen Isotopic Contamination During HF-MCI Dissolution of Bulk Carbonaceous Chondrites

Stable Isotopes in the Ordinary Chondrites: Characterisation of Isotopically Anomalous Phases
Wright J. P. Pillinger C. T.
Isotopically Heavy Carbon in the Allende Meteorite - New or
Previously Recognised Phases?

POSTER PRESENTATION

Chen J. H.
238U, 235U, 234U in Lunar and Terrestrial Samples and the Determination
of Lambda 238/Lambda 234

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Fukunaga K. Matsuda J. Nagao K. Ito K.
The Relationship Between the Concentrations of Ar in Vapor Growth
Diamond and the Partial Pressure of Ar

Matsuda J. Miyamoto M. Ito K.
On the Vapor-growth Diamonds formation in the Solar Nebula

Dearborn D. Lee T. Wasserburg G. J.
The Origin of Al-26

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Geology and Deposits of the Lunar Nectaris Basin

McGee J. J. *
Diversity of Granulitic Breccia Clasts from Feldspathic
Fragmental Breccia 67975

Takeda H. Miyamoto M.
Mineralogical Studies of Lunar Highland Breccia 67016, an Analog
of the Yamato-82 Lunar Meteorites

Laul J. C. *
Chemistry of Apollo 17 Highland Coarse Fines: Plutonic and Melt Rocks

Lindstrom M. M. * Marvin U. B. Middlefehldt D. W.
Highland Clasts in Apennine Front Breccia 15295

Dasch E. J. * Shih C.-Y. Bansal V. M. Wiesmann H. Nyquist L. E.
Age of A15 Norites, Continued

Morgan J. W. * Wandless G. A.
Lunar Dunite 72415-72417: Siderophile and Volatile Trace Elements

Premo W. R. * Tatsumoto M. Wang J. W.
Pb Isotopes in Anorthositic Breccias 67075 and 62237: A Search
for Primitive Lunar Lead

Meyer C. * Yang S. R.
Tungsten-bearing, Lunar "Yttrobetafite"

Maskin L. A. * Korotev R. L.
Limits from Eu Mass Balance on the Proportions of KREEP and Ferroan
Anorthosite in the Lunar Surface Crust

Warren P. M. * Kallemeyn G. W.
Lunar Meteorites: Constraints on Lunar Composition and Evolution

Bersch M. G. Taylor G. J. * Keil K.
Ferroan Anorthosites and the Magma Ocean - Searching for Trends in
the Sea of Confusion

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Miura Y.
Normal and Anomalous Compositions of Lunar Feldspars--I. Lunar
Plagioclases

Korotev R. L. Maskin L. A.
Compositional Survey of Particles from the Luna 20 Regolith
Korotev R. L.  Jolliff B. L.  Haskin L. A.
Compositional Survey of Particles from the Luna 16 Regolith

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Korina M. I.  Frenkel M. Y.
Fragments from Lunar Highland Regolith: Search for Magmatic Relatives

Neal C. R.  Taylor L. A.  Patchen A. D.  Lindstrom M. M.
Evidence for REE Metasomatism of the Apollo 14 Highlands Crust

Shearer C. K.  Papike J. J.  Simon S. B.  Shimizu N.
An Ion Microprobe Study of the Intra-Crystalline Behavior of REE in Pyroxene from KREEP Basalts

Simon S. B.  Galbreath K. C.  Papike J. J.
Petrology of Apollo 17 Highland Coarse Fines

James O. B.
Trace Elements in the Plagioclase of Lunar Ferroan Anorthosites

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THE K-T AND RELATED EVENTS
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O’Keefe J. D.*  Ahrens T. J.
Impact Production of CO2 by the K-T Extinction Bolide, and the Resultant Heating of the Whole Earth

Optical Microscopy and TEM of Shocked Material from the Clear Creek, Colorado K/T "Magic Layer"

Ciskowski S. M.*
Analogues for Magnetic Microspherules Associated with the K/T and Upper Eocene Extinction Events

Flexer A.*  Rosenfeld A.  Honigstein A.  Dvorachek M.
A Microdiamond - Additional Support for Extraterrestrial Signatures Near the K/T Boundary in Israel

Rosenfeld A.  Flexer A.*  Almogi-Labin A.
Honigstein A.  Dvorachek M.
Evidence for Multiple Extraterrestrial Impacts at the Cretaceous-Tertiary Transition in Israel

Gilmour I.*  Anders E.
Trace Elements at the K-T Boundary: Evidence for a Single Impact?

Orth C. J.*  Attrep M. Jr.  Quintana L. R.
Diner R.  Elder W. P.
Siderophile Abundance Maxima at Upper Cenomanian Marine Invertebrate Extinction Horizon: Western Interior of North America

Wolbach W. S.*  Gilmour I.  Anders E.
Environmental Changes Across the K-T Boundary at Woodside Creek New Zealand

Xu D.-Y.*  Zhang Q.-W.  Sun Y.-Y.  Yan Z.  Chai Z.-F.
On the Astrogeological Events in China

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de Silva S. L.  Sharpton V. L.
The K-T Boundary Debate - A Volcanological Perspective

Cisowski S. M.
Paleomagnetism of Manson Structure Cores Inconsistent with K/T Link

Yamakoshi K.
Local Event of Cosmic Matter Accretion Around 580,000 Years Before Present Found in Two Dated Central Pacific Cores
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UREILITES
1:30 p.m. Gilruth Gym

Prinz M.* Weisberg M. K. Nehru C. E.
Feldspathic Components in Polymict Ureilites

Takeda H.* Mori H. Ogata H.
Mineralogy of Magnesian and Calcic Groups of Ureilites
and Formation Condition of Ureilites

Davis A. M.* Prinz M. Laughlin J. R.
An Ion Microprobe Study of Plagioclase-rich Clasts in the
North Haig Polymict Ureilite

Goodrich C. A.* Patchett P. J. Drake M. J.
Nd and Sr Isotopic Analyses of the Ureilite Novo Urei:
Evidence for a Young LREE-enriched Component

Clayton R. W.* Mayeda T. K.
Ureilites are not Igneous Differentiates

Warren P. H.* Kallemeyn G. W.
A New Model for Ureilite Origin: Incomplete Impact-Disruption
of Partially Molten Asteroids

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Spitz A. Goodrich C. Crozaz G. Luxenberg L.
Ion Microprobe Search for the LREE Host Phase in Ureilite Meteorites

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Mori H. Takeda H.
TEM Observation of Carbonaceous Material in the Dyalpur Ureilite

Miyamoto M. Matsuda J. Ito K.
Raman Spectra of Ureilite Diamond and the Origin of Diamond
in Meteorites

LEW86010 AND ADOR
3:00 p.m. Gilruth Gym

Treiman A. H.*
Angra dos Reis is not a Cumulate Igneous Rock

Goodrich C. A.*
Petology of the Unique Achondrite LEW86010.

Prinz M.* Weisberg M. K. Nehru C. E.
LEW 86010, A Second Angrite: Relationship to CAI's and Opaque Matrix

Delaney J. S.* Sutton S. R.
Lewis Cliff 86010, an ADORable Antarctician
McKay G.* Lindstrom D. Yang S.-R. Wagstaff J.
Petrology of Unique Achondrite Lewis Cliff 86010

McKay G.* Lindstrom D. Le L. Yang S.-R.
Experimental Studies of Synthetic LEW 86010 Analogs: Petrogenesis
of a Unique Achondrite

Croaz G.* Lundberg L. L. McKay G.
Rare Earth Elements (REE) in the Unique Achondrite LEW 86010

Aubele J. C.*
Morphologic Patterns in Lunar Mare Wrinkle Ridges and
Kinematic Implications

Golombek M.* Plescia J. Franklin B.
The Relative Importance of Faulting Versus Folding in the Formation
of Planetary Wrinkle Ridges

Plescia J. B.*
Vertical Relief of Martian Wrinkle Ridges: Implications
for Internal Structure

Watters T.*
The Wrinkle Ridge Assemblage

Watters T.* Tuttle M. Chadwick J.
Mare Ridge-Highland Scarp Structures and Upland Scarps on the Moon,
Mars, and Mercury

Watters T.*
Strain Distribution in the Anticlinal Ridges of the Columbia
Plateau: Implications for Their Origin and the Origin of First-Order
Ridges on the Terrestrial Planets

Hills L. S.*
Buried Topography as a Controlling Factor in the Origin of
the Giant Polygons of Mars

Forsythe R. D.* Zimbelman J.
Transcurrent Faulting on Mars: The Gordii Dorsum Escarpment

McGill G. E.*
Evidence for a Very Large Basin Beneath Utopia Planitia, Mars

Craddock R. A.* Greeley R. Christensen P. R.
Origin of Grooved Features in the Hesperian/Noachian Cratered
Terrain, Mawson Quadrangle (MC-16), Mars

Clow G. D.* Moore H. J. Davis P. A. Strichartz L. R.
Stability of Chasma Walls in the Valles Marineris, Mars

Wichman R.* Schultz P. H.
Ridged Plains Units on the Margins of Martian Impact Basins
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Jons H.-P.
Hints for an Embryonic Stage of Underplating/Plate Tectonics on Mars?

Wilhelms D. E. Baldwin R. J.
The Role of Igneous Sills in Shaping the Martian Uplands

Anderson R. C.
Lineament Analysis and Tectonic Interpretation for the Central Tharsis Region, Mars

Frey H. Schultz R. A.
Large Impact Basins as a Test of the Mega-Impact Origin of the Mars Crustal Dichotomy

Friday, March 18, 1988
LUNAR AND METEORITE BASALTS
8:30 a.m. Gilruth 104

Longhi J.* Pan V.
The Parental Magmas of the SNC Meteorites

McSween H. Y. Lundberg L. Crozaz G.
Crystallization of the ALHA77005 Shergottite: How Closed is a Closed System?

Wentworth S. J.* Gooding J. L.
Chloride and Sulfate Minerals in the Nakhla Meteorite

Neal C. R.* Taylor L. A.
Comparison of Lunar and Terrestrial Granites: A Unique Petrogenesis for the Lunar Occurrence

Neal C. R.* Taylor L. A.
The Origin of Phosphates in the Fra Mauro Highlands by Silicate Liquid Immiscibility: Part of the Basaltic Melt Produced in Lunar Granite Petrogenesis

Shearer C. K.* Papke J. J. Simon S. B. Shimizu N.
An Ion Microprobe Study of the Intra-crystalline Behavior of REE and Selected Trace Elements in Pyroxenes from Mare Basalts With Different Cooling and Crystallization Histories, Preliminary Results

Papke J. J.* Shearer C. K. Simon S. B. Shimizu N.
Lunar Pyroxenes: Crystal Chemical Rationalization of REE Zoning, Pattern Shapes, and Abundances - An Ion Microprobe Investigation

Shervais J. W.* Vetter S. K. Lindstrom M. M.
Heterogeneity in Small Aliquots of Apollo 15 Olivine Normative Basalt: Implications for Breccia Clast Studies

Schuraytz B. C.* Ryder G.
A New Petrochemical Data Base of Apollo 15 Olivine-Normative Mare Basalts

Nyquist L.* Wiesmann H. Bansal B. Shih C.-Y.
Rb-Sr Age of the Large Mare Basalt Clast in Breccia 15459

Ryder G.*
Limited Chemical Variation of Apollo 15 KREEP Basalts

Dickinson T.* Bild R. W. Taylor G. J. Keil K.
Late-Stage Enrichment of Ge in the Magma Ocean: Evidence from Lunar Basalts

Hughes S. S.* Delano J. W. Schmitt R. A.
Chemistry of 74220 Orange Mars Volcanic Glass; Implications for Their Magma Source Composition
Delano J. W.
Depths of Mare Source-regions: Limits Imposed by Buoyancy-driven Melt Segregation

POSTER PRESENTATIONS

Neal C. R. Taylor L. A.
"K·frac" + "REEP·frac": A New Understanding of KREEP in Terms of Granite and Phosphate Petrogenesis

Neal C. R. Taylor L. A. Schmitt R.
A Re-evaluation of Olivine Vitrophyre Petrogenesis

Lu F. Taylor L. A. Jin Y.
Coarse-grained Basic Igneous Samples from Mare Crisium: Mineralogy, Petrography, and Petrogenesis

Jin Y. Taylor L. A. Lu F.
Mineral Chemistry and Petrology of Luna 16 Basalts: Sample 21036

Ryder G.
A New Variant of High-Ti Mare Basalt from Van Serg Drive Tube 79001

Burt D. M.
Lunar Production of Oxygen and Metals Using Fluorine: Concepts Involving Fluorite, Lithium, and Acid-base Theory

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Mare Basalts From the Highland Region: Petrochemical Varieties and Geochemical Features (Luna 20)

Jones J. H.
Partitioning of Mg and Fe Between Olivine and Liquids of Lunar Compositions: The Roles of Composition, Pressure and Ti Speciation

Neal C. R. Taylor L. A. Schmitt R. Hughes S. S. Lindstrom M. M.
VHK Basalt Petrogenesis: Further Evidence from Breccias 14303 and 14304

Neal C. R. Taylor L. A. Patchen A. D.
Basalts from Apollo 14 Breccia 14321: Part 1 - Mineralogy and Petrology

Neal C. R. Taylor L. A. Schmitt R. Hughes S. S.
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Hughes S. S. Schmitt R. A.
A Least-Squares Method Used to Constrain Mixing Models of Hybridized Lunar Mare Basalt Magma Sources

Hughes S. S. Schmitt R. A.
Chemistry of a Unique Low-Titanium Basalt Clast Extracted From 60255 Regolith Breccia

Schreiber H. D. Kozak S. J. McManus K. K. Janjic D.
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Mossbauer Spectra of Weathered Stony Meteorites Relevant to Oxidation on Mars: II. Achondrites and SNC Meteorites

Semenova A. S. Nazarov M. A. Kononkova N. N. Solov'eva N. V.
Model Mineralogy and Major Element Chemistry of Luna 16 Basalt Rocks

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Inter-element Correlations among Mare Basalts and Pristine Lunar Glasses
Blum J. D.* Wasserburg G. J. Hutcheon I. D. Beckett J. R. Stolper E. M.
Opaque Assemblages in the Allende Meteorite: Evidence for Equilibrium at Low Temperatures (<<770K) and High fO2-fS2

Caille L. C.* MacPherson G. J. El Goresy A.
Fremdlinge in Vigarano CAI 4778: Assemblages, Compositions, and Possible Formational History

Davis A. M.* MacPherson G. J.
Rare Earth Elements in a Hibonite-rich Allende Fine-Grained Inclusion

Ireland T. R.* Fahey A. J. Zinner E. K.
Calcium and Titanium Isotopic Systematics of Hbonites

Grossman L.* Fahey A. J. Zinner E.
Carbon and Oxygen Isotopic Compositions of Individual Spinel Crystals from the Murchison Meteorite

Esat T. M.* Ireland T. R.
Cr Isotope Anomalies in Cr-rich Murchison Spinels

Bigham C. A.* Hutcheon I. D. Papanastassiou D. A.
Wasserburg G. J.
Isotopic Heterogeneity and Correlated Isotope Fractionation in Purple FUN Inclusions

Papanastassiou D. A.* Bigham C. A.
Correlated, Large Isotope Effects in Purple, Spinel-rich Inclusions

Prombo C. A.* Lugmair G. W.
Calcium Isotopic Disequilibrium in Allende Inclusion HN-3

Sheng Y. J.* Hutcheon I. D. Wasserburg G. J.
Plagioclase-Olivine Inclusions in Allende -- A Link Between CAI and Ferro-Magnesian Chondrules

Wark D. A.*
Small Compact CAI's: Collisional Splash Droplets?

Laughlin J. R. Davis A. M. Kuehner S. M. Grossman L.
Rare Earth Elements in a Compound Group II Allende Inclusion

Wark D. A.* Palme H.
MO and W Anomalies in CAI's: Sign of High Temperature Condensation, or Subsolidus Alteration?

Kuehner S. M.* Laughlin J. R. Grossman L. Johnson M. L. Burnett D. S.
Electron Probe and Ion Probe Determination of Melilithe/Liquid and Clinopyroxene/Liquid Partition Coefficients of Trace Elements in CMAS and NaCMAS

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Nelson R. M.* Bhattacharya S. K. Thiemens M. H. Nuth J. A.
Further Studies of the Hydrous Alteration and Oxygen Isotopic Fractionation of Refractory Condensates

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Bischoff A.
Exsolution Textures Produced by Annealing A Metal Alloy of Fremdlinge Composition

A Trace Element/Petrographic Study of Refractory Inclusions in Kaba (CV3)

Esat T. M. Wark D. A. Taylor S. R.
Mg Isotopic Composition of Rim Layers in the Vigarano Inclusion Vl-1

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Mg Isotopic Composition of Murchison Spinels

Kinsey A. E. Esat T. M. Taylor S. R.
Mg Isotopic Composition of Chondrules from Bjurbol and Murchison Meteorites

Zinner E.* Ming T.
Anomalous Oxygen in Spinels from a Murray Separate

Wark D. A. Spettel B. Palme H. El Goresy A.
Rim Formation by Flash Heating and Metasomatism: Evidence from Vigarano CAI Vl-1

Fisenko A. V. Ignatenko K. I. Lavrukhina A. K.
Metallic Particle EM1 - The Result of the Metal Crystallization in CAI Melt
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ASTEROIDS/COMETS
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Gradie J.* Flynn L.*
A Search for Satellites and Dust Belts Around Asteroids:
Negative Results

Jones T.* Lebofsky L. Lewis J.
The 3-micrometer Hydrated Silicate Signature on C Class Asteroids:
Implications for Origins of Outer Belt Objects

Harris A. W.* Young J. W.
Two Dark Asteroids with Very Small Opposition Effects

Bell J. F.*
An Earth-Crossing Source Body for the Basaltic Achondrites:
Vesta’s Son or Vesta’s Nephew?

Colwell J.* Jakosky B. Sandor B.
Sublimation Rates in Icy Craters, Trenches, and Crevasses on Comets

Roessler K.* Bischoff A. Eich G. Grun E. Fechtig H. Joo F.
Klinger J. Kochan H. Stoffler D. Thiel K.
Cometary Matter in Observation and Simulation Experiments

Kochan H.* Bischoff A. Fechtig H. Feuerbacher B.
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Roessler K. Seboldt W. Thiel K. Schwehm U.
Laboratory Simulation of a Cometary Nucleus: Experimental Setup and First Results

Bischoff A. Stoffler D.*
Comet Nucleus Simulation Experiments: Mineralogical Aspects of Sample Preparation and Analysis

Klinger J.* Benkhoff J. Espinasse S. Grun E.
Roessler K. Seboldt W. Spohn T. Thiel K.
How Far Do Results of Recent Simulation Experiments Fit with Current Models of Cometary Nuclei?

Hyde T.* Alexander W. M. Goed S. McDonald R.
Dynamics of Submicron Lunar Ejecta in Selenocentric, Cislunar and Geocentric Space

Oberst J.* Nakamura Y.
A Monte Carlo Simulation of the Diurnal Variation in Seismic Detection Rate of Sporadic Lunar Meteoroid Impacts

Zook H. A.*
On the Optical Detection of Meteoroids, Small Near-Earth Asteroids and Comets, and Space Debris

Van Dyk M. H. H.* Bosma P. B. Hovenier J. W.
Analysis of Zodiacal Light Data Based on a Finite Homogeneous Dust Cloud

POSTER PRESENTATIONS

Roessler K. Nebeling B.
High Energy and Radiation Chemistry in Space

Alexander W. M.* Goad S. Pollock J. Tanner W. G.
McDonnell J. A. M.
Analysis of Discrete Impact Events from the Giotto Comet Halley Dust Impact Experiment

Bell J. F. Owensby P. D. Hawke B. R. Gaffey M. J.
The 52-color Asteroid Survey: Final Results and Interpretation

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Nikolaeva O. V.
Comet Nucleus Matter: Some Predictions

Wdowiak T. J. Robinson E. L. Brasher L. D. Flickinger C.
Setze H. R.
Formation of Organic Cometary Dust by Ion Bombardment of Cosmic Ices

Cerroni P. Fujiwara A.
Experimental Study of Catastrophic Fragmentation of “Differentiated” Targets

Williams J. G.
The Unusual Alexandra Family

Shoemaker C. S. Shoemaker E. M.
The Palomar Asteroid and Comet Survey (PACS), 1982-1987

Hartmann W. K.
Trojan Asteroids: A Unique Frontier in Space Research

Capaccioni F. Barucci M. A. Cerroni P. Fulchignoni M.
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