

LUNAR AND PLANETARY



# INFORMATION BULLETIN

SEPTEMBER 1988 • NUMBER 51

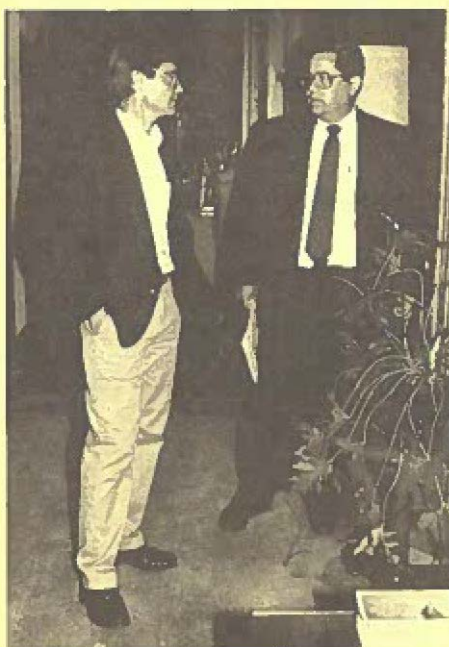
## New Director Joins Lunar and Planetary Institute

Dr. David C. Black has been named to succeed Dr. Kevin Burke as Director of the Lunar and Planetary Institute. Black is an internationally recognized research scientist in theoretical astrophysics and planetary science, specializing in studies of star and planetary system formation. He has also done pioneering experimental research involving the isotopic composition of noble gases in meteorites. He discovered and correctly identified evidence for nonsolar material in solar system matter and was the first to show that the isotopic composition of solar flare noble gases differs from that of solar wind noble gases. He is the recognized leader of a growing effort to search for and study other planetary systems.

After receiving his Ph.D. in physics from the University of Minnesota in 1970, Black was a National Research Council Postdoctoral Fellow from 1970–1972 at NASA Ames Research Center in California and has been employed by Ames since 1972. While there he has served as Chief of the Theoretical Studies Branch, Deputy Chief of the Space Science Division, and the first Chairman of the Ames Basic Research Council. Black was a Visiting Professor at the University of London during the 1974–1975 academic year. He was asked to serve as the first Chief Scientist for the Space Station Program at NASA Headquarters in 1985. He returned to Ames in the summer of 1987 as the Chief Scientist for Space Research.

Dr. Black is a member of the Executive Committee at the Space Science Laboratory at U.C. Berkeley and a member of NASA's Space and Earth Science Advisory Committee. He is a charter member of NASA's Task Force on Scientific Uses of the Space Station and the National Academy of Sciences study "Space Sciences: 1995–2015."

Publishing has been active part of



Dr. Black with Dr. David Cummings, Executive Director of Universities Space Research Association, the LPI's parent organization.

Black's career. He is on the Editorial Board of "Astrophysical Letters and Communications." He has authored or coauthored over 80 articles for scientific journals and was the lead editor on *Protostars and Planets II*, a fundamental resource book published by the University of Arizona Press. He is currently writing a monograph on searching for other planetary systems and is an invited coauthor of a volume in the forthcoming "Space Exploration Series" to be published by the Harvard University Press.

When asked to comment on any plans he might have for the LPI, Dr. Black indicated that he sees a more active role for the LPI in combining the theoretical and experimental phases of planetary

science, a concept he called "planetary system science." He feels that the LPI can continue its role as a bridge between NASA and universities and become a mecca for intellectual science. He remarked that "science is a bit like people; it tends to broaden with age," and he sees this broadening of the scientific scope of planetary science to be a very exciting prospect for the LPI. He views the Space Station as a unique opportunity to obtain scientific data about the solar system and about planetary systems around other stars.

Dr. Black and his family will be moving to the Clear Lake area in the near future. He will be in residence at the Institute by the first of September.

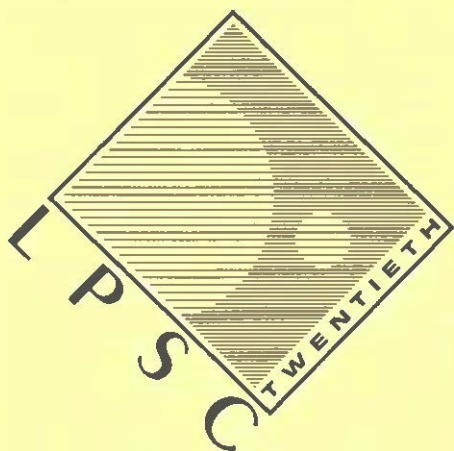
With the assumption of LPI director responsibilities by Black, Dr. Burke will be devoting more time to faculty responsibilities at the University of Houston and will continue some research efforts at LPI.

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# 20th Lunar and Planetary Science Conference

The Twentieth Lunar and Planetary Science Conference will be held March 13-17, 1989, in Houston, Texas. This year's conference continues the tradition of assembling international specialists in petrology, geochemistry, geophysics, geology, and astronomy to present the newest results in planetary science. However, it will be highlighted with special observations, as this is the twentieth annual gathering since the first samples were returned from the Apollo missions.



During the five days of the conference, research results will be presented in both poster and oral formats. Oral presentations will be strictly limited to eight minutes followed by brief discussion periods; poster sessions are encouraged, although also tightly scheduled, to maximize use of space and time. Participants will receive a set of volumes containing the abstracts reviewed and accepted by the LPSC Program Committee. All presentations must be supported by an abstract in the set. The proceedings of the conference will be copublished by Cambridge University Press and the Lunar and Planetary Institute.

Plenary or theme sessions are solicited. These sessions may be impromptu or structured by the conference community. Direct suggestions or requests to either of the LPSC chairmen, David Black or Michael Duke, as soon as possible for incorporation into planning and announcement mailing programs.

## Invitation to Participate

Researchers in all planetary and lunar programs are invited to participate in the conference and to submit abstracts. Anyone interested in attending the

conference who has not received the first announcement mailing or anyone needing additional program and registration information should contact the LPI Projects Office at 713-486-2150.

## Guidelines for Abstract Submission

Abstracts are limited to two pages and must be received in the LPI Publications Office by January 18, 1989. There are other guidelines and typing specifications. Anyone who received the first announcement and returns the Indication of Interest form to the LPI Projects Office will automatically receive a set of instructions and forms. Contact the LPI Publications Office at 713-486-2143 for additional information.

## Conference Fee

A fee of \$40 (\$20 for students) will be assessed each participant to cover conference services. Forms and information on preregistration will be included in the second mailing to everyone who returns the Indication of Interest form.

## Anniversary Observations

The LPSC Program Committee and the LPI Projects Office solicit suggestions on how to commemorate the twentieth anniversary meeting. Photographs and/or mementos for display at the conference are encouraged. Contact Pam Jones at the LPI Projects Office with suggestions or offers of assistance.

## Publishers' Exhibit

The LPI's Library Information Center sponsors a Combined Publishers' Display at the conference. Publishers and individual authors are invited to submit items for the exhibit. Information sent before the conference will be included in the official catalog of the exhibit. Deadline for submission to this catalog is February 24, 1989. Contact Fran Waranius at 713-486-2135 for additional information.

## Reminder to Non-U.S. Citizens:

Non-U.S. citizens who plan to visit the analytical and curation laboratories at the Johnson Space Center (or any other NASA center) during attendance at the conference must secure approval. NASA rules and procedures require authorization (via NASA Form 1589) from the International Affairs Division at NASA

Headquarters. Anyone needing to make this arrangement should contact his/her embassy in Washington, D.C. This procedure does not apply to attendance of scientific sessions at the conference.

## Chairmen of the LPSC:

David C. Black  
Lunar and Planetary Institute

Michael B. Duke  
NASA Johnson Space Center

## Sponsors of the LPSC:

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## Notice to Purchasers of 18th Proceedings Outside the U.S.

For orders of the Proceedings of the Eighteenth Lunar and Planetary Science Conference outside the U.S. and Canada, contact Cambridge University Press at the following address for price and availability:

Cambridge University Press  
The Edinburgh Building  
Shaftesbury Road  
Cambridge CB2 2RU  
U. K.

The New York offices of Cambridge University Press do not ship outside the U.S. Prepayment will be required unless there is an account already established with the Cambridge offices.

The Lunar and Planetary Information Bulletin is published three times a year by the Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX, 77058-4399

Fran Waranius, *Editor*.  
Editorial and production support were provided by the Publications Office and Production Services Office at the LPI.

Copy deadline for the February issue of the *Bulletin* is January 20, 1989. Send information of announcements to be included to the LPI Publications Office, 3303 NASA Road One, Houston, TX 77058-4399.



# Pioneer Spacecraft Continue Successful Missions

The Pioneer Venus Orbiter spacecraft, currently operating in venusian orbit, completed 10 years of space flight on May 20—the date of its launch from Kennedy Space Center, Florida, in 1978. Meanwhile, the Pioneer 10 spacecraft, launched in 1972, is now over four billion miles from the sun and continues to collect and transmit data back to Earth.

Radar data from Pioneer Orbiter provided the first topographic maps of Venus. Before the mission, Venus' surface was almost totally unknown. The spacecraft's orbit allowed 90% of the surface to be precisely mapped. Pioneer Orbiter continues to take pictures of Venus' cloud cover and gather data on the planet's environment as well as collect information on Venus' atmosphere.

## Orbiter Surpasses Primary Mission

The Pioneer Orbiter has three primary objectives: (1) global mapping of the venusian atmosphere by remote sensing and radio occultation; (2) direct measurements of the upper atmosphere, ionosphere, and solar wind/ionosphere interaction region; and (3) studies of the planetary surface by radar. In addition to pursuing the original planetary scientific objectives, the spacecraft continues to study comets approaching the sun and Venus. The Pioneer Orbiter has made systematic observations of several comets using the onboard Ultraviolet Spectrometer. It monitored the following comets between 1984 and 1988: Encke, Giacobini-Zinner, Halley, Wilson, Nishikawa-Takimizawa-Tago (NTT), and McNaught.

Comet Wilson presented a rare opportunity to compare a "fresh" comet, a nonperiodic comet making its only approach to the sun, with periodic comets (which make regular passages around the sun). Wilson reached its closest approach to the sun on April 20, 1987. It produced as much water as Halley did at the same distance, ejecting approximately eight tons of water per second. Wilson was believed to produce more water relative to its size than older comets, which generally have a less active surface.

While the Pioneer Orbiter continues to operate without major difficulties, project scientists and engineers have had to develop creative techniques in instrument management. The solar cells that provide Pioneer Orbiter with electrical energy are slowly degrading with time, and there is

insufficient energy to operate all of the Orbiter's instruments simultaneously. Researchers have been sending instructions to turn certain instruments on and off as needed. This and other energy-saving procedures are maximizing the spacecraft's total data productions.

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## *... the spacecraft continues to study comets approaching the sun and Venus*

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Another successful Pioneer spacecraft, Pioneer 10, has become the most distant human-made object in existence. On June 13, 1988, Pioneer 10 had spent five years beyond all the planets. On that date it was 4,175,500,000 miles from the sun, almost 45 times the distance from the Earth to the sun. Radio signals, moving at the speed of light, now take 12 hr and 26 min to travel from Earth to the spacecraft and back, the longest time of any radio communication in history.

## Beyond the Outer Solar System

Pioneer 10's primary mission, originally scheduled for 21 months, was to assess the feasibility of passage through the Asteroid Belt and to provide the first close-up examination of Jupiter and its moons. Pioneer 10 accomplished all of its original goals by December 1973. At that point, the mission was indefinitely extended. Scientists reprogrammed the probe to explore the sun's atmosphere and to look for a tenth planet and gravity waves in the far outer solar system and beyond.

Perhaps the most important finding about the outer solar system concerns the heliosphere, the sun's atmosphere. Pioneer 10 continues to measure the "solar wind," the million-mile-per-hour flow of charged atomic particles boiling off the sun's surface that forms the sun's tenuous atmosphere. Several scientists, including Dr. James Van Allen, Pioneer principal investigator and discoverer of the Earth's radiation belts, and Dr. Darrell Judge, at the University of Southern California, suggest that the heliosphere varies in size with solar activity and is nearly spherical in shape. Because of this, they think

Pioneer 10 may break through the boundary of the solar atmosphere and pass into interstellar space in the next one to three years. There the spacecraft could directly measure the interstellar gas. Data on this space between the stars is impossible to obtain from the Earth.

## Searching the Outer Regions of Space

The possible existence of a tenth planet at the outer fringes of the solar system may result from measuring minute changes in Pioneer 10's flight path. Astronomers have suggested the presence of a new planetary body, since Pluto was found in 1978 to be too small to explain past irregularities in the orbits of Uranus and Neptune. Pioneer 10 and its twin, Pioneer 11, are excellent indicators of the gravitational pull of celestial objects. Because they are spin-stabilized, they generate almost no forces of their own that would affect their straight-line path. Thus large, nearby masses exerting forces should easily be observed by changes in Pioneer 10's trajectory, but NASA scientist John Anderson has found absolutely no evidence of any uncharted planetary bodies.

Despite this lack of evidence, Anderson and others believe that the huge volume of past measurements, which were made by many eminent observers, show irregularities in the orbits of Uranus and Neptune that are too widespread and consistent to be discarded. They suggest that whatever perturbed the outer planets between 1800 and 1900 has now "gone away." It could well be an object whose orbit is tilted at a high angle to the plane of the solar system. These gravitational anomalies are no longer observed because the object is currently too far away or too high above the planets to affect either Pioneer or the outer planets. Anderson and other researchers have suggested places to look for this planet-sized body, and a number of groups are searching these regions of space.

Project manager Richard O. Fimmel expects that NASA will be able to trace Pioneer 10 until the spacecraft's power source limits communications toward the end of the 1990s. Scientists believe that both Pioneer 10 and 11 will travel among the stars virtually forever, because interstellar space is so empty and they have long passed the region where there is the greatest potential for damage from solar wind and micrometeoroid impact.

# Lunar and Planetary Institute Telephone Directory, Fall, 1988

The following list of telephone extension numbers is provided for your convenience. To reach any of these telephones, dial 713-486 and the four-digit extension. These numbers are valid for both commercial and FTS lines.

## Administrative Departments

### *Accounting and Employee Benefits*

Olene Edwards 2140  
Sheila Bowles 2169

### *Bibliographic Search Services*

Stephen Tellier 2191

### *Computer Center*

Kin Leung 2165  
Mark Conlon 2152  
Jackie Lyon 2181  
Brian Fessler 2184

### *Computing Center for Planetary Data Analysis*

#### *Image Processing Facility*

Kin Leung 2165

#### *Geophysical Data Facility*

Brian Fessler 2184

#### *Computer Remote Access*

300/1200 baud modem 486-8214;  
486-9782

### *Director's Office*

David Black 2138  
Helene Thorson 2168  
Dory Brandt 2180  
Carolyn Kohring 2192

### *General Information*

Janice Doherty 2139

### *Guards: After Hours/Weekends*

Bessie Bell 2139  
Charles Candido 2139  
Willie Dearborne 2139  
Bill Johnson 2139

### *Library Information Center*

Fran Waranius 2135  
Stephen Tellier 2191

### *Maintenance and Security*

James McKinney 2171  
William Garcia 2171  
Willie Williams 2171

### *Order Department*

### *Planetary Image Center*

Mary Ann Hager 2136  
Debra Rueb 2199  
Joan Shack 2172

### *Production Services Office*

Pam Thompson 2175

#### *Graphics*

Deborah Barron 2148  
Shirley Brune 2148  
Donna Chady 2195

#### *Typesetting*

Cindy Schwartz 2195

### *Projects Office*

Pam Jones 2150  
Terry Gore 2166  
Becky Turner 2158

### *Publications Office*

Stephanie Tindell 2143  
Lisa Bowman 2164  
Renee Dotson 2188  
Ambra Watkins 2161

### *Review Panel Office*

Lila Mager 2151  
Lita Holley 2149

### *Secretaries, Scientific Support*

Mildred Dickey - Main Building 2153  
Cathy Fischer - McGetchin Hall 2157

## Scientists/Visiting Fellows—Fall 1988

Ashwal, Lew 2147  
Barlow, Nadine 2156  
Bills, Bruce 2167  
Black, David C. 2138  
Burke, Kevin 2194  
Clifford, Stephen 2146  
de Silva, Shanaka 2114  
Elthon, Don 2142  
Francis, Peter 2174  
Koeberl, Christian 2170  
Murali, A.V. 2193  
Reid, Arch 2167  
Ryder, Graham 2141  
Sharpton, Buck 2111  
Schuraytz, Ben 2141  
Williams, Steven 2113

## Publications

### New Materials Available from A. S. P.

#### Slides Examine Forms of Radiation From the Cosmos

A new slide set from the Astronomical Society of the Pacific (A. S. P.) shows what the sky would look like if our eyes could detect the many invisible forms of radiation the cosmos sends us. Entitled "The Sky at Many Wavelengths," the set is an excellent tool for overcoming the "light chauvinism" with which many people regard the universe. Eleven color slides reveal full-sky images in the radio, infrared, visible, ultraviolet, and X-ray bands of the spectrum. There is even one slide that shows the heavens in the glow of the background radiation left over from the big bang.

Assembled by astronomers Christine Jones and William Forman of Harvard, the set comes with a 40-page booklet of background information, detailed nontechnical captions explaining each image, and a thorough introductory bibliography. It is one of a series of educational materials produced by A. S. P. Copies of the slide set are available for \$15.95 (including postage and handling).

#### Information Packet Explores Astrology

An information packet that debunks the popular science called astrology is available from A. S. P. Included are several articles explaining the results of scientific tests to show that astrology 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 the late astronomer George Abell, who spent considerable time examining and exposing the tenets of astrology. Copies of the packet are available for \$3.00 (to cover printing, handling, and mailing costs.)

To order either of these publications, send the appropriate amount to:

A. S. P.  
390 Ashton Avenue  
San Francisco, CA 94112



# AVAILABLE FROM LPI



## — BOOKS —

### **ORIGIN OF THE MOON—W.K. Hartmann, R.J. Phillips, G.J. Taylor, eds.**

*Origin of the Moon* provides a synthesis of models and theories about the formation of the Moon. In this collection of 33 original research and review papers are the findings and contributions of both data analysts and planetary theorists. There are historical reviews covering the early history of scientific thinking as well as scenarios based on the post-Apollo views. The book includes papers discussing the traditional scenarios of capture, fission, and coaccretion. Two additional ideas—the impact-trigger model and a coaccretional “composition filter” model—are also presented. Dynamic, geochemical, and geophysical constraints are explored in detail.

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### **LUNAR BASES AND SPACE ACTIVITIES OF THE 21ST CENTURY—Edited by W.W. Mendell**

This book contains 90 individual articles which address the various problems and opportunities associated with development of a manned base on the Moon. Also included are ideas for missions to Mars and other proposed space activities of the twenty-first century. It is an informative, referenceable text for research scientists and college students as well as interested laymen and is heavily illustrated with diagrams, photos, and artists' conceptions. As applicable to lunar occupation, the technology discussed encompasses agriculture, architecture, astronomy, engineering, economics, geology, hydrology, medicine and health, mining, manufacturing, physics, and space research.

**Softcover, 865 pp., 211 figures and illustrations, indexes, references**

**Order Code: B-BASES, \$20.00**

### **PLANETARY SCIENCE: A LUNAR PERSPECTIVE—S. Ross Taylor**

This publication is an excellent synthesis of information on our understanding of the nature, origin, and evolution of the solar system. It addresses such topics as: planetary geology and stratigraphy; meteorite impacts, craters and multi-ring basins; planetary surfaces and crusts; basaltic volcanism and planetary interiors; and the chemical composition of the planets. In addition to the text, this book offers 24 pages of appended material. It has become a definitive reference work for the planetologist as well as the astronomer.

**Hardcover, 481 pp., 176 illustrations, glossary, index**

**Order Code: B-PLANS, \$30.00**

### **CHONDRULES AND THEIR ORIGINS—Edited by E.A. King, Jr.**

*Chondrules and their Origins* contains 25 review papers and original research contributions designed to provide the reader with a broad knowledge of the most recent data regarding the origin and history of chondrules. As a resource text, it also provides an extended bibliography of 467 related papers.

**Hardcover, 375 pp., 129 figures and tables, subject index**

**Order Code: B-CHON, \$25.00**

## — SLIDE SETS —

**Each set includes an explanatory booklet.**

**STONES, WIND, AND ICE: A GUIDE TO MARTIAN IMPACT CRATERS** 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. 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. (30 slides)

**Order Code: S-STONES, \$13.00**

**VOLCANOES ON MARS** This slide set illustrates various geologic features on Mars. The set includes some of the best examples of Viking Orbiter images that include constructional volcanic landforms. Approximately half of the slides deal with the large shield flows on the flanks of the volcanoes. The remainder of the slides shows various constructs (classified as Mons, Patera, or Tholus) from the Tharsis, Elysium, and Hellas regions as well as the km-sized mounds that are interpreted to be of volcanic origin. (20 slides)

**Order Code: S-VOLCA, \$10.00**

**APOLLO LANDING SITES** This set of 40 slides provides photographic coverage of the regional setting for the six Apollo landing sites. This collection shows the sites at a variety of scales ranging from Earth-based telescopic views spanning hundreds of kilometers to high-resolution photographs taken from lunar orbit. Descriptions giving geological details for each area are included in the accompanying booklet. Useful for educators and researchers who wish to show the regional setting of samples and photographs returned by the Apollo missions. (40 slides)

**Order Code: S-APOLLO, \$15.00**

(Over, please)

## SLIDE SETS—*continued*

**SHUTTLE VIEWS THE EARTH: THE OCEANS FROM SPACE** This slide set offers a selection of the most fascinating and informative Shuttle photographs of the oceans and features images taken with a variety of equipment. Naturally-occurring sea surface features have been photographically recorded, as well as the meteorological and oceanic influences on land masses. (40 slides) **Order Code: S-OCEAN, \$15.00**

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**SHUTTLE VIEWS THE EARTH: GEOLOGY FROM SPACE** Photographs of stunning geological features on the Earth have captured the attention of Shuttle astronauts mission after mission. Shuttle photographs enable us to trace fault margins in the Earth's crust and observe large structures, such as meteor impact craters, in their entirety and in the context of their surroundings. The images reveal how much of the Earth's surface is covered by vast deserts and also provide comparisons of old volcanic structures with young erupting volcanoes at various locations around the world. (40 slides) **Order Code: S-GEOL, \$15.00**

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## — TECHNICAL REPORTS AND CONTRIBUTIONS —

Available for the cost of shipping and handling except as noted below.

**Order Code: R-85-02** WORKSHOP ON DUST ON MARS. S. Lee

**Order Code: R-86-02** WORKSHOP ON PAST AND PRESENT SOLAR RADIATION: THE RECORD IN METEORITIC AND LUNAR REGOLITH MATERIAL. R. Pepin, D. S. McKay

**Order Code: R-86-04** WORKSHOP ON EARLY CRUSTAL GENESIS: THE WORLD'S OLDEST ROCKS. L. D. Ashwal

**Order Code: R-86-05** TRAJECTORY DETERMINATIONS AND COLLECTION OF MICROMETEORIDS ON THE SPACE STATION. F. Horz

**Order Code: R-86-06** WORKSHOP ON COSMOGENIC NUCLIDES. R. C. Reedy, P. Englert

**Order Code: R-86-09** MECA WORKSHOP ON DUST ON MARS II. S. Lee

**Order Code: R-87-01** MECA SYMPOSIUM ON MARS: EVOLUTION OF ITS CLIMATE AND ATMOSPHERE. V. Baker, M. Carr, F. Fanale, R. Greeley, R. Haberle, C. Leovy, T. Maxwell

**Order Code: R-87-02** MARTIAN GEOMORPHOLOGY AND ITS RELATION TO SUBSURFACE VOLATILES (MECA Special Session at LPSC XVIII). S. Clifford, L. Rossbacher, J. Zimbelman

**Order Code: R-87-03** MARTIAN CLOUDS DATA WORKSHOP. S. Lee

**Order Code: R-88-01** PROGRESS TOWARD A COSMIC DUST COLLECTION FACILITY ON SPACE STATION. I. D. R. Mackinnon, W. C. Carey

**Order Code: R-88-02** WORKSHOP ON THE GROWTH OF CONTINENTAL CRUST. L. D. Ashwal

★Price: \$6.00★**Order Code: R-88-03** ASTRONAUT'S GUIDE TO TERRESTRIAL IMPACT CRATERS. R. A. F. Grieve, C. A. Wood, J. B. Garvin, G. McLaughlin, J. F. McHone, Jr.

**Order Code: R-88-04** WORKSHOP ON THE ORIGINS OF SOLAR SYSTEMS. J. A. Nuth, P. Sylvester

**Order Code: R-88-05** MEVTV WORKSHOP ON NATURE AND COMPOSITION OF SURFACE UNITS ON MARS. J. R. Zimbelman, S. C. Solomon, V. L. Sharpton

**Order Code: R-88-06** WORKSHOP ON THE DEEP CONTINENTAL CRUST OF SOUTH INDIA. L. D. Ashwal

**Order Code: R-88-07** WORKSHOP ON MARS SAMPLE RETURN SCIENCE. M. Drake, R. Greeley, G. McKay, D. Blanchard, M. Carr, J. Gooding, C. McKay, P. Spudis, S. Squyres

**Order Code: R-88-08** A COMPILATION OF INFORMATION AND DATA ON THE MANSON IMPACT STRUCTURE. J. Hartung, R. Anderson

**Order Code: R-88-09** SCIENTIFIC RESULTS OF THE NASA-SPONSORED STUDY PROJECT ON MARS: EVOLUTION OF ITS CLIMATE AND ATMOSPHERE. S. Clifford, R. Greeley, R. Haberle

**Order Code: R-88-10** MECA WORKSHOP ON ATMOSPHERIC H<sub>2</sub>O OBSERVATIONS OF EARTH AND MARS. S. Clifford, R. Haberle

**Order Code: C-652** SYMPOSIUM ON LUNAR BASES & SPACE ACTIVITIES OF THE 21st CENTURY. April 5-7, 1988 (abstracts)

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## — LPSC ABSTRACTS —

Abstract volumes from the following Lunar and Planetary Science Conferences are available for the cost of shipping and handling:

**Order Code: ABS-04** IV—1973

**Order Code: ABS-11** XI—1980

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**Order Code: ABS-14** XIV—1983

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**Order Code: ABS-17** XVII—1986

**Order Code: ABS-18** XVIII—1987

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# Telecommunications

## LPI Computer Access from Internet Nodes

The LPI's computer is now accessible from Internet nodes (ARPANET, NSFnet, NSN) through the DFTNIC computer (IP address: 128.183.10.3) in the Advanced Data Flow Technology Office at the NASA Goddard Space Flight Center.

If you are on an Internet node and wish to contact the LPI, use the following procedure:

Type

```
$ telnet dftnic.gsfc.nasa.gov
USERNAME: DFTNIC
```

The system will respond with

```
Welcome to ADFTO DFTNIC'S
Nicolas
```

Press Return/Enter.

Follow the system prompt to enter your terminal type.

A menu-driven program will guide you through the available services. Choose option 5 from the Nicolas Top Menu and option 3 from Automated Remote Logins Menu. The system will respond with

```
DFTNIC's DECnet/SPANnet Passthru
1.0
```

Please enter the nodename of host...

Type

```
$LPI
USERNAME:LPI
```

If you find this mode of access useful, or if you have information on other passthru gateways that would be of interest to LPIB readers, please contact Carolyn Kohring.

## LPI's FAX Operational

The LPI's facsimile transceiver went into operation in June. It is compatible with other G3, G2, and 6-minute FM mode machines. The phone number for the FAX is 713-486-2162. For voice communications related to the FAX, call Carolyn Kohring at 713-486-2192.

Please note: ABSTRACTS AND THEIR RELATED FORMS AS WELL AS ORIGINAL MANUSCRIPTS WILL NOT BE ACCEPTED BY FAX.

## LPI Telecommunication Numbers

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

LPI Telex Number: 7400832  
Answerback: LAPI UC

LPI FAX Number:  
713-486-2162

LPI SPAN Node Name: LPI  
LPI Bibliography from SPAN:  
LPI::SEARCH  
Password: LPI

Direct dial access to LPI VAX:  
713-486-8214 or  
713-486-9782

For help with telecommunications problems, contact:

Carolyn Kohring  
713-486-2192  
LPI::KOHRING on SPAN

## LPI Computer Facilities Accessible via Remote

If you can access other computers from your home computer, you can take advantage of several datasets available on the LPI's computer. The LPI's computer is accessible via phone, from SPAN nodes, from Internet nodes, and through NPSS. The account name is LPI. Instructions are available in a pamphlet available from Carolyn Kohring (713-486-2192, LPI::KOHRING on SPAN).

## Geophysical Data Facility (GDF)

The GDF provides a set of research tools to access and quantitatively analyze orbital gravity data for the terrestrial planets. A user-oriented package has been developed to allow users to select a planet, have the global coverage of the desired dataset displayed graphically, and compile a dataset of a region of interest. Profiles and 3D perspectives can be displayed. The package is compatible with graphics terminals running DEC REGIS graphics software and Tektronics PLOT10 compatible terminals.

Current collections include Earth topography, SEASAT, MAGSAT, GEOS-3 LOS gravity, Venus topography and LOS gravity, Mars topography and LOS gravity, the Mars Consortium datasets, Lunar LOS gravity, and the Lunar Consortium datasets.

## Library Information Center (LIC)

The LIC provides basic library functions and a bibliographic search service through the LPI account. The on-line search service allows access to the 24,000 references in the Lunar and Planetary Bibliography, which includes articles on lunar science, the Moon, planets and their satellites, comets, asteroids, meteorites, and space utilization and colonization. You may also access the 600 references in the Antarctic Meteorite Bibliography, which include articles on Antarctic, Allan Hills, and Yamato meteorites among others, and their analyses, descriptions, compositions, classifications, etc.

## Lunar and Planetary Science Conference Program

For the last two years the program of the Lunar and Planetary Science Conference has been available in a searchable form before the program is distributed. This will continue in the future, and programs from other major LPI-sponsored conferences may be included.

## MAIL and Kermit File Transfer

These facilities are made available to users who wish to communicate with LPI staff and scientists. The Kermit File Transfer option allows transmission of binary files such as images, executable programs, and files from word processors.

### SSI Develops Space Curriculum for Half-Million Young Astronauts

The Space Studies Institute (SSI) will help educate over half a million elementary and junior high school children about the exciting possibilities of space this fall through a curriculum package developed for the Young Astronaut Program. The package, which will focus on the Moon, is the initial project between SSI and Young Astronauts.

"We are delighted with this new relationship; it is important to provide our members with up-to-date information on man's future activities in space," said Paul Burke, Deputy Director of the Young Astronaut Program. "We are especially pleased to be able to bring this information to them from one of the leading authorities in this area of research."

The SSI/Young Astronauts Moon Package, due for release in September, will include activities on the Moon's composition, phases, history of exploration, myths, and legends. The package will also include a game designed to demonstrate the economic benefits of lunar settlements. It is the first in a series of joint efforts that will include lessons based on uses of shuttle external tanks, solar power, and magnetic flight.

"The Young Astronauts Council is pioneering the use of exciting long-range visions of America's future in space to inspire and educate today's students. We applaud their foresight and are delighted to be partners in this endeavor," said Gregg E. Maryniak, Executive Vice-President.

The Space Institute is a private, nonprofit organization founded in 1977 by Dr. Gerard K. O'Neill, professor emeritus of physics at Princeton University and member of the National Commission on Space, to conduct the research necessary to the creation of lunar bases. The Young Astronaut Program was launched by President Ronald Reagan in 1984 to encourage elementary and junior high school students in mathematics, science, and technology-related subjects. They held the First Annual Young Astronauts International Conference June 16-18 in Oklahoma City, OK.

For further information, contact SSI at 609-921-0377 or Young Astronauts at 202-682-1984.

### Challenger Center Teacher Conference Huge Success

The Challenger Center for Space Science Education was created in September 1986 by the families of the seven astronauts who died in the Space Shuttle Challenger accident. The organization held its first annual teacher conference in cooperation with Johnson Space Center in Houston, July 11-15. More than 200 educators, representing all subjects and school systems as far away as Germany and Guam, gathered for a week-long series of special tours and lectures on space and education. Johnson Space Center hosted the group for two days during which time the teachers got a firsthand look at the training ground for America's astronauts.

Most of the conference participants are nationally recognized for their work in science and aerospace education; in fact, most of the original state and agency finalists in NASA's Teacher in Space Program were present. During the conference, the teachers heard some of the nation's foremost aerospace experts speak on a wide variety of subjects including the shuttle, the space station, the industrial space facility, future planetary missions, and the Biosphere II project in Houston.



One of the highlights of the week was a teacher test-trial and a firsthand look at the prototype affiliate Challenger Center at the Houston Museum of Natural Science. This Space Life Station prototype is one of 20 sites the Challenger Center for Space Science Education plans to open around the country over the next few years to allow students and their teachers to simulate realistic mission scenarios in ground-based space stations experiencing environment control, engineering, communications, and human factors.

During another conference session, the Challenger family members awarded the first Challenger Seven Fellowship to Dr. Gerald Mallon, a planetarium director from Norristown, PA. The \$5000 education grant honors "space-age pioneers in education."

The week of activities concluded with a performance by the Challenger Center Choristers under the direction of Natt Vaughn. This group of young singers represents three Houston area schools recognized for their musical accomplishments. The original Challenger Center Choristers performed at a televised fundraiser last March at the Wortham Center in Houston along with Pia Zadora, Gary Morris, Melba Moore, Steve Wariner, Brooke Shields, and the Thunderbirds.

### 15,000 Schools Respond to Shuttle Orbiter-Naming Competition

The National Aeronautics and Space Administration announced that 15,000 schools are participating in its national competition to name the new Space Shuttle orbiter. Entry packets are still available and the deadline for submission is December 1988.

The new orbiter, currently designated OV 105, will replace the Challenger. It is scheduled to be completed in 1991.

Orbiter-naming projects must be completed during the fall semester, and entries must be postmarked by December 31, 1988. To enter, U.S. students in kindergarten through 12th grade form teams and research a name for the orbiter. The name proposed must be of a sea vessel used in research or exploration. The teams must prepare an interdisciplinary classroom project to support and justify the name selected. A team coordinator, who must be a faculty member, is responsible for directing the team's activities.

Interested faculty members can obtain Orbiter-Naming Program Entry packets by contacting the Council of Chief State School Officers, which is administering the program for NASA, at 202-783-5109 or 202-783-5113, or by writing:

NASA Orbiter-Naming Program  
Council of Chief State School  
Officers  
400 North Capitol Street, N.W.  
Suite 379

Washington, D.C. 20001

NASA Press Release 88-90



# Calendar

## September

- 21-23 **Dust on Mars III**, Estes Park, Colorado. *LeBecca Turner, Lunar and Planetary Institute, 3303 NASA Road One, Houston TX 77058-4399. Phone: 713-486-2158.*

## October

- 5-7 **Early Tectonic and Volcanic Evolution of Mars**, Easton, Maryland. *Pam Jones, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77058-4399. Phone: 713-486-2150.*
- 20-23 **Global Catastrophes in Earth History: An Interdisciplinary Conference on Impacts, Volcanism and Mass Mortality (Snowbird II)** Snowbird, Utah. *Pam Jones, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77058-4399. Phone: 713-486-2150.*
- 20-26 **Twenty-second International Symposium on Remote Sensing of Environment**, Abidjan, Ivory Coast. *Alan K. Parker, chairman, P.O. Box 8618, Ann Arbor MI, 48107-8618. Phone: 313-994-1200, ext. 3886.*
- 31-November 3 **Geological Society of America CENTENNIAL CELEBRATION**, Denver, Colorado. *GSA Meetings Department, P.O. Box 9140, Boulder, CO 80301. Phone: 303-447-2020 or 1-800-GSA-1988.*

## November

- 13-16 **Pacific Rim Opportunities: 2nd Space Entrepreneurs Conference**, Kona, Hawaii. *Space Age Publishing Company, 3210 Scott Boulevard, Santa Clara, CA 95054-0975. Phone: 408-988-0592.*
- 14-16 **Moon in Transition: Apollo 14 and Extreme Lunar Differentiation**, Houston, Texas. *Pam Jones, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77058-4399. Phone: 713-486-2150.*

## December

- 1-3 **Origin of the Earth**, Oakland, California. *Pam Jones, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77058-4399. Phone: 713-486-2150.*
- 5-9 **American Geophysical Union, Fall Meeting**, San Francisco, California. *Meetings Department, American Geophysical Union, 2000 Florida Avenue N.W., Washington DC 20009. Phone: 202-462-6903; 1-800-424-2488. For details on special session entitled: Recent Refinements in the Terrestrial Impact Record, contact Buck Sharpton, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77058. Phone: 713-486-2111.*

## January 1989

- 10-13 **Fourth International Conference on Mars**, Tucson, Arizona. *Hugh H. Kieffer, U.S. Geological Survey, Branch of Astrogeology, 2255 North Gemini Drive, Flagstaff AZ 86001. Phone: 602-527-7015.*
- 11-13 **Workshop on the Archean Mantle**, Houston, Texas. *Pam Jones, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77058-4399. Phone: 713-488-2150.*
- 16-18 **Analysis of Returned Comet Nucleus Samples**, San Francisco, California. *Pam Jones, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77058-4399. Phone: 713-486-2150.*

## March

- 5-10 **Symposium on Space Commercialization: Roles of Developing Countries**, Nashville, Tennessee. *Prof. F. Shahrokyi, University of Tennessee Space Institute, Tullahoma, TN 37388. Phone: 615-455-0631.*
- 13-17 **20th Lunar and Planetary Science Conference**, Houston, Texas. *Pam Jones, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77058-4399. Phone: 713-486-2150.*
- 20-23 **European Union of Geosciences V**, Strasbourg, France. *Organizing Committee EUG V, Geological Survey of Norway, Box 3006 Lade, N-7002 Trondheim, Norway.*

## April

- 6-9 **National Science Teachers' Association National Convention**, Seattle, Washington. *Bill Schmitt, Pacific Science Center, 200 Second Ave., N., Seattle, WA 98109. Phone: 206-443-2904.*
- 24-28 **Comets in the Post-Halley Era**, Bamberg, Federal Republic of Germany. *R. Newburn and J. Rahe, Jet Propulsion Laboratory, 264-664, 4800 Oak Grive Drive, Pasadena, CA 91109.*

## May

- 10-14 **Ninth SSI/Princeton Conference on Space Manufacturing**, Princeton, New Jersey. *Mary Ann Grams, Space Studies Institute, P.O. Box 82, Princeton, NJ 08542. Phone: 609-921-0377.*
- 14-17 **Joint Annual Meeting, Geological Association of Canada and the Mineralogical Association of Canada, with the participation of the Canadian Geophysical Union**. *Dr. Colin Stearn, Chairman, Local Organizing Committee for Montreal '89, Rm. 238, 3450 University St., Montreal, Quebec, H3A 2A7. Phone: 514-398-4082.*

# Calendar

## July

- 9-19      **28th International Geological Congress,**  
Washington, D.C. *Dr. Bruce Hanshaw,*  
*Secretary General, 28th IGC, P.O. Box*  
*1001, Herndon, VA 22070-1001. Phone:*  
*703-648-6053.*
- 24-August 4      **International Association of Geomagnetism**  
**and Aeronomy, 6th Scientific Assembly,**  
**Exeter University, United Kingdom.** *Dr.*  
*Roy Jady, IAGA 1989 Organizing*  
*Secretary, Department of Mathematics,*  
*University of Exeter, Exeter ED4 4QE,*  
*United Kingdom.*
- 25-26      **Cosmogenic Nuclide Production Rates in**  
**Meteorites, Vienna, Austria.** *Pam Jones,*  
*Lunar and Planetary Institute, 3303 NASA*  
*Road One, Houston, TX 77058-4399.*  
*Phone: 713-486-2150.*
- 27-28      **Differences Between Antarctic and Non-**  
**Antarctic Meteorites, Vienna, Austria.** *Pam*  
*Jones, Lunar and Planetary Institute, 3303*  
*NASA Road One, Houston, TX 77058-*  
*4399. Phone: 713-486-2150.*

## July

- 31-August 4      **52nd Meteoritical Society Meeting, Vienna,**  
Austria. *Pam Jones, Lunar and Planetary*  
*Institute, 3303 NASA Road One, Houston,*  
*TX 77058-4399. Phone: 713-486-2150.*

## August

- August 1989 (date      **Workshop on Advances in Impact**  
to be announced)      **Cratering, Sudbury, Ontario, Canada.** *Pam*  
*Jones, Lunar and Planetary Institute, 3303*  
*NASA Road One, Houston, TX 77058-*  
*4399. Phone: 713-486-2150.*

## October

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



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