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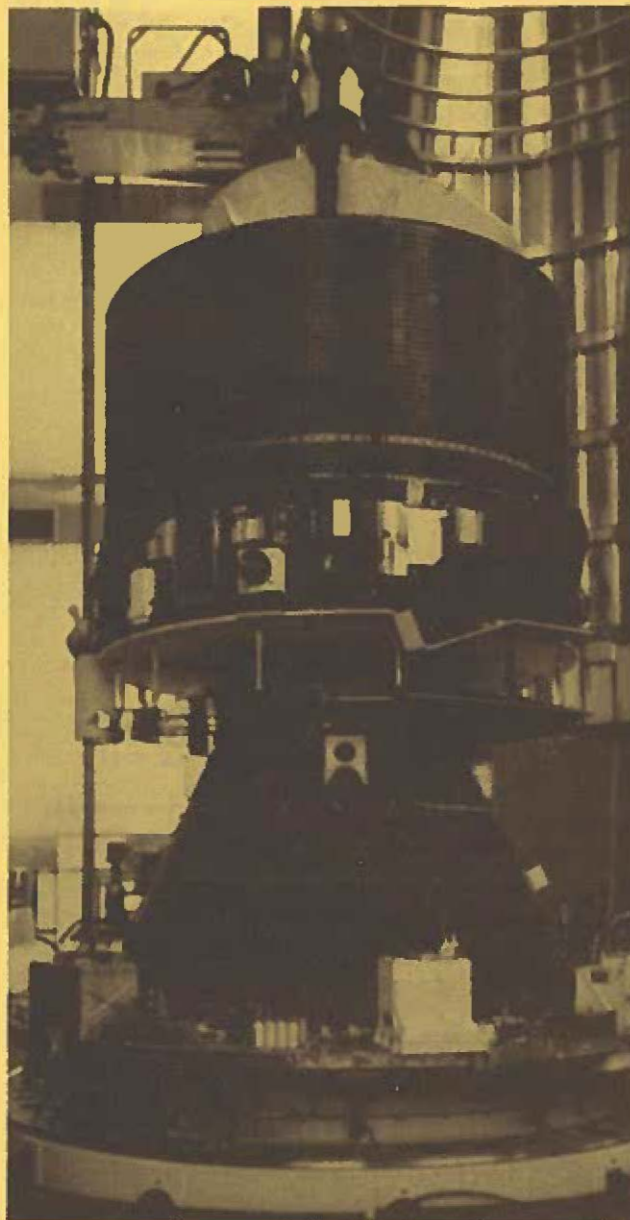
A WEEK OF EXCITING SCIENCE AT THE 17TH LPSC

The *Seventeenth Lunar and Planetary Science Conference* was held at NASA Johnson Space Center (NASA/JSC) in Houston on March 17-21, 1986. Conference sponsors were: the Lunar and Planetary Institute (LPI); NASA Johnson Space Center; the American Geophysical Union (AGU); the Division for Planetary Sciences of the American Astronomical Society (DPS); the Geological Society of America (GSA); the International Union of Geological Sciences (IUGS); and the Meteoritical Society. The conference program was prepared on the basis of submitted abstracts. The Program Committee consisted of co-chairmen Kevin Burke, LPI, and Michael Duke, NASA/JSC, and members: Richard Becker, University of Minnesota; A.E. Bence, Exxon Production Company; Mark Cintala, NASA/JSC; Donald Clayton, Rice University; Stephen Clifford, LPI; Cyrena Goodrich, University of New Mexico; Richard Grieve, Energy, Mines and Resources Canada; Dieter Heymann, Rice University; Bruce Jakosky, University of Colorado; Ralph Kahn, Washington University; John Kerridge, UCLA; Gordon McKay, NASA/JSC; William McKinnon, Washington University; Richard Morris, NASA/JSC; Donald Morrison, NASA/JSC; Larry Nyquist, NASA/JSC; James J. Papike, South Dakota School of Mining and Technology; Donald Wise, University of Massachusetts; E.R.D. Scott, University of New Mexico; Charles Wood, NASA/JSC; James Zimbelman, LPI; and Stan Zisk, Haystack Observatory.

Participating in the conference were 568 scientists representing 15 countries. Three concurrent sessions were conducted each morning and afternoon of the four and one-half day conference with two concurrent sessions held Monday evening and one session on Wednesday evening. There were 519 abstracts submitted to the Program Committee for consideration as oral presentations, poster presentations, or "print only" designation.

Three special sessions were conducted during the conference. On Monday afternoon a session entitled "Martian Geomorphology and Its Relation to Subsurface Volatiles" was chaired by Stephen Clifford and Lisa Rossbacher. The session began with an invited talk by Robert Pepin "Volatile Inventory of Mars" and concluded Monday evening with a panel discussion. Panel members included R. Arvidson, M. Carr, F. Fanale, B. Lucchitta, P. Mouginis-Mark, P. Schultz, S. Squyres, and J. Zimbelman.

Wednesday morning the "Venera/Vega/Venus" session was chaired by V.L. Barsukov and J.W. Head. Soviet scientists



ESA's Giotto spacecraft.

attending the conference presented their data from the Vega and Venera missions during this session. A session open to the general public was held Wednesday evening on "Recent Encounters." Michael Duke organized this session which included invited talks by Geoffrey Briggs, NASA Headquarters,

"Solar System Exploration Status." Torrence V. Johnson, Jet Propulsion Laboratory, "Observations from Voyager's Encounter with Uranus," Peter Eberhardt, University of Bern, "Observations from Giotto's Encounter with Halley's Comet" and Lev Mukhin, Institute of Space Research, Moscow, "Observation from Vega's Encounter with Halley's Comet."

The annual chili cook-off held on Tuesday evening on the grounds of the LPI was a rousing success. Fifteen teams participated in cooking up batches of award-winning chili. The best overall chili was prepared by the *Chili Cooking Team of America*. Chief cooks were Dale E. Moore and Rod Loe of JSC.

Lunar and Planetary Science XVII contains the abstracts submitted to this conference. The two-volume set may still be obtained by mail order. An order form is included in this issue of the **Bulletin**.

The Proceedings of the 17th LPSC will again be published by the American Geophysical Union as supplements to the *Journal of Geophysical Research*.

Summaries of the conference will be published in the June issue of *Geotimes*.

LPSC CONFERENCE FORUM

The Lunar and Planetary Science Conference Forum was convened by the Planetary Meetings Steering Committee (PMSC) on Thursday evening. To record the events of the meeting and to inform all of the community about the discussions and recommendations, the minutes are published here.

MINUTES OF THE 17TH LPSC FORUM

March 20, 1986 8:00 p.m.
Gilruth Center Houston, Texas

The third meeting of the Lunar and Planetary Science Conference Forum was called to order by Chairman Kevin Burke at 8:20 p.m. Pam Jones was appointed recorder.

The minutes from last year's Forum were distributed and reviewed. Representatives of LPSC co-sponsoring societies were asked to introduce themselves, and to discuss meetings and other pertinent information regarding the activities of their societies. The reports and representatives were as follows:

American Geophysical Union—Sean Solomon, Representative

□ At least three planetary symposia are planned for Spring AGU, which will be held May 19-23 in Baltimore. JGR-Solid Earth and Planets will advertise for an editor-in-chief and 5-6 editors to be on board by October 1986. The editors will aggressively seek papers on planetology for the journal.

Division for Planetary Science of the AAS—No representative present

Geological Society of America—Ted Maxwell, Representative

□ A Symposium entitled "Mars: Ten Years After Viking" is being organized for July 21-23, 1986, in Washington, D.C. Dr. Maxwell also reported that the Planetology Division of GSA had decided not to hold a workshop jointly sponsored with LPI prior to the GSA meeting in San Antonio this year.

Meteoritical Society

□ A member of the Meteoritical Society who was present announced that the dates of this year's meeting in New York City are September 22-25, and that the 1987 meeting will be held in July in Newcastle, England.

International Union of Geological Sciences

□ Nadia Stovickova, IUGS member from the International Association of Planetology announced that an International Planetological Conference was being organized by the Czech State Department on Geology. Dr. Stovickova requested both Soviet and Lunar and Planetary Institute co-sponsorship for the meeting, which will be held in Prague in September, 1988.

Chuck Wood (JSC) mentioned that the American Association of Petroleum Geologists (AAPG) will have a session on "Planetary Astrogeology" at their next meeting and have shown an increasing interest in interacting with planetary geologists. It was suggested that they be asked to become co-sponsors of the LPSC. Gene Shoemaker, who is a member of the AAPG agreed to work with Chuck Wood to get that society involved in the LPSC.

Following the reports from the co-sponsoring societies, the floor was opened to discussion of conference facilities and logistics. The following were noted:

(1) The slide projection service was much better this year than last, although there were still a few minor problems (slow response to cues, some focusing problems, etc.). It was suggested that hiring graduate students to work as projectionists might provide more "tuned in" projectionists in that they would be following the talks scientifically. The funds earned could be used to offset the cost of attending the conference for the students.

(2) The noise from the upstairs hallway continues to be a problem for those attending sessions in the Gym. This year heavier draping was provided to cover the 2nd floor screens; however, short of full sound-proof blocking being installed, noise control must remain at the mercy of those conference attendees who are causing the problem by carrying on conversations in the hallway. So far signs noting "Quiet Please, Conference in Session" do not seem to be having any effect.

(3) The location of the poster session in room 206 leaves posters somewhat removed from the mainstream of conference activity. Is there a better location for the posters, or a way to more properly highlight them? It was suggested that perhaps having a cash-bar social hour each evening between 5:30 and 6:30 to highlight the posters appearing on that day's program would provide a means for interaction as well as a focus for the poster presentations.

(4) The temperature in Gilruth 104 was variable, being very cold much of the time. Repeated attempts to get the temperature raised during the week were unsuccessful until late Thursday.

Following the discussion of conference logistics, the Chairman opened the floor for discussion of concerns regarding the conference program. The following issues were raised:

(1) Abstracts are not as thoroughly reviewed as they ought to be. The Program Committee needs to spend more time reading each abstract for scientific content. This poor review resulted in . . .

(2) . . . too many talks scheduled to allow for good discussion. Most sessions had 13 talks, whereas 12 are considered the maximum for good interaction. Some felt that evening sessions wear people out, and should be scheduled only under very special circumstances.

(3) It was suggested that a line be added to the abstract information form stating that papers not designated as oral, print or poster would be assumed to be "print only." Objection was raised to the fact that some authors of abstracts designated for print-only were asked to give oral presentations.

(4) Some who served on this year's program committee stressed that the committee should be chosen to give good topical coverage for abstracts received. Also, some topics contain a large number of abstracts to be reviewed and scheduled, and therefore require more people from those topical areas to handle the load.

(5) It was suggested that a plenary could be scheduled from 8:00-8:30 a.m. each morning of the conference. This extra time would allow for scheduling review talks to highlight significant advances made in specific areas of research during the previous year.

(6) It was suggested that session chairmen be advised that they are not to re-arrange talks within the program. Too many authors of late papers tried to get added to the program by pressuring the session chairmen; this should not be allowed.

(7) It was suggested that session chairmen be told that combined talks receive more time (12 minutes). Others felt that there should be no combined talks.

These comments from the Forum will be forwarded to both the Planetary Meetings Steering Committee and next year's program committee for consideration.

Kevin Burke then opened the floor to a discussion of the publication of the LPSC Proceedings. The decline in the number of papers published in the Proceedings continues to be a cause of great concern among those attending the Forum. The numbers of papers and pages published from the 9th Proceedings through the 16th were provided, as well as distribution figures for the 13th through the 16th. They are as follows:

PROCEEDINGS	# OF PAGES	# OF PAPERS	DISTRIBUTION
9th	3,973	212	Unavailable
10th	3,077	176	Unavailable
11th	2,502	142	Unavailable
12th	1,823	127	Unavailable
13th	942	95	1,270
14th	715	66	1,570
15th	845	67	2,030
16th	530	48	5,000

The discussion centered around a debate on whether to stay with AGU or to move to another publisher for the Proceedings. A summary of each position is as follows:

Arguments for staying with AGU: The Proceedings are getting better circulation to libraries with AGU than they did when Pergamon was the publisher. With the addition of the planetology editor and board the review process should be smoother and possibly more fairly administered. With the inclusion of the Proceedings with JGR subscriptions, the overall distribution is very much improved. AGU has promised to improve fulfillment on Proceedings orders. There is no guarantee that distribution by a private publisher will be better than that provided by AGU, or that more authors would contribute to such a volume.

Arguments for leaving AGU and seeking a private publisher: Despite the seemingly large number of copies distributed, the audience JGR reaches is narrow when compared to the subject matter covered by the Proceedings. Many contributors to the Proceedings are not members of AGU and do not desire to be. It is more important to reach the right audience than to send it to many who are not interested. Members of the community have expressed their desire in polls and votes during meetings to leave AGU (e.g. LPSC XVII Program Committee) and to change to a privately published hardbound book. AGU has promised to remedy fulfillment problems since they began publishing the Proceedings but still the problems continue. There is no confidence that fulfillment will radically improve in the near future. The Proceedings are dying a slow death with AGU in any case; what is to be lost from trying to revive it with a hardbound volume?

At a request from the floor, the Chairman called for a vote from among those remaining at the close of the discussion on the following motion:

"For the 18th Proceedings continue to publish in JGR."

The result of the vote was as follows:

11 Yes

16 No

7 Abstaining

The Chairman agreed to convene a meeting of the Planetary Meetings Steering Committee to review the discussion and to get a recommendation from that body as to how to publish the 18th LPSC Proceedings. Dr. Burke agreed to convey those recommendations to the Community on the morning of March 21st.

There being no further business, the meeting was adjourned at 11:00 p.m.

Pam Jones
Recorder

FOOTNOTE: The PMSC met at 9:00 a.m. on Friday, March 21st and at 10:00 a.m. distributed the following statement:

"Concern about the availability of bound volumes of the Proceedings particularly to non-AGU members was clearly a dominant consideration amongst those attending the Forum. LPI was therefore instructed to

endeavor to ensure the availability of bound copies of 17th LPSC Proceedings to first authors gratis and at reasonable cost to all who wish to obtain them. LPI should explore the possibility of a similar procedure for earlier volumes published with AGU.

PMSC welcomed the plans for a new approach toward the publication of papers in Lunar and Planetary Science that AGU is developing. There is, however, a clear demand for publication of conference proceedings as a hard-bound book. Therefore starting with the 18th conference LPI will produce such a book and seek an agreement with a publisher for distribution. If this venture is to be successful a substantial increase in submission of papers and active participation by a broad section of the community is essential."

PLAN AHEAD FOR THE 18TH LPSC

The 18th Lunar and Planetary Science Conference will be held in Houston on March 16-20, 1987. The following is an important announcement for A.I.L. contributors:

FIRST ANNOUNCEMENT Abstract Deadline for LPS XVIII JANUARY 21, 1987

There's good news and bad news about the deadline for abstracts for the 1987 Lunar and Planetary Science Conference abstract volume.

The *good news* is that the deadline has been extended to **JANUARY 21, 1987**. Mark your planning calendars now. Note that this deadline gives ample time for preparation in spite of the Christmas holidays. Along with the extension is the elimination of the late fees.

The *bad news* is that **JANUARY 21, 1987** is The Deadline. Abstracts arriving after 6:00 pm on January 21 will be returned to the author. There is no publication connection between this January 21 deadline and the date of the Program Committee meeting. **JANUARY 21, 1987** is the "real" deadline.

If you have any questions or need additional information, please contact the Publications Office, 713/486-2143.

Stephanie Tindell
Managing Editor

LPSC Program Goes On-Line

Since the preliminary program for the conference is so useful for planning purposes to the attendees of the meeting, plans are being made to have the program on-line. The Username will be *PROGRAM* and the password will be *LPI*. The preliminary program will still be published in the February issue of the LPIB but having the program on-line will make it instantly available as soon as the LPIB goes to press rather than a couple of weeks later. It is also possible that copies of the preliminary program will be distributed to corresponding authors of abstracts.

Check the November issue of **LPIB** for further developments and for additional instructions on how to access the on-line *Program* and when it will be available.

YOUNG ASTRONAUT PROGRAM

The Young Astronaut Program is a privately sponsored, non-profit, educational organization established to develop and deliver high-quality curricular material to chapters formed by schools, community groups or interested businesses, and to encourage students in elementary and junior high schools to study science, mathematics, technology and related subjects. By receiving information and activities related to the space program, Young Astronauts will gain the knowledge and skills they need for the coming decades.

All materials are reviewed by the Young Astronaut Education and Technology Board, composed of representatives of all the major professional education associations as well as aerospace experts. These materials are then sent to 50 classrooms across the country for additional review. In this way Young Astronauts ensures that learning and fun are effectively blended.

For more information about the Young Astronaut Program, contact:

Young Astronaut Program
P.O. Box 65432
Washington DC 20036
Phone: 202/682-1985



REVIEW JOURNAL TO CONCENTRATE ON SPACE LITERATURE

In its 1986-1987 volume year, the American Association for the Advancement of Science (AAAS) review journal *Science Books & Films (SB&F)* will be concentrating on the critique of materials relating to space science and what we can learn through space about the earth as well as worlds beyond. The journal will be reviewing trade books and films for children, young adults, and general audiences.

To complement this theme, *SB&F* will publish a special section in the September-October 1986 issue evaluating most of the major physics textbooks used or destined to be used (1986 and 1987 copyrights) in the nation's high school.

Many of the reviewers who volunteered for the physics texts evaluation are AAAS members. Now, *SB&F* needs additional reviewers to critique books and films about astronomy, astrophysics, aeronautics, planetology, and political and social policy issues related to the exploration of space. If you are interested, please write:

Kathleen Johnston, editor
Science Books & Films
1333 H Street NW
Washington DC 20005
Phone: 202-326-6454

LPI SUMMER INTERN PROGRAM FOR UNDERGRADUATES

From the group of applications for the intern program which have been received, the following students have been selected to participate in the Summer Intern Program at the Lunar and Planetary Institute. The program, now in its tenth year, is designed to acquaint undergraduates or recent graduates to the world of research. Each intern will have a project directed by a scientist-advisor from the LPI or the Johnson Space Center. During the ten-week period, the interns will have the opportunity to attend lectures and seminars given by various scientists in the space science programs. On August 14, there will be a mini-conference at which each of the interns will present the results of the research they have conducted during the summer.

This year's interns, their advisors, and projects are:

1986 SUMMER UNDERGRADUATE INTERN ROSTER

Louis John Boschelli, University of Illinois Urbana-Champaign

ADVISOR: Dr. David McKay, NASA Johnson Space Center

PROJECT: One of the products of impacts on Earth, moon and other planetary bodies is the creation of glass beads which have been heated significantly above the melting temperature. These superheated glass droplets may lose material because of vaporization to the vacuum of space or to a planetary atmosphere. Because of differing volatilities, the depletion of volatile elements can be more severe than the refractory elements. The project will consist of studying a suite of impact glasses in lunar soils and breccias, determining by Scanning Electron Microscope (SEM) and Energy Dispersive X-Ray Analysis (EDXA) the extent of depletion for various elements, and relating these data to theoretical and experimental studies of element volatilities. Some samples from terrestrial impact glasses will also be analyzed for comparison.

Randall A. Briggs, Worcester Polytechnic Institute

ADVISOR: Dr. Richard J. Williams, NASA Johnson Space Center

PROJECT: The kinetics of oxidation and reduction of FeTiO_3 - Fe_2O_3 solid solutions is an important issue for many petrologic investigations as well as for possible applications to lunar bases. The project involves the preparation and characterization of starting compositions on the binary join, including high temperature synthesis under controlled redox conditions. As time permits some kinetic data will be obtained using thermogravimetric techniques.

Kenneth S. Edgett, Earlham College

ADVISOR: Dr. James Zimbelman, Lunar and Planetary Institute

PROJECT: The project involves the reduction and analysis of the highest spatial resolution thermal infrared data from the Tharsis and Phoenicis Lacus quadrangles of Mars (30°S to 30°N, 90° to 135°W). This region covers approximately 5

million km^2 , about 1/30th of the surface area of Mars, and it includes four large shield volcanoes and a portion of the Vallis Marineris canyon system. The thermal data will be processed into digital images that can then be overlaid on existing maps and photomosaics. This will allow thermal properties to be related to specific surface features, aiding in the interpretation of the geologic history of the study region.

Elizabeth A. Eide, Franklin and Marshall College

ADVISOR: Dr. Lewis D. Ashwal and Dr. Donald Elthon, Lunar and Planetary Institute

PROJECT: Involves petrology and geochemistry of anorthositic and gabbroic rocks from the River Valley complex in the Grenville Province of Ontario. Our Sm-Nd isotopic work on these rocks indicates that they are the oldest anorthositic intrusives in the Grenville, about 2.4 billion years. The intern will characterize the major element and trace element chemistry of these rocks, and possibly of mineral separates, using x-ray fluorescence spectroscopy and instrumental neutron activation analysis.

Elizabeth Ann Harding, Rice University

ADVISOR: Dr. David McKay, NASA Johnson Space Center

PROJECT: Consists of a comparison of volcanic activity on Io to early fire-fountain type volcanic activity on the moon. This project will include Scanning Electron Microscope (SEM) study of actual lunar glass beads inferred to be volcanic ejecta from early lunar volcanic vents. A comparison can be made of observed Io ejection velocities, ejecta distribution, plume temperature, and possible ejecta composition to similar data reconstructed for lunar volcanoes. The role of sulfur in both Io and lunar volcanic eruptions will be examined. Analogies to several terrestrial volcanoes will be made. SEM examination of glass beads from several terrestrial eruptions will provide useful comparisons.

Grant Marshall, University of California, Santa Cruz

ADVISOR: Bruce Bills, Lunar and Planetary Institute

PROJECT: Bonneville was the largest of the Pleistocene lakes in the Great Basin (Utah and Nevada). The well-preserved shorelines provide record of significant uplift in the center of the lake, relative to the periphery. The well-constrained chronology of the loading and the excellent geometric control on the rebound make this an almost ideal laboratory for testing theories of isostatic rebound. The present study will consist of several parts: 1) use remote sensing data (Landsat and HCMM images) to delineate and map lacustrine features throughout the region, 2) estimate the importance of erosion and sedimentation, fluctuations in the regional groundwater budget, and tectonic motion related to the Wasatch fault zone as factors influencing the vertical deformation of the shorelines and 3) using these factors and the known surface water loading history, compare the computed shoreline deflection (for a variety of lithosphere models) with the observed, in an attempt to better understand the response of the earth to loads of relatively short duration (a few 10^4 years) and wavelength (a few 10^2 km).

Glenn S. McLaughlin, New Mexico State University

ADVISORS: Dr. Peter Francis, Lunar and Planetary Institute and Dr. Charles Wood, NASA Johnson Space Center

PROJECT: The title of this ongoing project is "Volcano Census of the Central Andes, Part 2." Photographs taken by Shuttle astronauts and Landsat will be used to compile a complete inventory of all major volcanoes in the Central Andes. Volcano location, type, size, erosional state, inferred eruption styles, and other characteristics will be determined from examination of the photos, and this information will be combined with geochemical and geochronological data taken from published reports. This exhaustive compilation, the most complete survey of any volcanic arc, should shed light on the eruptive history, relation between vents, and magma processes at a poorly-known segment of the Ring of Fire.

David E. Melendrez, California State Polytechnic University, Pomona

ADVISORS: Drs. Peter Francis and James Zimbelman, Lunar and Planetary Institute

PROJECT: The major debris avalanche in Gengis Chasma is one of the best known landslide features on Mars. To date, however, it has only been studied on hardcopy photomosaics of the Viking data. It is proposed that the intern will use the original digital Viking imagery to compile a high resolution digital mosaic of the debris flow and the surrounding areas. This will require processing of the original raw image data, contrast enhancement, filtering, geometric correction and smoothing. The final product will be a digital mosaic from which hardcopies can be made at various scales for photointerpretation and mapping. This study will complement existing studies of terrestrial debris avalanche deposits and mass wasting processes on Mars.

Richard J. Neve, Amherst College

ADVISOR: Dr. Gordon McKay, NASA Johnson Space Center

PROJECT: The project entitled "Phosphates in Shergottite Meteorites" involves detailed major and trace element electron microprobe analysis of phosphates in Shergottite meteorites from Mars. Understanding phosphate chemistry is important for deciphering several aspects of shergottite petrogenesis. The REE inventory in shergottites is largely contained in whitlockites. There is an active controversy regarding whether phosphates in two shergottite meteorites, Shergotty and Zagami, have been subjected to post-magmatic chemical alteration. Furthermore, Sm-Nd chronology is strongly affected by phosphates. Some acid-soluble phase, possibly whitlockite, anchors one end of the 350 m.y. Sm-Nd isochron. Moreover, as reservoirs of radiogenic incompatible elements, phosphates must have played an active role in shock resetting of U-Pb and Sm-Nd isotopic systems. Better understanding of phosphate chemistry and evolution during magma crystallization will permit more valid interpretation of the complex and confusing isotopic data for these meteorites.

Anton Skaugset, Reed College

ADVISOR: Dr. Everett K. Gibson, NASA Johnson Space Center

PROJECT: Studies of the earth's paleoatmosphere will be carried out by analyzing fluid and vapor inclusions in unaltered Archean sediments. The study will make use of a laser microprobe-mass spectrometer gas analysis system. From the analysis of the fluid and vapor inclusions in these well-characterized materials, models of the evolution of the earth's atmosphere are developed along with providing vital information about the conditions under which the particular Archean sample formed.

Stephanie Skinner, University of Northern Iowa

ADVISOR: Dr. James Zimbelman, Lunar and Planetary Institute

PROJECT: This project involves the reduction and analysis of the highest spatial resolution thermal infrared data from the Lunae Palus and Coprates quadrangles of Mars (30° S to 30° N, 45° to 90° W). This region includes the Viking I landing site and most of the Vallis Marineris canyon system. The thermal data will be compared to maps and photographs of the area to relate the thermal properties to specific surface features, aiding in the interpretation of the geologic history of the study region.

Alison M. Steele, Acadia University

ADVISOR: Dr. Graham Ryder, Lunar and Planetary Institute

PROJECT: An ongoing study to understand how the characteristics of individual terrestrial plutonic hand samples relate to its parent magma and the details of crystallization processes. The object is to be able to interpret extraterrestrial igneous samples (moon and meteorites) better. The work requires (1) microscopic observations of thin sections of rocks (2) separation of minerals into different types under binocular microscope (3) preparation of powders of mineral separates and whole rocks ready for chemical analysis (4) making fused beads of powders and (5) assistance in running neutron activation analysis (i.e. sample preparation, sample (changes) switches, and data reduction with packaged computer programs) (6) assistance in calculations and interpretation of the results. Rock samples used will include terrestrial, lunar, and possible meteoritic samples.

Susan Webb, State University of New York at Binghamton

ADVISOR: Dr. Michael Zolensky, NASA Johnson Space Center

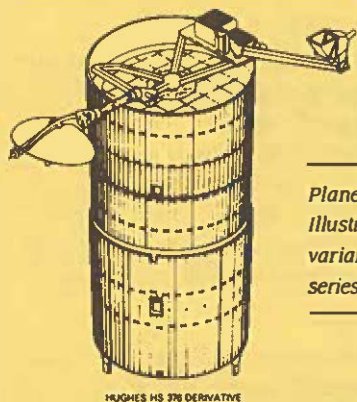
PROJECT: Search for cosmic dust particles in half-million year old Antarctic ice samples. Characterize these same particles using a scanning electron microscope. Compare these old cosmic dust samples with similar particles recently collected from the earth's stratosphere. The project may also involve collecting near infrared and optical spectra of cosmic dust particles for comparison to similar spectra recently collected from asteroids. The ultimate aim of this research is to evaluate the possible sources of cosmic dust.

MARS OBSERVER INVESTIGATIONS SELECTED

As a first step towards returning to Mars exploration, NASA announced selection of 33 possible investigations for the Mars Observer mission scheduled for launch in 1990. The mission will place an unmanned U.S. spacecraft in orbit around the Red Planet in 1991 to conduct a 2-year study.

During the next 6 months (instrument accommodation phase), each proposed investigation will be evaluated for compatibility with the Mars Observer spacecraft and mission. Final selection then will take place and the investigations will be developed for the mission itself.

The Mars Observer mission, first in a new series of planetary observer missions to the inner solar system, will carry seven or eight instruments. Power for the spacecraft will be supplied by solar panels. Carried into low-Earth orbit by the Space Shuttle, the spacecraft will be launched toward Mars by a solid fuel upper stage and placed into a near-polar orbit of 224

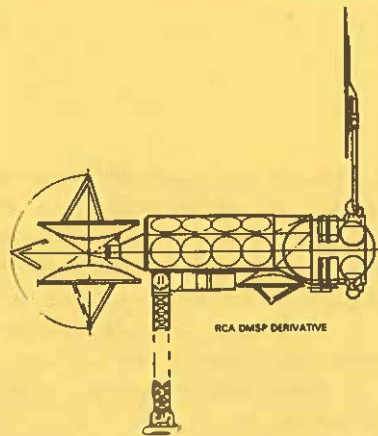


*Planetary Observer Class Spacecraft—
Illustrations show possible design
variants based on existing satellite
series.*

miles. The sun-synchronous, 117-minute orbit will allow the spacecraft instruments to make a complete global survey of the planet's surface and atmosphere about every 56 days. During the 2-year study, the spacecraft will track the planet's seasons and watch seasonal changes on the martian surface and in the atmosphere.

"This return to Mars is especially exciting because Mars is probably the only other planet in the solar system on which humans might reasonably expect to live some day," said Dr. William Quaide, Chief Scientist of NASA's Solar System Exploration Program. "It's also an exciting planet because in the past it may have been very Earthlike, whereas today it is a cold desert. We want to know how that came about."

Three experiments are expected to provide detailed information about the nature of martian surface material. They are the gamma ray spectrometer (GRS), the visual infrared mapping spectrometer (VIMS) and the thermal emission spectrometer (TES). The trio of instruments will determine the chemical and mineral composition of the surface by measuring the gamma rays, visible light and infrared (heat) radiation emitted by the surface. The data will provide invaluable information on volatile materials (water ice and carbon dioxide), lava flows, rock types and surface weathering.



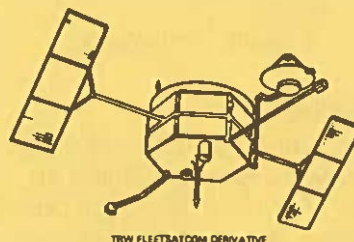
The martian atmosphere also is a major target for investigation. A pressure modulated infrared radiometer (PMIRR) will detect infrared radiation from the atmosphere to measure its chemical composition, pressure, temperature, water content and the presence of atmospheric dust. Other atmospheric measurements will be carried out by the GRS, VIMS and TES as well.

The spacecraft telecommunications system, along with the GRS and the VIMS, are primary instruments called facility instruments and are a special feature of the spacecraft's experiment package. Developed by NASA, the instruments can be modified to fly on future planetary missions. A team of scientists has been selected to operate each instrument and analyse the scientific results. A second special feature is the selection of five scientists who will carry out wide-ranging interdisciplinary studies using data from several different instruments and experiments.

The Mars Observer radio communications system also will be used to map the atmospheric pressure and structure by noting how the atmosphere affects the radio transmission each time the spacecraft goes behind or comes out from behind the planet.

Three other experiments will focus on determining the shape of Mars and learning as much as possible about the interior of the planet. A magnetometer will be aboard to determine whether or not Mars has a weak magnetic field or perhaps, none at all.

The shape of the planet will be accurately measured by a radar altimeter to help determine details of the planet's



surface, slopes of ancient river channels, exact depths of great canyons and the shapes of the huge martian volcanos. Combined with measurements of the martian gravity field, the altimetry measurements also will help scientists probe the inside of Mars and help determine the strength of the martian crust.

It is uncertain if the mission will include a camera. NASA has selected an imaging experiment for evaluation during the instrument accommodation phase on the chance that the

limited spacecraft resources and budget will accommodate it. "We want very much to include an imaging system on the mission," said Quaide, "but the Mars Observer has been planned as a mission with limited resources—power, data rate and dollars—and we are not certain we can squeeze the camera in with all the other instruments which are considered more critical to the mission." The camera, if selected, would provide synoptic images of global weather systems important for monitoring global dust storms on Mars. It also would give scientists the highest resolution images ever obtained from orbit of selected surface features.

Approved by Congress as a new start in Fiscal Year 1985, the Mars Observer mission will focus on specific goals of

geoscience and atmospheric studies and is part of a new program of continued planetary exploration recommended in 1983 by the Solar System Exploration Committee, a part of the NASA Advisory Council. Mission development and operations will be carried out by NASA's Jet Propulsion Laboratory, Pasadena, Calif. Project manager is William I. Purdy and project scientist is Dr. Arden Albee. The Mars Observer program is part of NASA's Solar System Exploration Division under the direction of Dr. Geoffrey Briggs. Headquarters program manager is James Murphy and the program scientist is Dr. Bevan French. Program management is the responsibility of the Office of Space Science and Applications, NASA Headquarters.

INVESTIGATIONS SELECTED FOR THE INSTRUMENT ACCOMMODATION PHASE

Experiment Payload

Space Telecommunications System:	Facility Instrument
Ultrastable Oscillator:	Add-on to telecommunications system
Gamma Ray Spectrometer:	Facility Instrument
Visual Infrared Mapping Spectrometer:	Facility Instrument
Mario H. Acuna	Magnetometer
Goddard Space Flight Center	
Roger J. Phillips	Radar Altimeter
Southern Methodist University	
David E. Smith	Radar Altimeter
Goddard Space Flight Center	
Daniel J. McCleese	Pressure Modulated Infrared
Jet Propulsion Laboratory	Radiometer
Phillip R. Christensen	Thermal Emission Spectrometer
Arizona State University	
Michael C. Malin	Mars Observer Camera
Arizona State University	

Facility Instruments

Gamma Ray Spectrometer

William V. Boynton, University of Arizona, Team Leader
 James R. Arnold, University of California-SD
 Peter Englert, University of Cologne, FR Germany
 Albert E. Metzger, Jet Propulsion Laboratory
 Robert C. Reedy, Los Alamos National Laboratory
 Steven W. Squyres, Ames Research Center
 Jacob I. Trombka, Goddard Space Flight Center
 Heinrich Waenke, Max-Planck-Institute für Chemie, Mainz, FRG

Visual Infrared Mapping Spectrometer

Laurence A. Soderblom, U.S. Geological Survey, Team Leader
 Bonnie J. Buratti, Jet Propulsion Laboratory
 Roger N. Clark, U.S. Geological Survey
 Larry W. Esposito, University of Colorado
 Fraser P. Fanale, University of Hawaii
 Hugh H. Kieffer, U.S. Geological Survey
 Dennis L. Matson, Jet Propulsion Laboratory
 Thomas B. McCord, University of Hawaii

Space Telecommunications System

G. Leonard Tyler, Stanford University, Team Leader
 Georges Balmino, BGI, GRGS, Toulouse, France
 David P. Hinson, Stanford University
 William L. Sjogren, Jet Propulsion Laboratory
 David E. Smith, Goddard Space Flight Center
 Richard Woo, Jet Propulsion Laboratory

Interdisciplinary Scientists

Michael H. Carr	Geosciences
U.S. Geological Survey	
James B. Pollack	Atmospheres/Climatology
Ames Research Center	
Andrew P. Ingersoll	Polar Atmospheric Sciences
CALTECH	
Bruce M. Jakosky	Surface Atmosphere Interactions
University of Colorado	
Raymond E. Arvidson	Data Management/Archiving
Washington University	

CONFERENCES—HERE AND ABROAD

A number of meetings, symposia, conferences, and workshops are being planned which are of interest to space scientists. Short descriptions of a number of them follow.

Mars Observer Session at Spring AGU

The Planetology Section of the American Geophysical Union has organized a session called *New Perspectives on Remote Sensing of the Surface of Mars* which will be held Wednesday, May 21, at the 1986 AGU Spring Meeting in Baltimore, Maryland.

Early in the session, speakers will discuss what is already known about the planet's surface, according to session chairman Bruce M. Jakosky of the Laboratory for Atmospheric and Space Physics at the University of Colorado, Boulder. In recent years, additional analysis of data from Viking and Mariner missions, as well as study of earth-based observations, has resulted in new findings, Jakosky said. In the latter part of the session, Arden L. Albee of NASA's Jet Propulsion Laboratory and the California Institute of Technology, project scientist for the Mars Observer mission, will give an extended talk about plans for the mission itself. (*Eos* 4/22/86 p. 221)

National Commercial Remote Sensing Conference

A remote sensing conference on data users global requirements in the Space Station/Polar Orbiting Platform era of the 1990's scheduled for June 3-5, 1986 in Denver Colorado, is sponsored by the National Aeronautics and Space Administration (NASA), National Oceanic and Atmospheric Administration (NOAA), the GEOSAT Committee, Institute for Technical Development/Space Remote Sensing Center (ITD/SRSC), EOSAT, and American Society of Photogrammetry and Remote Sensing (ASPRS). The conference will provide an open forum for the private sector and government to review current and future plans as well as the global need of remote sensing data users. It is designed to stimulate the potential and existing remote sensing data market and accelerate the development of new commercial ventures. Remote sensing requirements and applications will be explored in depth and industry/government measurement requirements for the Space Station era and beyond will be identified.

Further information can be obtained through:

GEOSAT Office	or	NASA Earth Resources Labs
153 Kearny		Code H-A30
Suite 209		NSTL
San Francisco CA 94108		NSTL Station MS 39529
Phone: 415/981-6265		Phone: 601/688-1903

COSPAR XXVI PLENARY MEETING

At France's invitation, from June 30 to July 12, 1986, the XXVIth Plenary Meeting of the Committee on Space Research (COSPAR) will be held in Toulouse. More than 1200 scientists from some 50 countries will meet to discuss the present state of research and coordinate tomorrow's major scientific space programs.

In parallel with the meeting, the *Espace 86* exhibition of scientific space technologies will highlight the activities and projects of national and international space agencies; and present high performance on-board and ground equipment produced by industrial firms and research laboratories in their respective speciality areas. COSPAR themes include: Solar astronomy and physics; Planetology; Earth environment: ionosphere, thermosphere, middle atmosphere, magnetosphere; Meteorology, oceanography; Geodesy and geodynamics; Earth resources; Materials sciences, and Life sciences. Two of the sessions are of particular interest to the planetary community.

On July 3-4, Workshop III is dedicated to *Future Planetary Missions*. Session topics include: Overviews of future mission planning; Planetary science and the space station; Moon/Mars; Comets/Asteroids; Venus/Outer planets; and International Cooperation. The Program Committee consists of: Dr. R.W. Shorthill and Prof. Yu. A. Surkov, Co-Chairmen; Dr. M. Duke, Dr. R.M. Bonnet, Dr. D.M. Hunten, Prof. S.K. Runcorn, Prof. N.S. Kardashev, and Dr. H. Masursky.

COSPAR Symposia VIII will consist of *Latest Results on Venus and Uranus Missions*. This symposia will be held on July 7-8. July 7 will be dedicated to the Voyager Uranus Encounter and July 8 will have reports on Venus from Venera 15/16 and from Vega-1 and -2. Co-chairmen of the Program Committee are Dr. H. Masursky and Dr. A.T. Basilevsky; members include: Dr. D.M. Hunter, Dr. A.J. Kliore, Prof. V.I. Moroz, Dr. A.F. Nagy, and Dr. E.C. Stone. The organizing secretary is Dr. R.W. Shorthill.

Announcement and Call for Papers: Materials Processing in the Reduced Gravity Environment of Space

As part of the Materials Research Society 1986 Fall Meeting, December 1-5, 1986 in Boston, Massachusetts, a *Symposium on Materials Processing in the Reduced Gravity Environment of Space* will be held.

Low gravity research in space involves reduced contamination, convection, and body forces. These advantages are valuable in such areas of materials science and technology as biotechnology, electronic materials, combustion, fluids, high temperature materials and properties and processing of metals, alloys ceramics, glasses, and polymers. This symposium will

include these and additional areas of low gravity research, with special emphasis on microgravity science, and commercial applications.

The symposium will feature scientist-astronaut Taylor Wang of JPL as keynote speaker. Invited speakers include M.E. Glicksman, RPI, Harry Gatos, MIT, and John Margrave, Rice University; and Directors of the materials-oriented NASA Centers for the Commercialization of Space: Charles Bugg, University of Alabama-Birmingham; Charles Lundquist, University of Alabama-Huntsville; Frank Jellinek, Battelle; and John Bayuzick, Vanderbilt University.

Contributed papers are solicited in the following areas:

High Temperature Processing and Measurements
Crystal Growth from the Vapor, Melt, and Solutions
Commercial Applications
Biological Preparations and Separations
Fluid Phenomena
Combustion
Polymer Processing
Glass and Ceramic Processing

Abstracts of contributed papers should be submitted to one of the symposium chairmen by June 13, 1986.

Symposium Chairmen

R.H. Doremus	P.C. Nordine
Materials Engineering Dept.	Midwest Research Inst.
Rensselaer Polytechnic Inst.	425 Volker Boulevard
Troy NY 12180	Kansas City MO 64110
Phone: 518/266-6373	Phone: 816/753-7600

Space Processing Session Planned

The American Institute of Aeronautics and Astronautics (AIAA) Aerospace Sciences Meeting, January 12-16, 1987 in Reno, Nevada, will include a special session on *Space Processing*. Papers are solicited for a broad range of topics in the science and technology of processing materials in the microgravity of Earth orbit and on the lunar and planetary surfaces. Papers describing recent flight experiments are strongly encouraged; however, papers on ground-based research directed toward space experiments are also encouraged. The areas of interest for both theoretical and experimental efforts include:

1. Protein and semiconductor crystal growth
2. Microgravity separation of materials
3. Metals and glass solidification and extraction
4. Fluid dynamics of materials processing
5. Other effects related to space processing.

Papers from graduate and undergraduate students are also solicited. A minimum of one student paper will be accepted.

Abstracts should be sent to:

Dr. Archibald L. Fripp
Mail Stop 473
NASA Langley Research Center
Hampton VA 23665

IUGG General Assembly

The XIXth General Assembly of the International Union of Geodesy and Geophysics (IUGG) will be held at the University of British Columbia, Vancouver B.C., Canada on August 9-22, 1987.

In addition to Union and interdisciplinary symposia the Assembly will include meetings sponsored by IUGG member associations which are: Geodesy; Seismology and physics of the Earth's interior; Volcanology and chemistry of the Earth's interior, Geomagnetism and Aeronomy; Meteorology and Atmospheric Physics; Hydrological Sciences, and Physical sciences of the oceans.

Details regarding the Assembly and the Call for Papers can be obtained by contacting:

The Secretariat
c/o Venue West LTD.
#801 - 750 Jervis Street
Vancouver B.C. Canada V6E 2A9
Phone: 604/681-5226; Telex 04-352848 VCR

Cryptoexplosions and Catastrophes to be topic of workshop

An *International Workshop on Cryptoexplosions and Catastrophes in the Geological Record* will be held at Parys, South Africa (near center of Vredefort structure, ca. 100 km SW of Johannesburg) July 6-10, 1987. It is sponsored by the C/T Working Group of International Committee on Stratigraphy (ICS); International Association of Seismology and Physics of the Earth's Interior (IASPEI) and the Council for Scientific and Industrial Research.

The objectives of the meeting are:

- A. to provide a forum in 1987, where cryptoexplosions and catastrophes in the geological record are compared and discussed;
- B. to search for a genetic scheme for Vredefort which best accounts for the observations;
- C. to gather detailed facts about global geophysical variations during the late Cretaceous-early Tertiary (90 m.y.-55 m.y.) interval;
- D. to cull out the critical facts (from A,B, and C) for understanding the genesis of cryptoexplosion structures and boundary layers;
- E. to note the crucial needs in regard to further research.

For more information, contact:

Organising Committee
Cryptoexplosions Workshop
Bernard Price Institute of Geophysical Research
University of Witwatersrand
1 Jan Smuts Avenue
Johannesburg 2001 South Africa

LUNAR INITIATIVE UPDATES

The Lunar Initiative is a set of activities, loosely coordinated through the NASA Johnson Space Center's Solar System Exploration Division, aimed at anticipating the issues associated with future manned lunar exploration and settlement. In the last two issues of the *IPIB* many of these efforts have been briefly described. In this update, we mostly report that all is well; but one fascinating new lunar resource will be mentioned below.

A promised summary of the workshop on *Astronomy from the Moon* will not appear because the short papers have not quite yet been collected from the participants. However, an excellent summary of the meeting was reported as the cover story in the March 8, 1986, issue of *Science News* as "Moon Colony Astronomy."

Symposium-86, the meeting being organized by the American Mag-Lev Corporation on lunar development and electromagnetic transportation systems, is proceeding on schedule for September 22-24 in Atlantic City. In addition to technical sessions on the lunar environment and the engineering topics, the program committee anticipates a strong set of papers on the very important issue of private sector participation in such a long term, large scale venture. A call for papers and a program outline can be obtained from Dr. G. Merrill Andrus at (609)589-4090 or by writing Symposium '86, P.O. Box 1986, Pitman, NJ 08071-1986.

Graduate students in the Architecture Department of the University of Houston under Professor Guillermo Trotti have produced very interesting designs of lunar base elements. Using a sophisticated computer design system, the group has produced a modular design, emplaced in phases, which will have the capacity for a hundred or more people in less than ten years. Since the concept requires a certain amount of construction machinery, the UH students have joined forces with engineers at Georgia Tech who have a NASA sponsored student project to design vehicles and machines for lunar surface operations. Meanwhile, David Nixon at the Southern California Institute of Architecture is looking at the applicability of Space Station modules on the lunar surface. His students have experience with the designs stemming from ongoing projects at NASA Ames Research Center.

EL DORADO

Exploration of the New World in the Sixteenth and Seventeenth Centuries was motivated, in part, by rumors of fabulous riches such as the legendary seven cities of gold. In the long term, investors in the colonies of the Western Hemisphere became rich from exploitation of more mundane resources or from trade in agricultural products.

Advocates of lunar development usually are expected to provide a list of valuable resources or products from the Moon which will pay for the investment in the first five years or so. Unfortunately, the story of "fabulous riches" on the Moon is a little difficult to support from the available evidence. Strategies based on exploitation of lunar resources for sale on Earth are

defeated by the currently high cost of transportation to the Moon and the apparently low value of any known lunar material. Consequently, the lunar base scenarios constructed at JSC have tried to take advantage of the high cost of Earth-to-orbit transportation and to argue that lunar resources will lower the expense of projects in space or on the Moon itself in the long term. However, at the bottom of the presentation charts, there is always a line which reminds us of potential surprises because our knowledge of the Moon is incomplete and our predictions of technology are inexact.

The "surprise" theory has received a small boost recently from the preprint of a paper to be published in the September, 1986, issue of *Fusion Technology*, a journal of the American Nuclear Society. "Lunar Source of ^3He for Commercial Fusion Power" is authored by L. J. Wittenberg, J. F. Santarius, and G. L. Kulcinski of the University of Wisconsin - Madison. The researchers point out that the reaction between deuterium and the isotope ^3He is one of the most attractive options for thermonuclear fusion from the standpoint of energy efficiency, reactor engineering, and safety. The reaction has not been studied as intensively as others because the helium isotope is very difficult to obtain in terrestrial helium sources.

As might be gleaned from the title of the paper, the Wisconsin scientists believe that solar wind helium implanted in the lunar regolith over the last four billion years may be a rich, accessible, and economically exploitable source of the rare isotope. A calculation of the energy required to mine the helium and transport it to Earth is compared to the energy which could be extracted from the fuel in a power plant. The authors conclude the energy payback ratio is at least 250:1.

At JSC we see ways to improve the simple mining scheme based on our work over the past few years on lunar oxygen production. If the research on the fusion reaction fulfills expectations, then the extraction facility on the surface of the Moon will fit nicely into the scenarios already under investigation in the Lunar Initiative. Although thermonuclear fusion power plants on the Earth are by no means a foregone conclusion, the search for El Dorado and "lunar gold" may not be so quixotic as some would maintain.

W. Mendell, NASA/JSC

INTERNATIONAL SPACE YEAR 1992 RESOLVED BY CONGRESS

In a joint resolution of the U.S. Senate and House of Representatives the following was resolved:

Whereas the year 1992 is the five hundredth anniversary of the discovery of America by Christopher Columbus;

Whereas Spain will commemorate the discovery of America by launching an Hispanic communications satellite in 1992;

Whereas 1992 is the 35th anniversary of the IGY (International Geophysical Year) when the first artificial satellites were launched, thus marking the beginning of the space age;

Whereas an International Geosphere/Biosphere Program is planned for the early 1990's as a sequel to the IGY, but its space activities will be limited to Earth observation;

Whereas space exploration has made enormous strides since the IGY and deserves concerted worldwide commemorative recognition and engagement as well;

Whereas as International Space Year in 1992 could help maximize budgetary efficiency and scientific gain;

Whereas the U.S. has already established itself as the world leader in international cooperation in space; and

Whereas 1992 appears to be ideally suited for such recognition and engagement: Now, therefore, be it

Resolved by the Senate and House of Representatives of the U.S.A. in Congress assembled,

That (a) it is the sense of the Congress that the President should—

1. endorse the concept of an International Space Year (ISY) for 1992;
2. consider the possibility of discussing an ISY with other foreign leaders;
3. direct the Administrator of NASA, in association with other relevant public and private agencies, to initiate interagency and international discussions that explore the opportunities for an ISY in 1992; and
4. submit to the Congress at the earliest practicable date, but no later than May 1, 1986, a report detailing the steps taken in carrying out paragraphs (1), (2), and (3).

(b) Discussions referred to in subsection (a3) should address possible missions, research, and educational activities of an international character, including the possibility of incorporating already planned events into an ISY framework.

The above resolution has been passed by the Senate and House, and is now law. An interagency group led by J. Morrison, NASA International Affairs is now preparing a report that will be ready May 1 on ways to implement the recommendations. The possible themes being discussed by the group are:

1. Education—using space for education with Comsats; educating people about space.
2. Global Change—the "Mission to planet earth"
3. Solar System Exploration—Mars observer, Venus exploration.
4. Astronomy and Astrophysics
5. Solar-Terrestrial Physics—Japanese Geotail, Soviet plans, U.S. plans for ISTP
6. Space technology benefits—for example, the new data technology and the new information society.
7. Commercial use—e.g., drugs in Space.
8. A major international flight project—moon base, mission to Mars, asteroid landing, etc.

More about the plans for ISY will be reported as they become more firm.



"SPACE BECKONS: JOIN THE ADVENTURE"—1986 SPACEWEEK THEME

Spaceweek National Headquarters has selected *Space Beckons: Join the Adventure* as the theme for the organization's July 16-24, 1986 nationwide series of events and activities in support of the U.S. space program.

"Even before the tragic events of Shuttle Mission 51-L, 1986 had been heralded as one of the most important years in space. Today, 1986 is viewed as a critical turning point in the U.S. space program," said Dennis Stone, President of Spaceweek. "There is a great need today to provide information and public forums addressing the U.S. space program. Spaceweek, which since 1980 has served as a clearinghouse for educational and information programs, will play an important role in meeting those needs during 1986."

"At Spaceweek, we want to build upon the grassroots public support for the space program that has been demonstrated across the country during the past weeks," Stone said, "Spaceweek '86 events will be focused at building upon that momentum and encouraging people to become involved in space activities throughout the year."

"Spaceweek is currently seeking both individual volunteers and organizations interested in sponsoring events and activities during Spaceweek '86," Stone said. To volunteer to organize an event during Spaceweek, individuals or groups should contact Spaceweek National Headquarters, P.O. Box 58172, Houston, TX 77258.

"Volunteers in cities throughout the country are the backbone of Spaceweek," says Stone. "Spaceweek National Headquarters draws upon thousands of volunteers to organize and coordinate events in some 100 locations. Last year, more than 250,000 people participated in Spaceweek activities, which included conferences, lectures, seminars, model rocket launches, public star parties, public displays, contests and special events at planetariums, museums, science centers and schools. The events were covered 23 times by the national media."

Organizations which have sponsored Spaceweek '85 activities include the American Institute of Aeronautics and Astronautics (AIAA), L-5 Society, National Space Institute, the Planetary Society, Students for the Exploration and Development of Space, the Space Foundation, and others.

Spaceweek is an annual public observance of education-oriented space events celebrated in over 100 U.S. cities during the July 16-24 period, the anniversary of the historic Apollo 11 mission. Spaceweek National Headquarters is a non-profit organization which serves as a coordinator and support center for space-related groups, organizations, and technical societies throughout the country.



Astronaut Memorial to be Built

NASA and the Astronauts Memorial Foundation, Inc. have announced plans to build a memorial at the Kennedy Space Center, Florida, dedicated to astronauts who have lost their lives while flying, training or awaiting assignment to fly for the space agency.

NASA will provide a site for the memorial at the Kennedy Space Center, while the Foundation will raise funds for the design, construction and perpetual care of the memorial. U.S. Senator Jake Garn and U.S. Representative Bill Nelson, both of whom have flown on the Space Shuttle, are co-chairing national fundraising efforts for the private, non-profit foundation, based in Cape Canaveral, Florida.

Once the memorial is completed, education will become the focus of the Foundations's efforts, according to the group's organizers. A scholarship fund will be established to support students pursuing careers in the fields of teaching, engineering and science.

The memorial will honor: the Space Shuttle Challenger crew, including Francis (Dick) Scobee, Michael Smith, Judith Resnik, Ronald McNair, Ellison Onizuka, Christa McAuliffe and Gregory Jarvis; the Apollo crew who died when a fire swept their spacecraft during a launch simulation in 1967, including Virgil (Gus) Grissom, Edward H. White II and Roger Chaffee; Gemini IX astronauts Charles Bassett and Elliott See, who were killed in a crash of their T-38 trainer aircraft in 1966; Theodore Freeman, who died in a T-38 accident in 1964; Clifton Williams, who also died in a T-38 accident in 1967, and Edward Givens, who was killed in an automobile accident in 1967.

Contributions to the Astronauts Memorial Foundation, Inc. may be addressed to:

Astro Memorial Foundation Inc.
P.O. Box 628003
Orlando FL 32862-8003

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 credit cards. Just include the account number and expiration date on your order to them. Some of the publications may be available from the GPO bookstores which are found 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. It should also be noted 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 IPI. 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.

NASA PUBLICATIONS

The Human Factor: Biomedicine in the Manned Space Program to 1980

The history of the biomedical aspects of the manned space program is a multifaceted one. One facet is the technical and operational decision making that underlay biomedical research, development, and operations in support of the manned space

program. Another facet is the administrative decision making and still a third is a study of biopolitics.

This historical analysis of biomedicine during the manned space program considers all three facets and the many questions raised by each. The technical and operational problems that NASA's life scientists faced as they strove to provide biomedical support for both approved and advanced manned programs are discussed, as well as the administrative and political problems that emerged as NASA's life sciences programs expanded and diversified to meet the requirements of an accelerated space program. Together the narrative and analysis illuminate the important contributions of NASA's life scientists to the nation's achievements in space, and record the difficulties and frustrations these scientists experienced as they tried to create a viable, integrated, and effective program in the space life sciences.

A volume in the NASA History Series, this special publication written by John A. Pitts follows the tradition of excellence in this series of publications. It provides a one-stop answer to many questions about man in space during the early eras of the Mercury, Gemini, Apollo, and Skylab programs with a projected look into the future.

NASA SP-4213 is available from the Superintendent of Documents as Stock Number 033-000-00977-1. \$23.00 U.S.; \$28.75 foreign. 404 p. illustrated, soft cover.

A Look at the Planets

This is a short (only 8 pages) pamphlet published by NASA with the report number PAM 107. It does contain a small colored picture of each of the planets in the solar system, a brief description of that planet, two tables: one which is a chronology

of all the NASA planetary probes with dates of the mission, target planet, and status of the mission; the other contains data about each planet including distance from the Sun, period of revolution, rotation period, number of satellites, rings, and several other pieces of information. A chart shows the relative size of the planets. At its price of \$1.00 it would be a useful booklet for classroom use.

Available from the Superintendent of Documents as stock number 033-000-00964-0. \$1.00 U.S.; \$1.25 foreign. 8 p., colored illustrations, 1985.

Other Materials

Satellite Newsletters

Two newsletters reporting data and findings of the LANDSAT and SPOT satellites have just been published.

EOSAT: LANDSAT Data User Notes v.1 no. 1 published in March 1986, will continue to provide the remote sensing community with the information that they have been receiving from NOAA's Landsat Data User Notes which has ceased publication with no. 35. The quarterly will be distributed at no cost to persons interested and involved in satellite remote sensing, worldwide. To obtain a free subscription to this newsletter call the Earth Observation Satellite Company (EOSAT) at 301/552-0500 or write to:

Editor
EOSAT Landsat Data User Notes
4300 Forbes Boulevard
Lanham MD 20706 USA

Spotlight the quarterly newsletter from SPOT Image Corporation, also premieres with volume 1, number 1. In a column written by Gilbert Weill, President of SPOT Image Corporation, he comments that SPOTLIGHT is their effort to maintain an active line of communications with the users of SPOT data. The newsletter will contain information about the progress of the SPOT program, including satellite updates, staff and user profiles, new applications, SPOT data options and more.

To obtain *SPOTLIGHT* write to:

Editor, SPOTLIGHT
SPOT Image Corporation
1897 Preston White Drive
Reston VA 22091-4326

British Museum Geology Books Available from Cambridge

Several years ago, the British Museum published a series of booklets on geology which were lucidly written for general readers and students. These books explain facts and meaning of the fascinating world of geology. They were well illustrated, most in color, are brief (about 35-40 pages) but were difficult to obtain in the U.S.

Now, Cambridge University Press is making these booklets available in the U.S. Booklets in the series include:

Moon, Mars and Meteorites
Age of the Earth
Story of the Earth
Volcanoes
Earthquakes

At a cost of \$2.95 each they are a real bargain and could certainly be used for students in junior high and high school classes. To obtain these booklets, contact your local bookstore or Cambridge University Press, 32 East 57th Street, New York, NY 10022.

Geology and Ore Deposits of the Sudbury Structure

The Ontario Geological Survey is pleased to announce the publication of Special Volume 1: *Geology and Ore Deposits of the Sudbury Structure*. The volume contains 25 chapters authored by geoscientists from several universities, from mining and consulting companies, and from two Canadian geological surveys. A detailed geological map of the Sudbury Structure at a scale of 1:50,000, a magnetic anomaly map (1:1,000,000), a Bouguer anomaly map (1:1,000,000), and several charts are included.

To order send a check or money order in Canadian funds for \$30.00 (Canadian) made payable to the Treasurer of Ontario. VISA and Master Card are accepted, show account no., expiration date, and signature. Send to:

Publications Services Section
Ministry of Government Services
5th Floor, 880 Bay Street
Toronto, Ontario M7A 1N8

Astronomical Society of the Pacific

Slide Set on Future Astronomy consists of 15 slides depicting future space astronomy missions. Selected by Dr. George Field of Harvard, the slides show a variety of planned spacecraft and instruments for exploring the universe from above our planet's atmosphere.

The slides show the Hubble Space Telescope and the Galileo probe of Jupiter, the Space Infrared Telescope Facility, the Large Deployable Reflector, the Advanced X-Ray Astrophysics Facility, the Gamma Ray Observatory, a possible Space Station, and others. A 20-page captioned booklet gives clear, nontechnical information on each mission.

Copies of the set may be obtained by sending \$13.95 plus \$2.50 for postage and handling to the Slide Sales Dept. at A.S.P. (California residents please add sales tax. Outside North America, please double postage & handling charge.)

Universe at Your Fingertips is a useful new resource book for teachers of astronomy at the university, college, or high-school level which is being distributed by A.S.P. Written by astronomers/educators R. Robert Robbins and Andrew Fraknoi, the 96-page volume lists and organizes a wealth of materials available to help teachers of astronomy.

Resources listed include: books, periodicals, software, atlases, catalogs, texts, films, videotapes, slides, and other

audiovisual materials, laboratory manuals, observing aids, organizations, and more. Complete addresses are included for publishers and distributors. There are special sections on Halley's Comet, archaeoastronomy, and debunking pseudoscience.

The book was produced in late 1985 under the auspices of the International Astronomical Union and only a limited number of copies were printed. They are available on a first-come, first-served basis for \$8.95 postpaid. Send to IAU Book Dept. at A.S.P. (Payment must accompany order. California residents add sales tax. Allow 4-6 weeks for delivery)

The address of the society is:



Astronomical Society of the Pacific
1290 24th Avenue
San Francisco CA 94122

Video Tapes of Some Sessions of the XVIIth LPSC

Four of the sessions at the XVIIth Lunar and Planetary Science Conference were recorded on video tape. Copies can be obtained from *Space Frontier Group* in either VHS or Beta formats. This is the first time in the history of the conference that session video tapes are available. The project was an experiment by Space Frontier Group, and some of the proceeds go to the I.S. Society.

The following sessions were recorded:

- **MARS AND OTHER REMOTE SENSING:** Topics include Mars, Mercury, Lunar radar images, and the composition of the Martian moons, Phobos and Deimos. 1 tape, \$30.00
- **SPACE UTILIZATION:** Topics include site selection for a Lunar Base, smelting lunar material, microwave fusing of lunar materials, hydrogen content of lunar soils, and lunar concrete for space construction. 1 tape, \$30.00
- **VENUS:** Topics include volcanic origins of some craters, evidence for large-scale strike-slip faulting, photogeologic comparisons of features on Venus and Earth, and water vapor content in the Venusian atmosphere. 2 tapes, \$50.00
- **RECENT ENCOUNTERS:** Topics include solar system exploration status, early results from Voyager Uranus encounter, and early results from the Soviet VEGA 1 and VEGA 2, and ESA's Giotto encounters with Halley's Comet. 1 tape, \$30.00
- **SUMMARY:** One hour of documentary style highlights from the above four sessions. 1 tape, \$50.00

SPECIAL: All of the above tapes at a reduced price: 5 tapes for \$150.00

When ordering please specify which session and the video tape format (VHS or Beta). Send check or money order to:



Space Frontier Group
P.O. Box 580386
Houston TX 77258-0386

Lunar Base Posters

A 23" X 20" poster of the original cover painting from *Lunar Bases* is available from the LPI. This full-color reproduction with descriptive text will be mailed in a tube for \$7.00 U.S. and \$7.75 (air mail), \$4.00 (surface) Foreign.

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ye editor

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The next issue will be in NOVEMBER. Copy deadline is OCTOBER 15, 1986. If you have any announcements which 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

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CALENDAR

May 19-23	American Geophysical Union, Spring Meeting, Baltimore, Maryland.	American Geophysical Union 2000 Florida Avenue NW Washington DC 20009 Phone: 202-462-6903.
May 23-26	5th L5 Society Space Development Conference,	L5 Society 1060 East Elm Tucson AZ 85719-9990 Phone: 602-622-6351
June 1-6	Third International Conference on Geoscience Information, Adelaide, South Australia.	The Secretary, Third ICGI Australian Mineral Foundation Private Bag 97 Glenside South Australia 5065, Australia.
June 3-5	National Commercial Remote Sensing Conference,	Geosat Office 153 Kearny, Suite 209 San Francisco CA 94109 Phone: 415-981-6265
June 13	Abstract deadline for Geological Society of America Annual Meeting	For abstract forms Phone: 303-447-8850

June 22-26	168th Meeting of the American Astronomical Society, Ames, Iowa.	George Bowen Dept. of Physics Iowa State University Ames IA 50011 Phone: 515-294-7659
June 30-July 4	Sixth International Conference on Geochronology, Cosmochronology and Isotope /Geology, Cambridge, England.	Organizing Committee 6th International Conference Dept. of Earth Sciences University of Cambridge Downing Street Cambridge CB2 3EQ, England.
July 12-17	98th Annual Meeting of the Astronomical Society of the Pacific, University of Colorado, Boulder.	A.S.P. Boulder Meeting 1290 24th Avenue San Francisco CA 94122 Phone: 415-661-8660
July 14-17	Conference on Primitive Body Cornerstone, University of Kent at Canterbury.	Prof. J.A.M. McDonnell Physics Laboratory University of Kent Canterbury, Kent CT2 7NR England
July 16-24	Spaceweek '86: Space Beckons: Join the Adventure.	Spaceweek National Headquarters P.O. Box 58172 Houston TX 77528
July 18-19	Mars: the Evolution of Its Climate and Atmosphere, Hirshhorn Museum, Washington DC. Sponsors: National Air and Space Museum and Lunar and Planetary Institute.	Pam Jones Lunar and Planetary Institute 3303 NASA Road One Houston TX 77058-4399 Phone: 713-486-2150.
July 21-23	The Mars Conference, National Academy of Sciences Auditorium, Washington DC.	Mrs. Lu Agee Administrative Chairman P.O. Box 416 Hampton VA 23669 Phone: 804-865-8400
August 4-11	Field Workshop on Archean Deep Crustal Processes, Northern Manitoba.	Pam Jones Lunar and Planetary Institute 3303 NASA Road One Houston TX 77058-4399 Phone: 713-486-2150.
August 6-9	The Planet Mercury Conference, Tucson, Arizona	Mildred S. Matthews Lunar and Planetary Laboratory University of Arizona Tucson AZ 85721 Phone: 602-621-2902

September 15-17	Space Tech 86 , Orlando, Florida	Space Tech Secretariat Society of Manufacturing Engineers One SME Drive - P.O. Box 930 Dearborn, MI 48121
September 22-25	Meteoritical Society, 49th Annual Meeting , New York, New York.	Martin Prinz Dept. of Mineral Sciences American Museum of Natural History New York NY 10024 Phone: 212-873-1300
September 25-27	MECA Workshop on Atmospheric H₂O Observations of Earth and Mars , LPI, Houston, Texas	Pam Jones Lunar and Planetary Institute 3303 NASA Road One Houston TX 77058-4399 Phone: 713/486-2135
October 6-11	XXVII Congress of the International Astronautical Federation , Innsbruck, Austria	
October 14-18	International Symposium: Origin and Evolution of Planetary and Satellite Systems , Potsdam, DDR.	Prof. Dr. H. Stiller Zentralinstitut für Astrophysik Potsdam, DDR
October 21-24	Hypervelocity Impact Symposium San Antonio, Texas	Dr. Charles E. Anderson Southwest Research Institute P.O. Box 28510 San Antonio TX 78284
October 27-31	20th ESLAB Symposium on the Exploration of Halley's Comet , Heidelberg, West Germany.	Dr. R. Reinhard Space Science Dept. ESA, ESTEC Postbus 299 2200 AG Noordwijk, The Netherlands.
November 4-7	American Astronomical Society Division for Planetary Sciences , 18th Annual Meeting, Paris, France	Catherine de Bergh Observatoire de Meudon 92190 Meudon, France
November 10-13	Geological Society of America Annual Meeting , San Antonio, Texas.	Jean Kinney Geological Society of America P.O. Box 9140 Boulder CO 80301 Phone: 303-447-2020
December 1-5	Symposium on Materials Processing in the Reduced Gravity Environment of Space , Boston, Massachusetts	R.H. Doremus Materials Engineering Dept. Rensselaer Polytechnic Institute Troy NY 12180 Phone: 518/266-6373
December 8-12	American Geophysical Union Fall meeting, San Francisco, California.	American Geophysical Union 2000 Florida Avenue NW Washington DC 20009 Phone: 202-462-6903

December 15-19	Space Exploitation and Utilization , Sheraton Waikiki Hotel, Honolulu, Hawaii.	American Astronautical Society 6212-B Old Keene Mill Court Springfield VA 22152 Phone: 703-866-0020
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1987

January 4-8	169th Meeting of the American Astronomical Society , Vancouver, British Columbia.	Alan Dressler Mt. Wilson & Las Campanas Observatories 813 Santa Barbara Street Pasadena CA 91101 Phone: 213-577-1122
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January 5-9	Meteorites and the Early Solar System Conference , Tucson, Arizona.	Dr. John Kerridge Institute of Geophysics University of California Los Angeles CA 90024 Phone: 213-825-3331
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January 12-16	AIAA Aerospace Sciences Meeting , Reno, Nevada	Dr. Archibald L. Fripp Mail Stop 473 NASA Langley Research Center Hampton VA 23665
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March 10-14	Origin and Evolution of Planetary and Satellite Atmospheres Conference , Tucson, Arizona.	Sushil K. Atreya University of Michigan Space Research Building Ann Arbor MI 48109-2143
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March 16-20	XVIIIth Lunar and Planetary Science Conference Houston, Texas.	
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April 13-16	1987 European Union of Geosciences Biennial Meeting , Strasbourg	Organizing Committee EUG IV Dept. of Earth Sciences ETH-Honggerberg CH-8093 Zurich, Switzerland
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June 14-18	170th Meeting of the American Astronomical Society , Vancouver, British Columbia.	Harvey Richer Dept. of Geophysics and Astronomy University of British Columbia Vancouver BC V6T 1W5 Canada Phone: 604-228-4134
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July 6-10	International Workshop Cryptoexplosions and Catastrophes in the Geological Record , Parys, South Africa	Organising Committee Cryptoexplosions Workshop Bernard Price Institute of Geophysical Research University of the Witwatersrand 1 Jan Smuts Avenue Johannesburg 2001 South Africa
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August 9-22	XIXth General Assembly of the International Union of Geodesy and Geophysics , Vancouver, British Columbia, Canada	Conference Secretariat c/o Venue West #801 - 750 Jervis Street Vancouver, B.C., Canada V6E 2A9
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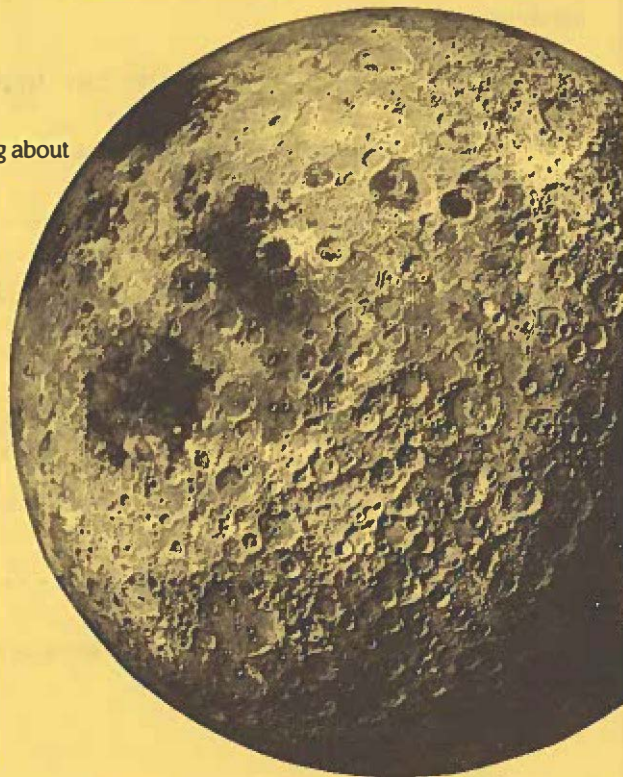
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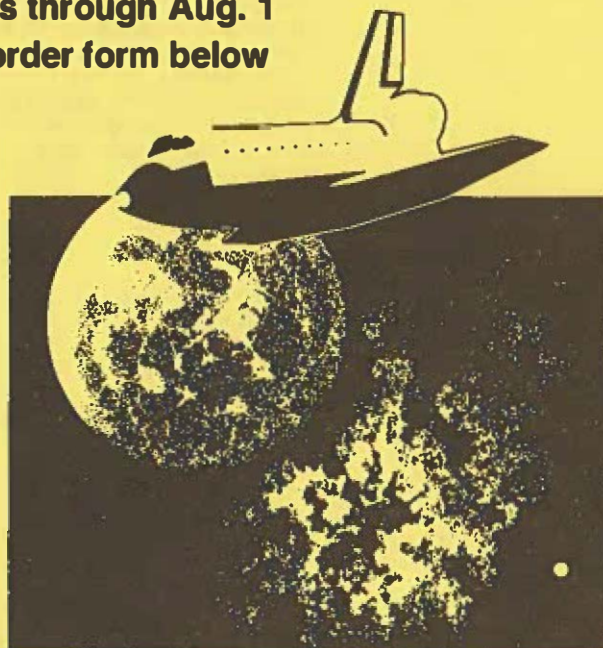
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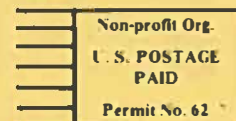
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