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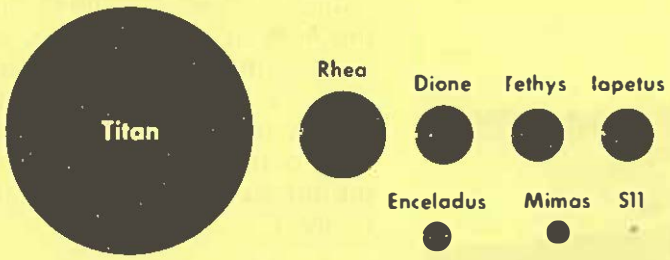
VOYAGER 1 AT SATURN

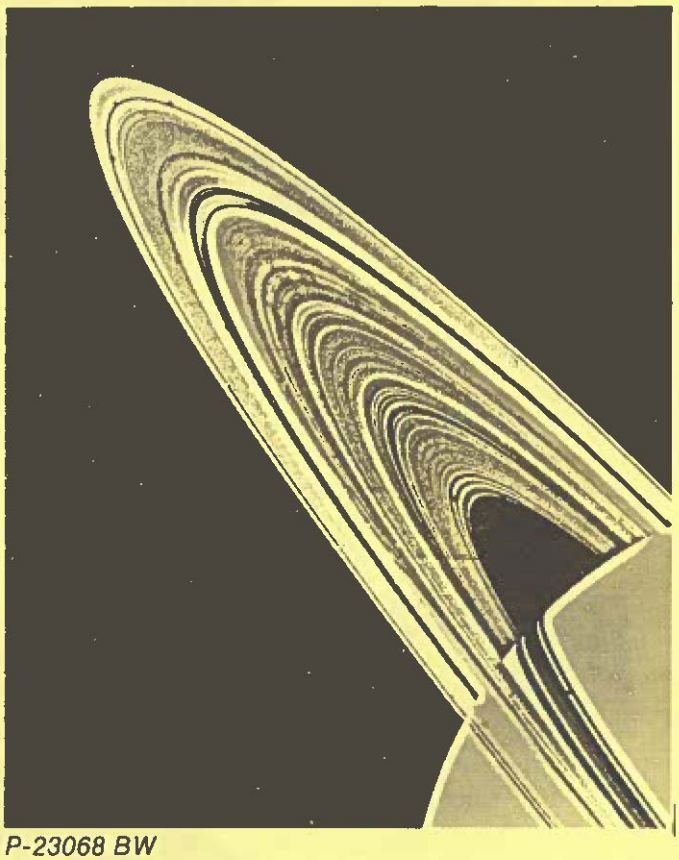
The Voyager encounter with Saturn beginning with the early coverage of the planet in August and continuing to the closest encounter on November 12 has presented us with a massive amount of data much of it causing planetary scientists to scratch their heads and rework old theories. Some of the pictures released from the Jet Propulsion Laboratory are included in this *Bulletin* along with the descriptions prepared by JPL staff. Several write-ups of the findings of Voyager at Saturn have already appeared in the magazines. Among these are:

Science News v.118, 324-325,333 (November 22, 1980)
Sky and Telescope v.60, 481, December 1980
New Scientist v.88, 491-495, November 22, 1980
Time, November 24, 1980 pp. 32-41
Newsweek, November 24, 1980 pp. 60-71
Science v.210, 1107-1113, December 5, 1980

The Planetary Imagery Center (PIC) at the LPI is preparing a slide set containing 52 slides and a brochure with the descriptions of each slide. For information about price and availability, contact Ron Weber, LPI, phone: 713/486-2172.

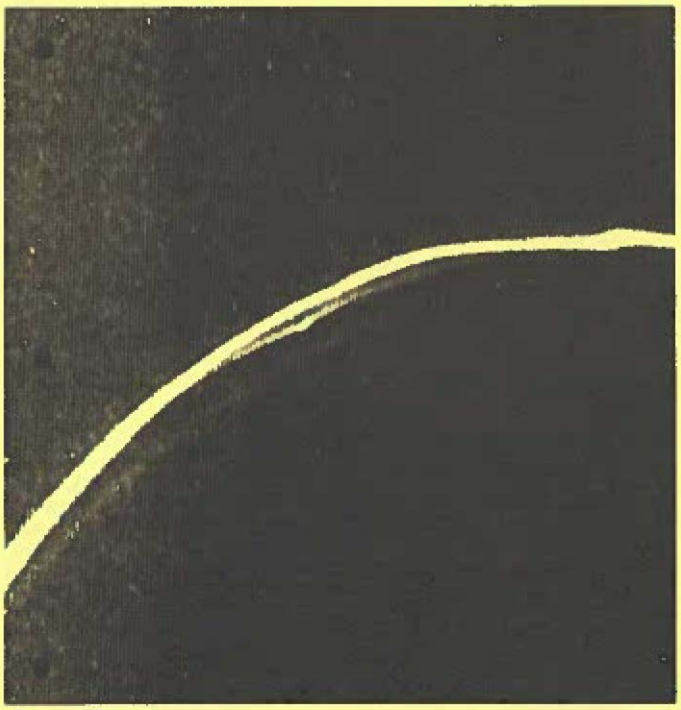


Relative scale of Saturn's satellites



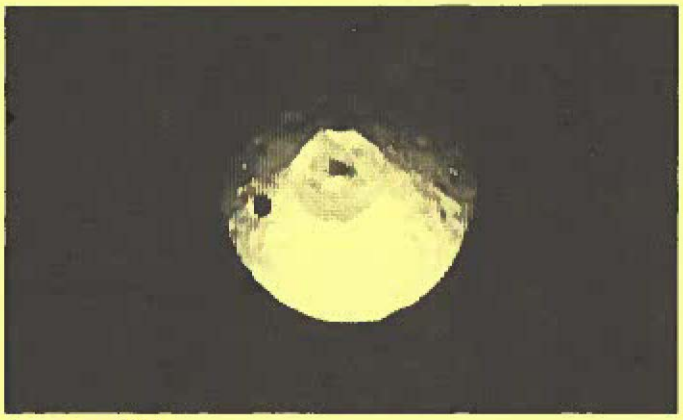
P-23068 BW

This computer-assembled two-image mosaic of Saturn's rings taken by Voyager 1 on Nov. 6, 1980 at a range of 8 million km (5 million miles) shows approximately 95 individual concentric features in the rings. The extraordinarily complex structure of the rings is easily seen across the entire span of the ring system. The ring structure, once thought to be produced by the gravitational interaction between Saturn's satellites and the orbit of ring particles, has now been found to be too complex for this explanation alone. The 14th satellite of Saturn, discovered by Voyager 1, is seen (upper left) just inside the narrow F-ring, which is less than 150 km (93 miles) wide.



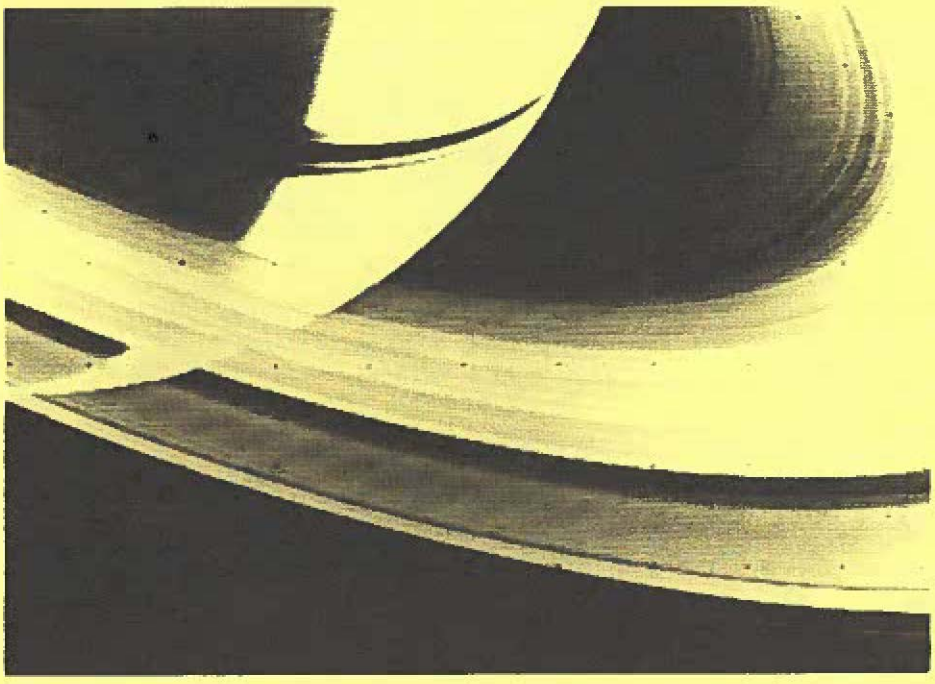
P-23099 BW

Saturn's F, or outermost ring was photographed from the unilluminated face of the rings at a range of 750,000 km (470,000 miles). Complex structure is evident, with several components seen. Two narrow, braided, bright rings that trace distinct orbits are evident. Visible is a broader, very diffuse component about 35 km (20 miles) wide. Also seen are "knots", which probably are local clumps of ring material, but may be mini-moons.



P-23098 BW

This Voyager 1 picture of *Mimas* shows a large impact structure at 110° W Long., located on that face of the moon which leads Mimas in its orbit. The feature, about 130 km in diameter (80 miles), is more than one-quarter the diameter of the entire moon. This is a particularly interesting feature in view of its large diameter compared with the size of the satellite, and may have the largest crater diameter/satellite diameter ratio in the solar system. The crater has a raised rim and central peak, typical of large impact structures on terrestrial planets. Additional smaller craters, 15-45 km in diameter, can be seen scattered across the surface, particularly along the terminator. This photo was taken on Nov. 12, 1980 from a range of approximately 660,000 km (about 400,000 miles). Mimas is one of the smaller Saturnian satellites with a low density implying its chief component is ice.

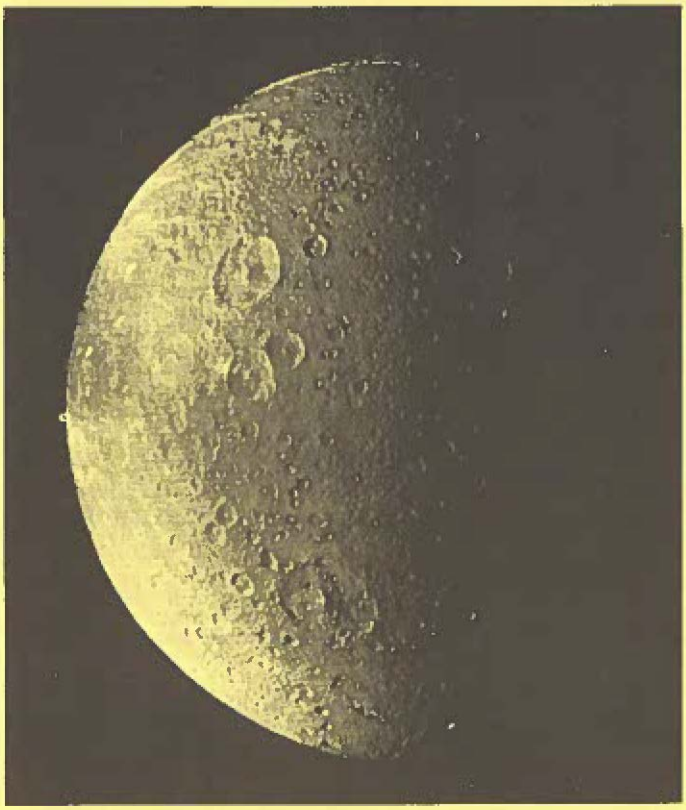


P-23110 BW

The crescent of Saturn, the planet's rings and their shadows are seen in this Voyager 1 image taken Nov. 13, 1980 at a distance of 1,500,000 km (930,000 miles) as the spacecraft began to leave the Saturn system. The bright limb of Saturn is clearly visible through the A, B, and C rings. The dark band cutting through the crescent is the shadow of the rings. This image was over-exposed to bring out the detail in the rings, so the crescent appears artificially brighter.

P-23103 BW

This image of Saturn's moon *Mimas* was taken on Nov. 12, 1980 and shows the heavily and uniformly cratered surface of the satellite. The photograph taken at a range of 208,000 km (129,000 miles), shows features as small as about 5 km (3 miles). Topography is best seen along the terminator where it is enhanced by the low sun angle. The apparent crater density decrease toward the top of the picture is not real and results from a change in sun angle. A long, narrow trough about five kilometers (3 miles) across is seen to cross from left to the center of the image where it terminates. A second trough originates near the center and extends to the right limb, where it appears to branch into a series of smaller troughs.

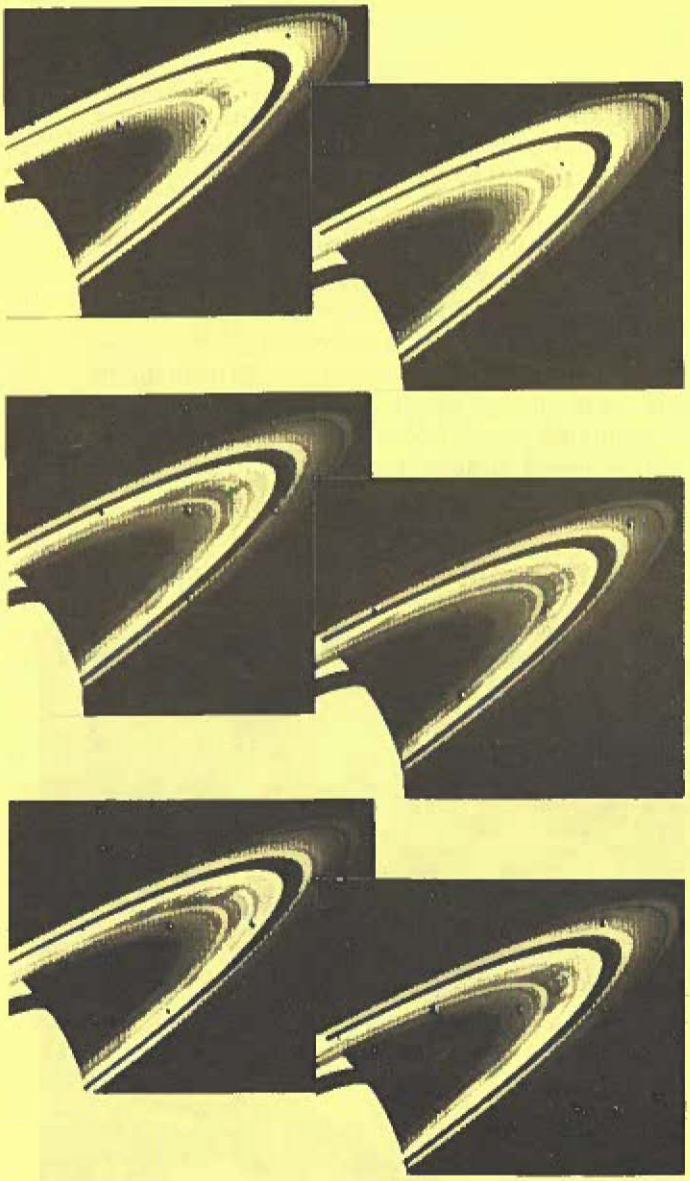


P-23113 C

Many impact craters— the record of the collision of cosmic debris— are shown in this Voyager 1 color mosaic of Saturn's moon *Dione*. The largest crater is less than 100 km (62 miles) in diameter and shows a well-developed central peak. Bright rays represent material ejected from other impact craters. Sinuous valleys probably formed by faults break the moon's icy crust. Images in this mosaic were taken from a range of 162,000 km (100,600 miles) Nov. 12, 1980.

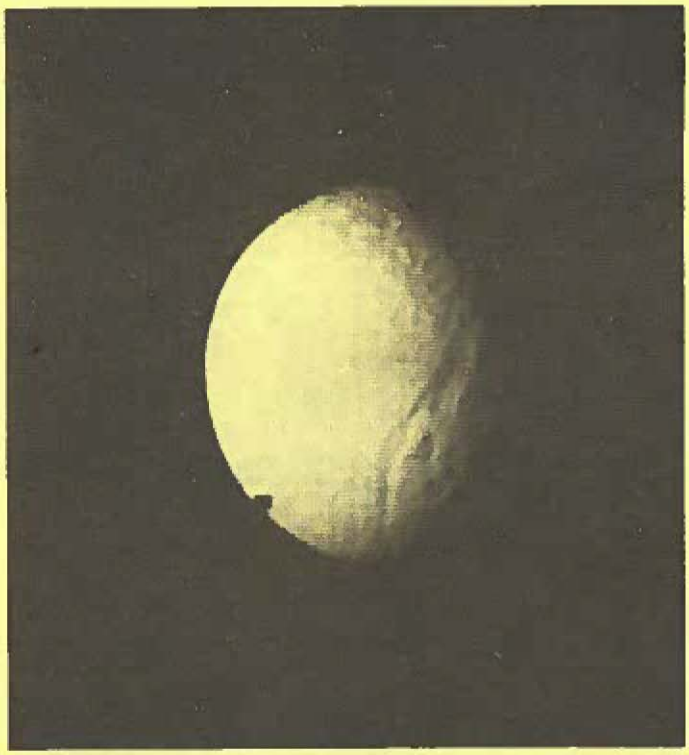
P-23102 BW

Multiple impact craters are seen on the ancient surface of Saturn's moon *Rhea* in this picture taken by Voyager 1 on Nov. 12, 1980 at a range of 73,000 km (45,000 miles). The craters closely resemble those on Mercury and Earth's Moon. Many of the craters have central peaks formed by rebound of the floor during the explosive formation of the crater. The craters are old and degraded by later impacts. Crater diameters seen are as large as approximately 75 km (45 miles). Many have sharp rims and appear relatively fresh while others are very shallow and have subdued rims, indicative of their antiquity.



P-23053 BW

Dark spokelike features in Saturn's rings are seen revolving around the planet with the rings' orbital motion in these six photographs taken by NASA's Voyager 1 spacecraft on Oct. 25, 1980. The images were taken in sequence (from upper left to lower right) approximately every 15 minutes at a distance of about 24 million km (14.9 million miles) from the planet. The rotation of the spokelike features, visible in the brightest part of the rings, is recorded in each frame. Because the outer part of the rings revolves more slowly than the inner rings, the differential motion is thought to cause the features to dissipate. However, the radial features are apparently ubiquitous and are regenerated by some unexplained mechanism. Dark round spots on the rings and planet are reseau marks engraved on the camera and are not features of Saturn.



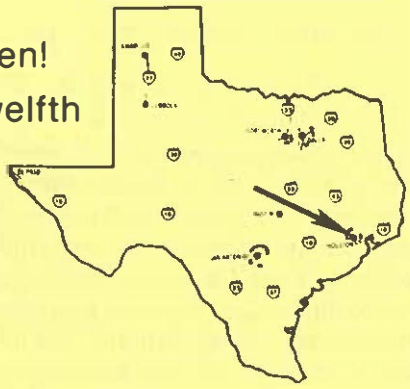
P-23095 BW

The heavily cratered surface of *Tethys* was photographed at 1:35 a.m. PST on Nov. 12 from a distance of 1.2 million km (750,000 miles) by Voyager 1. This face of Tethys looks toward Saturn and shows a large valley about 750 km long and 60 km wide (500 by 40 miles). The craters are probably the result of impacts and the valley appears to be a large fracture of unknown origin. The diameter of Tethys is about 1000 km (600 miles) or slightly less than 1/3 the size of our Moon. The smallest feature visible on this picture is about 24 km across.

Columbia successful rollout achieved

A significant milestone has been accomplished in the Space Shuttle Project with the successful rollout from the Orbiter Processing Facility of the first shuttle *Columbia* on 23 November 1980. This rollout adheres to the schedule announced in July by Dr. Frosch which leads to the first Shuttle flight in March 1981. In a special announcement, Dr. A. M. Lovelace congratulated the entire team for achieving the completion of a very critical phase in the preparation for the first flight.

It's an even dozen! Time for the Twelfth Lunar and Planetary Science Conference



The Twelfth *Lunar and Planetary Science Conference* will be held at the Johnson Space Center in Houston, March 16-20, 1981, under the joint sponsorship of the Center and the Lunar and Planetary Institute.

This conference continues to be the key annual conference in planetary science because it brings together a broad group of disciplinarians in petrology, geochemistry, geophysics, geology and astronomy. For 1981, the conference will proceed with at least the same level of vigor as in previous years, but with important modifications in format to keep pace with the rapid evolution in knowledge of the planets.

For previous conferences, abstracts have been solicited to address six or seven major topics chosen by the Program Committee. However, to insure that the Conference's topical format is responsive to changes in research interests of the community, the Program Committee has eliminated formal topics this year. Instead, authors will be asked to describe their abstracts by selecting appropriate topical key words, which the Committee will use as guides to developing sessions which reflect the current interests of as many contributors as possible. It is likely that some of the former topical interests will re-appear, but this new method should provide greater visibility to new areas of interest than was previously available. Abstracts are due at LPI by 12 January 1981. Please write the Conference Office for forms and instructions.

Because of competition for space at JSC caused by the concurrently scheduled launch of Shuttle and the Conference, this year will find the entire conference centered at the Gilruth Center. The gymnasium will be converted to provide the third lecture hall, with temporary buildings housing the registration area, coffee, and displays. Poster sessions will again be available as alternatives to oral presentations, and will be displayed in the temporary buildings. Requests for space must be accompanied by informative abstracts, and will be judged by the same criteria for allocation of space and time as for oral presentations.

Those planning to attend this conference are urged to *MAKE HOTEL RESERVATIONS IMMEDIATELY*, as the influx of media people and Shuttle observers will make the already tight hotel space even more difficult to obtain. Please call the Conference Office, LPI, telephone 713/486-2150 for further information.

Summer Undergraduate Intern Program at LPI June 1 - August 7, 1981

The Lunar and Planetary Institute offers selected undergraduates an opportunity to participate actively in lunar and planetary research with scientists at the Institute and at the NASA Johnson Space Center. The ten-week program begins June 1 and ends August 7, 1981, although these dates can be adjusted somewhat to fit individual schedules. The weekly stipend will be $124, plus $70/week living expenses, and assistance with travel costs.

Areas of Research Interests: Magnetism, thermal models of planetary bodies, thermal models of magmas, analysis of basalts, ion microprobe analysis, planetary regolith studies, experimental petrology, sedimentary petrology, scanning electron microscope studies, planetary photogeology, remote sensing of planetary surfaces, applied math, computer applications, space industrialization, and special library science. Such studies are part of current research at the LPI and JSC with direct applications to problems concerning the formation and evolution of solid bodies in the Solar System. Each project will be coordinated by an LPI or JSC scientist.

Eligibility and Selection Criteria: Undergraduates, including class of 1980 graduates, are eligible and will be considered for appointment without regard for race, creed, color, sex, national origin, age, handicap status or other non-merit factors. Selection is based upon the following criteria: (1)Scholarship, curriculum and experience, (2) career objectives and scientific interests, and (3) match of interests of applicant with available research projects. Notification of selection will be made by April 17, 1981.

Please direct questions and requests for application materials to Mrs. Pamela Jones, Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77058. Telephone 713/486-2150.

NASA Plans for Comet Intercept Mission

The National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA) are continuing to negotiate regarding the level of U.S. participation in the Giotta mission to Halley.

The Giotto mission will use a spinning spacecraft with the capability for approximately a 50 kg science payload. The spacecraft is shielded to permit it to penetrate the inner portion of the comae and survive dust impacts. The imaging system's primary purpose will be to photograph the nucleus of the comet. The mission has the potential for an excellent science payload. ESA is now choosing instruments which will include non-imaging instruments such as mass spectrometers, and dust and plasma measuring instruments. The two major drawbacks of Giotto are the navigation system and the short observing time of approximately 4 hours because of a limited power supply.

NASA has studied the Halley Intercept Mission which is based on a Jet Propulsion Laboratory recommendation. The spacecraft is a three-axis stabilized craft which will have an internal tracking system for more accurate navigational ability. The spacecraft has a total mass of approximately 1600 kg, of which 300-400 kg will be allotted to the dust shield, and about 125 kg to the science payload. It will have a high quality imaging system consisting of both a wide angle and narrow angle cameras. It should be able to take pictures for approximately two months revealing more about the overall comet structure. The rest of the science payload would include similar instrumentation to Giotto- ...mass spectrometer, dust composition and plasma wave analyzers, and dust counters.

Both Japan and the USSR are also considering missions to Halley's Comet. The Russian mission is said to be based on a stabilized spacecraft with a high quality imaging system which could supply a comet overview on approach but not of the nucleus. The Japanese mission would be quite small with a very limited science payload.

The latest recommendations of the Comet Science Working Group, chaired by Dr. Joseph Veverka, Cornell University, have been published in a NASA Technical Memorandum no. 82386, 19 pp., November 1980.

VOIR PROGRAM STATUS

The *Venus Orbiting Imaging Radar* (VOIR) received an unusual distinction for a NASA program when it was announced on November 1 by the NASA Administrator that VOIR will be in the budget which the President submits to Congress in January. Such information is usually embargoed until the budget is submitted. This good news for planetary science was later confirmed by President Carter when he telephoned congratulations to Mr. Andy Stofan, Acting Administrator for Space Science, during the Voyager 1 encounter at Saturn. Mr. Carter showed considerable interest in planetary exploration as he watched the Saturn encounter program on television in the White House on November 11.

Launched by the Space Shuttle, the VOIR spacecraft would circle the planet for at least seven months, taking radar pictures and making measurements of the atmosphere as well as the surface. It would be the most detailed scientific examination ever made of the surface of that planet, which is perpetually covered by clouds.

According to plans, NASA would launch one VOIR spacecraft from the Shuttle to Venus in 1986. A typical trajectory would begin in May or August 1986 and provide for arrival at Venus in December 1986, where the spacecraft would be inserted into a near-polar orbit at an altitude of 250 kilometers (150 miles). Radar mapping and other science gathering would continue for five months or more. The mapping activity would result in near-global coverage of the planet in moderate resolution (about 600 meters— 2,000 feet) imagery, and coverage of a small percentage of the planet's surface in higher (about 150 meters— 500 feet) resolution pictures.

Venus has yielded her secrets with great reluctance, principally because of the obscuring clouds, crushing atmospheric pressure (100 times that of Earth) and searing temperatures (480 degrees C or 900 degrees F). Several probes, both American and Soviet, have penetrated the planet's atmosphere and transmitted important data for periods ranging from minutes to hours. Pioneer Venus has provided considerable knowledge of Venus' atmospheric properties, but none has provided a satisfactory picture of the Venusian surface.

The VOIR imagery is expected to disclose the presence of continents, ocean basins, mountain belts, rift valleys, fault belts or volcanoes. The nature and time sequence of plate tectonic activity (continental drift) may also be revealed, as well as any relationship between this and volcanic episodes in the history of

the planet. If impact craters are present, as suggested by Earth-based radar observations, their size and frequency can be determined. Other science investigations will be conducted which relate to the planet's fundamental geophysical and atmospheric problems.

The VOIR orbiter— weighing approximately 5,000 kilograms (11,000 pounds) at launch— will consist of a structure with a Synthetic Aperture Radar (SAR) and other science instruments. The VOIR project office at the Jet Propulsion Laboratory is now engaged in preparing the Request for Proposals (RFP's) for the full-scale development of the VOIR spacecraft and the SAR. It is planned that these two RFP's will be released in early 1981 so contractor selection can be made by mid-summer. Assuming Congressional approval for the mission, the hardware development contracts will be initiated in October 1981.

The VOIR spacecraft and SAR Phase B Studies were essentially completed in August. At that time, Hughes and Martin Marietta submitted their reports on spacecraft design and implementation. Goodyear and Hughes submitted their reports on the design studies for the SAR instrument. All contractors produced excellent reports which indicated the feasibility of performing the mission with adequate performance margins and acceptable risks.

Tentative science selection for the mission was completed in August. The NASA Associate Administrator for Space Science selected eight altimetry Co-Investigators (Co-I's) to add to the group of 20 SAR investigators. He selected M. Lefebvre, CNES/GRGS, and W.L. Sjogren, JPL, as principal investigators (PI's) for gravity investigations using radio signals. C.A. Barth, University of Colorado, was chosen for an airglow photometer investigation and M.A. Janssen, JPL, for a microwave radiometer investigation. Three investigations concerning the ionosphere were conditionally chosen to study their impacts on the project. These were a neutral mass spectrometer from N.W. Spencer, NASA/Goddard Space Flight Center, a Langmuir probe from L.H. Brace also of Goddard, and a retarding potential analyzer with ion drift meter from R.A. Heelis, University of Texas at Dallas. This brought the total number of investigators for the mission to eight PI's and 61 Co-I's. All selections are subject to later confirmation.

A set of 57 35mm slides and a 15-minute color sound movie about Venus and VOIR have been produced by the VOIR Project Office at Jet Propulsion Laboratory and are available for loan to those giving talks about the mission.

PROJECT GALILEO UPDATE

Galileo, a cooperative project with the Federal Republic of Germany, is the only planetary mission currently in the development stage. The science objectives of Galileo are: to investigate the chemical composition and physical state of Jupiter's atmosphere; to investigate the chemical composition and physical state of the Jovian satellites; and to investigate the structure and physical dynamics of the Jovian magnetosphere. Fundamental advances beyond the information acquired by Voyager are anticipated.

After separate launches of the orbiter and probe spacecraft by the Space Transportation System in early 1984, arrival of the orbiter spacecraft at Jupiter is planned for mid-1986, and the probe in mid-1987. The orbiter will provide imaging, remote sensing and magnetospheric information about the planet and its satellites for a 20-month period with flybys of the satellites as close as 200 km.

The probe will descend into the atmosphere of Jupiter carrying instruments to make detailed measurements of its chemical and physical properties to a pressure equivalent to ten Earth atmospheres.

Recent Galileo activity has been directed at completing the preliminary design for the 1984 launch. An additional preliminary mission and systems requirements review has been completed, which assessed the impact of the change in launch dates on the spacecraft mission and science requirement. All subsystem preliminary design reviews have now been completed by the Jet Propulsion Laboratory for the orbiter spacecraft. Major contracts have been renegotiated to the new launch schedule. The probe contract with the Hughes Aircraft Company (HAC) has also been recently competitively selected to develop the probe carrier. The Ames Research Center manages the probe effort. Critical Design reviews have been completed on several subsystems thus providing the go-ahead to begin fabrication of flight hardware.

Agreements with the German government for the rescheduling of the spacecraft propulsion module have been completed. Agreements have also been reached with the Department of Energy for use of lighter weight General Purpose Heat Source Radioisotope Generators for the orbiter spacecraft.

Fifth Princeton Conference on Space Manufacturing

The fifth Princeton Conference on Space Manufacturing will be held May 18-21, 1981 at Princeton University. Co-sponsors are the Princeton University Conference, the American Institute of Aeronautics and Astronautics and the Space Studies Institute.

The Conference is a forum for substantive papers covering research results since the Fourth Conference in 1979, both technical and in the social sciences. Session categories include international and legal considerations, nonterrestrial materials resources and processing, electromagnetic accelerators, space stations and habitats, space manufacturing, social sciences and novel technical concepts.

Dr. Gerard K. O'Neill, Professor of Physics at Princeton University and President of the Space Studies Institute, is Chairman of the Conference Organizing Committee. For additional information contact Barbara Evans, Space Studies Institute, P.O. Box 82, Princeton NJ 08540. Telephone: 609/921-0377.

PIONEER VENUS 1 COMPLETES TWO YEARS IN ORBIT.

Mission planned through 1986

The Pioneer Venus Orbiter spacecraft will have completed two Earth years in orbit around the cloud-shrouded planet on Thursday, December 4, 1980. The spacecraft is expected to remain in Venus orbit until 1992. Current mission planning extends through 1986. In the next six years, the Pioneer Orbiter will be looking at Venus from a variety of new vantage points.

Since its arrival at Venus on December 4, 1978, Pioneer has made 730 24-hour orbits of the planet. It has returned over 1000 ultraviolet pictures of Venus's clouds, and it has mapped by radar 93 per cent of the planet's surface, revealing a terrain of mountains, high plateaus, and great plains. Pioneer has transmitted over 40 billion bits of data back to Earth. To stay locked on Earth, its antenna has made over five million rotations relative to the spinning spacecraft. The Venus Orbiter has made over 100 maneuvers and traveled 145 million km (90 million miles). The spacecraft gamma-ray burst instrument has recorded 75 gamma bursts from various parts of the galaxy. Pioneer's other 17 experiments have made a variety of measurements of Venus's atmosphere and surface, its interior, and surrounding environment.

For the first two years of its mission, maneuvers commanded from Earth have maintained the spacecraft orbit in one fixed position relative to the planet. From now on Pioneer's orbit will be allowed to "float" responding to pressure from solar radiation and Venus and solar gravity. This means that the orbit, now tilted 17° to the equator will drift down until it coincides with Venus's equator in 1986. This also means that its orbital low point will rise from 150 km (93 mi) above the planet's surface in 1980 to 2200 km (1365 mi) above it in 1986. After 1986, orbital low point will reverse direction, dropping downward until it is so low that the spacecraft enters the atmosphere and burns up in 1992. At this point orbital tilt will have returned to 17° to the equator, but with orbital low point in the southern rather than northern hemisphere.

As Pioneer's orbit changes position during this "float" period, it will be possible to measure the planet's bow shock wave and wake region or "tail" in the solar wind and other planet-solar wind interactions at a variety of places not now reachable by the spacecraft. Gravity-sensing experiments will be improved because the small rocket thrusts made to maintain spacecraft position will no longer be needed. It should be possible by this gravity sensing to make detailed and precise maps of mass concentrations in Venus's crust. Virtually all other instruments can continue making their measurements providing a longer time to study such things as periodic long-term changes in cloud circulation. Other instruments will be able to study planet-solar interactions during a large portion of, or even for a complete solar cycle. There should be significant changes in Venus's upper atmosphere as the Sun comes down from its present high activity period.

Cooperative measurements may take place with Russian Venus spacecraft, expected to arrive at the planet in 1982 and 1984.

The Pioneer Project is managed by NASA's Ames Research Center, Mountain View, CA. The spacecraft were built by Hughes Aircraft Co., Space and Communications Group, El Segundo, CA.

CRUSTAL DYNAMICS AND EARTHQUAKE RESEARCH...

An Announcement of Opportunity

NASA's Office of Space and Terrestrial Applications (OSTA) announces an opportunity to propose investigations for studies of plate movement and crustal deformation using space techniques. The Crustal Dynamics Project was formed by NASA in 1979 to apply space methods and technology to advance the scientific understanding of earth dynamics, tectonophysics, and earthquake mechanisms. This Project is responsible for the application of space technology to the design and development of systems for making precise geodetic measurements useful for studies of crustal movements and deformation; for planning a measurement strategy to organize and collect the measurements; for carrying out the measurement program; and for support of the analysis and interpretation of these measurements by selected teams of investigators.

The announcement, A.O. No. OSTA 80-2, was issued on October 21, 1980. Formal proposals will be required by 4:30 PM, EST March 30, 1981. A preproposal briefing will be held at the Goddard Space Flight Center on January 19. Persons desiring further scientific/technical information relating to this solicitation should contact either of the following individuals by mail or telephone:

Dr. David E. Smith
(Crustal Dynamics Project Scientist)
Code 921
NASA/Goddard Space Flight Center
Greenbelt, MD 20771
Phone: 301/344-8555

or

Dr. Edward A. Flinn
(Crustal Dynamics Program Scientist)
Resource Observation Division
Code ERG-2
NASA Headquarters
Washington DC 20546
Phone: 202/755-3260

NASA DIVISION NAME CHANGE

The name of the Planetary Division in the NASA Headquarters' Office of Space Science has been changed to *Solar System Exploration Division* as of 1 December 1980.

Dr. John Naugle named acting chief scientist

Dr. John E. Naugle, former Chief Scientist of NASA, will return to the space agency on a temporary basis as Acting Chief Scientist effective December 1, 1980.

Naugle will be the principal scientific advisor to the NASA Administrator and will continue as a member of the NASA Advisory Council with the responsibility for planning long-range solar system exploration and for looking at other possible long-range goals for NASA.

Naugle retired from NASA in June 1979. He joined the space agency at the Goddard Space Flight Center in 1959 as head of the Nuclear Emulsion Section. In 1961 he became Chief of Physics, Physics and Astronomy Programs in the Office of Space Science at NASA Headquarters and from June 1962 until May 1966 he was director of Physics and Astronomy Programs in the Office of Space Science and Applications.

He was appointed Associate Administrator for Space Science and Applications in 1967 and became Deputy Associate Administrator of NASA in 1974. Naugle assumed duties of Acting Associate Administrator in April 1975 and Associate Administrator of the agency in November 1975. He was named Chief Scientist in November 1977.

NEW PUBLICATIONS

NASA PUBLICATIONS.

A number of publications on planned and recent space programs have been prepared and are generally available from the Superintendent of Documents, Government Printing Office, Washington DC 20402. Although this agency requires prepayment on all orders, they will now accept Master Charge or VISA credit cards. Just include the account number and expiration date on your order to them. *PLEASE* do not send orders for these publications to the LPI. We are not a distribution center for SOD documents.

Voyager Encounters Jupiter. In the summer of 1977, two unmanned Voyager spacecraft were launched on a decade-long mission to explore the outer planets. The first encounter, in 1979, was with the giant Jovian planetary system. This full-color booklet provides an early look at the best of the 30,000 pictures collected during this first phase of the Voyager mission. 1979. 40 pp. illustrated. Order no.: S/N 033-000-00772-8 $3.00

A New Sun: The Solar Results from Skylab This impressive book from NASA presents the highlights of the new and exciting picture of the Sun that has come from Skylab. Filled with stunning and unique photographs, it illustrates solar phenomena that were only speculated about in the past. The text is written in an easy-to-understand style and quotes from famous astronomers are sprinkled throughout. A *New Sun* will make a great addition to your library or a most welcome gift for your favorite student or armchair astronaut. Clothbound. 1979. 199 pp. illustrated. Order no.: S/N 033-000-00742-6 $10.40

Voyage to Jupiter This NASA SP-439 written by David Morrison and Jane Samz published in 1980 presents an overview of Jupiter and the Jovian system. It reviews the early knowledge of Jupiter, examines the various spacecraft which have explored Jupiter, and presents a review of the scientific results of these missions. The publication is beautifully and bountifully illustrated with many color photographs of the planet, of the people who worked on the missions, and includes the pictorial maps of each of the four Galilean satellites. This volume should be a part of any library where there is an interest for the most up-to-date information on the planet Jupiter. 1980. 199 pp. illustrated. Order No.: S/N 033-000-00797-3. $7.50

OTHER PUBLICATIONS OF INTEREST

REMEMBER. . . please do not order any of the publications listed here from the LPI. Contact the source, publisher, or your local book seller if you wish to obtain a copy.

A set of six beautiful posters (2x3 ft.) depicting some of the results obtained by Voyagers 1 and 2 during their passages through the Jupiter system has been prepared by the NASA Educational Programs Office. Sets of these posters are available for distribution to school systems, libraries, museums, universities or other institutions engaged in educational activities. If you are in a position to put them on public display or otherwise use them for the purpose they were intended, request a set of Voyager posters from:

National Aeronautics and Space Administration
Community Services and Education Branch (LFG-9)
Washington DC 20546

A *Student Science Training Directory* (SE 81-20D), a listing of projects for talented junior and senior high school students, will be available in February 1981. For a copy, mail a postcard request to:

Student-Oriented Programs
National Science Foundation
Washington DC 20550

or contact the program office by phone 202/282-7150.

FLIGHT A unique series of sound-strips exploring the science, history, technology, and social impact of aviation and space exploration has been prepared by the National Air and Space Museum of the Smithsonian Institution. Aerospace achievement comes to life in titles like:

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The next issue will be in February. Copy deadline is January 15, 1981. 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.

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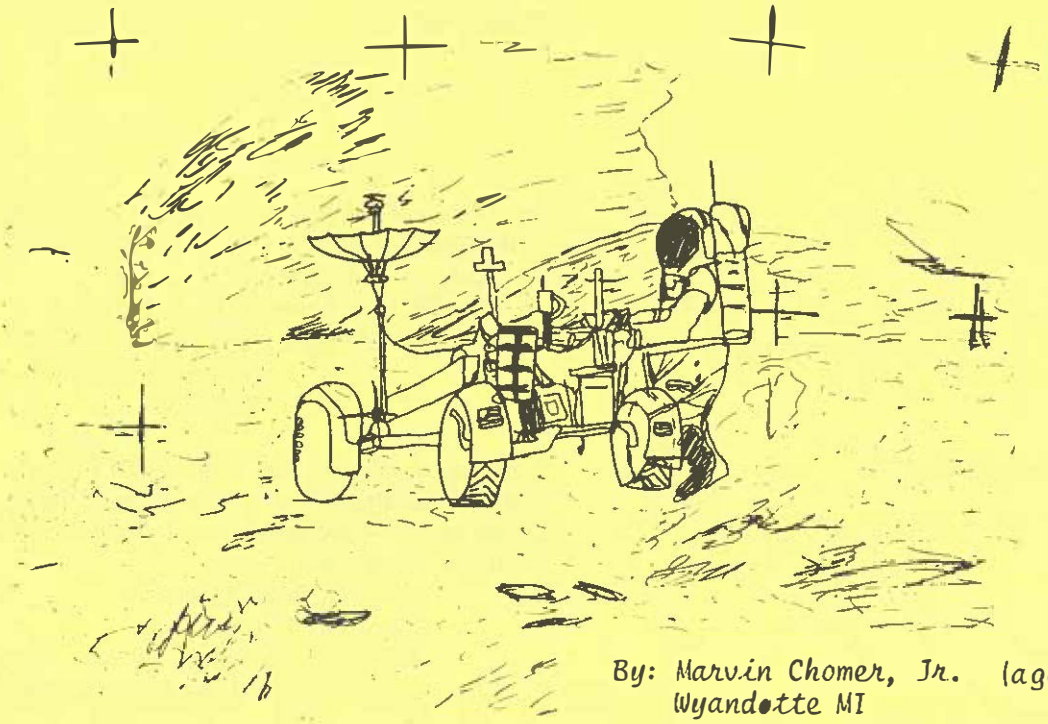

By: Marvin Chomer, Jr. (age 12)
Wyandotte MI

calendar

January 11-14	American Astronomical Society, 157th Meeting University of New Mexico, Albuquerque NM. Contact: Dr. Peter B. Boyce American Astronomical Society 1816 Jefferson Place NW Washington DC 20036
January 12	DEADLINE for Abstracts - 12th Lunar and Planetary Science Conference. LPI. Contact: Ms. Paula Criswell LPI 713/486-2161
January 15	DEADLINE for Abstracts - Comets, Ices, Grains and Plasma. Tucson, AZ. For contact see meeting scheduled March 11-14.
March 11-14	Comets, Ices, Grains and Plasma, Tucson AZ. Contact: Mildred S. Matthews Lunar and Planetary Laboratory University of Arizona Tucson AZ 85721 Telephone: 602/626-2902 or 4602
March 16-20	TWELFTH LUNAR AND PLANETARY SCIENCE CONFERENCE Johnson Space Center, Houston TX. Contact: Ms. Pamela Jones LPI 713/486-2150
March 23-24	Space Comes of Age: Perspectives in the History of the Space Sciences, National Air and Space Museum, Washington DC. Contact: Rita Bobowski Public Affairs Officer National Air and Space Museum Washington DC 20560
March 23-April 4	NATO Advanced Study Institute on Early Evolution of Planets and Their Atmospheres, University of Newcastle upon Tyne, England. Contact: Mr. M. Walmsley Administrative Assistant School of Physics University of Newcastle upon Tyne Newcastle upon Tyne, England NE1 7RU

April 8-10

International Symposium on the Hellenic Arc and Trench, Athens, Greece
Contact: Prof. S.S. Augustithis
National Technical University
Dept. of Mineralogy-Petrology-Geology
P.O. Box 1006
Athens, Greece

April 14-16

Uranus and the Outer Solar System, University of Bath, Bath England.
Contact: Dr. G. E. Hunt
Laboratory for Planetary Atmospheres
Dept. of Physics and Astronomy
University College London
Gower Street
London WC1E 6BT England

May 18-21

Fifth Princeton Conference on Space Manufacturing, Princeton University, Princeton New Jersey
Contact: Ms. Barbara Evans
Space Studies Institute
P.O. Box 82
Princeton NJ 08540
Telephone: 609/921-0377

May 25-29

American Geophysical Union Spring Annual Meeting Baltimore MD.
Contact: AGU
2000 Florida Avenue NW
Washington DC 20009

July 18-22

Fourth International Conference on Permafrost, University of Alaska, Fairbanks, Alaska
Contact: Louis De Goes, Executive Secretary
Polar Research Board
National Academy of Sciences
2101 Constitution Ave. NW
Washington DC 20418

August 10-14

Fourth International Conference on Basement Tectonics, Oslo Norway.
Contact: Mr. Roy H. Gabrielsen
Dept. of Geology
University of Oslo
P.O. Box 1047, Blindern
Oslo 3, Norway

August 17-21

Meteoritical Society, 44th Annual Meeting, Bern, Switzerland.
Contact: Prof. P. Eberhardt
Physikalisches Institut
University of Bern
Sidlerstr. 5
3012 Bern, Switzerland

August 28-Sept. 9

IAVCEI Symposium on Arc Volcanism,
Tokyo and Hakone, Japan.
Contact: IAVCEI Symposium on Arc Volcanism
Prof. Daisuke Shimozuru
Earthquake Research Institute
University of Tokyo
Bunkyo-ku
Tokyo 113 Japan

October 13-16

Division for Planetary Science, American Astronomical Society, Pittsburgh PA
Contact: Dr. Bruce Hapke
University of Pittsburgh
Dept. of Earth and Planetary Science
321 Old Engineering Hall
Pittsburgh PA 15260

November 2-6

International Conference on the Venus Environment, San Francisco Bay, Area, CA.
Contact: Ms. Kathleen Thomas-Miller
Conference Coordinator
Mail Stop 245-7
NASA-Ames Research Center
Moffett Field CA 94035

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