News Release

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

For Release

Donald Savage
Headquarters, Washington, DC
(Phone: 202/358-1547)

January 5, 1998

NOTE TO EDITORS: N98-1

NASA SPACE SCIENCE DISCOVERIES FEATURED AT AMERICAN ASTRONOMICAL SOCIETY WINTER MEETING

Several new findings from a number of NASA's space science missions and researchers will be presented in special sessions and press conferences at the upcoming Winter Meeting of the American Astronomical Society in Washington, DC, Jan. 6-10, at the Washington Hilton & Towers, 1919 Connecticut Ave., N.W. Following are highlights of the NASA results to be announced at the meeting (embargoed until day and time noted). More information can be obtained at the FTPs and URLs listed.

On Wednesday, Jan. 7 at 11:30 a.m. EST, NASA Administrator Daniel S. Goldin will deliver a speech reporting on space science progress and will issue a challenge to astronomers concerning the origins of life in the Universe. The Administrator will trace recent findings bearing on the origins of life in the Universe and stress the need for additional emphasis on the biological sciences. In addition, Dr. Wesley T. Huntress, Jr., NASA's Associate Administrator for Space Science, will be available for questions from reporters at 3:30 p.m. Wednesday. For specific press conference location, time and other winter meeting information, contact the AAS Press Room at 202/797-4534, starting Tuesday, Jan. 6.

• **"OLD FAITHFUL" BLACK HOLE ERUPTS EVERY HALF HOUR:** Scientists have observed a black hole in our galaxy which hurls hot gas outward in opposite directions in jets moving at nearly the speed of light. The black hole pulls in fresh material from the surface of a nearby star, and then undergoes another disruption, repeating the sequence at half-hour intervals. (press briefing 9:30 a.m. EST Jan. 7)
FTP://PAO.GSFC.NASA.GOV/newsmedia/JAN_AAS/BH

* **ONE OF GALAXY'S LARGEST STARS MAY BE TWINS**: X-rays studied by astronomers using NASA's Rossi X-ray Timing Explorer spacecraft lend strong support to a controversial new idea that one of the Galaxy's largest stars may be a double star system. (Jan. 7) FTP://PAO.GSFC.NASA.GOV/newsmedia/JAN_AAS/TWINS

-more-

* **HUBBLE SPACE TELESCOPE IMAGES OF JUPITER AND SATURN SHOW SPECTACULAR AURORAE:** Ultraviolet light images from Hubble's new Space Telescope Imaging Spectrograph (STIS) show northern and southern auroras of Jupiter and Saturn, at more than ten times the sensitivity and twice-to-five-times higher resolution than earlier cameras. The resolution in these images is sufficient to show the "curtain" of auroral light extending several hundred miles above the planets' limbs. (paper to be released Jan. 7)

Jupiter Aurorae (STIS) PRC98-04
http://oposite.stsci.edu/1998/04
Saturn Aurorae (STIS) PRC98-05
http://oposite.stsci.edu/1998/05

* **TWO TEAMS PRESENT FINDINGS ON POSSIBLE PLANETARY FORMATION:** New images of the visibly warped disk of matter around the star Beta Pictoris support the theory that nascent planets may be forming inside and perturbing the disk through their gravitational influence says one team, but another team says a passing star or companion brown dwarf may be the culprit. (press briefing 9:30 a.m. EST Jan. 8)

FTP://PAO.GSFC.NASA.GOV/newsmedia/JAN_AAS/DISK
http://oposite.stsci.edu/1998/03

* **TWO TEAMS PROVIDE NEW DATA ON POSSIBLE FATE OF UNIVERSE**: Two teams of astronomers using the Hubble Space Telescope present measurements of high-redshift supernovae, indicating the Universe does not have enough matter to stop its expansion, and so may go on forever, never collapsing. (paper to be released Jan. 8)

http://oposite.stsci.edu/1998/02

* **COBE DATA REVEALS "FOSSIL" INFRARED BACKGROUND GLOW TO UNIVERSE:** Astronomers announce the first definitive detection of a background infrared glow across the sky produced by dust warmed by all the stars that have existed since the beginning of time. The discovery of this "fossil" infrared radiation puts a limit on the total amount of energy released by all the stars in the Universe since the Big Bang. (press briefing 8:15 a.m. EST Jan. 9)

http://oposite.stsci.edu/1998/01

* **PREVIEW OF THE FEBRUARY TOTAL ECLIPSE OF THE SUN**: NASA solar and eclipse experts discuss where and when to see it, science experiments including the role of Galileo near Jupiter, advice on safe viewing & photography. (press briefing 9:30 a.m. EST Jan. 10) Information, animation and images from NASA available at the AAS and via NASA TV Videofile Jan. 12.

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Video Advisory

National Aeronautics and
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For Release
Jan. 7, 1998

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VIDEO ADVISORY: V98-01

NEW FLASHES FROM THE UNIVERSE

Several recent findings from NASA's space science program dominate today's video file. First, there is new animation of a black hole that "burps" every half hour the mass equivalent of a 100-trillion ton asteriod. Next are images of aurorae around Saturn and Jupiter that were taken by NASA's Hubble Space Telescope. And lastly, what was thought of as the brightest star in the Universe, Eta Carinae, may in fact be a double star system.

ITEM 1: OLD FAITHFUL
Animation of a black hole that hurls gas from a "companion" star every 30 minutes.
ITEM 1a: NASA'S ROSSI X-RAY TIMING EXPLORER
Animation of the spacecraft that observed this black hole activity.
ITEM 1b: INTERVIEW - CRAIG MARKWARDT, ASTRONOMER
ITEM 1c: INTERVIEW - JEAN SWANK, PROJECT SCIENTIST
For more information contact Deanna Corridon at 301-286-0041.
ITEM 2: SATURN'S LIGHTS
ITEM 3: JUPITER'S LIGHTS
ITEM 3a: NORTH AND SOUTH
Auroras are seen over Jupiters' northern and southern hemispheres.
ITEM 3b: JUPITER - FULL SHOT
ITEM 3c: EARTH'S AURORAS
Images of auroras over Earth's northern and southern hemispheres.
ITEM 3d: INTERVIEW - JOHN CLARKE, UNIV. OF MICHIGAN
For more information contact Ray Villard at 410-338-4514.
ITEM 4: TWIN STARS?
Images of Eta Carinae taken by NASA's Rossi X-Ray Timing Explorer.
For more information contact Bill Steigerwald at 301-286-5017.

Video news file today at noon, 3, 6, 9 p.m. and midnight EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

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For Release
January 7, 1998
EMBARGOED UNTIL 9 AM EST

William Steigerwald
Goddard Space Flight Center, Greenbelt, MD
(Phone: 301/286-5017)

RELEASE: 98-1

X-RAYS REVEAL GIGANTIC STAR MAY BE TWINS

One of the Milky Way Galaxy's largest stars may in fact be a double star system, according to recent research by a team of astronomers using NASA's Rossi X-ray Timing Explorer (RXTE) spacecraft. The team's results will be the subject of a presentation Jan. 7 in Washington, DC, at the winter meeting of the American Astronomical Society.

The team, led by Dr. Michael Corcoran of the Universities Space Research Association, Columbia, MD, bases its conclusions on unusual variations in the intensity of X-rays emitted by hot gas near the star, called Eta Carinae, which is located about 7,500 light years from Earth. They believe that the variations are caused by the presence of a massive companion star in orbit around Eta Carinae.

The new work offers insight into the origin and evolution of a class of stars called luminous blue variables, which are the most massive stars known.

"Stars such as these shine so intensely that, sometimes, they become unstable and blow their outer layers off," said Corcoran. "That's what happened to Eta Carinae. During the mid-1800's, it blasted an amount of material equivalent to the mass of our entire solar system into space. The gas and dust that make up this material formed a shell that surrounds the star and now blocks it from direct view. We have taken what amounts to an X-ray of this shell and found that what's inside may really be two stars."

While using the Rossi Explorer to monitor the X-ray emission from Eta Carinae every week for a period of two years, the team found that X-rays emitted by hot gas near the star initially increased over a period of months and then rapidly diminished in intensity in a matter of days.

Such variability is highly unusual and has never before been observed for Eta Carinae. The simplest explanation is that the variability of the X-ray emission is due to the presence of a massive stellar companion orbiting the star, bound to each other by the force of gravity.

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The presence of such a companion has recently been claimed based on variations in near-infrared and optical spectra by Dr. Augusto Damineli and collaborators at the University of Colorado at Boulder. However, the presence of the "companion" star remained controversial, since the spectrum (a means of measuring the properties of objects by splitting their light into its component colors) of Eta Carinae is notoriously variable, and since the spectral features originate in a very complex medium. As a result, the "binary model" for Eta Carinae has not yet been generally accepted by the astronomical community. The X-ray variations may help change this situation.

"We believe the orbit of the companion star is elongated into an ellipse," Corcoran said, "which alternately moves it closer to and further away from Eta Carinae over the five-and-a-half year orbital period. When the stars are close, the two stellar winds slam together, which creates a shock wave that heats the gas tremendously, to about 60 million degrees, and it emits large amounts of X-rays. When they are further away, this shock wave diminishes, along with the X-rays. This agrees pretty well with our RXTE X-ray measurements."

The spacecraft's data may have helped close one mystery, but at the same time, they have opened another.

"Strange peaks in the X-ray emission intensity seem to occur every 85 days," notes Kazunori Ishibashi of the University of Minnesota. "While the first peaks detected were relatively weak, their strength has recently risen as the overall X-ray emission from Eta Carinae has brightened."

"The most puzzling unknown is what causes the 85 day X-ray period," Davidson said. "It may be the rotation of the star, or the star may pulsate in that time, or it might even be the orbit period of a third object in the system, a possibility that makes some astronomers uncomfortable."

With at least 50 times more mass than the Sun, luminous blue variable stars like Eta Carinae are the most massive known. If Eta Carinae is really a double star system, each is estimated to be 70 times more massive than the Sun, according to Damineli's binary star model.

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Note to Editors: Images to support this story are available at the following Internet locations:

FTP://PAO.GSFC.NASA.GOV/newsmedia/JAN_AAS/BH

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RELEASE: 98-2

"OLD FAITHFUL" BLACK HOLE EJECTS MASS EQUAL TO AN ASTEROID

Scientists observing a disk of matter surrounding a black hole in our galaxy have discovered that the disk is periodically disrupted and hurled outward in opposite directions from the black hole, in jets moving at nearly the speed of light. The black hole replenishes the disk by pulling hot gas from the surface of a nearby "companion" star, and then undergoes another disruption, repeating the sequence at half-hour intervals.

The researchers represent teams at the California Institute of Technology, Pasadena, CA, the Massachusetts Institute of Technology (MIT), Boston, and NASA's Goddard Space Flight Center, Greenbelt, MD, which all worked to correlate the disappearance of X-ray emitting hot gas in the disk with the appearance, shortly thereafter, of rapidly expanding jets. Dr. Ronald Remillard of MIT and Dr. Jean Swank of Goddard are presenting X-ray results, obtained with NASA's Rossi X-ray Timing Explorer (RXTE), which show the disappearing disk. Dr. Stephen Eikenberry of Caltech is presenting new infrared observations which demonstrate that when the X-rays from the disk vanish, the jets suddenly appear. The observations will be the subject of a press conference by three of the researchers involved, to be held Jan. 7 during the winter meeting of the American Astronomical Society in Washington, DC.

The disks of hot gas, known as accretion disks, are commonly observed around black holes with orbiting stellar companions, but the near simultaneous disappearance of the disk and formation of the jet has never been seen before. It promises to shed light on the origin of the enigmatic jets, also commonly observed near accreting black holes, but poorly understood.

"The system behaves like the celestial version of Old Faithful," notes Dr. Craig Markwardt, a researcher working with Swank at Goddard. "At fairly regular intervals, the accretion disk is disrupted and a fast moving jet is produced."

"This jet is staggeringly more powerful than a geyser," adds Swank. "Every half-hour, the black hole, in the constellation Aquila, throws off the mass equal to that of a 100 trillion

- more -

ton asteroid at nearly the speed of light (approximately 650 million miles per hour). This process clearly requires a lot of energy -- each cycle is equivalent to six trillion times the annual energy consumption of the entire United States."

"What is even more amazing is that we are seeing the first clues to the source of matter ejected in the jets -- the correlations we discovered indicate that the jet material must come from the inner disk. For years theorists have hypothesized that the jets come from somewhere close to the black hole, but no one had ever actually seen that direct link until now" said Eikenberry.

Black holes are very massive objects with gravitational fields so intense that near them, nothing, not even light, can escape their pull. While this prevents anyone from observing black holes directly, their presence can be inferred from effects on nearby matter. Many of the known or suspected black holes are orbiting a close "companion" star. The black hole's gravity pulls gas from the companion star into a swirling disk of material which orbits around the black hole, much as soap suds swirl around a bathtub drain. As it falls into the black hole, the gas in the disk is compressed and heated to millions of degrees, emitting X-rays.

"We found that the X-rays from the disk disappeared almost completely every half hour. About five minutes later, they would return again. The results of the X-ray observations, Eikenberry's infrared observations at Mt. Palomar, CA, and infrared and radio observations made by Dr. Felix Mirabel, Director, Centre d'Etudes de Saclay, France, and collaborators, showed that very shortly after the X-rays vanished, jets appeared at infrared and radio wavelengths. Since X-ray emitting hot gas in the disk disappears during these episodes, we all concluded that the matter in the disk must have escaped, probably flung out in the jets. As the black hole pulls more gas from its companion star, the disk appears again, along with the X-rays, and the cycle starts over," Swank said. Dr. Mirabel obtained results with the United Kingdom Infrared Telescope and the Very Large Array in New Mexico.

"The great value of these observations," notes Swank, RXTE project scientist, "is that potentially they are giving us a key to answer some big questions. It is remarkable how little we understand of these jets, because they are such a common and impressive phenomenon. In fact, black hole jet formation is rather mysterious because it's hard to understand how anything can be expelled from the vicinity of a black hole since its powerful gravity pulls everything in. I believe this black hole will prove to be one key to finding out lots of things about black holes and jets.

"This is like having a miniature quasar in your back yard; and, because it is much smaller, it changes over minutes and hours, rather than months and years. This will let us learn a lot in a much shorter period of time," said Elkenberry.

- end -

Note to Editors: A video file, with computer animation and, will be broadcast on NASA TV Jan. 7. Images to support this story are available on the Internet at: FTP://PAO.GSFC.NASA.GOV/newsmedia/JAN_AAS/BH
RXTE information is available at: http://heasarc.gsfc.nasa.gov/docs/xte/XTE.html

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January 8, 1998

RELEASE: 98-4

**ROTHENBERG TO HEAD OFFICE OF SPACE FLIGHT;
DIAZ NAMED GODDARD SPACE FLIGHT CENTER DIRECTOR**

Joseph H. Rothenberg, Director of NASA's Goddard Space Flight Center, Greenbelt, MD, has been named to head the Agency's Office of Space Flight, NASA Administrator Daniel S. Goldin announced today. Rothenberg will lead the Human Exploration and Development of Space enterprise.

Goldin also named Alphonso V. ("Al") Diaz to suceed Rothenberg as Goddard director. Diaz is currently the deputy director at Goddard.

As Associate Administrator for the Office of Space Flight, Rothenberg will be responsible for all NASA human space flight programs, as well as a variety of expendable launch vehicle operations and tracking and communications functions. The appointment is effective Jan. 12.

"I am pleased that Joe Rothenberg is joining our senior management team at NASA Headquarters," Goldin said. "He brings a wealth of experience and a fresh perspective as NASA's human space flight enterprise enters a new era with the construction of the International Space Station. NASA Goddard has thrived under his leadership over the last three years, and now I have asked him to turn his talents to another set of challenges. I know Goddard will be in capable hands with Al Diaz at the helm."

Rothenberg began his aerospace career with Grumman Aerospace in 1964, where he managed the development of flight hardware, test and launch systems for the Orbiting Astronomical Observatory series of spacecraft. In 1983, he joined NASA Goddard as operations manager for the Hubble Space Telescope, leading the team which developed the orbital operations of the telescope.

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In April 1987, he was appointed Chief of the Mission Operations Division at Goddard. In September 1989, he was named Deputy Director of Mission Operations and Data Systems, and from 1990 to 1994 he served as Associate Director of Flight Projects for the Space Telescope. Rothenberg provided the project leadership which resulted in the success of the first servicing mission to the orbiting Hubble, which corrected an optical flaw and restored the telescope to full scientific capacity.

Rothenberg is a graduate of C.W. Post College of the Long Island University, where he earned a B.S. in engineering science and a Master of Science in engineering management. He also received an honorary Doctorate in engineering from the Stevens Institute of Technology, Hoboken, NJ. He is a member of the American Institute of Aeronautics and Astronautics and past president of the Long Island Section of the Instrument Society of America. He is the recipient of numerous honors and awards, including the National Aviation Association's Collier Trophy, the American Institute of Aeronautics and Astronautics' Goddard Astronautics Award, the NASA Distinguished Service Medal, the NASA Outstanding Leadership Medal, the NASA Exceptional Service Medal, the National Space Club's Nelson P. Jackson Award and was inducted in the Smithsonian's Aviation Week and Space Technology Hall of Fame.

He and his wife Fran reside in Darnestown, MD and have three married children.

Diaz joined NASA as a cooperative education student at the Langley Research Center, Hampton, VA, in 1964. He was actively involved in the Viking Project from 1969 to 1977 in a variety of roles. In 1979, he moved to NASA Headquarters and had a broad range of experience in the management of space science projects, including program management of the Ulysses and Galileo missions. Before moving to Goddard in 1996, he served as Deputy Associate Administrator for Space Science.

Diaz received a bachelor's in physics from St. Joseph University, Philadelphia, and a master's in physics from Old Dominion University, Norfolk. He also attended the Massachusetts Institute of Technology Sloan School of Management where he received a M.S. in management in 1986. He and his wife Angela Phillips Diaz reside in Alexandria, VA.

- end -

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January 8, 1998

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RELEASE: 98-5

ENDEAVOUR LAUNCH TO MIR SET FOR JAN. 22;
STS-89 & MIR BACKGROUND PRESS BRIEFINGS NEXT WEEK

The night of Jan. 22 was selected today by Space Shuttle program managers as the launch date for the first flight of 1998 and the eighth to rendezvous and dock with Russia's Mir space station.

A series of background press briefings on the STS-89 mission are scheduled beginning at 9 a.m. EST, Jan. 13, on NASA TV. A Mir spacewalk activities briefing and Lunar Prospector briefing also will be part of the lineup on Jan. 13. A list of the briefings, NASA Centers from which they are originating, times and participants is attached. NASA TV is available on GE-2, Transponder 9C at 85 degrees West longitude, vertical polarization, with a frequency of 3880 Mhz, and audio of 6.8 Mhz.

The STS-89 mission objectives include replacing astronaut David Wolf with Andy Thomas, who will be the next U.S. crew member on the station as part of the Phase One Program. During the mission, more than 7,000 pounds of experiments, supplies and hardware are scheduled to be transferred between the two spacecraft. Wolf will return home following four months on Mir.

The preferred launch window opportunity opens at approximately 9:48 p.m. EST and closes about five minutes later. Following a nominal flight duration of eight days, 19 hours, 48 minutes, Endeavour is scheduled to land at NASA's Kennedy Space Center, FL, at about 5:36 p.m. EST, Jan. 31.

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Today's launch date decision follows the traditional face-to-face Flight Readiness Review at Kennedy by Shuttle managers from NASA and prime contractor United Space Alliance.

"The team is ready to put Endeavour back into space after a year and a half of undergoing important modifications and upgrades," said George Abbey, director of NASA's Johnson Space Center, Houston, TX, who chaired the review. "The work that has been done in getting this vehicle ready to fly is attributable to a real team effort across the program."

STS-89 will be Endeavour's 12th mission into space and the 89th Shuttle flight in the program's history.

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EDITOR'S NOTE: Following the STS-89 mission briefings, individual round-robin interviews with the STS-89 astronauts will be held for reporters at Johnson and for those who make special arrangements in advance to conduct the interviews by phone. Reporters interested in round-robin interviews with the STS-89 astronauts should fax a letter of interest to Eileen Hawley in Johnson Public Affairs by close of business on Jan. 9, at 281/483-2000. The round-robin interviews will not be seen on NASA TV.

STS-89 PRE-FLIGHT BRIEFINGS
Tuesday, Jan. 13, 1998
(All times shown are EST)

9:00 a.m. Mission Overview (Originating from JSC)
Phil Engelauf, STS-89 Lead Flight Director

10:00 a.m. Mir 24 Pre-EVA Activities Briefing (JSC)
Frank Culbertson, Director, Shuttle-Mir Phase One Program
Greg Harbaugh, Acting Manager, EVA Projects Office

10:45 a.m. Phase One Overview (JSC)
Frank Culbertson, Director, Shuttle-Mir Phase One Program
Valery Ryumin, Director, RSC Energia, Phase One Program
John Uri, Shuttle-Mir Mission Scientist

Noon Lunar Prospector Press Conference (ARC)

1:00 p.m. Spacehab Briefing (JSC)
Mike Bain, Shuttle-Mir Program Manager, Spacehab

1:30 p.m. Astroculture/X-ray Detector Test/MGM Experiment Briefing (MSFC)
Joel Kearns, Microgravity Research Program Manager, MSFC
Dr. Daniel Carter, New Century Pharmaceuticals
Dr. Raymond Bula, University of Wisconsin
Buddy Guynes, Project Manager, MGM experiment

2:30 p.m. STS-89 CREW PRESS CONFERENCE (JSC)
Terrence Wilcutt, Mission Commander
Joe Edwards, Pilot
Jim Reilly, Mission Specialist-1
Mike Anderson, Mission Specialist-2
Bonnie Dunbar, Payload Commander/Mission Specialist-3
Salizhan Sharipov, Mission Specialist-4
Andy Thomas, Mission Specialist-5

3:30 p.m. STS-89 Crew Round Robins
Note: The round robin interview event with the STS-89 crew is a local JSC event only and will not be carried on NASA TV.

JSC - Johnson Space Center
KSC - Kennedy Space Center
ARC - Ames Research Center
MSFC - Marshall Space Flight Center

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NOTE TO EDITORS: N98-2

NASA TV PLANS COVERAGE OF MIR SPACEWALK

The scheduled spacewalk outside the Russian space station Mir by U.S. astronaut David Wolf and Mir 24 Commander Anatoly Solovyev will be covered on NASA Television on Wednesday, Jan. 14. NASA Television coverage will begin at approximately 3:30 p.m. EST.

The spacewalk, which is scheduled to begin at approximately 3:45 p.m. EST, is expected to last about three hours and is designed to operate a portable spectrometer outside Mir to measure the effect of the space environment on a space station structure. Wolf will become the third American to conduct a spacewalk in a Russian suit outside Mir. Jerry Linenger was the first U.S. astronaut to conduct a Russian spacewalk last April and Mike Foale ventured outside with Solovyev last September.

Plans call for limited commentary during the spacewalk, translation of the Russian air-to-ground communications by Wolf and Solovyev as they talk to Russian ground controllers, and any available television which may be downlinked during the operation. Currently, the cosmonauts have no plans to downlink TV during the spacewalk. A short briefing by NASA Phase One Deputy Program Manager James Van Laak, Greg Harbaugh, the acting director of the Extravehicular Activity Projects Office, and Mike Hess, EVA Officer at the Johnson Space Center, Houston, TX, will follow the spacewalk at about 7 p.m. EST. It will be broadcast on NASA Television with multicenter question and answer capability available.

NASA Television is carried on GE-2, Transponder 9C, 85 degrees West longitude, vertical polarization, with a frequency of 3880 Mhz, and audio of 6.8 Mhz.

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Elizabeth Carter
Ames Research Center, Moffett Field, CA
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For Release
January 12, 1998

NOTE TO EDITORS: N98-3

LUNAR PROSPECTOR BRIEFING SCHEDULED FOR JAN. 13

The status of NASA's Lunar Prospector mission, now in orbit around the Moon, will be the subject of a press briefing at 12 p.m. EST (9 a.m. PST) on Tuesday, Jan. 13, in the main auditorium of NASA's Ames Research Center, Moffett Field, CA.

Mission managers will discuss the results of the final major orbit adjustment maneuver, scheduled for earlier that morning, and preview the robotic mission's initial scientific observations, due to get underway later that day. A series of briefings previewing activities on the next Space Shuttle mission (STS-89) will be broadcast on NASA TV immediately before and after the Lunar Prospector briefing.

The briefing will last a maximum of one hour, and will be broadcast live on NASA Television.

Participants in the press briefing are scheduled to include:

- Scott Hubbard, Lunar Prospector Mission Manager, NASA Ames Research Center, Moffett Field, CA
- Dr. Alan Binder, Lunar Prospector Principal Investigator, Lunar Research Institute, Gilroy, CA
- Tom Dougherty, Lunar Prospector Program Manager, Lockheed Martin Missiles and Space, Sunnyvale, CA

The third flight in NASA's Discovery Program of lower-cost, highly focused Solar System exploration missions, Lunar Prospector was successfully launched at 9:28 p.m. EST on Jan. 6, 1998, from Spaceport Florida's new Launch Complex 46 at Cape

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Canaveral. The small robotic mission is designed to provide the first global maps of the Moon's elemental surface composition and the lunar gravitational and magnetic fields.

On Sunday morning, Jan. 11, at 7:17 a.m. EST, it was confirmed that Lunar Prospector had successfully entered into the lunar orbit via a 32-minute engine firing. Earlier today, a second, 27-minute orbit adjustment engine burn was successfully conducted that placed Lunar Prospector into a temporary 3.5-hour orbit, on its way to a final two-hour science mapping orbit.

To reach Ames Research Center, take the Moffett Field exit (not Moffett Blvd.) off U.S. Highway 101. Turn right immediately before the main gate, and park in the lot to your right. Present media credentials and personal identification at the Pass & ID Office (to the right of the gate) to receive an entry badge, directions and a map to the press briefing site, Bldg. N-201 .

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz. Reporters who wish to observe and participate remotely in the live broadcast of the press conference may do so at participating NASA field centers.

Extensive information on Lunar Prospector is available on the Internet at the following address:

http://lunar.arc.nasa.gov

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NOTE TO EDITORS: N98-4

SCIENCE RESULTS AND FUTURE APPLICATIONS OF SOLAR-POWERED PATHFINDER TO BE DETAILED IN BRIEFING

Science results and the future applications of the remotely piloted, solar-powered aircraft Pathfinder will be the subject of a technical briefing from 8:30 a.m. to noon EST on Wednesday, Jan. 21, at NASA Headquarters' auditorium, 300 E Street SW, Washington, DC.

The briefing will include an overview of the Pathfinder program and its related flights, the aircraft's design history, and a review of detailed imagery obtained from two digital instruments flown on the aircraft. The session is open to the public and media representatives are invited.

Last year, Pathfinder broke the record for high-altitude flight by a propeller-driven aircraft (71,530 ft.) during flight operations conducted at the U.S. Navy's Pacific Missile Range Facility, Kauai, Hawaii. The aircraft also demonstrated its capability to carry scientific payloads and other experiments into the upper atmosphere. This means that future flights could spend long periods of time over an ocean monitoring storm developments to provide more accurate predictions of hurricanes or be used to monitor major croplands, forests and other large, remote expanses to provide early warning of crop damage or fires. Other commercial applications such as remote communications relays are being explored.

Pathfinder is one of several remotely piloted aircraft being developed under NASA's Environmental Research Aircraft and Sensor Technology Program, which aims to provide faster, better, and cheaper vehicles to obtain measurements at higher altitudes and durations than the current fleet of scientific platforms. Additional technology goals include lightweight materials, avionics, sensor technology, aerodynamics, and other forms of propulsion suitable for extreme altitudes. The most extreme mission envisioned for solar-powered aircraft would reach altitudes of 100,000 feet for environmental sampling missions. Science missions at lower altitudes could exceed one week.

-end-

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Headquarters, Washington, DC
(Phone: 202/358-1743)

VIDEO ADVISORY: V98-04

LUNAR PROSPECTOR BRIEFING AT NOON

Today's video file will originate live from NASA's Ames Research Center as experts discuss the Lunar Prospector's final orbit-adjustment maneuver and preview the spacecraft's initial scientific observations. This press briefing will begin at 12:00 noon EST, and will be repeated in today's Video Files at 3, 6, 9 and midnight EST.

Participants in the press briefing are scheduled to include:

Scott Hubbard, Lunar Prospector Mission Manager, NASA Ames Research Center, Moffett Field, CA
Dr. Alan Binder, Lunar Prospector Prinicipal Investigator, Lunar Research Institute, Gilroy, CA.
Tom Dougherty, Lunar Prospector Program Manager, Lockheed Martin Missiles and Space, Sunnyvale, CA.

For more information contact Doug Isbell at 202-358-1753 or Betsy Carter at 650-604-2742.

Video news file today at noon, 3, 6, 9 p.m. and midnight EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

-end-

Video Advisory

National Aeronautics and
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Washington, DC 20546
(202) 358-1600

For Release
Jan. 14, 1998

Debbie Rivera
Headquarters, Washington, DC
(Phone: 202/358-1743)

VIDEO ADVISORY: V98-05

DAVE WOLF TO TAKE A WALK AROUND MIR

Although there will be no television available of today's Mir spacewalk, the video file will feature previous source material of Wolf's training.

ITEM 1: ASTRONAUT DAVID WOLF TRAINING

Footage of Wolf's training in the hydro laboratory at the Gagarian Cosmonaut Training Center in Star City, Russia.

For more information contact Debra Rahn at 202-358-1639.

ITEM 2: REPLAY - ECLIPSE OF 1998

For more information contact Don Savage at 202-358-1727 or Wade Sisler at 301-286-6256.

Video news file today at noon, 3, 6, 9 p.m. and midnight EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

-end-

NewsRelease

National Aeronautics and
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Washington, D.C. 20546
(202) 358-1600

For Release

Brian Welch
Headquarters, Washington, DC
(Phone: 202/358-1600)

January 15, 1998

NOTE TO EDITORS: N98-5

NASA TO MAKE MAJOR ANNOUNCEMENT TOMORROW

NASA will make a major announcement at a news conference tomorrow at noon EST in the NASA Headquarters auditorium, 300 E St., SW, Washington, DC. Participants will include NASA Administrator Daniel S. Goldin.

The news conference will be broadcast on NASA Television with two-way question and answer capability for reporters at participating NASA centers.

NASA Television is carried on GE-2, Transponder 9C, 85 degrees West longitude, vertical polarization, with a frequency of 3880 Mhz, and audio of 6.8 Mhz.

-end-

Video Advisory

National Aeronautics and
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For Release
Jan. 15, 1998

Debbie Rivera
Headquarters, Washington, DC
(Phone: 202/358-1743)

VIDEO ADVISORY: V98-06

SPACE SHUTTLE LITE: NEW EXTERNAL TANK IS READY TO ROLL

Today's video file will have source material of the first new, super lightweight external fuel tank for the Space Shuttle. The tank is the same size as the current external tank (standing taller than a 15-story building) yet is 7500 pounds lighter. This new tank will roll out during ceremonies at NASA's Michoud Assembly Facility, New Orleans, LA.

ITEM 1: EXTERNAL TANK LITE
B-roll and interviews.

For more information contact Jennifer McCarter 202-358-1639 or June Malone at 205-544-0034.

Video news file today at noon, 3, 6, 9 p.m. and midnight EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

-end-

News Release

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For Release

Michael Braukus
Headquarters, Washington, DC
(Phone: 202/358-1979)

January 16, 1998

RELEASE: 98-8

SEN. GLENN GETS A "GO" FOR SPACE SHUTTLE MISSION

NASA today named John Glenn to the crew of the Space Shuttle Discovery, scheduled to launch in October. Glenn will serve as a payload specialist on that mission.

Glenn made history 35 years ago when he strapped himself into a nine- by -seven foot capsule atop an experimental rocket and became the first American to orbit the Earth. Recently he asked NASA if he could fly again to conduct space-based research on aging, but only if he met the agency's physical and mental requirements.

"Not only is John Glenn a Marine test pilot, an astronaut, and the first American to orbit the Earth, he brings a unique blend of experience to NASA," said NASA Administrator Daniel S. Goldin. "He has flight, operational, and policy experience. Unlike most astronauts, he never got the opportunity for a second flight. He is part of the NASA family, an American hero, and he has the right stuff for this mission."

Glenn, who still flies his own plane, flew 149 missions as a Marine fighter pilot in World War II and Korea, and was hit by enemy fire 11 times. As a test pilot, he set a transcontinental speed record and recently set a record for speed on a flight from Dayton, OH, to Washington.

Since aging and space flight share a number of similar physiological responses, the study of space flight may provide a model system to help scientists interested in understanding aging. Some of these similarities include bone and muscle loss, balance disorders and sleep disturbances. Space biomedical researchers and gerontologists believe more research in these areas could help older people live more productive and active lives, and could reduce the number of individuals requiring long-term medical care in their later years.

Senator Glenn has been a catalyst in promoting the use of space flight for the benefit of healthy and productive aging.

- more -

The human research on this mission will be conducted by NASA and the National Institute on Aging, part of the National Institutes of Health. The research was peer reviewed by independent scientists, and includes studies on sleep disorders, muscle atrophy, balance, and clinical evaluations of blood and heart function.

"The research on this mission will contribute to building our knowledge and understanding of the aging process," said Dr. Richard Hodes, director of the National Institute on Aging. "The data collected will be used to conduct continued research on how aging affects sleep cycles, muscle deterioration, and balance."

Dr. Michael DeBakey, Chancellor Emeritus of Baylor Medical College, who reviewed the medical data on Glenn, said he sees "no evidence to prevent him from going into space. Flying Senator Glenn offers important opportunities to study the effects of the space environment on aging systems as has never been done in the past."

Dr. Robert Butler, professor of Geriatrics at Mount Sinai Medical Center, director of the International Longevity Center, agreed.

"It serves both science and a better understanding of what human beings of all ages will experience as we enter the next century to have an older person included on a space flight," said Butler, one of the nation's foremost gerontologists. "Senator Glenn is particularly well qualified since he has done this before, and because of his work with NASA and the National Institute on Aging to develop research that will lead to a better understanding of the effects of aging. His involvement makes a bold statement about the capabilities of older people and will help us understand the effects of aging and space flight. Senator Glenn's courage and willingness to undertake this mission are notable."

NASA has previously flown astronauts up to 61 years old. At least eight crew members over the age of 55 have flown multiple missions. Shannon Lucid was 54 when she spent six months aboard the Russian space station Mir.

Before NASA made the decision to fly Glenn, the senator underwent a battery of medical tests conducted by NASA physicians and by independent consultants. They all found him medically qualified for space flight. According to NASA flight surgeons, Glenn's fitness level is excellent.

"We have 42 years of medical history on Senator Glenn and we were able to perform an exhaustive medical evaluation," said Dr. Denise Baisden, a NASA flight surgeon. "He is medically qualified to fly."

A distinguished group of multi-disciplinary medical experts, led by Dr. Clifford C. Dasco of Baylor College of Medicine, concurred with Baisden's recommendation. "There are no significant medical issues that would prevent Senator Glenn from going into space on the Space Shuttle," the panel concluded.

- end -

Here's what the experts are saying about John Glenn's return to flight:

"John Glenn's flight will provide a unique opportunity to study the effect of space flight on cardiovascular function in an older individual. NASA's research program has already made important contributions to cardiovascular medicine, in particular in regard to problems encountered by older patients. John Glenn's flight highlights the combined benefits to the space program and to public health which come out of space medicine research."

Professor Richard J. Cohen M.D., Ph.D (617) 253-7430
Massachusetts Institute of Technology
Division of Health Sciences and Technology

"John Glenn's flight will provide a unique opportunity to study the effect of space. It serves both science and a better understanding of what human beings of all ages will experience as we enter the next century to have an older person included on a space flight. Senator Glenn is particularly well-qualified since he has done this before and because of his meetings with NASA and the National Institute on Aging to develop research that will lead to a better understanding of the effects of aging. His involvement makes a bold statement about the capabilities of older people and will help us understand the effects of aging and space flight. Senator Glenn's courage and willingness to undertake this mission are notable."

Dr. Robert N. Butler
Professor, Department of Geriatrics and Adult Development
Mount Sinai Medical Center, New York

"Aside from the historic precedent, John Glenn's return to space will help provide needed data on sleep and waking physiological functions in older humans living in space. The need to understand the interaction between the aging process and space has escalated in the past decade, and it has become apparent that humans of different ages will spend increasingly longer periods of time in space. To the extent he qualifies physically for the mission, Senator Glenn is ideally suited to help shed light on these issues, since he already has experience with the operational demands of space flight and with providing physiological data. The physiological information Senator Glenn provides to scientists on his sleeping and waking brain, cardiovascular, and related physiological functions during space flight may provide clues to troubling aspects of the aging process itself. Many of the physiological effects of space flight in younger astronauts, such as loss of bone and muscle, disturbances of balance, and loss of sleep, are problems that plague millions of elderly persons on Earth. Establishing whether these effects also occur in

an older astronaut and finding clues to the mechanisms that produce them could lead to more effective prevention and treatment strategies here on Earth."

David F. Dinges, Ph.D **(215) 898-9949**
Chief, Division of Sleep and Chronobiology
University of Pennsylvania School of Medicine

"Aging is associated with muscle atrophy, intervertebral disc degeneration, and loss of proliferative potential of the bone marrow. Space flight also results in muscle loss and less well-defined changes in the intervertebral discs and bone marrow. Muscle weakness, back pain, and anemia may be experienced by both groups. Cooperation between NASA and the National Institute on Aging may help solve these important public health problems."

Adrian LeBlanc, Ph.D **(713) 790-2761**
Professor of Medicine
Baylor College of Medicine/The Methodist Hospital
Houston, Texas

"Just as older people may stumble or fall, especially in the dark, astronauts often have trouble with Earth's gravity after a space flight. In both cases, the balance organs in the inner ear are affected and the brain must adapt to a new challenge of walking and standing. Measurements of the stability of stance and gaze following the space flight of Senator Glenn and his younger crew mates will help us understand the relationships between space and aging as they influence posture."

Professor Larry Young **(617) 253-7805**
Director, National Space and Biomendica Research Institute
Massachusetts Institute of Technology.

"There is mounting evidence that sacropenia, the wasting of skeletal muscle, is a primary health problem facing all men and women astronauts over 60 years of age. The same phenomenon occurs in astronauts exposed to space flight for a period of days to weeks, possibly mimicking that which occurs during the aging process. A fundamental question to be asked is whether there are linkages between aging-induced and space-flight induced sarcopenia. The ability to address this issue necessitates the exposure of aged individuals to space flight. If individuals such as Senator John Glenn, who has a long-standing familiarity with space flight, were given the opportunity to be once again exposed to this unique environment, important findings and insights could be obtained regarding the mechanisms of sarcopenia that could ultimately benefit the growing elderly population."

Kenneth Baldwin, Ph.D **(714) 824-7192**
Professor of Physiology
University of California, Irvine

News Release

National Aeronautics and
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Washington, DC 20546
(202) 358-1600

For Release

January 17, 1998

David E. Steitz
Headquarters, Washington, DC
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Ed Campion
Johnson Space Center, Houston, TX
(Phone: 281/483-7674)

NOTE TO EDITORS: N98-7

MORGAN MEDIA AVAILABILITY MOVED TO BOISE, IDAHO

Due to scheduling considerations, the media availability previously announced for Tuesday, Jan. 20 with Barbara Morgan, an elementary school teacher from McCall, ID, who has been chosen to join the next astronaut candidate class as a mission specialist, has been moved from the Johnson Space Center, Houston, TX, to Boise, ID.

At 2 p.m. EST on Tuesday, Jan. 20, Morgan will be available for media questions at the DoubleTree Hotel Riverside, 2900 Chinden Blvd, Boise, ID. Due to time constraints there will be limited opportunities for individual interviews. Beginning Monday media representatives may contact NASA Public Affairs Officer David Steitz through the hotel at 208/343-1871. The event will not be carried on NASA Television.

-end-

Video Advisory

National Aeronautics and
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Washington, DC 20546
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For Release
Jan. 17, 1998

Debbie Rivera
Headquarters, Washington, DC
(Phone: 202/358-1743)

VIDEO ADVISORY: V98-07

FIRST PIECE OF SPACE STATION SHOWS ITS STUFF IN MOSCOW

Today, Saturday, NASA TV will show highlights of the roll-out ceremony for the control module -- the first segment of the International Space Station -- at 3 p.m. EST, repeating at 6 p.m. EST. The control module was formerly named the Functional Cargo Block or FGB. The roll-out ceremony and press conference is being held Saturday, Jan. 17, at the Khrunichev State Research and Production Center in Moscow, at 11 a.m. local time. The control module is scheduled to be shipped from a Moscow factory to the Russian Space Agency launch site in Baikonur, Kazahkstan, on Thursday, Jan. 22.

NASA will receive a raw video feed of the ceremony at 8:30 a.m. EST on Galaxy 6 Transponder 17. Stations also may downlink this unedited feed.

ITEM 1: CONTROL MODULE HIGHLIGHTS
B-roll and interviews.

ITEM 2: ROLL-OUT CEREMONY AND PRESS CONFERENCE

For more information contact Michael Braukus 202-358-1979 or James Hartsfield at 281-483-5111.

Video news file today at 3 and 6 p.m.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

-end-

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For Release

Donald Savage
Headquarters, Washington, DC
(Phone: 202/358-1547)

January 20, 1998

Helen Worth
The Johns Hopkins University Applied Physics Laboratory, Laurel, MD
(Phone: 301/953-5113)

RELEASE: 98-9

EARTH SWINGBY PUTS NEAR SPACECRAFT ON FINAL APPROACH TO EROS

NASA's Near Earth Asteroid Rendezvous (NEAR) spacecraft, built by The Johns Hopkins University Applied Physics Laboratory (APL) in Laurel, MD, will become the first interplanetary spacecraft that can possibly be seen with the naked eye when it swings by Earth Jan. 22-23. The spacecraft's solar panels will reflect the Sun's rays onto the Earth in a greeting as it flies by for an adjustment of its trajectory to correctly align the spacecraft for a rendezvous with asteroid 433 Eros, its mission target.

Launched Feb. 17, 1996, NEAR completed a flyby of the asteroid Mathilde in June 1997 and is now on its way back to Earth. Late Thursday, Jan. 22, the spacecraft will approach Earth over the Pacific Ocean traveling at about 20,000 mph. Because the United States will be in darkness as NEAR approaches, if there is no cloud cover, several geographic areas will be able to see the Sun reflecting off the spacecraft's solar panels, which will act as large mirrors. These sunglints will be visible on the East Coast, Friday, Jan. 23, at about 1:30 a.m. EST and the West Coast at about 1:45 a.m. EST (Thursday, 10:45 p.m. PST).

The spacecraft then swings around the Aleutian Islands and over Siberia before reaching its closest point to Earth, about 336 miles above Ahvaz in southwest Iran, Friday, Jan. 23, at 11:23 a.m. local time (2:23 a.m. EST), traveling at about 29,000 mph, its fastest speed for the swingby. Although NEAR will be close to Earth at this time, daylight may obscure its image.

The spacecraft then swings over Africa and on to Antarctica before pulling away from the Earth at a speed of about 15,000 mph. The swingby will have changed NEAR's trajectory to approximately 11 degrees south of the Earth's ecliptic plane, the orbital path the Earth takes as it circles the Sun, and put the spacecraft on target for its Jan. 10, 1999, rendezvous with Eros.

-more-

NEAR scientists and engineers are using the swingby as an opportunity to test performance and calibration of the spacecraft's six instruments and to practice coordinated multi-instrument observations of the type that will be used at Eros.

The Multispectral Imager, a visible light camera that will help determine the physical characteristics of Eros, and the NEAR-Infrared Spectrograph, used to study surface minerals, will be calibrated by comparing their readings of geological features with proven measurements of the same areas. These instruments will also be used to take images of the Earth along the spacecraft's path. NEAR's Magnetometer will be calibrated by comparing swingby data with known measurements of the Earth's magnetic field.

Other activities during the swingby will include using the X-Ray/Gamma-Ray Spectrometer to observe celestial gamma ray bursts and to collect data on gamma ray and X-ray backgrounds. These data are needed so scientists can better remove background impurities from the measurements to be made at Eros.

NEAR is expected to capture its first images of Eros, a 25-mile-long near-Earth asteroid, a few months prior to the 100th anniversary of the asteroid's discovery on Aug. 13, 1898. After reaching Eros, the spacecraft will start its orbit about 600 miles above the asteroid's surface, descending to 200 miles by February and coming as close as 10 miles during its yearlong study. Scientists will thoroughly map Eros and will examine its surface composition and physical properties. On Feb. 6, 2000, the mission is expected to end with a controlled descent onto the asteroid, sending dozens of high-resolution pictures as the spacecraft closes in on Eros.

The NEAR mission will be the first close-up study of an asteroid. APL, the first non-NASA center to conduct a NASA planetary mission, is managing the mission for NASA's Office of Space Science, Washington, DC.

Information on the NEAR mission, including a list of areas most likely to see NEAR's sunglint and how to find NEAR as it swings by Earth, is available on the Internet at: http://sd-www.jhuapl.edu/NEAR/

- end -

News Release

National Aeronautics and
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Washington, DC 20546
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For Release

Debra Rahn
Headquarters, Washington, DC
(Phone: 202/358-1639)

January 21, 1998

Eileen M. Hawley
Johnson Space Center, Houston, TX
(Phone: 281/483-5111)

RELEASE: 98-10

VETERAN COSMONAUT NOMINATED TO FLY ON FINAL SHUTTLE/MIR MISSION

The Russian Space Agency has nominated veteran cosmonaut Valeriy Ryumin, Ph.D., to fly as a mission specialist on STS-91, set for a May 1998 launch on Discovery.

Ryumin, the Program Manager, Russian Phase I Mir-Shuttle Program, is training with the STS-91 crew at the Johnson Space Center, Houston, TX. He is a space flight veteran, having spent 362 days in space over three missions. He was the flight engineer on the Soyuz 25 mission, then flew on the Soyuz 32 mission to Salyut 6, spending 175 days there from Feb. 25 to Aug. 19, 1979. Ryumin's last space flight came as a member of the Soyuz 35 mission, on which he spent 185 days in space from April 9 to Oct. 11, 1980.

STS-91 will mark Ryumin's first Space Shuttle flight and first visit to the Mir space station. Already named to the crew are Commander Charles J. Precourt (Col., USAF), Pilot Dominic L. Gorie (Cmdr. USN), and Mission Specialists Wendy B. Lawrence (Cdr., USN), Franklin Chang-Diaz, Ph.D., and Janet Kavandi, Ph.D.

Mission Specialist Andrew Thomas, Ph.D., will join the STS-91 crew as he returns from a four-month research mission on Mir. Thomas' departure from Mir will bring to an end more than two years of a continuous U.S. presence on Mir, beginning with Shannon Lucid in March 1996. Thomas will arrive on Mir as a member of the STS-89 crew.

The Phase I Shuttle/Mir Program is a precursor to the International Space Station, maintaining a continuous American and Russian presence in space and developing the procedures and hardware required for an international partnership in space.

For complete biographical information on the STS-91 crew, or any astronaut, see the NASA Internet biography home page at URL: http://www.jsc.nasa.gov/Bios/

-end-

News Release

National Aeronautics and
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Washington, DC 20546
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For Release

Jim Cast
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(Phone: 202/358-1779)

January 21, 1998

Dom Amatore
Marshall Space Flight Center, Huntsville, AL
(Phone: 205/544-0031)

Barron Beneski
Orbital Sciences Corp., Dulles, VA
(Phone: 703/406-5528)

RELEASE: 98-11

NASA COMMITS TO SECOND VEHICLE FOR X-34 PROGRAM

NASA has modified its X-34 contract with Orbital Sciences Corp., Dulles, VA, to produce a second flight vehicle for the X-34 Program. "The purpose of a second vehicle is to reduce risk to the X-34 program," said deputy program manager Mike Allen of NASA's Marshall Space Flight Center, Huntsville, AL. "One of the lessons we learned from the Clipper Graham program is that it is desirable to have a second flight vehicle available, especially if it can be acquired at a relatively low cost." Clipper Graham was a previous technology demonstrator that NASA flew four times in 1996, until it was destroyed during landing.

Under the new arrangement, X-34 test objectives are being expanded, adding, for example, unpowered tests to the flight profile. A second vehicle also will provide flexibility in demonstrating various technologies, Allen said, allowing testing that requires repetitive flights to continue at the same time as tests which require significant, time-consuming changes to the vehicle.

In August 1996 NASA entered into a $50 million contract with Orbital Sciences Corp. to design, build and test-fly the X-34, a small, reusable technology demonstrator. An additional $10 million was committed by NASA to be spent in direct support of X-34 by NASA Centers and other government agencies. Now the contract has been increased by $7.7 million to purchase long lead-time hardware, including a new wing, fuselage, avionics set, hydraulic pump and actuator system, and more. NASA has committed $2 million more for the government to provide wind tunnel testing, additional testing and analysis, and a second leading-edge Thermal Protection System.

-more-

An $8.5 million option calls for purchase of shorter lead-time hardware, such as navigation systems, while a $1.8 million option has been added for assembly of piece parts into subsystems, integration and final assembly. These options should be formally exercised shortly.

The X-34 is a single-engine rocket with short wings and a small tail surface. The vehicle is 58.3 feet long, 27.7 feet wide at wing tip and 11.5 feet tall from the bottom of the fuselage to the top of the tail. Capable of flying eight times the speed of sound and reaching an altitude of 250,000 feet, the X-34 will demonstrate low-cost reusability, autonomous landing, subsonic flights through inclement weather, safe abort conditions, and landing in 20-knot cross winds.

The X-34 is designed to bridge the gap between the earlier Clipper Graham, or DC-XA, subsonic demonstrator vehicle, and the larger, more advanced X-33 vehicle. The X-34 will demonstrate key technologies applicable to development of a future Reusable Launch Vehicle. The overall goal of these vehicle programs is to demonstrate the key technologies needed to dramatically lower the cost of putting a pound of payload into space.

- end -

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For Release

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January 21, 1998

RELEASE: 98-12

**MISSION TO PLANET EARTH ENTERPRISE
NAME CHANGED TO EARTH SCIENCE**

NASA has renamed the Mission to Planet Earth enterprise the Earth Science enterprise. The Earth Science enterprise is one of the four strategic enterprises of the Agency, responsible for a long-term, coordinated research effort to study the total Earth system and the effects of natural and human-induced changes on the global environment.

In announcing the change of name, Acting Associate Administrator for Earth Science William Townsend said, "We feel that 'Earth Science' more clearly conveys to the American people the goals of our program, and more directly focuses on the research that we're conducting. 1998 will include several major launches in the enterprise, including the first Earth Observing System missions, and we are pleased to enter this era with the new name."

The Earth Science enterprise is pioneering the emerging discipline of Earth system science, with a near-term emphasis on global climate change. Earth science research capabilities under development will yield a variety of new scientific understandings and practical benefits to humankind.

The goals of the Earth Science enterprise are to expand scientific knowledge of the Earth system using NASA's unique vantage points of space, aircraft, and in situ platforms, creating an international capability to forecast and assess the health of the Earth system; to widely disseminate information about the Earth system; and to enable the productive use of Earth science results and related technology in the public and private sectors.

The title "Mission to Planet Earth" originated ten years ago in a report on future directions for the U.S. civil space program by a commission led by former astronaut Dr. Sally Ride. The term and the concept of looking at Earth as NASA looks at other planets were furthered by the 1990 Report of the Advisory Committee on the Future of the U.S. Space Program, prepared by a team of experts chaired by Dr. Norman Augustine. Since that time, NASA has organized its activities into four strategic enterprises, including Human Exploration and Development of Space, Aeronautics and Space Transportation, and Space Science.

-more-

In a manner similar to the way that the Space Science enterprise has been broadened to include questions about the origins and destiny of the Universe, the Mission to Planet Earth enterprise has been reshaped to answer key questions in five major Earth system science disciplines: land surface cover, near-term and long-term climate change, natural hazards research and atmospheric ozone.

The renaming of the enterprise to "Earth Science" is effective immediately. NASA will continue to use all supplies, such as stationery, that bear the former name of "Mission to Planet Earth" until such supplies are depleted, so as to avoid any unnecessary cost to the Agency.

-end-

News Release

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For Release

January 22, 1998

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Douglas Isbell
Headquarters, Washington, DC
(Phone: 202/358-1753)

RELEASE: 98-13

ADDITIONAL EXPERIMENTS SELECTED FOR MARS 2001 MISSIONS

NASA has selected additional instruments for the Mars Surveyor 2001 missions, which will study Mars' environment.

The Mars Surveyor 2001 missions will follow two other robotic Mars missions to be launched in late 1998 and early 1999. All are part of NASA's long-term, systematic exploration of Mars in which two missions are launched to the planet approximately every 26 months.

"In a sense, these missions allow virtual presence by humans and provide precursor data and subsequent infrastructure for possible human missions in the 21st century," said Arnauld Nicogossian, Associate Administrator of NASA's Office of Life and Microgravity Sciences and Applications. "By adding capability to missions already planned, this near term effort will result in cost effective, tangible progress in carrying out the Human Exploration and Development of Space strategy and contribute to the Origins program of NASA's Office of Space Science."

NASA's Office of Life and Microgravity Sciences and Applications has selected the following investigations for the Mars 2001 Orbiter, due for launch in March of that year, and the Mars 2001 Lander/Rover, due for launch in April 2001:

• The Martian Radiation Environment Experiment will characterize the radiation environment in the orbit and on the surface of Mars simultaneously. This experiment will consist of radiation spectrometers on both the Mars 2001 Orbiter and on the Mars 2001 Lander. Dr. Guatam Badhwar from NASA's Johnson Space Center, Houston, TX, is the principal investigator.

-more-

• The Mars Environmental Compatibility Assessment will characterize Martian dust and soil to identify potential undesirable and harmful interactions with human explorers and associated hardware, and to evaluate properties of the soil related to its use as a construction material. Dr. Thomas Meloy from West Virginia State University is the principal investigator.

A team consisting of NASA's Jet Propulsion Laboratory (JPL), Pasadena, CA, and Lockheed Martin Astronautics, Denver, CO, will develop the missions, led by JPL.

The radiation and dust investigations were selected from 39 proposals submitted to NASA in August 1997.

Both of the 2001 missions are part of an ongoing NASA series of robotic Mars exploration spacecraft that began with the launches of the Mars Global Surveyor in November 1996. The 2001 missions represent the first step in a NASA initiative to integrate the requirements for Space Science and the Human Exploration and Development of Space program into a single robotic exploration program.

- end -

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For Release

Michael Braukus
Headquarters, Washington, DC
(Phone: 202/358-1979)

January 26, 1998

Susan Povenmire
U.S. Department of State, Washington, DC
(Phone: 202/647-3486)

NOTE TO EDITORS: N98-8

SPACE STATION AGREEMENTS TO BE SIGNED AT U.S. STATE DEPARTMENT

Senior government officials from 15 countries will sign agreements on the International Space Station at the U.S. Department of State on Thursday, Jan. 29, at 4 p.m. EST. The agreements establish the framework for cooperation among the partners for the design, development, operation and utilization of the Space Station.

Secretary of State Madeleine Albright will sign the 1998 Intergovernmental Agreement on Space Station Cooperation, along with representatives of Russia, Japan, Canada and participating countries of the European Space Agency (Belgium, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland and the United Kingdom).

Three bilateral memoranda of understanding also will be signed by NASA Administrator Daniel S. Goldin separately with his counterparts: Russian Space Agency General Director Yuri Koptev, European Space Agency Director General Antonio Rodota and Canadian Space Agency President William (Mac) Evans. The memorandum between NASA and the government of Japan will be signed at a later date.

The signing ceremony will take place in the Dean Acheson Auditorium at the Department of State. U.S. media interested in covering the ceremony should have one of the following U.S. government press credentials: U.S. Department of State, NASA, the White House, Department of Defense, Capitol Hill or USIA's Foreign Press Center. International media should have accredited press credentials from their country of origin.

All media should enter the Department of State at the 23rd Street entrance. Cameras and still photographers can arrive for set up at 3 p.m. EST. Print media should plan to arrive at 3:30 p.m. EST.

- end-

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For Release

Donald Savage
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(Phone: 202/358-1547)

January 26, 1998

Bill Steigerwald
Goddard Space Flight Center, Greenbelt, MD
(Phone: 301/286-5017)

John Gustafson
Los Alamos National Laboratory, NM
(Phone: 505/665-9197)

RELEASE: 98-14

FAST-SPINNING PULSAR DISCOVERY PROVIDES EVOLUTIONARY LINK

Scientists have announced the discovery of a superdense star spinning at more than 60 times per second, and calculate it could have been spinning as fast as 150 times per second or more when it formed some 4,000 years ago. Most astronomers had not previously believed this class of star, called a pulsar, could form with such a rapid spin.

"This shatters the glass ceiling," said astrophysicist John Middleditch of the U.S. Department of Energy's Los Alamos National Laboratory in New Mexico. "This is the fastest high-energy pulsar of its type we know about."

"The pulsar is spinning twice as fast as any young pulsar that we have seen before," adds Dr. Frank Marshall of NASA's Goddard Space Flight Center, Greenbelt, MD, who led the team making the discovery. "To put it in perspective, this pulsar is spinning more than 6 million times as rapidly as the Earth."

The newly discovered pulsar establishes a link between fast-spinning pulsars with relatively weak magnetic fields and slow-spinning ones with strong fields, suggesting there may be a natural continuum between the two known types. The pulsar was found by Dr. Marshall and his colleagues Drs. William Zhang and Eric Gotthelf of Goddard, and Middleditch, by examining X-ray emissions recorded by NASA's Rossi X-ray Timing Explorer spacecraft in 1996, and confirmed with observations using the joint Japanese/U.S. Advanced Satellite for Cosmology and Astrophysics (ASCA) spacecraft.

- more -

Pulsars get their name because their emissions appear to turn on and off, or pulse, very rapidly. Astronomers believe the stars channel some of their energy into a beam of radiation, and as the star spins the beam sweeps through space like a lighthouse beacon. By counting how rapidly the beam flashes at Earth, scientists can calculate a pulsar's rate of spin. When a star explodes as a supernova it leaves behind a lingering core about 15 miles across but packed with as much matter as in Earth's Sun. The star is so dense that neutrons are the only form of matter that exist in the star, thus earning the name "neutron star." Those whose rapid spin can be observed are called "pulsars."

The team identified the pulsar as most likely being associated with the remnant of a supernova (catalogued N157B by astronomers) that exploded in the Large Magellanic Cloud, a companion to our Milky Way galaxy, about 4,000 years ago. (The age estimate comes from other X-ray and visible observations of the spreading, tattered gas cloud from the supernova blast and is in agreement with that predicted by theoretical models.) Data from both the Rossi and ASCA satellites were used to calculate the rate at which the pulsar's spin is slowing, which in turn provides an estimate of its age: 5,000 years old, a close match to the age estimate for the supernova remnant.

The other well-known high energy pulsar, in the Crab Nebula, spins just under 30 times per second, and is generally thought to have been spinning at only 60 times a second at its birth in 1054 AD. Since the Crab pulsar's discovery in 1968, astronomers have spotted pulsars spinning as fast as hundreds of times per second. These so-called "millisecond pulsars" (because their spin periods are only a few thousandths of a second) have magnetic fields a thousand times weaker than the Crab pulsar.

Most astronomers believe that the weak-field, millisecond pulsars were born with a slow spin and were "spun up" after sucking in gaseous material from an orbiting stellar companion, but astronomers have not located enough suitable binary star systems to account for the large numbers of millisecond pulsars being discovered.

The pulsar found in N157B, whose magnetic field is only a few times weaker than the Crab pulsar's, suggests an evolutionary link between the strong-field, slower-spinning energetic pulsars and the weak-field millisecond pulsars. Its discovery confirms a prediction published by Gotthelf and Dr. Q. Daniel Wang of Northwestern University.

"This is a fantastic confirmation of our hypotheses; that the central source of X-ray light from N157B is a fast pulsar associated with a supernova remnant, like that seen in the Crab nebula," commented Gotthelf.

"Now, clearly, it seems that the weaker the magnetic field, the faster the pulsar will spin at birth -- possibly all the way down to one- or two-millisecond periods (corresponding to spin rates of 1,000 to 500 times per second) for fields of the strength measured for the weak-field pulsars," Middleditch said.

-more-

Astronomers continue to search for a pulsar at the heart of SN1987A, a supernova that appeared in the southern skies Feb. 23, 1987. Most astronomers who study this supernova expect that a rapidly spinning, weak-field pulsar should eventually reveal itself for observation, which would provide another link in theories of how fast pulsars are born. Marshall and his team encouraged other researchers to study N157B at other regions of the spectrum to see if its pulsations are observable there, too.

The team announced their discovery last week through a circular distributed by the International Astronomical Union.

- end -

NOTE TO EDITORS: An image to support this story may be found at:

http://pao.gsfc.nasa.gov/gsfc/newsroom/flash/flash.htm

VideoAdvisory

National Aeronautics and
Space Administration

Washington, D.C. 20546
(202) 358-1600

For Release
Jan. 27, 1998

Renee Juhans
Headquarters, Washington, DC
(Phone: 202/358-1712)

VIDEO ADVISORY: V98-09

EL NIÑO MICROWAVES THE PACIFIC; PEERING INTO AN EARTHQUAKE; SPACE WHEATIES: FOOD FOR THE FUTURE; NEAR SWINGS BY EARTH

Today's video package features animation that shows the movement of water vapor over the Pacific Ocean as seen by the Microwave Limb Sounder (MLS) on the Upper Atmosphere Research Satellite (UARS) during the 1997 El Niño. Also on NTV is footage on how NASA scientists are studying samples of sand in space to see how granular materials interact under pressure, similar to soil during earthquakes. In addition, b-roll of NASA researchers attempting to harvest the first dwarf wheat seeds grown in space will be shown. Finally, NTV will feature images of the NEAR spacecraft's flyby of Earth.

ITEM 1: EL NIÑO WATER VAPOR CHANGES
For more information contact Stephanie Zeluck at (818) 354-5011.
ITEM 2: PEERING INTO AN EARTHQUAKE
ITEM 2a: INTERVIEW - BUDDY GUYNES, NASA PROJECT MANAGER, MARSHALL SPACE FLIGHT CENTER
ITEM 2b: INTERVIEW - DR. NICHOLAS COSTES, NASA SCIENTIST, MARSHALL SPACE FLIGHT CENTER
ITEM 3: FUTURE FOOD
ITEM 3a: INTERVIEW - DR. RAY BULA, RESEARCH SCIENTIST, UNIVERSITY OF WISCONSIN
ITEM 3b: INTERVIEW - STEVE LAMBING, SPACE PRODUCT OFFICE, MARSHALL SPACE FLIGHT CENTER
For more information contact Steve Roy at (205) 544-0034.
ITEM 4: EARTH AND MOON BY NEAR
ITEM 4a: NEAR SWINGS BY EARTH
For more information contact Don Savage at (202) 358-1727 or Helen Worth at (310) 953-5113.

Video news file today with replays during STS-89 Flight Day. Highlights, scheduled every hour on the hour during the crew sleep cycle.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

-end-

Contract Announcement

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

For Release

Douglas Isbell
Headquarters, Washington, DC
(Phone: 202/358-1753)

January 28, 1998

Allen Kenitzer
Goddard Space Flight Center, Greenbelt, MD
(Phone: 301/286-2806)

Pat Viets
NOAA/National Environmental Satellite, Data, and Information Service, Suitland, MD
(Phone: 301/457-5005)

RELEASE: c98-b

HUGHES SELECTED TO BUILD WEATHER SATELLITES

NASA and the National Oceanic and Atmospheric Administration (NOAA) have awarded a $423 million contract to Hughes Space and Communications, El Segundo, CA, for the manufacture, launch and delivery on-orbit of up to four weather-monitoring Geostationary Operational Environmental Satellites (GOES).

The procurement of the GOES-N through -Q spacecraft marks the extension of this multi-satellite program designed to provide continuous monitoring of the Earth's weather systems and the related space environment. The new spacecraft will be used to continue and enhance the functions of the current GOES I-M series of spacecraft.

GOES spacecraft are a mainstay of modern weather forecasting, providing meteorologists and hydrologists with visible and infrared images of weather systems, and precise atmospheric soundings. They orbit above the equator at a height of 22,238 miles, stationed at 75 degrees west longitude and 135 degrees west longitude to provide broad views of the Atlantic and Pacific oceans where storms can be monitored while first forming.

-more-

The basic contract value of $423.1 million provides for two spacecraft, GOES-N and -O, at a fixed total price. There are separate, fixed-price options for two additional spacecraft, GOES-P and -Q, priced at $190.9 million and $185 million, respectively.

Along with these options, there are additional, separately priced potential contract costs. They include Government-directed task assignments; additional integration and test support; changes to Government-furnished equipment deliveries; program-related launch vehicle changes; directed launch delays (due primarily to on-orbit satellites lasting longer than expected) and related spacecraft ground storage; and post-storage testing.

The GOES program is a partnership between NOAA and NASA's Goddard Space Flight Center, Greenbelt, MD. NOAA is responsible for program management and budget, determining the technical requirements for the spacecraft, operating the spacecraft in orbit and disseminating the resulting data. The NASA Goddard GOES project office is responsible for the acquisition of the spacecraft and oversight of the contract, and will support NOAA during the post-launch operations phase.

The first spacecraft purchased under this contract will be ready for launch in October 2001. GOES N-Q will carry an Imager and a Sounder to provide regular measurements of Earth's atmosphere, cloud cover and land surfaces. Two of them also will carry a Solar X-ray Imager and Space Environment Monitor instruments.

-end-

VideoAdvisory

National Aeronautics and
Space Administration

Washington, D.C. 20546
(202) 358-1600

For Release
Jan. 28, 1998

Renee Juhans
Headquarters, Washington, DC
(Phone: 202/358-1712)

VIDEO ADVISORY: V98-10

NASA COMMEMORATES FIRST U.S. SATELLITE LAUNCH

Today's video package features edited film clips of Explorer 1, the first successful U.S. satellite, which celebrates its 40th anniversary this week. Explorer 1 marked the nation's debut in the Cold War-era space race.

ITEM 1: EXPLORER 1 -- 40TH ANNIVERSARY

Footage includes an interview with Dr. William Pickering, and the development and launch of the Explorer 1 spacecraft.

For more information contact Doug Isbell (202) 358-1753 or Stephanie Zeluck at (818) 354-5011.

Video news file today with replays during STS-89 Flight Day. Highlights, scheduled every hour on the hour during the crew sleep cycle.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

-end-

News Release

National Aeronautics and
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Washington, DC 20546
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Douglas Isbell
Headquarters, Washington DC
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For Release
January 28, 1998

Mary Beth Murrill
Jet Propulsion Laboratory, Pasadena, CA
(Phone: 818/354-6478)

RELEASE: 98-15

SPACE PIONEERS RECALL FIRST U.S. SATELLITE LAUNCH UPON 40TH ANNIVERSARY

Forty years ago this week, a team of scientists and engineers successfully launched Explorer 1, the first U.S. satellite to orbit the Earth. This historic accomplishment marked the nation's debut in the Cold War-era space race and set the stage for the establishment of the civilian space agency that would become NASA.

NASA's Jet Propulsion Laboratory (JPL), Pasadena, CA, was still operated as a research laboratory for the U.S. Army when it was selected in November 1957 to develop the first U.S. satellite, including its science package, its communications system, and the high-speed upper stages for the Army's Redstone rocket that would guide the tiny, 20-pound Explorer 1 into the great unknown. JPL and the Army completed the assignment and successfully launched the satellite in less than three months. JPL and the Army Ballistic Missile Agency, based in Huntsville, AL, joined in firing the satellite toward space from the missile test center at Cape Canaveral, FL, on Jan. 31, 1958.

The scientific experiment onboard, a cosmic ray detector built by Dr. James Van Allen of the University of Iowa, soon returned one of the most important findings of the space program: the discovery of what are now known as the Van Allen Radiation Belts around the Earth. Explorer 1 went on to operate for three months.

Following the Soviet Union's launch of Sputnik on Oct. 4, 1957, "there was a lot of pressure to get a satellite in orbit as quickly as possible," said Dr. William Pickering, then JPL's director and the orchestrator of the Explorer 1 effort at JPL.

The intensive effort was accomplished by a team of experts from U.S. academia and the military, along with top World War II German rocket scientists such as

-more-

Dr. Wernher von Braun, who emigrated to the United States in the post-war years to help lead the development of American rocket capabilities. A globally linked telecommunications system developed by JPL tracked Explorer 1 and received its scientific data as it circled Earth. Amateur radio operators around the world were invited to listen in on Explorer 1's radio communications, including one key amateur radio shack operated largely by JPL ham radio operators at the Los Angeles County Sheriff's substation in Temple City, near JPL.

The most difficult technical challenge, said Pickering, "was getting the three rocket stages to work consistently, to get it all to go in the right direction, with no guidance system." Considering the telecommunications and computing capability of the Explorer 1 era versus that available for last summer's Mars Pathfinder mission, Pickering said, "it's astonishing to think what has happened over 40 years."

Van Allen, still an active planetary and space physics researcher, recalled that, the morning after the historic Explorer 1 launch, "a big press conference had been called at the Great Hall of the National Academy of Sciences in Washington, DC, and although it was 1:30 in the morning, there was still a huge crowd of reporters waiting around."

Donna Shirley, Mars Exploration program manager at JPL, was in high school when the news hit that Explorer 1 had been launched. "It was a terrific emotional moment," she recalled. "It seemed like a scary thing that the Soviet Union was so powerful that they could launch Sputnik. When Explorer went up, it was, 'Rah, rah, our team!'" she said. "It seemed to be framed in 'us versus them' rather than focused on the real technical and scientific achievement. But the dawn of the Space Age affected my life a lot.

"I don't think the 'right stuff' to work in the space program has really changed all that much" since the days of Explorer 1, said Shirley. "You don't have cigar-smoking guys with slide rules anymore, but I think the 'right stuff' is still the same: dedication and competence."

In late 1958, JPL was reassigned from the U.S. Army to NASA when the civilian space agency was created, and has helped lead the world's exploration of space with robotic spacecraft since then. Operated as a division of the California Institute of Technology, JPL has sent spacecraft to all of the known planets except Pluto, and this year will launch major astronomy and planetary exploration missions to comets, asteroids and Mars, along with many Earth-observing efforts.

As the size of NASA's space missions takes advantage of miniaturized electronics to shrink to fit the new "faster, better, cheaper" mold, some complete space science instrument packages are about the size of that on tiny Explorer 1, Shirley said.

"Miniaturization is allowing us to shrink down the brains of our spacecraft but still allow us to do more with them than we used to. The challenge now is to shrink the rest of the spacecraft down."

Considering the future of space science, Van Allen observed that "there is no shortage of great ideas on what we'd like to do. 'Faster, better, cheaper' is NASA's mantra, and the recent successful launch of the Lunar Prospector spacecraft is the best example of that. But the Hubble Space Telescope is a good example of big projects that will continue to be conducted. I think we have a very bright future in space science in all areas. There is good public support," he said. "There is virtually no limit to what can be investigated in interplanetary science and astronomy."

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NOTE TO EDITORS: Photos are available to news media to illustrate this story by calling the Headquarters Audio Imaging Branch at 202/358-1900. Photo numbers are:

97-HC-482
97-HC-483

News Release

National Aeronautics and
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Washington, DC 20546
(202) 358-1600

Michael Braukus
Headquarters, Washington, DC
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For Release
January 29, 1998

Susan Povenmire
U.S. Department of State, Washington, DC
(Phone: 202/647-3486)

RELEASE: 98-17

SPACE STATION AGREEMENTS TO BE SIGNED IN WASHINGTON

Today marks an important milestone for the International Space Station as senior government officials from 15 countries meet in Washington to sign agreements to establish the framework for cooperation among the partners on the design, development, operation and utilization of the Space Station.

Acting Secretary of State Strobe Talbott will sign the 1998 Intergovernmental Agreement on Space Station Cooperation, along with representatives of Russia, Japan, Canada and participating countries of the European Space Agency (Belgium, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland and the United Kingdom). The signing will be held at the U.S. State Department's Dean Acheson auditorium at 4 p.m. EST.

Three bilateral memoranda of understanding also will be signed by NASA Administrator Daniel S. Goldin separately with his counterparts: Russian Space Agency General Director Yuri Koptev, ESA Director General Antonio Rodota and Canadian Space Agency President William (Mac) Evans. The memorandum of understanding between NASA and the government of Japan will be signed at a later date.

Today's new agreements supersede previous Space Station agreements among the U.S., Europe, Japan and Canada signed in 1988. These new agreements reflect changes to the Space Station program resulting from significant Russian participation in the program and program design changes undertaken by the original partnership in 1993.

Led by the U.S., the International Space Station will be the largest, most complex international cooperative science and engineering program ever attempted. Taking advantage of the technical expertise from participating countries, the International Space Station will bring together scientists, engineers and researchers from around the globe to assemble a premier research facility in orbit.

-more-

Beginning in June 1998, with the launch of the first Space Station element, the partnership will ultimately assemble more than 100 components in low Earth orbit over the next five years, using approximately 45 assembly flights. When completed, the Station will provide access for researchers around the world to permanent, state-of-the-art laboratories in weightlessness.

As currently envisioned, the International Space Station will support a crew of up to seven and include five complete pressurized laboratories and attached external sites for research. The Station will provide a focal point for space operations among the partners well into the next century, and will serve as a stepping-stone for human exploration of the solar system. On the football-field-sized station, permanent crews will perform long-duration research in a variety of scientific disciplines advancing the world's understanding of life sciences, earth sciences and materials processing, while fostering commercial research activities in space.

- end -

News Release

National Aeronautics and
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For Release

January 29, 1998

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RELEASE: 98-18

RESEARCHERS GET A GRIP ON RUNAWAY RUNWAYS

NASA is leading an international effort, beginning this week, to help prevent accidents by aircraft losing traction on icy runways. Ice or snow on a runway was a factor in approximately 30 airplane accidents between 1983 and 1995, according to reports from the National Transportation Safety Board.

A research team is in Canada proving technology concepts for better understanding of runway friction, improved tire designs, better chemical treatments for snow and ice, and new types of runway surfaces that minimize bad weather effects.

Inaccurate, incomplete or confusing runway surface information has been a contributing factor in a number of cases where airliners have slid off the end of the runway upon takeoff or landing -- or have been dangerously slow in reaching liftoff speed due to the slowing effect of snow, ice or rain.

In response, the team has developed an international runway friction indexing method being tested on wintry runways at the Jack Garland Airport in North Bay, Ontario, Canada, about 200 miles north of Toronto. Researchers are comparing friction measurements from ground friction measuring vehicles and research aircraft in different winter runway conditions.

- more -

Once confident in the new indexing method, the research team will focus on relating it to different aircraft types and sizes.

"The index will be a single, accurate and easy-to-use tool to help both pilots and airport operators worldwide quickly assess winter runway conditions," said Thomas Yager, lead NASA engineer, based at the Langley Research Center, Hampton, VA.

The index -- probably in the form of a simple chart -- will help pilots with 'go/no-go' runway decisions based on readings taken by a ground-friction measurement vehicle on the same runway. The index will help airport operators determine if their runways are suitable for aircraft operations and when maintenance is required.

In spite of advances in technology and operational procedures, safe winter operations remain a challenge for airport operators, air traffic controllers, airlines and pilots who must coordinate their efforts under rapidly changing weather conditions. Complicating the winter weather picture is that criteria for safe operations on a given runway snow condition differ from airport to airport, due to differences in grooving and pavements.

At North Bay, the new indexing method has successfully "harmonized" runway traction measurements from 13 different ground vehicles on ice-, snow- and slush-covered runways. A Dassault Falcon-20 and a deHavilland Dash-8 aircraft -- both commuter-sized -- are taking complementary traction data from actual takeoffs and landings on the same runways at each surface condition.

Getting a grip on runaway runways is a joint effort led by NASA and Transport Canada with support from the Federal Aviation Administration (FAA), the Canadian National Research Council and several airframe manufacturers. Also participating are organizations and equipment manufacturers from Europe and several Scandinavian countries. The team is midway through a five-year study called the Joint Winter Runway Friction Measurement Program.

The program is also expected to help relieve airport congestion during bad weather.

The study contributes to NASA's recently established effort to reduce the U.S. aircraft accident rate by a factor of five within ten years and, while maintaining safety, triple airline system capacity in all weather conditions within ten years.

- end -

Editor's Note: Broadcast media organizations are invited to conduct live remote interviews via satellite with NASA research engineer Tom Yager. Live shots will be available from North Bay, Feb. 5, from 5:30 a.m. to 9:30 a.m. and from 1 p.m. to 3 p.m. EST. To book an interview, please call Ivelisse Gilman at 757/864-5036 or 705/474-8831 after Feb. 3.

News Release

National Aeronautics and
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Beth Schmid
Headquarters, Washington, DC
(Phone: 202/358-1760)

For Release
January 30, 1998

NOTE TO EDITORS: N98-9

NASA FY 1999 BUDGET BRIEFING SCHEDULED

A briefing on NASA's fiscal year 1999 budget request will be held on Monday, Feb. 2, at 3 p.m. EST in the auditorium of the NASA Headquarters building, 300 E St., SW, Washington, DC.

NASA Administrator Daniel S. Goldin will participate in the briefing and answer questions. A summary of the budget request will be distributed at the beginning of the press conference.

The briefing will be carried live on NASA television, GE-2, transponder 9C, located at 85 degrees West longitude, with vertical polarization. Frequency will be on 3880.0 megahertz, with audio on 6.8 megahertz.

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ADDITIONAL NOTE TO EDITORS: Vice President Al Gore, Cabinet members and officials of federal science and technology agencies will hold an open press event to announce the FY 99 R&D budget Monday, Feb. 2 at noon EST in the Truman Room, 3rd Floor, White House Conference Center, 726 Jackson Pl., NW, Washington, DC. Media representatives can contact Jeff Smith (202/456-6108) at the Office of Science and Technology Policy to arrange to cover this event.

News Release

National Aeronautics and
Space Administration

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Douglas Isbell
Headquarters, Washington, DC
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For Release
February 2, 1998

RELEASE: 98-19

ASRAR NAMED ASSOCIATE ADMINISTRATOR FOR EARTH SCIENCE

Dr. Ghassem Asrar has been selected as the new NASA Associate Administrator for Earth Science, Administrator Daniel S. Goldin announced today.

Asrar currently serves as the chief scientist for the Earth Observing System in the Office of Earth Science at NASA Headquarters. In this position, he has led an international team developing the scientific priorities and measurements to be obtained from a series of advanced Earth-orbiting satellites that promise fundamental new insights into the connections between Earth's land, oceans, atmosphere, ice and life.

"Dr. Asrar brings first-class interdisciplinary research skills and the respect of the scientific community to this challenging position," Goldin said. "Our Earth Science program is poised to enter a new era with the launch of the first Earth Observing System mission this summer. This is an ideal time for Dr. Asrar to assume the leadership of this key NASA enterprise." Asrar's appointment is effective immediately.

Asrar has authored more than 70 peer-reviewed scientific papers, primarily in the fields of land surface studies and biosphere/atmosphere interactions, and has edited several remote-sensing reference books. He conducted research and trained undergraduate and post-graduate students for nine years in academia prior to joining NASA as a senior scientist in 1987. He has continued his interest in developing the next generation of Earth scientists by establishing the NASA Earth System Science Fellowship Program, which has trained more than 400 young scientists to date. Prior to his research career, he earned graduate degrees in civil engineering and environmental physics from Michigan State University, East Lansing.

Asrar is an active member of several professional societies, including the American Geophysical Union, the American Meteorological Society, and the Geoscience and Remote Sensing Society. He has received numerous awards and honors, including the Distinguished Visiting Senior Scientist Award from NASA's Jet Propulsion Laboratory in 1991 and a NASA Exceptional Performance Award in 1997.

He and his wife Naimeh Razzaghi-Asrar live in Montgomery County, MD, and have one child.

-end-

News Release

National Aeronautics and
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For Release

February 3, 1998

Donald Savage
Headquarters, Washington, DC
(Phone: 202/358-1727)

Susan Hendrix
Goddard Space Flight Center, Greenbelt, MD
(Phone: 301/286-7745)

RELEASE: 98-20

STUDENT SATELLITE TO STUDY THE SUN AND EARTH'S ATMOSPHERE

The first in a new class of inexpensive, student-built space missions funded by NASA is scheduled for launch Feb. 5 from Vandenberg Air Force Base, CA. The mission, the Student Nitric Oxide Explorer (SNOE), will investigate the effects of energy from both the Sun and the magnetosphere on nitric oxide densities in the Earth's upper atmosphere.

"This new class of missions allows universities and graduate students to plan, build and fly science satellites for low Earth orbit applications," said Dr. Wesley T. Huntress, Jr., NASA Associate Administrator for Space Science, NASA Headquarters, Washington, DC. "As NASA looks for more innovative ways to provide lower-cost access to space for scientists, we're also committed to providing first-rate opportunities for the next generation of scientists, now in graduate school, to get involved in flying their investigations in space. The three missions under this program are a precursor to our University Explorer program of student-built missions, the first of which will be selected later this year."

The Student Nitric Oxide Explorer spacecraft was designed, built, and will be operated by the University of Colorado's Laboratory for Atmospheric and Space Physics in Boulder. SNOE is the first of three student satellite projects selected to be built under the Student Explorer Demonstration Initiative (STEDI) program.

The spacecraft will be launched into orbit by a Pegasus XL rocket built by Orbital Sciences Corp., Dulles, VA. A Lockheed L-1011 aircraft will carry the Pegasus to an altitude of 39,000 feet over the Pacific Ocean prior to its release. The Pegasus XL then will free-fall in a horizontal position for five seconds before igniting its first stage rocket motor. The aircraft is scheduled to depart from Vandenberg at 1 a.m. EST, with the drop planned for approximately 2:04 a.m. EST.

-more-

The 254-pound SNOE spacecraft will carry three instruments: an ultraviolet spectrometer to measure nitric oxide altitude profiles; a five-channel solar soft X-ray photometer; and a two-channel auroral photometer that will measure auroral emissions beneath the spacecraft.

Funded by NASA and managed by the Universities Space Research Association's (USRA) Lunar and Planetary Institute in Houston, TX, STEDI is a pilot program designed to assess the effectiveness of small, low-cost space flight missions. The SNOE project was selected in response to an Announcement of Opportunity issued by USRA. Total cost of the mission is $12 million, including launch costs.

"The SNOE team has done a marvelous piece of work in reaching this milestone on the road to their scientific payoff in orbit," said Dr. Paul Coleman, president of the USRA. "We at USRA could not be more grateful to NASA for the opportunity to demonstrate that teams like Professor Barth's (the University of Colorado principal investigator) can design, fabricate, and assemble a sophisticated scientific satellite on schedule and on budget, while providing outstanding educational opportunities for young engineers and scientists."

Under the Cooperative Agreement signed in 1994, which established the STEDI program, NASA is responsible for selecting and procuring the launch vehicle, tracking and data acquisition activities, technical assistance in support of the selection process as needed, and approval of the final selection. The Universities Space Research Association is responsible for general oversight of the program, evaluation of space flight proposals, conducting critical design and mission readiness reviews, and final program review reports to NASA upon conclusion of the missions.

NASA's Goddard Space Flight Center, Greenbelt, MD, manages the agency's responsibilities under the STEDI program for the Office of Space Science.

Information pertaining to SNOE is available on the Internet at the following URL:

http://lasp.colorado.edu/snoe/

Information from USRA on the STEDI program is available at:

http://www.usra.edu/ under "programs"

-end-

News Release

National Aeronautics and
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Washington, DC 20546
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Eileen Hawley/James Hartsfield
Johnson Space Center, Houston, TX
(Phone: 281/483-5111)

For Release
February 3, 1998

RELEASE: 98-21

COMMANDER, PILOT ROUND OUT STATION ASSEMBLY CREW

Astronaut Brian Duffy (Col., USAF) will command the third U.S. assembly flight, designated Shuttle mission STS-92, to the International Space Station.

Joining Duffy on the flight deck will be Pilot Pamela Ann Melroy (Major, USAF). Melroy, a member of the 1994 Astronaut Class, marks her first space flight with STS-92.

Mission Specialists Koichi Wakata (NASDA); Peter J. K. (Jeff) Wisoff, Ph.D.; Leroy Chiao, Ph.D.; William (Bill) McArthur, Jr., (Col., USA); and Michael Lopez-Alegria, (Cmdr., USN), were previously named to the flight in June 1997. Working in teams of two, Chiao, Wisoff, McArthur and Lopez-Alegria will conduct four space walks over the course of the mission, while Wakata has primary responsibility for operating the Shuttle's Remote Manipulator System robot arm.

This fifth Station assembly flight will build on previous American and Russian assembly flights beginning with the launch of the Control Module (FGB) in the summer of 1998. STS-92 will be the third Shuttle mission to the ISS.

"I couldn't be more pleased with the selection of Colonel Duffy and the crew for STS-92. I have complete confidence in him and his fellow crew members, and look forward to working with them as we prepare for the successful execution of this very important mission," said Randy Brinkley, Space Station Program Manager.

STS-92 marks the fourth space flight for Mission Commander Brian Duffy. For complete biographical information on the STS-92 crew and other astronauts, see the NASA Internet astronaut biography home page at URL: http://www.jsc.nasa.gov/Bios/ For information on the International Space Station, visit the Space Station home page at URL: http://station.nasa.gov

-end-

News Release

National Aeronautics and
Space Administration
Washington, DC 20546
(202) 358-1600

For Release February 4, 1998

~~Donald Savage~~
Headquarters, Washington, DC
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Goddard Space Flight Center, Greenbelt, MD
(Phone: 301/286-5566)

Ray Villard
Space Telescope Science Institute, Baltimore, MD
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NOTE TO EDITORS: N98-10

SUPERNOVA BLAST WAVE LIGHTS UP ITS RING ON NEXT SPACE SCIENCE UPDATE FEB. 10

The next Space Science Update (SSU), called "Ring of Fire: Shock Wave Sheds New Light on Fading Supernova," is scheduled for Tuesday, Feb. 10, at 1 p.m. EST, at NASA Headquarters, Washington, DC.

The Update will feature new Hubble Space Telescope images by astronomers who have discovered the first evidence that a shock wave pushed ahead of material ejected by the famous supernova 1987A is beginning to hit the rings, causing them to light up from the energy of the impact. In coming months other parts of the ring are expected to brighten to thousands of times their present levels as the shock wave hits.

Panelists will be:
* Robert Kirshner, Professor of Astronomy, Harvard University, and Associate Director of the Harvard-Smithsonian Center for Astrophysics, Cambridge, MA
* Dr. Richard McCray, George Gamow Distinguished Professor of Astrophysical and Planetary Sciences, University of Colorado, Boulder
* Dr. George Sonneborn, astrophysicist, Laboratory for Astronomy and Solar Physics, NASA's Goddard Space Flight Center, Greenbelt, MD
* Dr. Anne L. Kinney, Space Telescope Science Institute, Baltimore, MD
* Dr. Ed Weiler, Director of NASA's Origins Program, NASA Headquarters, panel moderator

The SSU will originate from the NASA Headquarters Auditorium, 300 E St., SW, Washington, DC, and will be carried live on NASA TV with two-way question-and-answer capability for reporters covering the event from participating NASA centers.

NASA Television is broadcast on the GE2 satellite transponder 9C, at 85 degrees West longitude, vertical polarization, frequency 3880.0 Mhz, audio 6.8 MHz. Audio of the broadcast will be available on voice circuit at NASA's Kennedy Space Center, FL, on 407/867-1220.

- end -

VideoAdvisory

National Aeronautics and
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Washington, D.C. 20546
(202) 358-1600

For Release
Feb. 4, 1998

Renee Juhans
Headquarters, Washington, DC
(Phone: 202/358-1712)

VIDEO ADVISORY: V98-12

NASA GETS A GRIP ON RUNAWAY RUNWAYS

Today's video package features animation and b-roll on how NASA and other organizations are working together to help prevent accidents by aircraft losing traction on icy runways. Researchers have developed an international runway friction indexing method that is being tested on wintry runways at the Jack Garland Airport in North Bay, Ontario, Canada.

ITEM 1: GLIDING ON THE RUNWAY

Footage includes animation of airplane tires on ice and snow, b-roll of planes landing on an icy or snowy runway, and four interviews.

For more information contact Dwayne Brown at (202) 358-1726 or Keith Henry at (757) 864-6120.

Video news file today at noon, 3, 6, 9 p.m. and midnight EST.

For schedule changes, late breaking news, or other events added to this NTV schedule go to: ***www.nasa.gov/ntv/breaking.html***

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

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News Release

National Aeronautics and
Space Administration
Washington, DC 20546
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Douglas Isbell
Headquarters, Washington, DC
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For Release
February 5, 1998

Mary Hardin
Jet Propulsion Laboratory, Pasadena, CA
(Phone: 818/354-5011)

NOTE TO EDITORS: N98-11

NEW INSIGHTS INTO ANCIENT ANGKOR BY NASA RADAR TO BE SUBJECT OF PRESS BRIEFING

Radar imagery that may revolutionize archaeological understanding of the ancient Angkor complex of temples in northern Cambodia will be the subject of a NASA press briefing at 1 p.m. EST on Thursday, Feb. 12.

The briefing will originate from NASA's Jet Propulsion Laboratory (JPL) in Pasadena, CA. The briefing, including supporting video material, will be broadcast live on NASA Television.

Angkor is a vast complex of some 1,000 temples covering about 100 square miles of northern Cambodia, built between the 8th and 13th centuries AD. Today, much of Angkor is inaccessible or hidden beneath a dense forest canopy. The latest research findings were made possible by the Airborne Synthetic Aperture Radar (AIRSAR) developed by JPL, an Earth science instrument that can reveal features hidden from visual systems.

Participants in the briefing will include:

- Dr. Elizabeth Moore, Head of the Art & Archaeology Department at the School of Oriental and African Studies, University of London

- JPL radar scientist Dr. Anthony Freeman

NASA Television is available through GE-2, transponder 9C at 85 degrees West longitude, vertical polarization, with a frequency of 3880 Mhz, and audio at 6.8 Mhz. Journalists may ask questions in the briefing remotely at participating NASA field centers.

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News Release

National Aeronautics and
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Washington, DC 20546
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For Release

Michael Braukus
Headquarters, Washington, DC
(Phone: 202/358-1979)

February 5, 1998

Steve Roy
Marshall Space Flight Center, Huntsville, AL
(Phone: 205/544-0034)

RELEASE: 98-22

SPACE RESEARCHERS GAIN INSIGHT INTO DEADLY VIRUS

NASA and industry biotechnology researchers have taken an important step toward developing a treatment for a life-threatening virus that causes pneumonia and severe upper respiratory infection in infants and young children.

The infection, called Respiratory Syncytial Virus, attacks the respiratory airways and lungs. According to the National Academy of Sciences' Institute of Medicine in Washington, DC, nearly four million children ages one to five are infected every year in the United States by the virus. Approximately 100,000 of these children require hospitalization and 4,000 die annually from the resulting infection. The virus is considered by physicians to be the most serious infectious disease for infants in the United States.

"Through NASA funded research in space and on the ground, and the application of space technology, we have determined the three-dimensional atomic structure of a potentially very important therapeutic antibody to this virus," said Dr. Daniel Carter, president of New Century Pharmaceuticals in Huntsville, AL. Antibodies aid the individual's immune system by neutralizing toxins, such as viruses, as they attempt to invade healthy cells.

Knowledge of the molecular structure of the antibody will permit scientists to understand key interactions between the antibody and virus, facilitating development of treatments for the disease.

-more-

"Currently, there is no vaccine against the virus," said Simon McKenzie, chief executive officer of Intracel Corp. in Issaquah, WA, which developed and produces the antibody. "Since this antibody neutralizes all known variants of the virus, therapeutics developed from it should have a major impact on lowering the mortality rate caused by the disease. And knowing its structure will provide key insight into our future development activities."

The illness most frequently begins with a fever, up to 101 degrees Fahrenheit, along with runny nose, cough and sometimes wheezing and trouble breathing. When his six-week old daughter caught the respiratory infection, Carter saw the effects of the virus first-hand. "There was nothing the hospital could do for her," he said. "We brought her home, watched as the infection ran its course and hoped for the best," he said. His daughter recovered.

Carter's research team used the viral antibody to grow antibody crystals aboard the Space Shuttle Columbia in June and July of 1997. In the weightless environment of space known as microgravity, the antibody crystals grew larger and were of better quality than those previously grown on Earth.

Using highly specialized X-ray equipment and computers, scientists at New Century Pharmaceuticals located the key positions of individual atoms in the crystal structure and constructed a model of the antibody. Because of the perfection and increased size of the space-grown crystals, the researchers were able to precisely determine the atomic structure of the antibody.

Dr. Arnauld Nicogossian, Associate Administrator of NASA's Office of Life and Microgravity Sciences, Washington, DC, which sponsored the joint research effort by government and industry, said, "This concrete benefit to human health is invaluable in demonstrating the importance of space-based research in solving Earth-based medical problems, as well as the need to have a permanently orbiting research facility. The International Space Station, to begin assembly later this year, will be at the forefront of new medical discoveries while it opens the space frontier to exploration."

- end -

VideoAdvisory

National Aeronautics and
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Washington, D.C. 20546
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For Release
Feb. 6, 1998

Renee Juhans
Headquarters, Washington, DC
(Phone: 202/358-1712)

VIDEO ADVISORY: V98-13

SPACE RESEARCHERS GAIN INSIGHT INTO DEADLY VIRUS

Today's video package features animation and b-roll on how NASA and industry biotechnology researchers are working together to develop a treatment for a life threatening virus that causes pneumonia and upper respiratory infection in infants and young children. Respiratory Syncytial Virus affects 4 million children in the U.S. between the ages of 1 and 5, causing 4,000 deaths annually.

ITEM 1: EASY BREATHING

Footage includes: a child's medical exam, animation of the antibody, image of the crystal grown in space.

ITEM 1a: INTERVIEW - DR. DANIEL CARTER, NEW CENTURY PHARMACEUTICALS

For more information contact at Michael Braukus (202) 358-1979 or Steve Roy (205) 544-0034.

Video news file today at noon, 3, 6, 9 p.m. and midnight EST.

For schedule changes, late breaking news, or other events added to this NTV schedule go to: ***www.nasa.gov/ntv/breaking.html***

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News Release

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

For Release

February 6, 1998

Donald Savage
Headquarters, Washington, DC
(Phone: 202/358-1547)

Keith Koehler
Wallops Flight Facility, Wallops Island, VA
(Phone: 757/824-1579)

RELEASE: 98-23

NASA STUDYING SPACE WEATHER FROM PUERTO RICO

Starting Feb. 12, NASA will launch a two-month campaign in Puerto Rico to study space weather using rockets and ground instruments, including the world's largest radio telescope in Arecibo, Puerto Rico. The project is expected to provide information that ultimately will help improve the reliability of radio and satellite communications.

Using a temporary range at Tortuguero on the north coast of Puerto Rico, NASA's Goddard Space Flight Center Wallops Flight Facility, Wallops Island, VA, is scheduled to launch 11 suborbital rockets between Feb. 12 and Apr. 9, 1998, as part of a project called Coqui Dos. The project is a continuation of a 1992 project called El Coqui, named after a species of native frog which is an ecological and cultural symbol of Puerto Rico.

"NASA, in association with several universities and other organizations, will launch these rockets to make measurements of electrical and turbulent layers that occur in the ionosphere, approximately 62 miles above the surface of the Earth," said Miguel Larson, campaign scientist from Clemson University, SC.

"People tend to think that space is a quiet place with no activity. However, over the years we have come to realize that the contrary is true," said Mike Kelley, a professor at Cornell University, Ithica, NY, and principal investigator for two of the rocket launches.

In fact, the layers that are the focus of the Coqui Dos study are very active features that are responsible for disruptions of radio, television, and satellite communications.

The activity is the result of the interaction between "space weather" and the Earth's atmosphere, according to Kelley, who also was the campaign scientist for NASA rocket launches from Puerto Rico in 1992. Space weather refers to the complex interactions of

-more-

the Solar wind (the fast-moving stream of particles emanating from the Sun), the Sun's magnetic field and the Earth's magnetic field and atmosphere. The 1992 project had a 100 percent success rate and ten scientific papers have been published based on the data obtained, Kelley said.

Just as studies of the lower atmosphere in the 1960s led to our current understanding of weather and improved weather forecasts, the Coqui Dos studies are expected to lead to a better understanding of the ionosphere so that we can predict activity in this region in the future, Kelley said.

Puerto Rico was selected as the launch site due to the availability of the National Science Foundation's National Astronomy and Ionospheric Center. The Arecibo radio telescope provides unique capabilities for detecting the activity within the electrical layers. Such information is needed for both deciding when to launch the rockets and for the interpretation of the rocket measurements after the flight. The Arecibo radio telescope is the largest in the world and is an essential part of the scientific mission, Larsen said.

During the Coqui Dos campaign, a total of 11 launches will be carried out as part of six separate sets of measurements. All the launches will be during the nighttime hours when ionospheric instabilities are present in the high altitude region above Puerto Rico. In some cases, two or three rocket launches may occur in one night.

Five of the rockets have payloads containing small amounts of the chemical trimethyaluminum (TMA), which will be released in the ionosphere at an altitude between 50 and 93 miles altitude. When TMA is released it forms a cloud that is luminescent for 10 to 20 minutes. These clouds can be tracked visually and with camera equipment to determine where the atmospheric turbulent layers occur. The milky-white clouds should be visible within several hundred miles of the launch site, across most of Puerto Rico and perhaps on some of the neighboring islands. The harmless by-products disperse for thousands of miles before settling into the upper atmosphere.

Three payloads being launched are chemical only, two payloads contain TMA and scientific instruments and six payloads contain instruments only.

The rockets will be launched over the Atlantic Ocean to altitudes of from 71 to 236 miles, and will fall in the ocean beyond 30 miles off shore. The launches, which typically will occur between 7 and 11 p.m., should be visible from most of Puerto Rico, especially along the northern coast and San Juan. The flights will last approximately 10 to 15 minutes each.

Further information on the Puerto Rico project, including a schedule of the rocket launches, is available on the Coqui Dos home page at:

http://www.wff.nasa.gov/~web/PRCampaign/CoquiDos.html

The Coqui Dos project is being conducted under the suborbital Sounding Rocket Program, which is managed at Wallops for NASA's Office of Space Science, Washington, DC. The program consists of approximately 25 sounding rockets launched each year from various locations worldwide.

- end -

News Release

National Aeronautics and
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Washington, DC 20546
(202) 358-1600

For Release

Donald Savage
Headquarters, Washington, DC
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February 9, 1998

NOTE TO EDITORS: N98-12

SYMPOSIUM ON MARS SAMPLE RETURN MISSION AT AAAS MEETING

What are the benefits of exploring Mars? Is it possible to find signs of life using robotic explorers? What are the risks of bringing a sample of the Red Planet back to Earth? These are among the issues to be discussed by a panel of scientists, including Dr. Wesley T. Huntress, Jr., NASA's Associate Administrator of Space Science, at the American Association for the Advancement of Science (AAAS) Annual Meeting and Science Innovation Exposition in Philadelphia, PA, on Feb. 15, 1998.

The panel, called "Mars Sample Return Missions: Scientific, Technical and Social Challenges," will begin at 3 p.m. Panelists are Dr. Huntress; Dr. Klaus Keil, Professor of Planetary Geosciences and Chair, Hawaii Institute of Geophysics and Planetology, University of Hawaii, Manoa; Dr. Rita R. Colwell, President, University of Maryland Biotechnology Institute, College Park, MD; Dr. Jonathan Y. Richmond, Director, Office of Health Safety, U.S. Centers for Disease Control and Prevention, Atlanta, GA; Dr. Margaret S. Race, SETI Institute, Mountain View, CA; and Dr. John D. Rummel, Marine Biological Laboratory, Woods Hole, MA, and NASA.

Following the symposium, the panelists will take part in a round-table discussion on the benefits and challenges of Mars sample return and will take questions from the audience.

The AAAS annual meeting is scheduled for Feb. 12-17 at the Pennsylvania Convention Center in Philadelphia. Reporters can register and obtain accreditation at the newsroom, which will be located in room 405 in the Philadelphia Marriott Hotel, 1201 Market St., after it opens on Thursday, Feb. 12.

- end -

VideoAdvisory

National Aeronautics and
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For Release
Feb. 9, 1998

Renee Juhans
Headquarters, Washington, DC
(Phone: 202/358-1712)

VIDEO ADVISORY: V98-14

NASA PROVIDES HIGH-TECH BEACH MAPPING AFTER COASTAL STORM

Today's video package features a NASA aircraft equipped with mapping instrumentation flying over Assateague Island to assess storm damage following this week's powerful coastal storm. The Airborne Topographic Mapper (ATM), a laser mapping instrument, flew over Assateague Beach at low tide. Assateague Island is located on the east coast of Maryland and Virginia.

ITEM 1: HIGH-TECH BEACH COMBING
B-roll from research plane flight over Wallops Island, Virginia, and local coastline.

ITEM 1a: INTERVIEW - BILL KRABILL, ATM LASER SCIENTIST
Krabill explains the benefits of the laser system.

For more information contact Doug Isbell (202) 358-1753 or Keith Koehler (757) 824-1579.

Video news file today at noon, 3, 6, 9 p.m. and midnight EST.

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VideoAdvisory

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For Release
Feb. 10, 1998

Debbie Rivera
Headquarters, Washington, DC
(Phone: 202/358-1743)

VIDEO ADVISORY: V98-15

HUBBLE SNAPS A RING OF FIRE THAT LIGHTS UP THE SKY

Today's video package features the latest from NASA's Hubble Space Telescope: a ring around the exploded star, Supernova 1987A, which light up when hit by the star's shockwaves. In addition, NTV has a pre-arrival package of the first major flight component of the X-33. Also, NTV will have animation of future space transportation designs.

ITEM 1: RING OF FIRE
Animation of shockwaves around Supernova 1987A.
ITEM 1a: SUPERNOVA 1987A
Hubble image of the exploded star taken in February1994.
ITEM 1b: ZOOM SEQUENCE
ITEM 1c: BRIGHT KNOT IN SUPERNOVA 1987A RING
ITEM 1d: INTERVIEW - GEORGE SONNEBORN, ASTROPHYSICIST
For more information contact Don Savage at 202-358-1727 or Ray Villard at 410-338-4514.
ITEM 2: LOX AND X-33
Production and loading of the X-33 aluminum liquid oxygen tank; interviews.
For more information contact Jim Cast at 202-358-1779 or Dave Drachlis at 205-544-0034.
ITEM 3: PHYSICS AND FUTURE SPACE TRANSPORTATION
Animation of new types of space transportation.
ITEM 3a: INTERVIEW - GEORGE SCHMIDT, NASA PHYSICIST
For more information contact June Malone at 205-544-7061.

Video news file today at noon, 3, 6, 9 p.m. and midnight EST.

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For Release

February 10, 1998

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Ray Villard
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RELEASE: 98-24

SHOCK WAVE SHEDS NEW LIGHT ON FADING SUPERNOVA

NASA's Hubble Space Telescope is giving astronomers a ringside seat to a never before seen titanic collision of an onrushing stellar shock wave with an eerie glowing gas ring encircling a nearby stellar explosion, called supernova 1987A.

Though the star's self-destruction was first seen nearly 11 years ago on Feb. 23, 1987, astronomers are just now beginning to witness its tidal wave of energy reaching the "shoreline" of the immense light-year wide ring.

Shocked by the 40-million mile per hour sledgehammer blow, a 100-billion mile diameter knot of gas in a piece of the ring has already begun to "light up," as its temperature surges from a few thousand degrees to a million degrees Fahrenheit.

"We are beginning to see the signature of the collision, the hammer hitting the bell. This event will allow us to validate ideas we have built up over the past ten years of observation," says Robert Kirshner of the Harvard-Smithsonian Center for Astrophysics (CfA) in Cambridge, MA. "By lighting up the ring, the supernova is exposing its own past."

Astronomers predict it's only a matter of years before the complete ring becomes ablaze with light as it absorbs the full force of the crash.

Illuminating the surrounding space like a flashlight in a smoky room, the glowing ring is expected to literally shed a brilliant new light on many unanswered mysteries of the supernova: What was the progenitor star? Was it a single star or binary system? Are a pair of bizarre outer rings attached to an invisible envelope of gas connecting the entire system?

- more -

"We have a unique opportunity to probe structure around the supernova and uncover new clues to the final years of the progenitor star before it exploded," adds Richard McCray of the University of Colorado in Boulder, CO. "The initial supernova flash only lit up a small part of the gas that surrounds the supernova. Most of it is still invisible. But the light from the crash will give us a chance to see this invisible matter for the first time, and then perhaps we can unravel the mystery of the outer rings."

Though scientists will never solve the paradox of what happens when an irresistible force meets an immovable object, the supernova collision is the closest real-world example yet. "This supernova gives us an unprecedented opportunity to directly witness new physics of shock interactions," says McCray. "Though astronomers have measured shock effects from the expanding debris of many supernovae which are centuries-old, their impact velocities are at least ten times slower than the ones we see today in supernova 1987A."

The ring was formed 20,000 years before the star exploded. One theory is that it resulted from stellar material flung off into space as the progenitor star devoured a stellar companion. The ring's presence was given away when it was heated by the intense burst of light from the 1987 explosion. The ring has been slowly fading ever since then as the gas cools.

Several years ago radio waves and X-rays were detected as the fastest moving explosion debris slammed into cooler invisible gas inside the ring. In spring of 1997 the newly installed Space Telescope Imaging Spectrograph (STIS) first measured the speed of the supernova debris pushing along the shock wave. "The STIS lets you see the invisible stuff," says George Sonneborn of Goddard Space Flight Center in Greenbelt, MD. "We see the shock happening everywhere around the ring." In July, Hubble Wide Field and Planetary Camera-2 images taken by Robert Kirshner and co-investigators showed that a compact region near on the ring lit up like a sparking diamond set in an engagement ring.

Supernova 1987A is the brightest stellar explosion seen since Johannes Kepler observed a supernova in the year 1604. It is located about 167,000 light-years from Earth in the Large Magellanic Cloud.

The Space Telescope Science Institute is operated by the Association of Universities for Research in Astronomy, Inc., for NASA, under contract with the Goddard Space Flight Center, Greenbelt, MD. The Hubble Space Telescope is a project of international cooperation between NASA and the European Space Agency.

- end -

EDITOR'S NOTE: Images to accompany this release are available to news media representatives by calling the Headquarters Imaging Branch on 202/358-1900.
NASA photo numbers are: Color: 98-HC-58, 98-HC-59

The images are also available electronically through the Internet via World Wide Web, ftp or Gopher. The Internet addresses are:
ftp: ftp.stsci.edu (IP address: 130.167.1.2)
WWW: http://www.stsci.edu
Gopher: www.stsci.edu

News Release

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

For Release

Sonja Alexander
Headquarters, Washington, DC
(Phone: 202/358-1761)

February 11, 1998

NOTE TO EDITORS: N98-13

AEROSPACE SAFETY ADVISORY PANEL TO PRESENT REPORT TO NASA

The Aerospace Safety Advisory Panel (ASAP) will present its annual report at a public meeting to NASA Administrator Daniel S. Goldin at 1 p.m. EST on Thursday, Feb. 12, 1998, in the Program Review Center, room 9H40, NASA Headquarters, 300 E Street S.W., Washington, DC.

Each year, the panel reviews and evaluates current and future NASA programs and activities and reports its findings to the NASA Administrator. Priority is given to programs that involve the safety of human flight.

Following the Apollo spacecraft fire on Jan. 27, 1967, Congress enacted legislation to establish the ASAP as a senior advisory committee to NASA.

The ASAP report will be available for media representatives at 1 p.m. Thursday in the NASA Headquarters Newsroom (202/358-1600). The report will be distributed at the meeting and is on the Code Q home page at URL:

http://www.hq.nasa.gov/office/codeq/

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VideoAdvisory

National Aeronautics and
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For Release
Feb. 11, 1998

Debbie Rivera
Headquarters, Washington, DC
(Phone: 202/358-1743)

VIDEO ADVISORY: V98-16

MARS LANDING ZONE REVEALED

Today's video package features new images of the landing zone for the Mars Polar Lander, taken by the camera aboard NASA's Mars Global Surveyor. The images show a dramatic departure from the now-familiar Martian landscapes observed by the Viking landers and Mars Pathfinder. In December 1999, the lander will set down in this uncharted territory to dig for traces of frozen, subsurface water.

ITEM 1: NEW MARS GLOBAL SURVEYOR IMAGES OF THE MARS '98 LANDING ZONE
ITEM 1a: MARS '98 ANIMATION
ITEM 1b: MARS '98 LANDER SCIENCE PAYLOAD TESTS, JET PROPULSION LABORATORY
ITEM 1c: MARS '98 LANDER PAYLOAD INTEGRATION, LOCKHEED MARTIN ASTRONAUTICS, DENVER, CO
ITEM 1d: INTERVIEW - DR. JOHN MCNAMEE, MANAGER OF THE MARS SURVEYOR 1998 PROJECT, JET PROPULSION LABORATORY
ITEM 1e: INTERVIEW - DR. YOUNG PARK, MANAGER OF THE MARS VOLATILES AND CLIMATE SURVEYOR PROJECT, JET PROPULSION LABORATORY
ITEM 1f: INTERVIEW - DR. RICHARD ZUREK, MARS SURVEYOR 1998 PROJECT SCIENTIST, JET PROPULSION LABORATORY

For more information contact at Douglas Isbell (202)358-1753 or Stephanie Zeluck at (818) 354-5011.

ITEM 2: REPLAY - RING OF FIRE
ITEM 2a: REPLAY - SUPERNOVA 1987A
ITEM 2b: REPLAY - ZOOM SEQUENCE
ITEM 2c: REPLAY - BRIGHT KNOT IN SUPERNOVA 1987A RING
ITEM 2d: REPLAY - INTERVIEW - GEORGE SONNEBORN, ASTROPHYSICIST
ITEM 3: REPLAY - LOX AND X-33
ITEM 3a: REPLAY - PHYSICS AND FUTURE SPACE TRANSPORTATION
ITEM 3b: REPLAY - INTERVIEW - GEORGE SCHMIDT, NASA PHYSICIST

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February 11, 1998

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Diane Ainsworth
Jet Propulsion Laboratory, Pasadena, CA
(Phone: 818/354-5011)

RELEASE: 98-26

1998 MARS PAYLOADS INTEGRATED AS SCIENTISTS VIEW FIRST CLOSE-UPS OF STRANGE, LAYERED POLAR TERRAIN

Swirling bands of eroded, layered rock, reminiscent of the edges of Alaskan ice sheets, and an array of light and dark mottled patterns blanket the frigid floor of Mars' south pole, where NASA's newly named Mars Polar Lander will touch down in late 1999.

The new images of the landing zone for the Mars Polar Lander, taken by the camera aboard NASA's Mars Global Surveyor, confirm that this strange, layered terrain in the south polar region represents a dramatic departure from the now-familiar Martian landscapes observed by the Viking landers and Mars Pathfinder. In December 1999, the next lander in a steady series begun by Pathfinder will set down in this uncharted territory to dig for traces of frozen, subsurface water.

"Despite ground fog that obscures part of the surface in these images, we can see much more surface detail than we've ever seen before, which suggests that the 75-degree south latitude landing zone is quite a bit more rugged and geologically diverse than we had previously thought," said Dr. Michael Malin of Malin Space Science Systems, Inc., San Diego, CA. Malin is principal investigator for the Global Surveyor camera and the cameras on the 1998 missions, the Mars Polar Lander and its newly named partner, the Mars Climate Orbiter.

In the current images from Mars Global Surveyor, obtained during an aerobraking orbit from about 1,700 miles above the planet's surface, objects about 48 feet across can be resolved. Once the spacecraft reaches its final mapping orbit early next year, at an average of 234 miles above the surface, the camera will be able to resolve ground features as small as seven to nine feet across. This greater clarity will enable views of objects as small as boulders or as subtle as sand dunes.

-more-

Over the next year, the Global Surveyor images will be used in concert with other spacecraft data such as that obtained by its thermal emission spectrometer to better characterize the geology of the Martian south pole. After Global Surveyor has reached its mapping orbit, data from the spacecraft's laser altimeter, which measures the height and roughness of Martian surface features, will be combined with the imaging data to aid the final choice of landing sites.

"We have a wonderful opportunity in the next year to study this region with data from Mars Global Surveyor, which underscores the true advantage of conducting a continuing program of Mars exploration," said Dr. John McNamee, Mars Surveyor '98 project manager at NASA's Jet Propulsion Laboratory (JPL), Pasadena, CA. "We will be able to characterize the geology of the whole region and find the best spot to land, one that presents a balance between lander safety and scientific interest. This process does not have to be finalized until June 1999, five months after the lander has been launched and six months before it lands."

The new landing site images are available on the Internet at JPL's Mars News web site and at the Malin Space Science Systems web site at:

http://www.jpl.nasa.gov/marsnews/
http://www.msss.com

The images are being studied while the 1998 Mars Climate Orbiter and Mars Polar Lander are undergoing key hardware integration and testing at Lockheed Martin Astronautics, Denver, CO. The spacecraft are currently being prepared for transfer to the Lockheed Martin environmental test chambers to ensure that they can survive and operate in the extreme conditions at Mars. At the completion of this testing, the spacecraft will be flown separately to NASA's Kennedy Space Center, FL, for integration with their launch vehicles.

The 1998 Mars lander and orbiter missions are designed to learn more about the history of Mars' climate and the behavior of related Martian volatiles, such as water vapor and ground ice. The orbiter, scheduled for launch on Dec. 10, will conduct a two-year primary mission to profile the Martian atmosphere and map its surface. The lander, scheduled for liftoff on Jan. 3, 1999, will carry out a three-month mission to search for traces of subsurface water in this frozen, layered terrain and any evidence of a physical record of climate change.

To meet these scientific objectives, the orbiter will carry a rebuilt version of the Pressure Modulated Infrared Radiometer (PMIRR) that was lost with Mars Observer in 1993. This atmospheric sounder will observe the global distribution and time variation of temperature, dust, water vapor and condensates in the Martian atmosphere. PMIRR is a collaboration between JPL, Oxford University and Russia's Space Research Institute.

Like Mars Global Surveyor, the Mars Climate Orbiter carries a dual camera system, contained in an amazingly compact package about the size of a pair of binoculars. The Mars color imager's one-pound wide-angle camera will return daily low-resolution global views of the planet's atmosphere and surface, while its medium-angle camera will provide higher resolution (30 feet per pixel) images. The medium-angle camera will build global and regional maps of Mars in multiple colors over the course of the mission. These maps will be used to characterize surface properties and changes in the distribution of dust.

The 1998 lander carries three scientific packages: the Mars descent imager, provided by Malin, which will view the landing site at increasingly higher resolution as the lander descends to the surface of Mars; the atmospheric lidar experiment, provided by the Russia space institute, which will monitor the presence and height of atmospheric hazes, coupled with a miniature microphone furnished by The Planetary Society, Pasadena, CA, to record the sounds of Mars; and the Mars Volatile and Climate Surveyor (MVACS) package, led by principal investigator Dr. David Paige of the University of California, Los Angeles.

MVACS includes a surface stereo imager based on the Mars Pathfinder camera, both built at the University of Arizona; a meteorology package, built at JPL; a robotic arm, also built at JPL, to acquire soil samples and close-up images of the surface and subsurface; and the thermal and evolved gas analysis experiment, built at the University of Arizona. JPL will oversee mission operations with the spacecraft team at Lockheed Martin Astronautics and the instrument teams located at their home institutions during the lander and orbiter missions.

"MVACS and the other science experiments are tailor-made for the exploration of Mars' south pole," said Dr. Richard Zurek, project scientist at JPL. "The robotic arm, which is reminiscent of the Viking arm and scoop that were used to carry out biology experiments in the mid-1970s, is, in fact, much more versatile. It can reach farther out, dig up to three feet below the surface and then place soil samples in a miniature oven, called the evolved gas analysis experiment, where the samples are 'cooked' and analyzed for chemical and gas content."

Piggybacking on the Mars Polar Lander are two small 4.5-pound microprobes provided by NASA's New Millennium technology validation program. Deployed before landing, they will penetrate and embed themselves beneath the Martian surface to study subsurface materials.

A CD-ROM with the names of students from all over the world will also be flown on the lander. Signatures may be submitted via the Internet to:

http://spacekids.hq.nasa.gov/mars

The Mars Polar Lander and the Mars Climate Orbiter are the second set of launches in a long-term NASA program of Mars exploration known as the Mars Surveyor Program. The missions are managed by JPL for NASA's Office of Space Science, Washington, DC. Lockheed Martin Astronautics, Denver, CO, is NASA's industry partner in the mission.

-end-

News Release

National Aeronautics and
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Washington, DC 20546
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For Release

Jim Cast
Headquarters, Washington, DC
(Phone: 202/358-1779)

February 11, 1998

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RELEASE: 98-27

FIRST MAJOR FLIGHT COMPONENT FOR X-33 ARRIVES AT PALMDALE

NASA and Lockheed Martin Tuesday saw their X-33 technology demonstrator move from drawing board to plant floor as the first major flight component arrived at the Lockheed Martin Skunk Works vehicle assembly facility in Palmdale, CA.

The 26-foot-long, 5,500-pound aluminum liquid oxygen tank that will form much of the nose and forward third of the X-33 vehicle arrived Tuesday afternoon by air from the Lockheed Martin Michoud Space Systems facility, New Orleans, LA.

"The arrival of the liquid oxygen tank marks the start of an ambitious assembly schedule that will see the X-33 vehicle roll out and begin flight tests within 18 months," said Jerry Rising, Lockheed Martin Skunk Works vice president for X-33/VentureStar.

"This is a significant achievement in making the X-33 vehicle ready for flight, as the liquid oxygen tank is the first major element to be placed into the assembly fixture," added Gene Austin, NASA X-33 program manager.

-more-

The tank, designed to hold more than 181,000 pounds of liquid oxygen, will supply the oxidizer needed to burn the vehicle's fuel, liquid hydrogen.

The liquid oxygen tank design also plays a key structural role in the X-33. It has a complex, two-lobed structure allowing for a close fit within the vehicle's outer shell. When filled, the tank will account for about 65 percent of total vehicle weight at liftoff.

The liquid oxygen tank design is one of a number of challenging technology areas that are key to the X-33, including the vehicle's two cutting-edge composite liquid hydrogen tanks, two linear aerospike engines, the vehicle's rugged metallic thermal protection system and advanced avionics systems, all of which will be arriving at the Palmdale facility during the coming year. Vehicle assembly is scheduled to be completed in late spring 1999, with the first flight, to be launched from Edwards Air Force Base, CA, scheduled for July 1999.

The wedge-shaped X-33 is a sub-scale prototype technology demonstrator leading to the next generation of commercially developed and operated single-stage-to orbit vehicles, flying after the turn of the Century, which could dramatically reduce the cost of putting payloads into space.

-end-

VideoAdvisory

National Aeronautics and
Space Administration

Washington, D.C. 20546
(202) 358-1600

For Release
Feb. 12, 1998

Renee Juhans
Headquarters, Washington, DC
(Phone: 202/358-1712)

VIDEO ADVISORY: V98-17

TAKING THE PULSE OF EL NIÑO

Today's video package features new images from NASA illustrating the effects of El Niño on global precipitation during 1997 and early 1998. The images highlight areas devastated by floods or droughts, and illustrate the effects of the early February storms that repeatedly slammed into the California Coast.

ITEM 1: GLOBAL PRECIPITATION ABNORMALITIES
ITEM 1a: REGIONAL PRECIPITATION ABNORMALITIES
ITEM 1b: AGGREGATE PRECIPITATION
ITEM 1c: EL NINO IN 3-D
ITEM 1d: SIDE BY SIDE EL NINOS
ITEM 1e: FIRES OVER INDONESIA (SEA VIEWING WIDE FIELD SENSOR)
ITEM 1f: FIRES OVER INDONESIA (TOTAL OZONE MAPPING SPECTROMETER)
ITEM 1g: GALAPAGOS
ITEM 1h: SCIENTISTS WORKING WITH EL NINO IMAGES
ITEM 1i: TOPEX ANIMATION
ITEM 1j: SEAWIFS ANIMATION
ITEM 1k: INTERVIEW - ANTONIO BUSALACCHI, RESEARCH OCEANOGRAPHER, GODDARD SPACE FLIGHT CENTER

For more information contact Doug Isbell at (202) 358-1753 or Wade Sisler at (301)286-6256.

ITEM 2: REPLAY - NEW MARS GLOBAL SURVEYOR PACKAGE

Video news file today at noon, 3, 6, 9 p.m. and midnight EST.

For schedule changes, late breaking news, or other events added to this NTV schedule, go to: ***www.nasa.gov/ntv/breaking.html***

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

News Release

National Aeronautics and
Space Administration
Washington, DC 20546
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For Release

February 12, 1998

Douglas Isbell
Headquarters, Washington, DC
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Mary Hardin
Jet Propulsion Laboratory, Pasadena, CA
(Phone: 818/354-0344)

RELEASE: 98-28

NASA RADAR REVEALS HIDDEN REMAINS AT ANCIENT ANGKOR

New evidence of a prehistoric civilization and remnants of ancient temples in Angkor, Cambodia, have been discovered by researchers using highly detailed maps produced with data from an airborne imaging radar instrument created by NASA.

Experts say the findings, made possible by the Airborne Synthetic Aperture Radar (AIRSAR) developed by NASA's Jet Propulsion Laboratory (JPL), Pasadena, CA, may revolutionize the way archaeologists view the ancient city's development.

Angkor is a vast complex of some 1,000 temples covering about 100 square miles of northern Cambodia. Little is known of the prehistoric occupation of this fertile flood plain, but at its height the city housed an estimated population of one million people. The famous temples were built from the eighth to thirteenth century AD and were accompanied by a massive hydrological system of reservoirs and canals. Today, much of the civilization of Angkor is hidden beneath a dense forest canopy and is inaccessible due to poor roads, land mines and political instability.

"The radar data have enabled us to detect a distribution of circular 'prehistoric' mounds and undocumented temples far to the northwest of Angkor," said Dr. Elizabeth Moore, Head of the Art and Archaeology Department at the School of Oriental and African Studies at the University of London. "The site's topography is highlighted by the radar, focusing our attention on previously neglected features, some at the very heart of the city.

"The radar maps not only bring into question traditional concepts of the urban evolution of Angkor, but reveal evidence of temples and earlier civilization either absent or incorrect on modern topographic maps and in early twentieth century archaeological reports," she said.

-more-

"The radar images make apparent many features that are not readily identifiable on the ground," said Dr. Anthony Freeman, a radar scientist at JPL who has collaborated with Moore for the past three years studying the use of radar on the Angkor site. "We can see differences in vegetation structure and some features that are obscured by vegetation cover."

In December 1997, Moore surveyed a small mound on the perimeter of the famous 12th century AD temple, Angkor Wat, that Freeman had first noticed in the radar image. "Previous archaeological accounts from 1904 and 1911 note only two temples and make no mention of the distinct circular form of the mound. We found four to six temple remains, including pre-Angkorean structures," Moore said. "This suggests occupation of the 12th century site some 300 years earlier, radically changing accepted chronologies of Angkor."

Angkor's beauty is seen in its temples, but the greatness of the Khmer city lies in the multitude of water-related constructions, according to Moore. The Khmer kings nominally dedicated temples to Hindu and Buddhist deities, but the underlying significance was veneration of ancestral spirits, ensuring fertility of the land. Management of water was essential, both for control during the monsoon rains and conservation during the dry season and involved the construction of moats, dikes, canals, tanks, and reservoirs. The largest of these reservoirs, dated to the 12th century AD, is five miles long and its function remains a matter of archaeological debate.

"These new detailed topographic maps have shown us many more hydrological features and highlighted how they function in the rituals and daily life of the Khmer people," Moore explained.

"Using a technique known as radar interferometry, which combines two images to create a three-dimensional topographic map, we can construct a map of the area surrounding Angkor that is more accurate than most maps we have of the United States," said Dr. Scott Hensley, a radar engineer at JPL. "This map lets us see both natural and human-made water management features at the site with great clarity."

"Angkor is situated on the edge of the Tonle Sap lake, a unique body of water that doubles in size during the rainy season. These maps give us new insights into the human impact on this ecosystem, from the ancient Khmer to the present day, and are of importance in the study of our changing Earth," Freeman continued.

The Angkor radar images were taken in late 1996 as part of the AIRSAR Pacific Rim Deployment and were a follow-up to the 1994 study of Angkor with data collected by the Spaceborne Imaging Radar-C/X-band Synthetic Aperture Radar (SIR-C/X-SAR) that flew on NASA's Space Shuttle Endeavour.

Like SIR-C/X-SAR, AIRSAR transmits and receives three radar frequencies in both horizontal and vertical polarizations. While both systems use C-band and L-band wavelengths, AIRSAR has the added benefit of P-band, a longer wavelength that can penetrate below the forest canopy. In addition, AIRSAR can be flown in a mode called TOPSAR that allows it to measure topography and create three-dimensional images of the surface.

AIRSAR images of the Angkor region will be posted to the Internet at this address:

http://www.jpl.nasa.gov/news/

AIRSAR flies on a NASA DC-8 aircraft that is managed at NASA's Dryden Flight Research Center, Edwards, CA. The AIRSAR instrument is managed by JPL, a division of the California Institute of Technology, for NASA's Office of Earth Science, Washington, DC. This office manages NASA's Earth Science enterprise, an internationally coordinated effort to study natural and human-induced changes in the Earth's land, oceans, atmosphere, ice and life.

The AIRSAR flight over Cambodia was funded by the Government of Thailand. Ground verification has been made possible by Vann Molyvann, Minister of State for Culture and Fine Arts, Territorial Management, Urban Planning and Construction; and Dr. Ang Chouléan of the Cambodian Authority for the Protection and Management of Angkor and the Region of Siem Reap.

-end-

News Release

National Aeronautics and
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Washington, DC 20546
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Jennifer McCarter
Headquarters, Washington, DC
(Phone: 202/358-1639)

For Release
February 13, 1998

Eileen M. Hawley/Ed Campion
Johnson Space Center, Houston, TX
(Phone: 281/483-5111)

NOTE TO EDITORS: N98-14

STS-95 CREW MEDIA OPPORTUNITY SET FOR FEBRUARY 20

A press opportunity with members of the STS-95 crew will be held on Friday, Feb. 20, at NASA's Johnson Space Center, Houston, TX, from 3 p.m. to 4:30 p.m. EST.

STS-95 Mission Commander Curt Brown will introduce his crew and they will talk briefly with reporters about their upcoming mission, which is slated for a late October launch. Joining Brown on the flight are Pilot Steve Lindsey, Mission Specialists Scott Parazynski, Steve Robinson, and European Space Agency astronaut Pedro Duque, along with two payload specialists -- Senator John Glenn and Chiaki Mukai from the Japanese Space Agency (NASDA).

The press conference marks the completion of the crew's first week of training together and coincides with the 36th anniversary of Glenn's first space mission, a five-hour flight on-board the Friendship 7 capsule in 1962.

Video background footage showing various crew training activities taken earlier in the week will be shown on Feb. 20 during the NASA Television Video File broadcasts and also following the press conference. NASA plans to offer periodic crew-training media opportunities for news media, and the agency also plans to document crew training in both still and video imagery for release on a regular basis.

On Thursday, Feb. 19, there will be a photo opportunity with John Glenn in connection with a centrifuge training session at Brooks Air Force Base in San Antonio, TX. For more information on the centrifuge photo opportunity, news media representatives should contact the Brooks Air Force Base Public Affairs Office at 210/536-3234.

NASA Television is available through the GE-2 satellite, transponder 9C located at 85 degrees West longitude, vertical polarization, with a frequency of 3880 MHz, and audio at 6.8 MHz. Journalists may ask questions during the press conference from participating NASA field centers. The daily NASA Video File airs on NASA Television at 12 noon, 3 p.m., 6 p.m. and 9 p.m. EST each weekday.

- more -

Important Note: Media wishing to attend the press conference at Johnson Space Center, must contact the Johnson Newsroom by noon Thursday, Feb. 19, for badging and registration. The newsroom can be reached by phone at 281/483-5111 or by fax at 281/483-2000.

- end -

VideoAdvisory

National Aeronautics and
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Washington, D.C. 20546
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For Release
Feb. 13, 1998

Renee Juhans
Headquarters, Washington, DC
(Phone: 202/358-1712)

VIDEO ADVISORY: V98-18

VOYAGER 1 TAKES THE LEAD AS FARTHEST HUMAN-MADE OBJECT IN SPACE

Today's video package features animation and b-roll of how the Voyager 1 spacecraft will cruise beyond the Pioneer 10 spacecraft and become the most distant human-made object in the Solar System at approximately 5:10 p.m. EST on Feb. 17.

ITEM 1: VOYAGER 1 & PIONEER 10 TRAJECTORY ANIMATION

ITEM 1a: VOYAGER 1 B-ROLL

ITEM 1b: INTERVIEW - DR. EDWARD STONE, DIRECTOR AND VOYAGER PROJECT SCIENTIST, JET PROPULSION LABORATORY

ITEM 1c: INTERVIEW - ED MASSEY, MANAGER, VOYAGER AND ULYSSES PROJECTS, JET PROPULSION LABORATORY

For more information contact Doug Isbell at (202) 358-1753 or Stephanie Zeluck at (818) 354-5011.

ITEM 2: REPLAY - EL NIÑO PACKAGE

Video news file today at noon, 3, 6, 9 p.m. and midnight EST.

For schedule changes, late breaking news, or other events added to this NTV schedule, go to: ***www.nasa.gov/ntv/breaking.html***

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

News Release

National Aeronautics and
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Washington, DC 20546
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For Release

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February 13, 1998

Eileen Hawley/James Hartsfield
Johnson Space Center, Houston, TX
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RELEASE: 98-29

BROWN TO COMMAND STS-95 MISSION

Astronaut Curt Brown (Lt. Col., USAF) will lead the crew of the STS-95 mission, supporting a variety of research payloads including deployment of the Spartan solar-observing spacecraft, the Hubble Space Telescope Orbital Systems Test Platform, and investigations on spaceflight and the aging process. STS-95 is scheduled for launch in October 1998.

Joining Brown on board Discovery will be Pilot Steven W. Lindsey (Major, USAF) and Mission Specialists Scott E. Parazynski, M.D.; Stephen K. Robinson, Ph.D.; and European Space Agency astronaut Pedro Duque, as well as Payload Specialist, NASDA Astronaut Chiaki Mukai, M.D., Ph.D. Senator John Glenn was named as a payload specialist on Jan. 16.

The primary objectives of STS-95 are to deploy the Spartan spacecraft for two days of free flight during which it will study the Sun's corona and to conduct research with the Hubble Space Telescope Orbital Systems Test Platform (HOST) and the International Extreme Ultraviolet Hitchhiker-3 (IEH-3) payloads. The Spartan spacecraft was previously carried on board the STS-87 mission in November but did not activate properly following its deployment from the Shuttle.

"This crew will be supporting a challenging research mission," said David C. Leestma, director of Flight Crew Operations. "They will be working with investigations that span a wide range of disciplines, and I have every confidence in the ability of this crew to carry out those responsibilities."

-more-

STS-95 will mark Brown's fifth space flight, and his second as Commander. He flew as pilot on STS-47 in 1992, STS-66 in 1994 and STS-77 in 1996. He commanded STS-85, an eight-day mission in August 1997 to deploy and retrieve the CRISTA-SPAS payload.

STS-95 will be the second flight for both Lindsey and Robinson. Lindsey flew previously as the pilot on Columbia in November/December 1997 for the fourth U.S. Microgravity Payload mission in a mission lasting16 days. Robinson was a member of the STS-85 crew which also was commanded by Brown. Parazynski will be making his third trip to space, having previously flown as a member of the STS-66 mission in 1994 and STS-86 in 1997.

Duque, a member of the 1996 astronaut class, will be making his first space flight. Selected by the European Space Agency in 1992, he was the Alternate Payload Specialist for STS-78 in 1996. Mukai will be making her second journey into space during STS-95. She flew previously as a Payload Specialist for the Second International Microgravity Laboratory Mission, STS-65, in July 1994.

In February 1962, Glenn became the first American to conduct an orbital flight of the planet on board Friendship 7. That mission lasted just under five hours. During STS-95, Glenn will conduct a series of investigations designed to better understand the correlation between the aging process on Earth and the physiological effects of spaceflight on the human body.

During the ten-day mission, crew members will support a variety of microgravity research projects. The HOST platform will validate possible components to be used during the third Hubble Space Telescope servicing mission in late 1999, while the TAS-2 payload will support five separate experiments ranging over a variety of disciplines.

For additional information on the STS-95 crew, or any astronaut, see the NASA Internet biography home page at URL:

http://www.jsc.nasa.gov/Bios/

-end-

News Release

National Aeronautics and
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For Release

Donald Savage
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February 13, 1998

Mary Hardin
Jet Propulsion Laboratory, Pasadena, CA
(Phone: 818/354-0344)

RELEASE: 98-30

VOYAGER 1 NOW MOST DISTANT HUMAN-MADE OBJECT IN SPACE

In a dark, cold, vacant neighborhood near the very edge of our Solar System, the Voyager 1 spacecraft is set to break another record and become the explorer that has traveled farthest from home.

At approximately 5:10 p.m. EST on Feb. 17, 1998, Voyager 1, launched more than two decades ago, will cruise beyond the Pioneer 10 spacecraft and become the most distant human-created object in space, at 6.5 billion miles (10.4 billion kilometers) from Earth. The two are headed in almost opposite directions away from the Sun.

"For 25 years, the Pioneer 10 spacecraft led the way, pressing the frontiers of exploration, and now the baton is being passed from Pioneer 10 to Voyager 1 to continue exploring where no one has gone before," said Dr. Edward C. Stone, Voyager project scientist and Director of NASA's Jet Propulsion Laboratory (JPL), Pasadena, CA.

"At almost 70 times farther from the Sun than the Earth, Voyager 1 is at the very edge of the Solar System. The Sun there is only 1/5,000th as bright as here on Earth, so it is extremely cold, and there is very little solar energy to keep the spacecraft warm or to provide electrical power. The reason we can continue to operate at such great distances from the Sun is because we have radioisotope thermal electric generators (RTGs) on the spacecraft that create electricity and keep the spacecraft operating," Stone said. "The fact that the spacecraft is still returning data is a remarkable technical achievement."

Voyager 1 was launched from Cape Canaveral on Sept. 5, 1977. The spacecraft encountered Jupiter on March 5, 1979, and Saturn on Nov. 12, 1980.

- more -

Then, because its trajectory was designed to fly close to Saturn's large moon Titan, Voyager 1's path was bent northward by Saturn's gravity, sending the spacecraft out of the ecliptic plane -- the plane in which all the planets except Pluto orbit the Sun.

Launched on March 2, 1972, the Pioneer 10 mission officially ended on March 31, 1997. However, NASA's Ames Research Center, Moffett Field, CA, intermittently receives science data from Pioneer as part of a training program for flight controllers of the Lunar Prospector spacecraft now orbiting the Moon.

"The Voyager mission today presents an unequalled technical challenge. The spacecraft are now so far from home that it takes nine hours and 36 minutes for a radio signal traveling at the speed of light to reach Earth," said Ed B. Massey, project manager for the Voyager Interstellar Mission at JPL. "That signal, produced by a 20 watt radio transmitter, is so faint that the amount of power reaching our antennas is 20 billion times smaller than the power of a digital watch battery."

Having completed their planetary explorations, Voyager 1 and its twin, Voyager 2, are studying the environment of space in the outer Solar System. Although beyond the orbits of all the planets, the spacecraft still are well within the boundary of the Sun's magnetic field, called the heliosphere. Science instruments on both spacecraft sense signals that scientists believe are coming from the outermost edge of the heliosphere, known as the heliopause.

The heliosphere results from the Sun's emitting a steady flow of electrically charged particles called the solar wind. As the solar wind expands supersonically into space in all directions, it creates a magnetized bubble -- the heliosphere -- around the Sun. Eventually, the solar wind encounters the electrically charged particles and magnetic field in the interstellar gas. In this zone the solar wind abruptly slows down from supersonic to subsonic speed, creating a termination shock. Before the spacecraft travel beyond the heliopause into interstellar space, they will pass through this termination shock.

"The data coming back from Voyager now suggest that we may pass through the termination shock in the next three to five years," Stone said. "If that's the case, then one would expect that within 10 years or so we would actually be very close to penetrating the heliopause itself and entering into interstellar space for the first time."

Reaching the termination shock and heliopause will be major milestones for the mission because no spacecraft have been there before and the Voyagers will gather the first direct evidence of their structure. Encountering the termination shock and heliopause has been a long-sought goal for many space physicists, and exactly where these two boundaries are located and what they are like still remains a mystery.

Science data are returned to Earth in real-time to the 34-meter Deep Space Network antennas located in California, Australia and Spain. Both spacecraft have enough electricity and attitude control propellant to continue operating until about 2020, when electrical power produced by the RTGs will no longer support science instrument operation. At that time, Voyager 1 will be almost 150 times farther from the Sun than the Earth -- almost 14 billion miles (more than 20 billion kilometers) away.

On Feb. 17, Voyager 1 will be departing the Solar System at a speed of 39,000 miles per hour (17.4 kilometers per second). At the same time, Voyager 2 will be 5.1 billion miles (8.1 billion kilometers) from Earth and is departing the Solar System at a speed of 35,000 miles per hour (15.9 kilometers per second).

JPL, a division of the California Institute of Technology, manages the Voyager Interstellar Mission for NASA's Office of Space Science, Washington, DC.

- end -

News Release

National Aeronautics and
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Eileen M. Hawley/Ed Campion
Johnson Space Center, Houston, TX
(Phone: 281/483-5111)

For Release
February 17, 1998

NOTE TO EDITORS: N98-15

WOLF TO DISCUSS MIR STAY

Astronaut David Wolf, who recently completed 119 days as a crew member on the Mir space station, will discuss his mission with reporters at a press conference beginning at 9 a.m. EST Thursday, Feb. 19. This will be Wolf's first media availability since returning to Earth on board Endeavour on Jan. 31.

Joining Wolf for the press conference will be Frank Culbertson, manager of the joint U.S./Russian Phase 1 program. The briefing will be held at NASA's Johnson Space Center, Houston, TX.

Wolf was the sixth American to complete an extended stay on board the Mir. He spent a total of 128 days in space, as a member of the STS-86, Mir and STS-89 crews.

Media may participate in the question-and-answer session at participating NASA centers. Media planning to attend the briefing in person should notify the Johnson Space Center newsroom no later than 4 p.m. Wednesday, Feb. 18, for badging and registration.

The briefing will be carried live on NASA Television. NASA Television is available through the GE-2 satellite, transponder 9C located at 85 degrees West longitude, vertical polarization, with a frequency of 3880 MHz, and audio at 6.8 MHz.

-end-

Video Advisory

National Aeronautics and
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Washington, DC 20546
(202) 358-1600

For Release
Feb. 17, 1998

Debbie Rivera
Headquarters, Washington, DC
(Phone: 202/358-1743)

VIDEO ADVISORY: V98-19

A SNEAK PEAK AT FEBRUARY'S SOLAR ECLIPSE

Today's video file provides a preview of the Feb. 26 solar eclipse. The package contains animation showing the path of the eclipse in the United States, some safe eclipse viewing tips, and examples of how NASA uses artificial eclipses to enhance its understanding of the Sun's corona.

ITEM 1: ECLIPSE OF 1998

Animation shows the path of the Moon's shadow on Earth during February's solar ecliipse.

ITEM 1a: VIEWING GUIDE

Much of the southeastern U.S. will see a partial eclipse. The still frame will help viewers determine how it will look in their hometown.

ITEM 1b: VIEWING TIPS - FRED ESPANEK, ASTRONOMER

ITEM 1c: TIME-LAPSE OF SOLAR FLARE

This sequence of a powerful solar flare was taken by the Solar and Heliospheric Observatory (SOHO) on Nov. 4, 1997.

For more information contact Don Savage at 202-358-1727 or Wade Sisler at 301-286-6256.

ITEM 2: REPLAY- VOYAGER 1 & PIONEER 10 ANIMATION & B-ROLL

Video news file today at noon, 3, 6, 9 p.m. and midnight EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

-end-

News Release

National Aeronautics and
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Washington, DC 20546
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For Release

Michael Braukus
Headquarters, Washington, DC
(Phone: 202/358-1979)

February 18, 1998

NOTE TO EDITORS: N98-16

NASA SPONSORS INTERNATIONAL SPACE STATION VIDEOCONFERENCE

NASA's International Space Station Program is sponsoring a live, interactive, 90-minute videoconference on Feb. 19, 1998, from 12:30 p.m. to 2 p.m. EST. The program, called "Countdown to Launch," will give teachers and students an inside look at the soon-to-be-launched International Space Station.

The program will feature panel discussions on key space station challenges from station engineers, astronauts and scientists, putting students directly in touch with the people who soon will launch, build and work on the orbiting science laboratory.

"Countdown to Launch" will be viewed by a national audience via satellite downlink at approximately 2,100 sites including schools, libraries and museums. To find a downlink site near you, go to the PBS Web site at:

www.pbs.org/als/programs/live

-end-

News Release

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

For Release

Donald Savage/Douglas Isbell
Headquarters, Washington, DC
(Phone: 202/358-1547)

February 18, 1998

RELEASE: 98-31

HUNTRESS ANNOUNCES HIS DEPARTURE FROM NASA

Dr. Wesley T. Huntress, Jr., NASA's Associate Administrator for Space Science, has announced his departure from the Agency in the near future.

Huntress is responsible for NASA's programs in astrophysics, planetary exploration and space physics. "I have served in this position for more than five years now," Huntress said, "and it is simply time to move on."

"Wes Huntress has presided over a revitalization of NASA's Space Science enterprise," NASA Administrator Daniel S. Goldin said. "Five years ago, the Hubble Space Telescope had problems, spacecraft costs were growing out of control, and serious budgetary threats were clouding NASA's future in space science. But during his tenure, thanks in no small part to the magnificent team he assembled at the field centers and NASA Headquarters, the Space Science enterprise has become one of NASA's crown jewels.

"The Hubble Telescope has become the workhorse of cutting-edge astronomy, and planetary exploration is now the province of faster, better, cheaper missions such as Mars Pathfinder. Through these efforts, even with constrained budgetary possibilities in the years ahead, NASA will continue to be a world leader in exploring the worlds beyond Earth. Much of this achievement is due to the wisdom and skill of Wes Huntress. We shall miss him."

Huntress was named to head the Office of Space Science in March 1993. He began his career at NASA's Jet Propulsion Laboratory (JPL), Pasadena, CA, as a National Research Council resident associate in the 1960s. He joined JPL permanently in 1969 as a research scientist specializing in ion chemistry and planetary atmospheres. Huntress and his research group gained international recognition for their pioneering studies of chemical evolution in interstellar clouds, comets and planetary atmospheres.

NASA will begin a search for Huntress' replacement immediately.

-end-

Video Advisory

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

Renee Juhans
Headquarters, Washington, DC
(Phone: 202/358-1712)

For Release
Feb. 20, 1998

VIDEO ADVISORY: V98-20

MATTERS OF THE HEART; ASTRONAUT JOHN GLENN TRAINING; LATEST IMAGE FROM EL NIÑO

In recognition of American Heart Month, today's video file features a compilation of footage on how NASA research and technology have led to breakthroughs in understanding, diagnosing and treating heart disease. Heart disease is the number one killer of American men and women. Also on NTV is b-roll of Astronaut John Glenn training for the STS-95 mission, scheduled for launch in October 1998. Finally, NTV will show the latest El Niño image of the Pacific Ocean that was produced using sea surface height measurements taken by the U.S.-French TOPEX/Poseidon satellite.

ITEM 1: FETAL HEART MONITOR
ITEM 1a: HEART PUMP
ITEM 1b: STS-80 CALCIUM EXPERIMENT
ITEM 1c: HEARTS IN SPACE
ITEM 1d: HEARTS ACROSS AMERICA

For more information contact Terri Hudkins at (202) 358-1977.

ITEM 2: GLENN TRAINING

For more information contact Eileen Hawley at (281) 483-5111.

ITEM 3: EL NIÑO: WARM WATER POOL IS THINNING

For more information contact Doug Isbell at (202) 358-1753 or Stephanie Zeluck at (818) 354-5011.

Video news file today at noon, 6, and 9 p.m. EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

-end-

News Release

National Aeronautics and
Space Administration
Washington, DC 20546
(202) 358-1600

David E. Steitz
Headquarters, Washington, DC
(Phone: 202/358-1730)

Walli Haley
University of Texas, El Paso, TX
(Phone: 915/747-7507)

For Release
February 23, 1998

NOTE TO EDITORS: N98-18

SOUTHWEST CLIMATE CONFERENCE TO BE HELD IN EL PASO

NASA Administrator Daniel S. Goldin will deliver the keynote address at "Tilting the Balance, Climate Variability and Water Resource Management in the Southwest," a conference to be held at the University of Texas at El Paso, March 2-4.

The conference is part of an in-depth investigation of regional climate variability and its effect on the availability and quality of water resources critical to the region. Congressman Silvestre Reyes (D-TX) and ten other members of Congress will co-chair the event.

The goal of the conference is to provide farmers, ranchers, industry leaders, planners, utility managers and others whose livelihoods are affected by climate change with practical information about climate variations, such as El Nino, and how they can affect regional decision making. Water resource issues will be a special focus of the meeting. Other sessions during the workshop will include topics such as water resources, agriculture, understanding change, drought preparedness and management, environmental education, regional and urban air quality and human health issues.

The workshop will be supported by the new Undergraduate Learning Center, under the auspices of the Pan American Center for Earth and Environmental Studies (PACES), a University Research Center funded by NASA. The center's mission is to conduct basic and applied research that will contribute to NASA's Earth Science enterprise. The center is providing an opportunity for students and researchers to gain an improved understanding of geological, ecological and environmental processes and changes in land usage taking place in the region.

Media wishing to cover the conference should contact Walli Haley at the University of Texas at El Paso at 915/747-7507. Complete information about the conference, including discussion papers and background about NASA's Earth Science enterprise, can be found via the Internet at URL: **http://www.southwest.hq.nasa.gov/southwest**

-end-

Video Advisory

National Aeronautics and
Space Administration
Washington, DC 20546
(202) 358-1600

For Release
Feb. 23, 1998

Debbie Rivera
Headquarters, Washington, DC
(Phone: 202/358-1743)

VIDEO ADVISORY: V98-21

NEW INTERNATIONAL SPACE STATION HARDWARE ARRIVES AT KSC

Today's video file features footage of the Pressurized Mating Adapter-3 (PMA-3), the third PMA for the International Space Station (ISS) arriving at the Kennedy Space Center. PMA-3 and the Integrated Truss Segment Z1 are scheduled to fly on Space Shuttle mission STS-92, the third ISS assembly flight.

ITEM 1: NEW SPACE STATION HARDWARE AT KSC
ITEM 1a: Z1 TRUSS

For more information contact Michael Braukus at (202) 358-1979 or Bruce Buckingham at (407) 867-2468.

ITEM 2: REPLAY - GLENN TRAINING
ITEM 3: REPLAY - HEART DISEASE PACKAGE

Video news file today at noon, 3, 6, and 9 p.m. EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

-end-

News Release

National Aeronautics and
Space Administration
Washington, DC 20546
(202) 358-1600

For Release

February 23, 1998

Jennifer McCarter
Headquarters, Washington, DC
(Phone: 202/358-1639)

Eileen M. Hawley
Johnson Space Center, Houston, TX
(Phone: 281/483-5111)

RELEASE: 98-33

SHUTTLE VETERANS DEPART NASA

Astronauts Jerry M. Linenger, M.D., (Capt., USN), Blaine L. Hammond (Col., USAF) and M. Rhea Seddon, M.D., have retired from NASA to pursue private interests.

Linenger, who lived aboard the Mir space station for 122 days from January to May 1997, has retired from NASA. He arrived at the Mir as a member of the STS-81 crew and returned with the STS-84 crew, logging 132 consecutive days in space during those combined missions. Selected as an astronaut in 1992, his first space flight was on board Discovery for STS-64, an 11-day mission, in 1994.

Hammond retired from NASA and the Air Force to join a private aerospace firm in California. He was selected as an astronaut in 1984 and is a veteran of two Shuttle flights. He served as the pilot on STS-39, the first unclassified Department of Defense mission in 1991, and again as pilot for STS-64, an 11-day mission in 1994 to study the atmosphere and the Earth's environment.

Seddon, one of the first six women selected as astronauts in 1978, retired to pursue a private career. She is a veteran of three space missions, accumulating 722 hours in space. She flew first on STS 51-D in April 1985 on a mission to deploy two commercial satellites. Seddon then flew on two life science research missions, Spacelab Life Sciences 1 and 2, in 1991 and 1993. From September 1996 through November 1997, she was detailed to Vanderbilt University Medical School in Nashville, TN, to assist in developing experiment protocols for the Neurolab mission set for an April 1998 launch.

"Jerry, Blaine and Rhea contributed greatly to the success of the missions they flew," said David C. Leestma, director of Flight Crew Operations. "We wish them the best of luck in their new ventures."

For information on Linenger, Hammond, Seddon or any NASA astronaut, see the NASA Internet biography homepage at URL: http://www.jsc.nasa.gov/Bios/

-end-

News Release

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

For Release
February 23, 1998

Sonja Alexander
Headquarters, Washington, DC
(Phone: 202/358-1761)

Steve Roy
Marshall Space Flight Center, Huntsville, AL
(Phone: 205/544-6535)

RELEASE: 98-34

NASA CELEBRATES THE ACHIEVEMENTS OF MINORITY UNIVERSITY STUDENTS AND PROFESSIONALS

As part of a continuing effort to partner with minority universities to expand their involvement in the Nation's science and technology challenges, NASA is sponsoring the second annual University Research Center Technical Conference this week at the Von Braun Center, 700 Monroe Street, Huntsville, AL. The conference is hosted by Alabama A&M University and NASA's Marshall Space Flight Center, both located in Huntsville.

To achieve its goal to increase research opportunities for both disadvantaged and disabled students, NASA has established University Research Centers at minority institutions—including 11 historically black colleges and three Hispanic-Serving Institutions. These centers provide students and faculty a NASA focus for research in various branches of aerospace sciences.

The program highlights the significant inroads NASA is making to address the historical imbalances among U.S. science and engineering advanced degree recipients. Last year, 262 faculty members conducted NASA research with 549 participating students. This resulted in 451 peer-reviewed research papers accepted for publication, 11 new patents and 10 new commercial products in development. The program also resulted in students attaining 106 bachelor's degrees, 76 master's degrees and eight doctorates in science and technology fields.

The University Research Center program was started in 1991, and has grown from an initial seven universities to the fourteen current participating institutions. Working as a partner with the research centers, NASA involves students and faculty from minority institutions in producing technical innovations through opportunities in aerospace research.

-more-

Funding for the NASA University Research Center program is provided jointly by the NASA Office of Equal Opportunity Programs and the NASA Strategic Enterprises, including Earth Science, Space Science, Human Exploration and Development of Space, and Aeronautics and Space Transportation Technology.

More information about the NASA University Research Center Program can be found at:

http://mured.gsfc.nasa.gov/pub/WWW/AWARDS/URC/awards.html

- end -

News Release

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

For Release

Roderic Olvera Young
Headquarters, Washington, DC
(Phone: 202/358-4726)

February 24, 1998

NOTE TO EDITORS: N98-20

NASA ADMINISTRATOR DANIEL S. GOLDIN TO PARTICIPATE IN EMERGING ISSUES FORUM

NASA Administrator Daniel S. Goldin will discuss NASA's role in developing predictive environmental, climate, natural disaster and natural resource models and how these findings may help ensure sustainable development and improve the quality of life on Earth.

Goldin will address the Emerging Issues Forum at 4 p.m., Thursday, Feb. 26, 1998, at North Carolina State University's McKimmon Center. Goldin will be available to the media from 2:45 p.m. EST to 3:15 p.m. EST in Room 4 of the McKimmon Center.

The Forum, a public service program bringing public policy debate to the people of North Carolina, features two days of discussions on the environment and sustainable development.

Goldin became the ninth NASA Administrator in April 1992. Highlights of his tenure include: (1) the inauguration of the Discovery Program, a new class of planetary probes designed and developed in less than three years with mission costs of less than $150 million; (2) the initiation of significant new cooperative endeavors with the Russian Space Agency; (3) the redesign of the Space Station program in order to significantly cut costs without sacrificing meaningful science or technology development capability; and (4) the balancing of the Agency's programs to ensure Earth Science, Space Science and Aeronautics achieve their respective goals and missions, while achieving new efficiencies in the Human Space Flight program.

Before receiving his Presidential appointment to NASA, Goldin was Vice President and General Manager of the TRW Space & Technology Group in Redondo Beach, CA. He is a Fellow in the American Institute of Aeronautics and Astronautics and a Fellow in the Institute for the Advancement of Engineering. In 1993, he received the John F. Kennedy Astronautics Award from the American Astronautical Society and the Space Pioneer Award from the National Space Society.

More information about NASA can be found via the Internet via URL:
http://www.nasa.gov

-end-

News Release

National Aeronautics and
Space Administration
Washington, DC 20546
(202) 358-1600

For Release

Michael Braukus
Headquarters, Washington, DC
(Phone: 202/358-1979)

February 25, 1998

NOTE TO EDITORS: N98-21

NASA SPONSORS SPACE STATION BUSINESS VIDEOCONFERENCE

NASA's International Space Station Program is sponsoring a live, interactive, 2-hour telecast on Thursday, Feb. 26, 1998, from 1 - 3 p.m. EST. The program, called "Open for Business," will give research and business professionals an inside look at the areas of scientific and commercial research being pursued on the station.

The International Space Station, scheduled to begin assembly this year, will be a world-class research laboratory enabling long-term research in the nearly gravity-free environment of space.

The program will feature briefings on how space station research can advance the fields of biotechnology, materials processing and agriculture. Participants also will learn more about space-based research plans, benefits and opportunities.

Viewers will be placed in touch with a panel of NASA experts, university and commercial researchers, and investors, who will take questions regarding the commercial possibilities aboard the space station.

"Open for Business" will be viewed by a national audience via satellite downlink at more than 600 sites. To find a downlink site near you, go to the PBS Web site at:

http://www.pbs.org/als/programs/live

- end -

Video Advisory

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

For Release
Feb. 25, 1998

Debbie Rivera
Headquarters, Washington, DC
(Phone: 202/358-1743)

VIDEO ADVISORY: V98-22

LATEST SOHO IMAGE; A SNEAK PEAK AT TOMORROW'S SOLAR ECLIPSE

Today's video file features the latest Solar and Heliospheric Observatory (SOHO) image of the Sun. Also NTV will be re-running the preview package on the Feb. 26 solar eclipse. The package contains animation of the path of the eclipse in the United States, some safe eclipse viewing tips, and examples of how NASA uses artificial eclipses to enhance its understanding of the Sun's corona. NTV will not provide live coverage of the solar eclipse on Feb. 26.

ITEM 1: LATEST SOHO IMAGE

For more information contact Don Savage at 202-358-1727 or Wade Sisler at 301-286-6256.

ITEM 2: ECLIPSE OF 1998

Animation shows the path of the Moon's shadow on Earth during February's solar eclipse.

ITEM 2a: VIEWING GUIDE

Much of the southeastern U.S. will see a partial eclipse. The still frame will help viewers determine how it will look in their hometown.

ITEM 2b: VIEWING TIPS - FRED ESPANEK, ASTRONOMER

ITEM 2c: TIME-LAPSE OF SOLAR FLARE

This sequence of a powerful solar flare was taken by the Solar and Heliospheric Observatory (SOHO) on Nov. 4, 1997.

For more information contact Don Savage at 202-358-1727 or Wade Sisler at 301-286-6256.

Video news file today at noon, 3, 6, and 9 p.m. EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

News Release

National Aeronautics and
Space Administration
Washington, DC 20546
(202) 358-1600

For Release

David E. Steitz
Headquarters, Washington, DC
(Phone: 202/358-1730)

February 25, 1998

RELEASE: 98-35

NASA TERMINATES CLARK EARTH SCIENCE MISSION

After an extensive review, NASA has partially terminated the Clark Earth science mission due to mission costs, launch schedule delays, and concerns over the on-orbit capabilities the mission might provide. NASA will retain launch vehicle services.

The Clark mission was part of NASA's Small Satellite Technology Initiative (SSTI) program, originally scheduled for launch in mid-1996. Named after the famous American explorer William Clark, the Clark spacecraft was to provide a very high resolution optical element with stereo imaging capabilities that would provide NASA's former Office of Mission to Planet Earth (the current Earth Sciences enterprise) with useful environmental data. Imagery provided from Clark also would have been available commercially with applications such as helping city planners assess community growth from the unique perspective of space and providing space surveys of construction sites.

The Clark mission's prime contractor was originally a company named CTA, with a launch vehicle to be provided by Martin Marietta Astronautics. Since the start of the program, CTA has been purchased by Orbital Sciences Corp., Dulles, VA, and Martin Marietta Astronautics was merged with the Lockheed Corporation which formed a new company, Lockheed Martin Aerospace, Bethesda, MD.

In June 1994, there was an industry-led competition to build, launch and operate Clark, based on a March 1996 launch. To date, NASA has invested approximately $55 million in Clark. The Agency expects to recover some assets of the mission, such as some spacecraft payloads, components and subsystems which may be used on other NASA projects.

-end-

News Release

National Aeronautics and
Space Administration
Washington, DC 20546
(202) 358-1600

David E. Steitz
Headquarters, Washington, DC
(Phone: 202/358-1730)

For Release
February 27, 1998

MEDIA ADVISORY

NASA ADMINISTRATOR DANIEL S. GOLDIN TO PARTICIPATE IN SOUTHWEST REGIONAL CLIMATE CONFERENCE IN EL PASO

NASA Administrator Daniel S. Goldin will discuss NASA's role in developing predictive environmental, climate, natural disaster and natural resource models and how these findings may help in the management of water resources in the Southwest at the opening dinner of "Tilting the Balance," a climate and water resources conference in El Paso, TX. On Monday, March 2 Goldin will deliver his remarks at 7 p.m. CST at the Camino Real Hotel, 101 S. El Paso Street, El Paso, TX, 79901 (915/534-3000).

During his day-long visit to El Paso, Goldin, as well as Congressman Silvestre Reyes (D-TX), also will tour two elementary schools and the Undergraduate Learning Center at the University of Texas at El Paso.

1:45-2:30 p.m. Mesita Elementary School, 500 Alethea Park Road, El Paso, TX 79902. Contact: Walli Halley, University of Texas at El Paso, 915/747-7507

2:45-3:30 p.m. Hebrew Day School, 805 Cherry Hill, El Paso, TX 79912, Contact: Walli Halley, University of Texas at El Paso, 915/747-7507

4-4:30 p.m. Tour of the PACES lab at the Univeristy of Texas at El Paso

5-5:30 p.m. MEDIA AVAILABILITY, Camino Real Hotel, Salon B

7 p.m. Keynote dinner address, Camino Real Hotel

Daniel S. Goldin became the ninth NASA Administrator in April 1992. Highlights of his tenure include: (1) the inauguration of the Discovery Program, a new class of planetary probes designed and developed in less than three years with mission costs of less than $150 million; (2) the initiation of significant new cooperative endeavors with the Russian Space Agency; (3) the redesign of the Space Station program in order to significantly cut costs without sacrificing meaningful science or technology development capability; and (4) the balancing of the Agency's programs to ensure Earth Science, Space Science and Aeronautics achieve their respective goals and missions, while achieving new efficiencies in the Human Space Flight program.

-end-

NewsRelease

National Aeronautics and
Space Administration

Washington, D.C. 20546
(202) 358-1600

For Release

Doug Isbell/Don Savage
Headquarters, Washington, DC
(Phone: 202/358-1547)

March 2, 1998

Elizabeth Carter
Ames Research Center, Moffett Field, CA
(Phone: 650/604-2742)

NOTE TO EDITORS: N98-23

LUNAR PROSPECTOR INITIAL SCIENCE RESULTS BRIEFING ON MARCH 5

The initial scientific findings and status of NASA's Lunar Prospector mission, now in orbit around the Moon, will be the subject of a press briefing at 1 p.m. EST, Thursday, March 5, at NASA's Ames Research Center, Moffett Field, CA. Lunar Prospector, the third mission in NASA's Discovery Program of lower-cost, highly focused Solar System exploration missions, was launched Jan. 6, 1998, to provide the first global maps of the Moon's elemental surface composition and gravitational and magnetic fields. The briefing will be broadcast live on NASA Television with two-way question-and-answer capability for reporters covering from participating NASA Centers.

Participants in the press briefing are:

* Scott Hubbard, Lunar Prospector Mission Manager, Ames Research Center
* Dr. Alan Binder, Lunar Prospector Principal Investigator, Lunar Research Institute, Gilroy, CA
* Dr. William Feldman, Co-Investigator for the Gamma Ray Spectrometer, Neutron Spectrometer, and the Alpha Particle Spectrometer, Los Alamos National Laboratory, Los Alamos, NM
* Dr. Alex Konopliv, Co-Investigator for the Doppler Gravity Experiment, NASA Jet Propulsion Laboratory, Pasadena, CA

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz. Information on Lunar Prospector is available on the Internet at the following address:

http://lunar.arc.nasa.gov

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Video Advisory

National Aeronautics and
Space Administration
Washington, DC 20546
(202) 358-1600

For Release
Mar. 2, 1998

Renee Juhans
Headquarters, Washington, DC
(Phone: 202/358-1712)

VIDEO ADVISORY: V98-24

CLOSEST EVER PIX OF EUROPA

Today's video file features animation and images of Jupiter's Moon, Europa, taken by NASA's Galileo spacecraft.

ITEM 1: EUROPA ANIMATION
ITEM 1a: LATEST IMAGES

For more information contact Doug Isbell at (202) 358-1753 or Stephanie Zeluck at (818) 354-0040.

Video news file today at noon, 3, 6, and 9 p.m. EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

-end-

Video Advisory

National Aeronautics and
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Washington, DC 20546
(202) 358-1600

For Release
Mar. 4, 1998

Renee Juhans
Headquarters, Washington, DC
(Phone: 202/358-1712)

VIDEO ADVISORY: V98-25

EL NIÑO: ATMOSPHERIC WATER VAPOR CHANGES DURING 1997-1998

Today's video file features animation that shows the movement of atmospheric water vapor over the Pacific Ocean as seen by the Microwave Limb Sounder on NASA's Upper Atmosphere Research Satellite from Sept. 1997 through Feb. 1998.

ITEM 1: WATER VAPOR CHANGES DURING EL NIÑO

For more information contact Doug Isbell at (202) 358-1753 or Stephanie Zeluck at (818) 354-0040.

Video news file today at noon, 3, 6, and 9 p.m. EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

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News Release

National Aeronautics and
Space Administration
Washington, DC 20546
(202) 358-1600

For Release

Dwayne Brown
Headquarters, Washington, DC
(Phone: 202/358-1726)

March 4, 1998

John Bluck
Ames Research Center, Moffett Field, CA
(Phone: 650/604-5026)

RELEASE: 98-36

KIDS USE INTERNET TO LEARN ABOUT AIRPLANE DESIGN

A NASA project called Aero Design Team Online is using the Internet to help students learn about airplane design.

Students and the general public can visit a website (http://quest.arc.nasa.gov/aero/) to find out how aeronautical engineers use airplane models, wind tunnels, supercomputers, simulators and other tools during the airplane design cycle. The project continues through May, although plans are underway to extend it into the summer.

"We're teaching about airplane design through the lives of people who are doing the work," said Susan Lee of NASA's Ames Research Center, Moffett Field, CA. "For example, we're following a wind tunnel test of a model of a future supersonic airliner."

In addition, kids ask questions via e-mail; learn how an airplane flies; see pictures of aircraft; and participate in Internet chats with people from teams that design and test airplanes. During Internet chats, youngsters use computers to converse with mentors by typing questions and reading responses and dialogue via the World Wide Web.

Teachers can visit the teachers' "lounge" on the website. Various educational materials including aeronautics lesson plans are in the lounge. The plans list creative ways to bring the Aero Design Team Online project into the classroom. Educators also have Internet chats with other teachers, describing classroom problems and solutions.

"NASA is providing the website because the agency has a mandate to help teachers and students understand NASA research in aeronautics. The website gives knowledge to students that they can apply to their studies," said Ames Educational Group Leader Garth Hull.

-more-

"The Internet gives our engineers an effective tool to interact with audiences we normally would not reach. We hope by using this resource these students will be better prepared to see vocational opportunities and become better informed citizens," he added.

Another segment of the on-line project will follow the progress of astronauts training in the largest vertical motion simulator in the world, located at Ames, Lee said. "They are practicing their Shuttle landings with a new simulator program that includes global positioning."

The project is one in a suite of online offerings from NASA's Quest Project at URL http://quest.arc.nasa.gov. These interactive projects connect students with NASA employees to inspire them to pursue high-tech careers.

-end-

Video Advisory

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

For Release
Mar. 5, 1998

Renee Juhans
Headquarters, Washington, DC
(Phone: 202/358-1712)

VIDEO ADVISORY: V98-26

LUNAR PROSPECTOR MISSION; ASTRONAUT EILEEN COLLINS B-ROLL

Today's 3:00 pm video file features animation and b-roll that depicts the Lunar Prospector Mission. NTV will broadcast the Lunar Prospector news briefing live at 1:00 pm EST, originating from NASA's Ames Research Center, Moffett Field, CA. Also on NTV is footage and b-roll of Astronaut Eileen Collins beginning at noon.

ITEM 1: LUNAR PROSPECTOR ANIMATION
ITEM 1a: LUNAR PROSPECTOR B-ROLL
ITEM 1b: INTERVIEW - DR. ALAN BINDER, LUNAR PROSPECTOR PRINCIPAL INVESTIGATOR, LUNAR RESEARCH INSTITUTE
ITEM 1c: INTERVIEW - G. SCOTT HUBBARD, LUNAR PROSPECTOR MISSION MANAGER, AMES RESEARCH CENTER
ITEM 1d: INTERVIEW - SYLVIA COX, LUNAR PROSPECTOR DEPUTY MISSION MANAGER, AMES RESEARCH CENTER
ITEM 1e: INTERVIEW - MARCIE SMITH, LUNAR PROSPECTOR MISSION OPERATIONS MANAGER, AMES RESEARCH CENTER

For more information contact Doug Isbell at (202) 358-1753 or Betsy Carter (650) 604-2742

ITEM 2: ASTRONAUT EILEEN COLLINS B-ROLL

For more information contact Debra Rahn at (202) 358-1639 or Eileen Hawley at (218) 483-5111.

ITEM 3: REPLAY - BARBARA MORGAN B-ROLL AND INTERVIEW

For more information contact Beth Schmid at (202) 358-1760.

Video news file today at noon, 3, 6, and 9 p.m. EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

-end-

News Release

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

For Release

Jennifer McCarter
Headquarters, Washington, DC
(Phone: 202/358-1639)

March 5, 1998

Eileen Hawley/James Hartsfield
Johnson Space Center, Houston, TX
(Phone: 281/483-5111)

RELEASE: 98-37

COLLINS NAMED FIRST FEMALE SHUTTLE COMMANDER

Astronaut Eileen Collins (Lt. Col., USAF) will become the first woman to command a Space Shuttle when Columbia launches on the STS-93 mission in December 1998. First Lady Hillary Rodham Clinton made the announcement today in the Roosevelt Room at the White House.

Collins will be joined on the flight deck by Pilot Jeffrey S. Ashby (Cmdr., USN) and Mission Specialists Steven A. Hawley, Ph.D., and Catherine G. "Cady" Coleman, Ph.D (Major, USAF). CNES Astronaut Michel Tognini (Col., French Air Force) was named to the crew on November 12.

Selected as an astronaut in 1990, Collins has served as a pilot on her two previous space flights. Her first space flight was STS-63 in February 1995 as Discovery approached to within 30 feet of Mir, in a dress rehearsal for the first Shuttle/Mir docking. In May 1997, she visited the Mir space station as pilot on board Atlantis for the sixth Shuttle/Mir docking mission, delivering Astronaut Mike Foale and returning Jerry Linenger to Earth.

STS-93 will be the first flight for Ashby. Hawley will be making his fifth space flight during STS-93, having flown previously on STS-41D in 1984, STS-61C in 1986, STS-31 in 1990 and STS-82 in 1997. Coleman has one previous space flight to her credit, having flown on STS-73, the second United States Microgravity Laboratory mission in October/November 1995. Tognini, who spent 14 days on the Mir space station in 1992, will be making his first Shuttle flight on STS-93.

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During the five-day mission, the crew will deploy the Advanced X-ray Astrophysics Facility Imaging System (AXAF), which will conduct comprehensive studies of the universe. AXAF will be the most advanced X-ray telescope ever flown. When scientists begin using AXAF next year, they will finally be able to unlock the secrets of some of the most distant, powerful and violent objects known to exist in the universe. They will study such exotic phenomena as exploding stars called supernovae, strange powerful objects called quasars, and mysterious black holes which are so massive that everything near them is pulled inside causing an explosion of X-rays that AXAF can study.

For additional information on the STS-93 crew, or any astronaut, see the NASA Internet biography home page at URL: http://www.jsc.nasa.gov/Bios/.

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News Release

National Aeronautics and
Space Administration
Washington, DC 20546
(202) 358-1600

For Release

Douglas Isbell
Headquarters, Washington, DC
(Phone: 202/358-1753)

March 5, 1998

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RELEASE: 98-38

LUNAR PROSPECTOR FINDS EVIDENCE OF ICE AT MOON'S POLES

There is a high probability that water ice exists at both the north and south poles of the Moon, according to initial scientific data returned by NASA's Lunar Prospector.

The Discovery Program mission also has produced the first operational gravity map of the entire lunar surface, which should serve as a fundamental reference for all future lunar exploration missions, project scientists announced today at NASA's Ames Research Center, Moffett Field, CA.

Just two months after the launch of the cylindrical spacecraft, mission scientists have solid evidence of the existence of lunar water ice, including estimates of its volume, location and distribution. "We are elated at the performance of the spacecraft and its scientific payload, as well as the resulting quality and magnitude of information about the Moon that we already have been able to extract," said Dr. Alan Binder, Lunar Prospector Principal Investigator from the Lunar Research Institute, Gilroy, CA.

-more-

The presence of water ice at both lunar poles is strongly indicated by data from the spacecraft's neutron spectrometer instrument, according to mission scientists. Graphs of data ratios from the neutron spectrometer "reveal distinctive 3.4 percent and 2.2 percent dips in the relevant curves over the northern and southern polar regions, respectively," Binder said. "This is the kind of data 'signature' one would expect to find if water ice is present."

However, the Moon's water ice is not concentrated in polar ice sheets, mission scientists cautioned. "While the evidence of water ice is quite strong, the water 'signal' itself is relatively weak," said Dr. William Feldman, co-investigator and spectrometer specialist at the Department of Energy's Los Alamos National Laboratory, NM. "Our data are consistent with the presence of water ice in very low concentrations across a significant number of craters." Using models based on other Lunar Prospector data, Binder and Feldman predict that water ice is confined to the polar regions and exists at only a 0.3 percent to 1 percent mixing ratio in combination with the Moon's rocky soil, or regolith.

How much lunar water ice has been detected? Assuming a water ice depth of about a foot and a half (.5 meters) -- the depth to which the neutron spectrometer's signal can penetrate -- Binder and Feldman estimate that the data are equivalent to an overall range of 11 million to 330 million tons (10-300 million metric tons) of lunar water ice, depending upon the assumptions of the model used. This quantity is dispersed over 3,600 to 18,000 square miles (10,000-50,000 square kilometers) of water ice-bearing deposits across the northern pole, and an additional 1,800 to 7,200 square miles (5,000-20,000 square kilometers) across the southern polar region. Furthermore, twice as much of the water ice mixture was detected by Lunar Prospector at the Moon's north pole as at the south.

Dr. Jim Arnold of the University of California at San Diego previously has estimated that the most water ice that could conceivably be present on the Moon as a result of meteoritic and cometary impacts and other processes is 11 billion to 110 billion tons. The amount of lunar regolith that could have been "gardened" by all impacts in the past 2 billion years extends to a depth of about 6.5 feet (2 meters), he found. On that basis, Lunar Prospector's estimate of water ice would have to be increased by a factor of up to four, to the range of 44 million to 1.3 billion tons (40 million to 1.2 billion metric tons). In actuality, Binder and Feldman caution that, due to the inadequacy of existing lunar models, their current estimates "could be off by a factor of ten in either direction."

The earlier joint Defense Department-NASA Clementine mission to the Moon used a radar-based technique that detected ice deposits in permanently shadowed regions of the lunar south pole. It is not possible to directly compare the results from Lunar Prospector to Clementine because of their fundamentally different sensors, measurement

"footprints," and analysis techniques. However, members of the Clementine science team concluded that its radar signal detected from 110 million to 1.1 billion tons (100 million to 1 billion metric tons) of water ice, over an upper area limit of 5,500 square miles (15,500 square kilometers) of south pole terrain.

There are various ways to estimate the economic potential of the detected lunar water ice as a supporting resource for future human exploration of the Moon. One way is to estimate the cost of transporting that same volume of water ice from Earth to orbit. Currently, it costs about $10,000 to put one pound of material into orbit. NASA is conducting technology research with the goal of reducing that figure by a factor of 10, to only $1,000 per pound. Using an estimate of 33 million tons from the lower range detected by Lunar Prospector, it would cost $60 trillion to transport this volume of water to space at that rate, with unknown additional cost of transport to the Moon's surface.

From another perspective, a typical person consumes an estimated 100 gallons of water per day for drinking, food preparation, bathing and washing. At that rate, the same estimate of 33 million tons of water (7.2 billion gallons) could support a community of 1,000 two-person households for well over a century on the lunar surface, without recycling.

"This finding by Lunar Prospector is primarily of scientific interest at this time, with implications for the rate and importance of cometary impacts in the history and evolution of the Solar System," said Dr. Wesley Huntress, NASA Associate Administrator for Space Science. "A cost-effective method to mine the water crystals from within this large volume of soil would have to be developed if it were to become a real resource for drinking water or as the basic components of rocket fuel to support any future human explorers."

Before the Lunar Prospector mission, historical tracking data from various NASA Lunar Orbiter and Apollo missions had provided evidence that the lunar gravity field is not uniform. Mass concentrations caused by lava which filled the Moon's huge craters are known to be the cause of the anomalies. However, precise maps of lunar mass concentrations covering the moon's equatorial nearside region were the only ones available.

Lunar Prospector has dramatically improved this situation, according to co-investigator Dr. Alex Konopliv of NASA's Jet Propulsion Laboratory, Pasadena, CA. Telemetry data from Lunar Prospector has been analyzed to produce a full gravity map of both the near and far side of the moon. Konopliv also has identified two new mass concentrations on the Moon's nearside that will be used to enhance geophysical modeling of the lunar interior. This work has produced the first-ever complete engineering-quality gravity map of the moon, a key to the operational safety and fuel-efficiency of future lunar missions.

"This spacecraft has performed beyond all reasonable expectations," said NASA's Lunar Prospector mission manager Scott Hubbard of Ames. "The findings announced today are just the tip of the iceberg compared to the wealth of information forthcoming in the months and years ahead."

Lunar Prospector is scheduled to continue its current primary data gathering mission at an altitude of 62 miles (100 kilometers) for a period of ten more months. At that time, the spacecraft will be put into an orbit as low as six miles (10 kilometers) so that its suite of science instruments can collect data at much finer resolution in support of more detailed scientific studies. In addition, surface composition and structure information developed from data returned by the spacecraft's Gamma Ray Spectrometer instrument will be a crucial aspect of additional analysis of the polar water ice finding over the coming months.

The third launch in NASA's Discovery Program of lower cost, highly focused planetary science missions, Lunar Prospector is being implemented for NASA by Lockheed Martin, Sunnyvale, CA, with mission management by NASA Ames. The total cost to NASA of the mission is $63 million.

Additional informaiton about the Lunar Prospector mission can be found on the Internet at URL:

http://lunar.arc.nasa.gov

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Video Advisory

National Aeronautics and
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Washington, DC 20546
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For Release
Mar. 6, 1998

Renee Juhans
Headquarters, Washington, DC
(Phone: 202/358-1712)

VIDEO ADVISORY: V98-27

NASA SCIENTISTS USE AIRBORNE LASERS TO MEASURE BEACH EROSION

Today's video file features footage on how NASA scientists are using airborne lasers to measure beach erosion. The Airborne Topographic Mapper (ATM), a laser mapping instrument, was used to assess changes to the Assateague Beach coastline following severe coastal storms.

ITEM 1: LASERS MEASURE BEACH EROSION
ITEM 1a: BEACH EROSION COMPARISONS
ITEM 1b: ASSATEAGUE ISLAND
ITEM 1c: FLYING THE LASER
ITEM 1d: EXAMINING THE BEACH DATA
ITEM 1e: THE FUTURE OF LASER MAPPING
ITEM 1f: INTERVIEW - BILL KRABILL, RESEARCHER, OBSERVATIONAL SCIENCE BRANCH, WALLOPS FLIGHT FACILITY

For more information contact Doug Isbell at (202) 358-1753 or Betty Flowers (757) 824-1584.

ITEM 2: REPLAY - ASTRONAUT EILEEN COLLINS B-ROLL

Video news file today at noon, 3, 6, and 9 p.m. EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

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News Release

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For Release
March 9, 1998

RELEASE.: 98-39

ASTRONOMERS TRACK DOWN ASTEROIDS IN HUBBLE ARCHIVE

Astronomers have stumbled on an unusual asteroid hunting ground: the thousands of images stored in the Hubble Space Telescope archive.

The hunt, by Robin Evans and Karl Stapelfeldt of NASA's Jet Propulsion Laboratory, Pasadena, CA, has yielded a sizable catch of small asteroids -- about 100. Their preliminary analysis suggests that a total population of 300,000 small asteroids -- essentially rocks just over half a mile to two miles wide (1-3 kilometers) -- are orbiting between Mars and Jupiter in a band of space debris known as the main belt. Currently, there are 8,319 confirmed main-belt asteroids whose orbits have been measured, and about the same number have been sighted but not confirmed.

Most astronomers stalk the Hubble archive for bigger game, such as quasars, distant galaxies, and supernovae, but Evans and Stapelfeldt have discovered that the pursuit of smaller prey such as asteroids can be equally successful.

Over a three-year period, the two astronomers and their collaborators have searched through more than 28,000 Wide Field and Planetary Camera 2 (WFPC2) images, looking for wide, looping streaks of light, the telescope's tell-tale signatures of asteroids. Most of the ones they found are too faint to be observed by current ground-based search programs. Hubble captures their images purely by accident: Nearby asteroids inevitably wander across the telescope's field of view while other, higher priority targets are being observed.

"The archive images are distributed fairly evenly across the sky, so we find asteroids

-more-

according to both their position in the sky and their number," Evans said. "As expected, we see the asteroids concentrated towards the ecliptic plane and we see small asteroids because they are the most numerous. Small main-belt asteroids such as these are the ones most likely to evolve into Earth-crossing asteroids due to encounters with their larger neighbors. Some of the asteroids in our survey could eventually migrate toward Earth." The Hubble archives represent a newly tapped information resource which could help scientists more precisely estimate the risks the asteroids pose to Earth.

According to Evans and Stapelfeldt, the Hubble archival data also strongly limit the number of small comets that could be passing very near Earth. Last year, Dr. Louis A. Frank of the University of Iowa in Iowa City, using data from NASA's Polar spacecraft, reported he found evidence that about a dozen small comets strike Earth's upper atmosphere each minute. Evans and Stapelfeldt estimate the such small comets should be bright enough to produce thousands of detectable trails in the Hubble archival images, but these were not seen.

The Hubble images capture an asteroid as a long trail produced by its motion across the camera's field of view. The trails appear like the streaks of light found on photos taken at night of speeding cars with their headlights on.

Finding asteroids isn't what the two astronomers originally had in mind. As members of the WFPC2 science team, Evans and Stapelfeldt were examining test images of distant stars and galaxies to ensure that the new camera was functioning properly. These were among the first images taken with WFPC2, which had restored sharp focus to Hubble's images when it was installed in late 1993. Stapelfeldt's wife, Deborah Padgett (also an astronomer), pinpointed the first asteroid in 1994 while looking at images on the couple's home computer. Intrigued, Evans and Stapelfeldt began combing through more than 1,600 of the science team's survey photos, finding 12 more asteroids. This discovery prompted their large-scale search, by eye, of two years worth of Hubble archival images.

Evans' and Stapelfeldt's initial results are reported in the February 1998 issue of the research journal Icarus.

The Space Telescope Science Institute is operated by the Association of Universities for Research in Astronomy, Inc. (AURA) for NASA, under contract with the Goddard Space Flight Center, Greenbelt, MD. The Hubble Space Telescope is a project of international cooperation between NASA and the European Space Agency (ESA).

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NOTE TO EDITORS: A photo and caption are available via the World-Wide Web at:
http://oposite.stsci.edu/pubinfo/latest.html or
http://oposite.stsci.edu/pubinfo/pictures.html

GIF and JPEG images are available via anonymous ftp to oposite.stsci.edu in:
/pubinfo/gif/9810.gif and /pubinfo/jpeg/9810.jpg.

News Release

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For Release

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March 11, 1998

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Johnson Space Center, Houston, TX
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Burke Fort
Texas Space Grant Consortium, Austin, TX
(Phone: 512/471-7225)

RELEASE: 98-40

TEAMS OF COLLEGE STUDENTS PREPARE EXPERIMENTS FOR NASA'S REDUCED GRAVITY AIRCRAFT

Forty-seven teams of undergraduate college students from around the country will "float" through school this month aboard a NASA research aircraft. The teams will participate in the 1998 NASA Reduced Gravity Student Flight Opportunities program, funded by NASA and administered by the Texas Space Grant Consortium, Austin, TX.

Each team consists of up to four undergraduate-level college students, a supervising professor, and a professional journalist. All team members, except the supervising professor, will have the opportunity to fly.

Teams will develop and fly experiments aboard a NASA KC-135A aircraft that flies a roller-coaster-like flight profile over the Gulf of Mexico. Each team will fly twice, and each flight will include approximately 40 parabolic arcs. During each two- to three-hour flight, the aircraft maneuvers through steep climbs and descents; depending on the precise trajectory, passengers and their experiments can experience about 25 seconds of a zero-gravity environment. Astronauts train for space flight, and NASA scientists have conducted extensive experiments, aboard this aircraft.

This year's teams are divided into two groups: Group A will report March 16 - 28, and Group B March 23 - April 4 at Ellington Field, near NASA's Johnson Space Center in Houston. During the first week, participants will receive pre-flight training and assemble and test their experiment packages. During the second week, they will fly with their experiments, adjust their equipment as needed, and conduct post-flight debriefings and reviews.

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In addition to performing the experiments, each team has developed a program for sharing research results with teachers, students, and the general public after the flights. Participants must analyze their data, prepare educational or informational materials, and submit final reports.

A list of the selected teams and additional information about the program can be found on the Internet at the following URL:

http://www.tsgc.utexas.edu/tsgc/floatn/

The Texas Space Grant Consortium is a component of the National Space Grant College and Fellowship Program, which is administered by NASA.

-end-

Video Advisory

National Aeronautics and
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Washington, DC 20546
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For Release
Mar. 12, 1998

Renee Juhans
Headquarters, Washington, DC
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VIDEO ADVISORY: V98-28

AXAF TELESCOPE COMPLETED; ASTEROID WIPES OUT PRE-EXISTING LIFE

Today's video file features animation and b-roll of the Advanced X-Ray Astrophysics Facility Telescope (AXAF). AXAF is scheduled to fly aboard Space Shuttle Columbia on the STS-93 mission in Dec. 1998. Also on NTV is footage of impact sites discovered by NASA scientists that support the unproved theory that an asteroid or comet collided with Earth 65 million years ago, subsequently killing off the dinosaurs and many other species on the planet.

ITEM 1: AXAF TELESCOPE COMPLETE
ITEM 1a: INTERVIEW - JEAN OLIVIER, NASA MANAGER, MARSHALL SPACE FLIGHT CENTER
ITEM 1b: INTERVIEW - DR. MARTIN WEISSKOPF, NASA ASTRONOMER, MARSHALL SPACE FLIGHT CENTER

For more information contact Donald Savage at (202) 358-1547 or Dave Drachlis at (205) 544-0034.

ITEM 2: DINOSAUR-KILLING IMPACT
ITEM 2a: INTERVIEW - ADRIANA OCAMPO, RESEARCHER, JET PROPULSION LABORATORY

For more information contact Doug Isbell at (202) 358-1753 or Diane Ainsworth at (818) 354-5011.

Video news file today at noon, 3, 6, and 9 p.m. EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

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News Release

National Aeronautics and
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For Release

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March 12, 1998

Allen Kenitzer/Lynn Chandler
Goddard Space Flight Center, Greenbelt, MD
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RELEASE: 98-41

LANDSAT-7 LAUNCH DELAYED

The Landsat-7 Earth science spacecraft will not be launched in July 1998 as planned, due to necessary changes in the design of the electrical power supply hardware for the spacecraft's main instrument. A new target launch date will be set by NASA officials after completion of instrument thermal vacuum tests scheduled for this July.

During a series of instrument-level thermal vacuum tests beginning in December 1997, a power supply on the Enhanced Thematic Mapper Plus (ETM+) instrument failed twice. ETM+ is Landsat-7's only science instrument. As a result of the most recent failure in January, both internally redundant power supplies were returned to their manufacturer. Completion of vacuum testing will be delayed while the power supplies are being repaired, which will consequently delay the launch.

It is not possible to set a precise new date for the launch from Vandenberg Air Force Base, CA, at this time, according to project managers. NASA will now work with its launch contractor, Boeing, on moving the Landsat-7 launch to a mutually agreeable date.

"We're looking at several options in order to minimize the impact to the launch schedule," said Phil Sabelhaus, Landsat-7 project manager at NASA's Goddard Space Flight Center, Greenbelt, MD. "When we understand precisely why the power supply failed and how long it will take to fix the problem, we'll be able to ascertain the impact to the launch schedule."

The enhanced thermatic mapper was designed and built by Raytheon (formerly Hughes) Santa Barbara Remote Sensing, Santa Barbara, CA. The Landsat-7 spacecraft was built by Lockheed Martin Missiles and Space, with integration of the instrument and spacecraft conducted at the company's facility in Valley Forge, PA.

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Landsat-7 is the latest installment in a long history of land remote-sensing spacecraft, spanning over 25 years of multispectral imaging of the Earth's surface, starting with the launch of Landsat-1 in 1972. Landsat-5, launched in March 1984, is still transmitting images to several domestic and international ground stations worldwide.

In particular, the science instrument on Landsat-7 will continue a data base of high-resolution Earth imagery begun in 1982 by the Landsat-4 thematic mapper. As changes occur on the Earth's surface due to natural or human-induced events, scientists will be able to study these recent changes with the aid of the archive of similar imagery. Applications include agriculture, forestry and urban planning.

Landsat-7 will add to the global archive of sun-lit, substantially cloud-free images of the Earth's land surfaces. Approximately one-quarter of the Earth's landmass will be imaged every 16 days, with a emphasis on seasonal changes in vegetation.

Landsat-7 contains several technological improvements over previous Landsat satellites and their instruments. These improvements include better instrument calibration and a solid state data recorder capable of storing 100 individual enhanced thematic mapper images of the Earth. This capability will enable Landsat-7 to update a complete global view of Earth's land surfaces seasonally, or approximately four times per year.

NASA also is developing an advanced land imager instrument and related small spacecraft technology that will enable future follow-on measurements to be made by a sensor that is one-fourth the mass of the enhanced thermatic mapper and uses only 20 percent of the electrical power, while reducing the instrument's cost by 75 percent.

Landsat-7 was authorized by the Land Remote Sensing Policy Act of 1992, which established a joint NASA-U.S. Air Force program. This was superseded by a second Presidential Directive in 1994, that established a joint program between NASA, the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Geological Survey (USGS).

Landsat-7 is part of NASA's Earth Science enterprise, a long-term research program designed to study Earth's land, oceans, atmosphere, ice and life as a total integrated system. Goddard Space Flight Center manages the development of Landsat for NASA's Office of Earth Science in Washington, DC.

-end-

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March 12, 1998

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RELEASE: 98-42

MORE EVIDENCE POINTS TO IMPACT AS DINOSAUR KILLER

Two new impact crater sites in Belize and Mexico add further evidence to the hypothesis that an asteroid or comet collided with Earth about 65 million years ago, subsequently killing off the dinosaurs and many other species on the planet.

Researchers Adriana Ocampo of NASA's Jet Propulsion Laboratory (JPL), Pasadena, CA, and Kevin Pope of Geo Eco Arc Research, La Canada-Flintridge, CA, led an international team that discovered the two new sites during a recent expedition sponsored by NASA's Exobiology Program and The Planetary Society, Pasadena, CA.

"We discovered an important new site in Alvaro Obregon, Mexico, about 140 miles (230 kilometers) from the rim of the Chicxulub crater. This crater was formed when a 6-to-8-mile diameter (10-to-14-kilometer diameter) asteroid or comet collided with Earth," Ocampo said.

"The site contains two layers of material, or ejecta, thrown out by the impact that flowed across the surface like a thick fluid, known as fluidized ejecta lobes," added Pope. "This is the closest surface exposure of ejecta to the Chicxulub crater that has yet been found and the best example known on Earth from a really big impact crater."

Centered on the coast of Yucatan, Mexico, the Chicxulub crater is estimated to be about 120 miles (200 kilometers) in diameter. The impact 65 million years ago kicked up a global cloud of dust and sulfur gases that blocked sunlight from penetrating through the atmosphere and sent Earth into a decade of near-freezing temperatures. The drop in temperature and related environmental effects are thought to have brought about the demise of the dinosaurs and about 75 percent of the other species on Earth.

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The Earth orbits the Sun in a swarm of so-called near-Earth objects, whether they are comets or asteroids, yet the science of detecting and tracking them is still relatively young. Only a handful of astronomers around the world search for these objects, and they estimate that currently only about one-tenth of the population of near-Earth objects has been detected. Chicxulub is the only impact event that has been correlated with mass extinctions to date. The site has been dated geologically to the boundary between the Cretaceous and Tertiary periods, also known as the K/T boundary.

Local geologist Brian Holland of Punta Gorda, Belize, guided the expedition to another new ejecta site about 290 miles (480 kilometers) from the crater rim. This Belize site contains tiny spheres of altered green glass, called tektites. Tektites are rocks that have been melted to glass by the severe heat of an impact. Expedition member Jan Smit of Free University, Amsterdam, noted that the Belize tektites were similar to those found in Haiti and northern Mexico. This finding links the stratigraphy of the Belize sites to the more distant Caribbean and Mexican ejecta sites.

Alfred Fischer of the University of Southern California, Michael Gibson of the University of Tennessee at Martin, and Jaime Urrutia and Francisco Vega of the National Autonomous University of Mexico helped the team collect 900 pounds (400 kilograms) of samples, including drill cores, for paleomagnetic studies. They also collected fossils from the site to help date the deposits and add new pieces to the puzzle of what happened at Chicxulub 65 million years ago.

Impact ejecta is very rare on Earth, but covers much of the surface of Mars because Mars' surface has remained stable and unchanged for billions of years, thus preserving debris from these rare impact events. Also, such fluidized ejecta lobes have never been observed directly on Earth before and can serve as an excellent laboratory for studying the ejecta lobes surrounding many Martian craters.

"The discovery of these new ejecta sites is very exciting," said team co-leader Ocampo. "It is like seeing a bit of Mars on Earth."

The exact nature of these ejecta lobes on Mars remains a mystery, Ocampo noted. Some scientists think they were created by an abundance of water in the Martian crust, which turned the ejecta into a muddy, molasses-like material. Others suggest the fluidized ejecta lobes were enabled by a much thicker atmosphere in Mars' early history. As flying ejecta from an impact event flew through the Martian atmosphere, it was reduced by friction to a very dense, turbulent cloud of debris, which also flowed like water. Study of the Chicxulub fluidized ejecta may help settle this debate and shed new light on theories that the Martian surface may once have been more hospitable for life.

Volunteers who assisted The Planetary Society and the scientists in the field have

posted their photographs of the expedition on The Planetary Society web site at the following URL:

http://planetary.org

Information about and images of newly discovered near-Earth objects found by JPL's ongoing Near-Earth Asteroid Tracking (NEAT) program are available at:

http://huey.jpl.nasa.gov/~spravdo/neat.html

Ocampo and Pope's research was funded in part by the Exobiology Program of NASA's Office of Space Science, Washington, DC. NASA's Jet Propulsion Laboratory is a division of the California Institute of Technology, Pasadena, CA.

-end-

News Release

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For Release
March 12, 1998

RELEASE: 98-43

ASSEMBLY OF NASA'S X-RAY TELESCOPE COMPLETED

Assembly of the world's most powerful X-ray telescope, NASA's Advanced X-ray Astrophysics Facility, was completed last week with the installation of its power-generating twin solar panels. AXAF is scheduled for launch aboard Space Shuttle mission STS-93, in December 1998.

The last major components of the observatory were bolted and pinned into place March 4 at TRW Space & Electronics Group in Redondo Beach, CA, and pre-launch testing of the fully assembled observatory began March 7.

"Completion of the observatory's assembly process is a big step forward toward launch scheduled for the end of this year," said Fred Wojtalik, manager of the Observatory Projects Office at NASA's Marshall Space Flight Center, Huntsville, AL. "With all the major components in place, we are now concentrating on a thorough pre-launch checkout of the observatory."

"We're delighted to reach this major milestone for the program," said Craig Staresinich, TRW's Advanced X-ray Astrophysics Facility program manager. "The entire observatory team has worked hard to get to this point and will continue an exhaustive test program to ensure mission success. We're looking forward to delivering a truly magnificent new space capability to NASA later this summer."

The first pre-launch test of the Advanced X-ray Astrophysics Facility was an acoustic test, which simulated the sound pressure environment inside the Space Shuttle cargo bay during launch. A thorough electrical checkout before and after the acoustic test

- more -

verifies that the observatory and its science instruments can withstand the extreme sound levels and vibrations that accompany launch.

"With 10 times the resolution and 50-100 times the sensitivity of any previous X-ray telescope, this observatory will provide us with a new perspective of our universe," said the project's chief scientist, Dr. Martin Weisskopf, of Marshall. "We'll be able to study sources of X-rays throughout the universe, like colliding galaxies and black holes, many of which are invisible to us now. We may even see the processes that create the elements found here on Earth."

Assembly of the observatory began in 1997 with the arrival of the high resolution mirror assembly at TRW Space and Electronics Group. In August 1997, the telescope's optical bench was mated with the mirrors, followed by integration of the telescope with the spacecraft in October. In February 1998, the observatory's science instrument module was mated to the top of the telescope. The complete observatory is 45 feet long, has a solar array wing span 64 feet wide, and weighs more than 5 tons.

Using glass purchased from Schott Glaswerke, Mainz, Germany, the telescope's mirrors were built by Raytheon Optical Systems Inc., Danbury, CT. The mirrors were coated by Optical Coating Laboratory Inc., Santa Rosa, CA, and assembled by Eastman-Kodak Co., Rochester, NY. The observatory's charged coupled device imaging spectrometer was developed by the Pennsylvania State University at University Park, and the Massachusetts Institute of Technology (MIT), at Cambridge. One diffraction grating was developed by MIT, the other by the Space Research Organization Netherlands, Utrecht, in collaboration with the Max Planck Institute, Garching, Germany. The high resolution camera instrument was built by the Smithsonian Astrophysical Observatory. Ball Aerospace & Technologies Corporation of Boulder, CO, developed the science instrument module.

The Advanced X-ray Astrophysics Facility program is managed by Marshall for the Office of Space Science, NASA Headquarters, Washington, DC. The Smithsonian Astrophysical Observatory, Cambridge, MA, will operate the observatory for NASA.

- end -

News Release

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

Michael Braukus
Headquarters, Washington, DC
(Phone: 202/358-1979)

For Release
March 12, 1998

James Hartsfield
Johnson Space Center, Houston, TX
(Phone: 281/483-5111)

Fred Brown
Dryden Flight Research Center, Edwards, CA
(Phone: 805/258-2663)

RELEASE: 98-44

X-38 ATMOSPHERIC VEHICLE COMPLETES FIRST UNPILOTED FLIGHT TEST

Development of the X-38, an innovative new spacecraft design planned for use as a future International Space Station emergency crew return "lifeboat," passed a major milestone today with a successful first unpiloted flight test.

The first X-38 atmospheric test vehicle was dropped from under the wing of NASA's B-52 aircraft at the Dryden Flight Research Center, Edwards, CA, at 11:30 a.m. EST and completed a descent from a 23,000 foot altitude at 11:38 a.m. EST. The test focused on the use of the X-38's parafoil parachute, which deployed as planned within seconds after the vehicle's release from the B-52 and guided the test craft to landing.

"This was a real experimental flight test and the culmination of two years of hard work by a team from the Johnson Space Center and the Dryden Flight Research Center," X-38 project manager John Muratore said. "We had done everything we could to minimize the unknowns. But the real proof of the concept is a successful flight. We got one of those today, and we plan to do this about 20 more times over the next two years to prove we're ready to fly from space."

Atmospheric drop tests of the X-38 will continue for the next two years using three increasingly complex test vehicles. The drop tests will increase in altitude to a height of 50,000 feet and include longer flight times for the test craft prior to deployment of the parafoil. In 2000, an unpiloted space test vehicle is planned to be deployed from a Space Shuttle and descend to a landing. The X-38 crew return vehicle is targeted to begin operations aboard the International Space Station in 2003.

-more-

"With Johnson and Dryden employees working as a team, we were able to design, outfit and test the vehicle," said Bob Baron, Dryden X-38 project manager. "Using existing NASA infrastructure, such as the Johnson and Dryden control rooms and the B-52 mothership, has provided considerable cost and schedule savings in the development of this prototype X-38 vehicle."

Once operational, the X-38 will become the first new human spacecraft designed to return humans from orbit in more than 20 years, and it is being developed at a fraction of the cost of past human space vehicles. The primary application of the new spacecraft would be as an International Space Station "lifeboat," but the project also aims at developing a design that could be easily modified for other uses, such as a possible joint U.S. and international human spacecraft that could be launched on expendable rockets as well as the Space Shuttle. The European Space Agency is cooperating with NASA in the current development work, supplying several components for the planned space test vehicle.

The X-38 is being developed with an unprecedented eye toward efficiency, taking advantage of available equipment and already-developed technology for as much as 80 percent of the spacecraft's design. The design uses a lifting body concept originally developed by the Air Force X-24A project in the mid-1970s. Following the jettison of a deorbit engine module, the X-38 would glide from orbit unpowered like the Space Shuttle and then use the steerable parafoil parachute for its final descent to landing.

In the early years of the International Space Station, a Russian Soyuz spacecraft will be attached to the station as a crew return vehicle. But, as the size of the station crew increases, a return vehicle like the X-38, that can accommodate up to seven passengers, will be needed.

-end-

Video Advisory

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

For Release
Mar. 13, 1998

Renee Juhans
Headquarters, Washington, DC
(Phone: 202/358-1712)

VIDEO ADVISORY: V98-29

MARS GLOBAL SURVEYOR REVEALS NEW DETAILS ON MARS; ASTRONAUT JOHN GLENN TRAINING

Today's video file features a flyover movie of the Vallis Marineris region of Mars and the latest animation as seen by the Magnetometer/Electron Reflectometer (MAG/ER) and Mars Orbiter Laser Altimeter (MOLA) instruments on board NASA's Mars Global Surveyor. Finally, NTV will broadcast b-roll of Astronaut John Glenn training for the STS-95 mission, scheduled for launch in October 1998.

ITEM 1: FLYOVER MOVIE
ITEM 1a MARTIAN MAGNETIC "FOSSILS"
ITEM 1b: SURFACE MAPPING BEGINS
ITEM 1c: "IMAGES" FROM MOLA
ITEM 1d: MARTIAN MAPS
ITEM 1e: INTERVIEWS

For more information contact Doug Isbell at (202) 358-1753 or Wade Sisler at (301) 286-6256.

ITEM 2: JOHN GLENN TRAINING

For more information contact Eileen Hawley at (281) 483-5111.

ITEM 3: REPLAY - X-38 DROP TEST
ITEM 4: REPLAY - AXAF TELESCOPE COMPLETE
ITEM 5: REPLAY - DINOSAUR-KILLING IMPACT
ITEM 6: REPLAY - ANIMATION OF ASTERIOD MATHILDE FROM THE NEAR EARTH ASTEROID RENDEZVOUS MISSION PACKAGE

Video news file today at noon, 3, 6, and 9 p.m. EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

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News Release

National Aeronautics and
Space Administration
Washington, DC 20546
(202) 358-1600

For Release

Douglas Isbell
Headquarters, Washington, DC
(Phone: 202/358-1547)

March 13, 1998

Diane Ainsworth
Jet Propulsion Laboratory, Pasadena, CA
(Phone: 818/354-5011)

Cynthia M. O'Carroll
Goddard Space Flight Center, Greenbelt, MD
(Phone: 301/286-6943)

RELEASE: 98-45

NEW GLOBAL SURVEYOR DATA REVEALS DEEPLY LAYERED TERRAIN, MAGNETIC FEATURES AND GENESIS OF A MARTIAN DUST STORM

For the first time in Mars exploration, a spacecraft has captured the full evolution of a Martian dust storm. NASA's Mars Global Surveyor mission also has returned new insights into the deeply layered terrain and mineral composition of the Martian surface, and to highly magnetized crustal features that provide important clues about the planet's interior.

These findings are among the early results from the Mars-orbiting mission being reported in today's issue of Science magazine.

This first set of formal results comes from data obtained in October and November 1997, while the spacecraft was just beginning to use the drag of Mars' upper atmosphere to lower and circularize its highly elliptical orbit in a process called aerobraking. At the time, a dust storm was brewing on Mars and had grown to about the size of the South Atlantic Ocean.

The Global Surveyor data suggest that the event began as a set of small dust storms along the edge of the planet's southern polar cap, according to Dr. Arden Albee of the California Institute of Technology, Pasadena, CA, the Mars Global Surveyor mission scientist. By Thanksgiving, it had expanded into a large regional dust storm in Noachis Terra that covered almost 180 degrees longitude, while spanning 20 degrees south latitude to nearly the tip of the Martian equator.

-more-

"As this storm obscured the Martian landscape, we followed it in detail using several instruments onboard Mars Global Surveyor," Albee said. "The Thermal Emission Spectrometer mapped the temperature and opacity of the atmosphere while the camera followed the visual effects. The effects of the storm extended to great heights of about 80 miles (130 kilometers) and resulted in great increases in both atmospheric density and variability from orbit to orbit. These atmospheric measurements have great significance to future Mars missions that will be using aerobraking techniques too."

Before the storm, atmospheric dust was generally distributed very uniformly, Albee said. Observations of the limb of the planet in the northern hemisphere revealed both low-lying dust hazes and detached water-ice clouds at altitudes of up to 34 miles (55 kilometers). Movement of these clouds was tracked by the spectrometer as the planet rotated. Atmospheric turbulence disrupted these cloud patterns as the small storms began to rise and kick more dust into the air. As the storm began to abate, small local storms began to crop up again along the edges of the south polar cap, and ice clouds formed in depressions as the carbon dioxide cap continued to retreat.

In addition to these unprecedented observations of a full-blown Martian dust storm, measurements from the spacecraft's Magnetometer and Electron Reflectometer have yielded new findings about Mars' strong, localized magnetic fields. These patches of the crust, which register high levels of magnetism, are beginning to unlock some of the mysteries surrounding Mars' internal dynamo and when it died, said Dr. Mario Acuna of NASA's Goddard Space Flight Center, Greenbelt, MD.

"These locally magnetized areas on Mars could not form without the presence of an overall global magnetic field that was perhaps as strong as Earth's is today," says Acuna. "Since the internal dynamo that powered the global field is extinct, these local magnetic fields act as fossils, preserving a record of the geologic history and thermal evolution of Mars."

Magnetic fields are created by the movement of electrically conducting fluids, and a planet can generate a global magnetic field if its interior consists of molten metal hot enough to undergo convective motion, similar to the churning motion seen in boiling water.

"The small size and highly magnetic nature of these crustal features, which measure on the order of 30 miles (50 kilometers), are found within the ancient cratered terrain rather than within the younger volcanic terrain," Acuna said. "By correlating crustal age with magnetization, we have a perfect window on Mars' past, which will help us to determine when Mars' internal dynamo ceased operating."

High-resolution images of dunes, sandsheets and drifts also are helping reveal earlier chapters of Martian history. Landforms shaped by erosion are almost everywhere, according to Albee, and many bear a striking resemblance to

Colorado's Rocky Mountains. Rocky ridges poke through the Martian dust just as the jagged edges of cliffs pierce through a blanket of snow in the Rockies. Martian dust appears to have spilled down the sides of ridges just as fresh snow slides down a ski slope.

"One almost expects to see ski tracks crisscrossing the area," Albee added. "These images present a sharp contrast to the images of boulder-strewn deserts found at the Viking and Pathfinder landing sites."

Newly released images from the Mars Global Surveyor camera, developed by principal investigator Dr. Michael Malin of Malin Space Science Systems, Inc., San Diego, can be viewed on the Internet at:

http://www.jpl.nasa.gov/marsnews or www.msss.com/

The Martian crust also exhibits much more layering at great depth than was expected. The steep walls of canyons, valleys and craters show the Martian crust to be stratified at scales of a few tens of yards, which is an exciting discovery, Albee noted. "At this point we simply do not know whether these layers represent piles of volcanic flows or sedimentary rocks that might have formed in a standing body of water," he said.

The Thermal Emission Spectrometer, led by principal investigator Dr. Philip Christensen of Arizona State University, is beginning to obtain a few infrared emission spectra of the surface, although it is still too cold on the surface for the best results. The best spectra clearly indicate the presence of pyroxene and plagioclase, minerals which are common in volcanic rocks, with a variable amount of dust component. No evidence was found for carbonate minerals, clay minerals or quartz. If present in these rocks, their abundance must be less than about ten percent.

Their absence indicates that carbonates are not widespread over the surface of the planet, but they may still be found in specific locations that either favored their initial deposition or their subsequent preservation. This finding could have important implications for identifying areas that may preserve signs of ancient life on Mars, since carbonate minerals are commonly formed in biological processes, Albee said.

Striking results also have been obtained from Global Surveyor's laser altimeter over Mars' northern hemisphere, which is exceptionally flat with slopes and surface roughness increasing toward the equator, according to principal investigator Dr. David Smith of Goddard. The initial data for this region helps scientists interpret a variety of landforms, including the northern polar cap, gigantic canyons, ridges, craters of all sizes and shield volcanoes. Most surprising are views of extraordinarily mundane regions -- as flat as the Bonneville Salt Flats in Utah - that extend over vast northern regions of the planet.

Mars Global Surveyor will complete the first phase of its two-part aerobraking strategy at the end of March, at which time the science instruments will be turned on again for most of the next six months. Over this period, the spacecraft will stay in an 11 1/2-hour orbit and collect an additional bounty of data at a closest approach of about 106 miles (170 kilometers) above the surface, much closer than the spacecraft will pass over the planet once it has reached its formal mapping orbit in March 1999. This closer orbit will allow the science teams to take more detailed measurements of the Martian atmosphere and surface without magnetic interference from the solar wind.

"When we decided to slow the pace of aerobraking to reduce the force on the solar panel that was damaged after launch, we knew we would get a bonus -- the ability to collect much more science data closer to the planet than will be possible during the prime mapping mission," said Glenn E. Cunningham, Mars Global Surveyor project manager at NASA's Jet Propulsion Laboratory, Pasadena, CA. "Additionally, the six-month period between the end of March and early September will yield an extraordinary opportunity as the lowest point of the orbit migrates over the northern polar cap. All of this information that is coming back now is really icing on the cake, a spectacular precursor to the global mapping data expected to start flowing next year."

Mars Global Surveyor is part of a sustained program of Mars exploration known as the Mars Surveyor Program. The mission is managed by the Jet Propulsion Laboratory for NASA's Office of Space Science, Washington, DC. JPL's industrial partner is Lockheed Martin Astronautics, Denver, CO, which developed and operates the spacecraft. JPL is a division of the California Institute of Technology.

end-

News Release

National Aeronautics and
Space Administration
Washington, DC 20546
(202) 358-1600

For Release

Douglas Isbell
Headquarters, Washington, DC
(Phone: 202/358-1753)

March 13, 1998

RELEASE: 98-46

EARTH-VIEWING SATELLITE WOULD FOCUS ON EDUCATIONAL, SCIENTIFIC BENEFITS

Keying off a concept proposed by Vice President Al Gore, NASA is developing plans for a small satellite which could provide continuous views of the Earth by the year 2000.

NASA plans to issue educational, scientific and possibly commercial announcements of opportunity within the next few weeks, following the Vice President's call today for NASA to design, build and launch the satellite by 2000.

"Vice President Gore has given us an exciting challenge," said NASA Administrator Daniel S. Goldin. "In the coming weeks, we plan to solicit ideas from the academic, environmental, scientific and commercial communities. We will synthesize these ideas and communicate with the Congress as we go forward."

Goldin said NASA envisions "down-to-Earth" applications: "This view of our planet can help us plan as fires ravage wilderness areas, it may be able to save lives as we watch hurricanes and typhoons form and threaten coastlines across the grand sweep of ocean basins. Moreover, we think it is important to inspire young minds, provide new perspectives on the planet for our scientific community, and perhaps provide commercial applications as well. We're going to pave the way for an Earth Channel."

The satellite concept would place a high definition television camera--paired with an eight-inch telescope--into an orbit at a unique vantage point a million miles from Earth where it could provide 24-hour views of the home planet. It would orbit at a point in space where the gravitational attraction of the Sun and the Earth essentially cancel one another out, allowing the satellite to constantly view a fully sunlit hemisphere.

"We want to directly involve university students, teamed with industry and government, in the design, development, operations and data analysis from this unique

- more -

venture," said Dr. Ghassem Asrar, NASA Associate Administrator for Earth Science. "It would allow scientists to track natural events such as hurricanes, large fires and volcano plumes. We expect further innovative applications to blossom as we let this singular view inspire the imaginations of all the citizens of planet Earth."

Early plans envision a 330-pound satellite linked to Earth through three simple, low cost ground stations equally spaced around the globe to provide continuous downlink capability. One new image would be downlinked every few minutes. The satellite would be developed and launched within two years of a competitive selection process. College students would participate in the design and development of the spacecraft, and student teams would operate the ground stations. The total mission cost, including launch and operations, would not exceed $50 million.

- end -

Video Advisory

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

For Release
March 17, 1998

Debbie Rivera
Headquarters, Washington, DC
(Phone: 202/358-1743)

VIDEO ADVISORY: V98-30

LOOKING FOR LEAKS IN ALL THE RIGHT PLACES

Today's video file provides footage of Node 1, a passageway connecting the living and working areas of the first International Space Station. The passageway is being checked for leaks as part of prelaunched activities.

ITEM 1: NODE 1 READY FOR LEAK TEST

For more information contact Mike Braukus at (202) 358-1979 or George Diller at (407) 867-2468.

Video news file today at noon, 3, 6, and 9 p.m. EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

-end-

Video Advisory

National Aeronautics and
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Washington, DC 20546
(202) 358-1600

For Release
March 19, 1998

Renee Juhans
Headquarters, Washington, DC
(Phone: 202/358-1712)

VIDEO ADVISORY: V98-31

EXPLORING THE OCEAN FLOOR

Today's video file provides b-roll of fourth- through ninth-grade students who will take turns controlling remotely operated underwater vehicles and cameras in Monterey Bay, Bermuda and the Guaymas Basin on March 19, as part of a science educational opportunity called JASON IX "Oceans of Earth and Beyond." The virtual field trip will be conducted from an auditorium at NASA Ames Research Center, Moffett Field, CA,

ITEM 1: EXPLORING THE OCEAN FLOOR

For more information contact Michael Mewhinney at (650) 604-3937.

Video news file today at noon, 3, 6, and 9 p.m. EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

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News Release

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

Douglas Isbell
Headquarters, Washington, DC
(Phone: 202/358-1753)

For Release
March 19, 1998

RELEASE: 98-47

TWO STUDIES WILL REFINE AND EXPAND SOLAR MONITORING TASK

The Naval Research Laboratory, Washington, DC, and the University of Colorado's Laboratory for Atmospheric and Space Physics in Boulder have been selected by NASA's Office of Earth Science to conduct parallel six-month definition studies of a new small satellite to monitor variations in the amount of radiant solar energy that reaches Earth.

The precise measurements to be obtained by the Total Solar Irradiance Mission (TSIM) will help scientists better understand the relationship between the Sun's variable energy output and its effects on Earth's climate. The six-month feasibility studies will focus on the development of a preliminary system design and operations concept for the cost-capped $23 million mission.

NASA has been measuring the total radiative output of the Sun from the unique perspective of space since the late 1970s. The current sensor being used is called the Active Cavity Radiometer Irradiance Monitor (ACRIM). NASA has flown two ACRIM instruments, including the ACRIM-II instrument onboard NASA's Upper Atmosphere Research Satellite. A third ACRIM instrument is scheduled for launch aboard a dedicated small satellite in October 1999.

TSIM will extend the broad data set gathered by the ACRIM series while exploring a new capability to measure solar irradiance in two discreet spectral bands. Once proven, this operationally oriented capability is a candidate for flight aboard future National Polar Orbiting Environmental Satellite System missions being planned by a tri-agency partnership among NASA, the Department of Defense and the National Oceanic and Atmospheric Administration.

"TSIM will be developed in 36 months or less using the same key principles of 'faster, better, cheaper' spacecraft demonstrated by the agency's Discovery Program," said Dr. Ghassem Asrar, NASA Associate Administrator for Earth Science. "We hope to obtain an instrument payload that is lighter and more technologically advanced, yet provides an exciting additional capability that will give us new knowledge about our climate and why it varies."

-more-

TSIM is part of NASA's Earth Observing System, a series of advanced remote-sensing satellites designed to provide simultaneous measurements of a broad range of physical, chemical and biological processes to enable researchers to study the Earth's land, oceans, air, ice and life as a total system. TSIM also will serve as NASA's contribution to the joint small Science Satellite (SciSat) program with the Canadian Space Agency. NASA and Canada have committed to developing independent science research missions to be launched on a NASA-funded launch vehicle in December 2001, with shared data after launch.

The two selected teams will document their analyses for NASA review by the end of 1998, with one team being selected to proceed with development. TSIM program management will be provided by NASA's Goddard Space Flight Center in Greenbelt, MD.

-end-

News Release

National Aeronautics and
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Washington, DC 20546
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For Release

March 19, 1998

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Goddard Space Flight Center, Greenbelt, MD
(Phone: 301/286-8955)

RELEASE: 98-48

NASA'S TRANSITION REGION AND CORONAL EXPLORER MISSION SET TO STUDY THE SUN'S TURBULENT UPPER ATMOSPHERE

NASA's Transition Region and Coronal Explorer (TRACE) mission, scheduled for launch at 9:40 p.m. EST (6:40 p.m. PST) March 30, 1998, will greatly improve understanding of events in the Sun's atmosphere, including intense storms and flares, which can have an impact on power and communications systems on Earth.

The TRACE mission will join a fleet of spacecraft studying the Sun during a critical period when solar activity is beginning its rise to a peak early in the new millennium. The Sun goes through an 11-year cycle from a period of numerous intense storms and sunspots to a period of relative calm and then back again. The coming months in the Sun's cycle will provide solar scientists with periods of strong solar activity interspersed with periods when the Sun is relatively passive and quiet. This will give TRACE the chance to study the full range of solar conditions, even in its relatively short planned lifetime.

TRACE will train its powerful telescope on the dynamic so-called 'transition region' of the Sun's atmosphere, between the relatively cool surface and lower atmosphere of the Sun where temperatures are about 6,000 degrees Fahrenheit, and the extremely hot upper atmosphere called the corona, where temperatures are up to 16 million degrees Fahrenheit. Using instruments sensitive to extreme-ultraviolet and ultraviolet wavelengths of light, TRACE will study the detailed connections between the fine-scale surface features and the overlying, changing atmospheric structures of hot, ionized gas, called plasma. The surface features and atmospheric structures are linked by fine-scale solar magnetic fields.

The power of the TRACE telescope to do detailed studies of the solar atmosphere makes this observatory unique among the current group of spacecraft studying the Sun.

- more -

"The spacecraft has roughly ten times the temporal resolution and five times the spatial resolution of previously launched solar spacecraft. Its findings are eagerly awaited by the solar science community," said Dr. Alan Title, TRACE principal investigator from the Stanford Lockheed Institute for Scientific Research in Palo Alto, CA. "We can expect to resolve some present mysteries of the Sun's atmospheric dynamics as well as discover new and exciting phenomena."

TRACE will be launched into a polar orbit to enable virtually continuous observations of the Sun, uninterrupted by the Earth's shadow for months at a time. This orbit will give the mission the greatest chance of observing the random processes which lead to flares and massive eruptions in the Sun's atmosphere.

The TRACE telescope is really four telescopes in one. Its 30-centimeter (12-inch) primary and six-centimeter (2-inch) secondary super-polished mirrors are individually coated in four distinct quadrants to allow light from different bandwidths (colors) to be reflected and analyzed. An electronic detector collects images over a 231,000-by-231,000-mile field of view, nearly 25 percent of the Sun's disk. A powerful data handling computer enables very flexible use of the detector array including adaptive target selection, data compression and image stabilization.

"TRACE was completed on time, under budget, and met all performance goals," said Jim Watzin, Small Explorer project manager, NASA Goddard Space Flight Center, Greenbelt, MD. "I'm really proud of this team. They have produced a magnificent observatory in a manner that saved NASA nearly $9.7 million over the initial cost estimate." TRACE, which costs $49 million, is the third launch in the Small Explorer series of small, quickly developed, relatively low-cost missions.

TRACE will be launched on an Orbital Sciences Corp., Dulles, VA, Pegasus-XL rocket released from an L-1011 jet aircraft at the Western Range, Vandenberg Air Force Base, CA. The launch window is open for 10 minutes.

TRACE will be the first space science mission with an open data policy. All data obtained by TRACE will be available to other scientists, students and the general public shortly after the information becomes available to the primary science team.

The TRACE telescope was designed and developed in cooperation between Lockheed Martin Corp. and Stanford University. The spacecraft was designed and tested at Goddard, which manages the mission for the Office of Space Science at NASA Headquarters, Washington, DC.

Further information about the TRACE mission can be found on the Internet at:
http://sunland.gsfc.nasa.gov/smex/trace
TRACE science information can be found at:
http://www.space.lockheed.com/TRACE/welcome.html

- end -

Video Advisory

National Aeronautics and
Space Administration

Washington, DC 20546
(202) 358-1600

For Release
March 24, 1998

Debbie Rivera
Headquarters, Washington, DC
(Phone: 202/358-1743)

VIDEO ADVISORY: V98-32

BEEN THERE, DONE THAT, GOT THE SPACESUIT: TWO YEARS ON MIR

Today's video file provides a statement by Astronaut Andy Thomas regarding the second anniversary of the U.S. presence aboard the Russian Space Station Mir.

ITEM 1: ANDY THOMAS FROM MIR

For more information contact Debra Rahn at (202) 358-1639.

Video news file today at noon, 3, 6, and 9 p.m. EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

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Video Advisory

National Aeronautics and
Space Administration
Washington, DC 20546
(202) 358-1600

For Release
March 25, 1998

Debbie Rivera
Headquarters, Washington, DC
(Phone: 202/358-1743)

VIDEO ADVISORY: V98-33

NEW TELESCOPE TO UNVEIL THE "INVISIBLE" UNIVERSE

Today's video file provides animation of the Space Infrared Telescope Facility (SIRTF), an advanced orbiting observatory that will see objects in the universe invisible to other telescopes.

ITEM 1: SIRTF TEST DEVELOPMENT PHASE
Animation of the Space Infrared Telescope Facility.
ITEM 1a: SHAKE, SHAKE, SHAKE
B-roll shows the shake test of a SIRTF prototype.
ITEM 1b: INTERVIEW -- LARRY SIMMONS, PROJECT MANAGER
ITEM 1c: INTERVIEW -- MIKE WERNER, PROJECT SCIENTIST
For more information contact Don Savage at (202) 358-1727 or Mary Beth Murrill at (818) 354-6478.

Video news file today at noon, 3, 6, and 9 p.m. EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

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News Release

National Aeronautics and
Space Administration

Washington, DC 20546
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For Release

Donald Savage
Headquarters, Washington, DC
(Phone: 202/358-1727)

March 25, 1998

Mary Beth Murrill
Jet Propulsion Laboratory, Pasadena, CA
(Phone: 818/354-6478)

RELEASE: 98-49

NASA STARTS WORK ON NEW SPACE INFRARED TELESCOPE FACILITY

NASA Administrator Daniel S. Goldin today authorized the start of work on the Space Infrared Telescope Facility (SIRTF), an advanced orbiting observatory that will give astronomers unprecedented views of phenomena in the universe that are invisible to other types of telescopes.

The authorization signals the start of the design and development phase of the SIRTF project, which is managed by NASA's Jet Propulsion Laboratory (JPL), Pasadena, CA. Scheduled for launch in December 2001 on a Delta 7920-H rocket from Cape Canaveral, FL, SIRTF represents the culmination of more than a decade of planning and design to develop an infrared space telescope with high sensitivity, low cost and long lifetime of at least two-and-a-half to as many as five years.

"The Space Infrared Telescope Facility will do for infrared astronomy what the Hubble Space Telescope has done in its unveiling of the visible universe, and it will do it faster, better and cheaper than its predecessors," said Dr. Wesley Huntress, NASA's associate administrator for space science. "By sensing the heat given off by objects in space, this new observatory will see behind the cosmic curtains of dust particles that obscure much of the visible universe. We will be able to study fetal stars, detect other solar systems and study the most ancient, distant galaxies at the edge of the universe."

Conventional optical telescopes can study stars and other objects that glow brightly enough to emit light in the visible portion of the electromagnetic spectrum. However, many objects, such as planets and unignited stars, do not "shine" in visible or ultraviolet light. Others that may burn brightly are veiled from Earth's view behind the vast clouds of dust and gas that populate the universe.

- more -

Some of the most fascinating objects and processes in the universe may exist behind these cosmic curtains of dust and gas, such as black holes, quasars, regions where stars are forming in galaxies and regions where planets are forming around stars. Most of these concealed attractions are detectable only with infrared telescopes, whose unique capability lies in their ability to sense the heat of dark, faint or hidden objects.

Infrared telescopes also provide the means to study the most distant objects at the edge of the expanding universe. Optical and ultraviolet light emitted from stars, galaxies and quasars since the birth of the universe has shifted, over time and distance, into the infrared portion of the spectrum. SIRTF will provide important insights into when and how the first galaxies and stars formed.

SIRTF, whose design and development is cost-capped at $458 million, will be one of astronomy's most advanced telescopes. Its unconventional approach uses new technologies, an innovative mission design and small launch vehicle. It is being developed on a quick schedule that closely integrates the work of the contractor and academic teams responsible for development and delivery. Its design promises high sensitivity and observing capability along with efficiency of operations and long lifetime.

SIRTF is the fourth and final element in NASA's family of complementary spaceborne "Great Observatories" that includes the Hubble Space Telescope, the Compton Gamma Ray Observatory and the Advanced X-ray Telescope Facility. The project also represents a bridge to NASA's new Origins program, which seeks to answer fundamental questions about the birth and evolution of the universe. SIRTF will lay the groundwork for many investigations fundamental to the Origins program, such as studies of the birth and evolution of galaxies, their stars, and searches for planets that orbit some of those stars.

Lockheed Martin Missiles and Space, Sunnyvale, CA, is responsible for the spacecraft and for the SIRTF system integration and testing. Ball Aerospace and Technology Corp., Boulder, CO, is responsible for the cryogenic telescope assembly. The three science instruments are being provided by Dr. Giovanni Fazio, Smithsonian Astrophysical Observatory, Dr. James Houck, Cornell University and Dr. George Rieke, University of Arizona. The SIRTF Science Center, at the California Institute of Technology (Caltech) in Pasadena, CA, will receive the date from JPL and process it, and work with the astronomy community. Astronomers around the world are invited to request observing time on SIRTF.

SIRTF is managed by JPL for NASA's Office of Space Science, Washington DC. Larry Simmons of JPL is the project manager. The project scientist at JPL is Dr. Michael Werner. At NASA Headquarters, the SIRTF program executive is Lia LaPiana. JPL is a division of Caltech. More information about SIRTF and other infrared astronomy projects can be found at:

http://sirtf.jpl.nasa.gov/sirtf/ and **http://www.ipac.caltech.edu**

- end -

VideoAdvisory

National Aeronautics and
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Washington, D.C. 20546
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For Release
March 26, 1998

Debbie Rivera
Headquarters, Washington, DC
(Phone: 202/358-1743)

VIDEO ADVISORY: V98-34

SO, YOU WANTED MORE TIME IN THE DAY? THANK EL NINO

Today's video file provides animation both of El Nino and radio telescopes that enable scientists to observe that Earth's rotation is slowing due to El Nino-driven changes in wind and ocean patterns. The second item on El Nino shows the phenomenon from its beginning through the most recent data.

ITEM 1: **SET YOUR WATCH BACK**
Animation of radio telescopes that help determine Earth's rotation.
ITEM 1a: **INTERVIEW - JOHN GIPSON, GEOPHYSICIST, GODDARD**
ITEM 1b: **EARTH ROTATION BY GALILEO**
ITEM 1c: **EL NINO RUNS DEEP (ACTUAL)**
ITEM 1d: **EL NINO RUNS DEEP (ANOMALY)**
ITEM 1e: **3-D EL NINO (3/26 UPDATE)**
ITEM 1f: **COMPARING THE BIG ONES (3/26 UPDATE)**
ITEM 1g: **ISOLATED DATA SETS**
ITEM 1h: **B-ROLL: SCIENTISTS DISCUSSING EL NINO (REVISED)**
ITEM 1i: **B-ROLL: NOAA BUOYS BEING DEPLOYED**
ITEM 1j: **INTERVIEW EXCERPTS**
For more information contact Wade Sisler at (301) 286-6256.
ITEM 2: **EL NINO FROM TOPEX-POSEIDON'S VIEW**
Animation of El Nino's evolution and decrease from 12/96 - 3/98.
ITEM 2a: **INTERVIEW - BILL PATZERT, RESEARCH SCIENTIST, JPL**
For more information contact Stephanie Zeluck at (818) 354-0040.
ITEM 3: **REPLAY - KC-135'S WILD RIDE FOR STUDENTS**
ITEM 4: **REPLAY - SPACE INFRARED TELESCOPE FACILITY**

Video news file today at noon, 3, 6, and 9 p.m. EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

News Release

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For Release

March 26, 1998

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RELEASE: 98-50

MARS GLOBAL SURVEYOR TO ATTEMPT IMAGING OF FEATURES OF PUBLIC INTEREST

NASA's Mars Global Surveyor spacecraft is about to begin a summer-long set of scientific observations of the red planet from an interim elliptical orbit, including several attempts to take images of features of public interest ranging from the Mars Pathfinder and Viking mission landing sites to the Cydonia region.

The spacecraft will turn on its payload of science instruments on March 27, about 12 hours after it suspends "aerobraking," a technique that lowers the spacecraft's orbit by using atmospheric drag each time it passes close to the planet on each looping orbit. Aerobraking will resume in September and continue until March 1999, when the spacecraft will be in a final, circular orbit for its prime mapping mission.

It will not be possible to predict on which orbit the spacecraft will pass closest to specific features on Mars until Global Surveyor has established a stable orbit and flight controllers are able to project its ground track. This process should be completed in the next few days. The exact time of observations and the schedule for the subsequent availability of photographs on the World Wide Web are expected to be announced early next week.

"Global Surveyor will have three opportunities in the next month to see each of the sites, including the Cydonia region, location of the so-called 'Face on Mars,' " said Glenn E. Cunningham, Mars Global Surveyor project manager at NASA's Jet Propulsion Laboratory, Pasadena, CA. "The sites will be visible about once every eight days, and we'll have a 30- to- 50-percent chance of capturing images of the sites each time."

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Several factors limit the chances of obtaining images of specific features with the high-resolution mode of the camera on any one pass. These factors are related primarily to uncertainties both in the spacecraft's pointing and the knowledge of the spacecraft's ground track from its navigation data. In addition, current maps of Mars are derived from Viking data taken more than 20 years ago. Data obtained by Global Surveyor's laser altimeter and camera during the last few months have indicated that our knowledge of specific locations on the surface is uncertain by 0.6 to 1.2 miles (1 to 2 kilometers). As a result, the locations of the landing sites and specific features in the Cydonia region are not precisely known.

In addition, the Mars Pathfinder and Viking landers are very small targets to image, even at the closest distance possible, because they are the smallest objects that the camera can see. The Cydonia features, on the other hand, are hundreds to thousands of times larger and the camera should be able to capture some of the features in that area.

Global Surveyor's observations of the Viking and Pathfinder landing sites will provide scientists with important information from which to tie together surface observations and orbital measurements of the planet. Data from landing sites provide "ground truth" for observations of the planet made from space.

As for the "Face on Mars" feature, "most scientists believe that everything we've seen on Mars is of natural origin," said Dr. Carl Pilcher, acting science director for Solar System Exploration in NASA's Office of Space Science, Washington, DC. "However, we also believe it is appropriate to seek to resolve speculation about features in the Cydonia region by obtaining images when it is possible to do so."

Information about Viking observations of the Cydonia region and a listing of those images are available on the World Wide Web at:
http://www.hq.nasa.gov/office/pao/facts/HTML/FS-016-HQ.html

New images of the landing sites and Cydonia region taken by Mars Global Surveyor will be available on JPL's Mars news site at:
http://www.jpl.nasa.gov/marsnews and on the Global Surveyor home page at **http://mars.jpl.nasa.gov** . These sites will also carry detailed schedules of the imaging attempts once they have been determined. Images will also be available on NASA's Planetary Photojournal web site at: **http://photojournal.jpl.nasa.gov** .

So far in the aerobraking process, Global Surveyor's orbit has been reduced from an initial 45-hour duration to less than 12 hours. During the aerobraking hiatus, the spacecraft will be orbiting Mars about once every 11.6 hours, passing about 106 miles (170 kilometers) above the surface at closest approach and about 11,100 miles (17,864 kilometers) at its farthest distance from the planet. The pause in aerobraking allows the spacecraft to achieve a final orbit with lighting conditions that are optimal for science observations.

Mars Global Surveyor is part of a sustained program of Mars exploration, managed by JPL for NASA's Office of Space Science, Washington, DC. Lockheed Martin Astronautics, Denver, CO, which built and operates the spacecraft, is JPL's industrial partner in the mission. Malin Space Science Systems, Inc., San Diego, CA, built and operates the spacecraft camera. JPL is a division of the California Institute of Technology, Pasadena, CA.

-end-

Contract Announcement

National Aeronautics and
Space Administration

Washington, D.C. 20546
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For Release

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Headquarters, Washington, DC
(Phone: 202/358-1983)

March 27, 1998

John Bluck
Ames Research Center, Moffett Field, CA
(Phone: 650/604-5026)

RELEASE: C98-d

NASA AWARDS $148 MILLION CONTRACT TO RAYTHEON STX CORP

Following a re-evaluation due to protests by competing companies in June 1997, NASA has selected Raytheon STX Corp., Lanham, MD, (formerly Hughes STX) for award of a $148.3 million contract to provide federal information processing services at NASA's Ames Research Center, Moffett Field, CA.

Included in the contract services are software development and maintenance, engineering operations and maintenance, network services, analysis, quality assurance and reviews.

The new, five-year award includes a one-year base period followed by four one-year options. Cost of the contract includes all options. The contract will be managed at Ames. The first year contract (base period) award is $32.7 million. This is a cost-plus-incentive-fee, task order, completion-type contract.

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News Release

National Aeronautics and
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For Release

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Headquarters, Washington, DC
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March 27, 1998

Eileen M. Hawley
Johnson Space Center, Houston, TX
(Phone: 281/483-5111)

NOTE TO EDITORS : N98-24

STS-90 PRESS BRIEFINGS SET FOR APRIL 2

A series of background press briefings on the upcoming STS-90 mission are scheduled beginning at 9 a.m. EST April 2 on NASA TV, originating from NASA's Johnson Space Center, Houston, TX. The 16-day Shuttle mission is dedicated to the study of the human nervous system, the most complex and least understood part of the body.

The principal objectives of the STS-90 mission are to expand our understanding of how the nervous system develops and functions in space, but the research also will provide unique contributions to the study and treatment of neurological disorders on Earth.

The launch window opens at 2:19 p.m. EDT on April 16, and lasts 2 hours. Following a nominal flight duration of 15 days, 21 hours, 50 minutes, Space Shuttle Columbia is scheduled to land at the Kennedy Space Center, FL, on May 2 about 12:09 p.m. EDT.

Following the STS-90 mission briefings, round-robin interviews with the crew members will be held for reporters at the Johnson Space Center, Houston, TX, and for those reporters who make advance arrangements to conduct the interviews by phone. Media interested in the round robin interviews should fax their request to Eileen Hawley in Johnson Public Affairs by close of business March 31. The round-robin interviews will not be seen on NASA TV. NASA TV is available on GE-2, Transponder 9C at 85 degrees West longitude, vertical polarization, with a frequency of 3880 Mhz, and audio of 6.8 Mhz.

STS-90 will be Columbia's 25th mission into space and the 90th Shuttle flight in the program's history.

- end -

STS-90 PRE-FLIGHT BRIEFINGS
Thursday, April 2, 1998
(all times shown are EST)

9 a.m. **Mission Overview**
Al Pennington, STS-90 lead flight director

9:30 a.m. **Neurolab Overview**
Dr. Mary Anne Frey, program scientist, NASA Headquarters
James McGuire, program manager, NASA Headquarters

10:30 a.m. **Neurolab science briefing**
Dr. Jerry Homick, Neurolab mission scientist
Dr. Mel Buderer, JSC payload project scientist
Dr. Louis Ostrach, ARC payload project scientist

12 p.m. **NASA TV Videofile**

2:30 p.m. **STS-90 Crew Press Conference**
Rick Searfoss, Commander
Scott Altman, Pilot
Rick Linnehan, Payload Commander, MS1
Kay Hire, MS2
Dave Williams, MS3
Jay Buckey, PS1
Jim Pawelczyk, PS2

4 p.m. **STS-90 Crew Round Robins**
Note: The round robin interview event with the STS-90 crew is a local JSC event only and will not be carried on NASA TV.

VideoAdvisory

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For Release
March 27, 1998

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VIDEO ADVISORY: V98-35

MARS GLOBAL SURVEYOR TO TAKE A PEEK AT CYDONIA

Today's video file provides an image of the Cydonia region of Mars as previously viewed by Viking. This area is of particular interest to the public, and an area that the Mars Global Surveyor (MGS) will be attempting to survey over the next few months.

ITEM 1: MGS TO LOOK AROUND
Image of Cydonia taken by the Viking 1 orbiter in 1976.

ITEM 1a: INTERVIEW - GLENN CUNNINGHAM, OPERATION PROJECT MANAGER, JPL
For more information contact Doug Isbell at (202)358-1753 or Stephanie Zeluck at (818) 354-0040.

ITEM 2: REPLAY - SET YOUR WATCH BACK

ITEM 3: REPLAY - EL NINO FROM TOPEX-POSEIDON'S VIEW

Video news file today at noon, 3, 6, and 9 p.m. EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

-end-

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For Release

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March 27, 1998

Lynn Chandler
Goddard Space Flight Center, Greenbelt, MD
(Phone: 301/286-9016)

RELEASE: 98-51

EARTH DRAGGING SPACE AND TIME AS IT ROTATES

An international team of NASA and university researchers has found the first direct evidence of a phenomenon predicted 80 years ago using Einstein's theory of general relativity -- that the Earth is dragging space and time around itself as it rotates.

Researchers believe they have detected the effect by precisely measuring shifts in the orbits of two Earth-orbiting laser-ranging satellites, the Laser Geodynamics Satellite I (LAGEOS I), a NASA spacecraft, and LAGEOS II, a joint NASA/Italian Space Agency (ASI) spacecraft. The research, which is reported in the current edition of the journal Science, is the first direct measurement of a bizarre effect called "frame dragging."

The team was led by Dr. Ignazio Ciufolini of the National Research Council of Italy and the Aerospace Department of the University of Rome, and Dr. Erricos Pavlis of the Joint Center for Earth System Technology, a research collaboration between NASA's Goddard Space Flight Center, Greenbelt, MD, and the University of Maryland at Baltimore County.

"General relativity predicts that massive rotating objects should drag space-time around themselves as they rotate," said Pavlis. "Frame dragging is like what happens if a bowling ball spins in a thick fluid such as molasses. As the ball spins, it pulls the molasses around itself. Anything stuck in the molasses will also move around the ball. Similarly, as the Earth rotates, it pulls space-time in its vicinity around itself. This will shift the orbits of satellites near the Earth.

"We found that the plane of the orbits of LAGEOS I and II were shifted about six feet (two meters) per year in the direction of the Earth's rotation," Pavlis said. "This is about 10 percent greater than what is predicted by general relativity, which is within our margin of error of plus or minus 20 percent. Later measurements by Gravity Probe B, a NASA spacecraft scheduled to be launched in 2000, should reduce this error margin to less than one percent. This promises to tell us much more about the physics involved."

-more-

Einstein's theory of general relativity has been highly successful at explaining how matter and light behave in strong gravitational fields, and has been successfully tested using a wide variety of astrophysical observations. The frame-dragging effect was first derived using general relativity by Austrian physicists Joseph Lense and Hans Thirring in 1918. Known as the Lense-Thirring effect, it was previously observed by the team of Ciufolini using the LAGEOS satellites and has recently been observed around distant celestial objects with intense gravitational fields, such as black holes and neutron stars. The new research around Earth is the first direct detection and measurement of this phenomenon.

The team analyzed a four-year period of data from the LAGEOS satellites from 1993 to 1996, using a method devised by Ciufolini three years ago. The other team members are Dr. Federico Chieppa of Scuola d'Ingegneria Aerospaziale of the University of Rome, and Drs. Eduardo Fernandes and Juan Perez-Mercader of Laboratorio de Astrofisica Espacial y Fisica Fundamental (LAEFF) in Madrid.

The measurements required the use of an extremely accurate model of the Earth's gravitational field, called the Earth Gravity Model 96, which became available only recently due to the collaborative work of the Laboratory for Terrestrial Physics at Goddard, the National Imagery and Mapping Agency (formerly the Defense Mapping Agency), Fairfax, VA, and the Ohio State University, Columbus, OH. It was developed over a four-year period using tracking data from approximately 40 spacecraft.

Dr. John Ries, an expert in satellite geodesy at the University of Texas at Austin, cautions that it is very challenging to remove the much larger effects of tidal changes and small zonal influences in the Earth's gravitational field, so that estimating the possible errors in the measurement of the Lense-Thirring effect is itself uncertain.

"The relativistic effect being sought is about ten million times smaller than classical Newtonian disturbances on the plane of the LAGEOS orbits, requiring an enormously accurate treatment of background effects," said Dr. Alan Bunner, science program director for the Structure and Evolution of the Universe in the Office of Space Science at NASA headquarters, Washington, DC.

LAGEOS II, launched in 1992, and its predecessor, LAGEOS I, launched in 1976, are passive satellites dedicated exclusively to laser ranging, which involves sending laser pulses to the satellite from ranging stations on Earth and then recording the round-trip travel time. Given the well-known value for the speed of light, this measurement enables scientists to determine precisely the distances between laser ranging stations on Earth and the satellite.

LAGEOS is designed primarily to provide a reference point for experiments that monitor the motion of the Earth's crust, measure and understand the "wobble" in the Earth's axis of rotation, and collect information on the Earth's size, shape, and gravitational field. Such research is part of NASA's Earth Science enterprise, a coordinated research program that studies the Earth's land, oceans, ice, atmosphere and life as a total system.

-end-

Video Advisory

National Aeronautics and
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For Release
March 31, 1998

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VIDEO ADVISORY: V98-36

IMPROVED IMAGES OF THE SUN EXPECTED BY THE NEWEST EXPLORER; HELPING PILOTS FLY SAFER

Today's video file provides animation and b-roll of the Transition Region and Coronal Explorer (TRACE) satellite scheduled to launch April 1 at 9:40 p.m. Eastern, from Vandenberg Air Force Base, CA. Also on NTV, will be footage of a small plane using new ground collision avoidance software.

ITEM 1: TRACE ANIMATION
Includes over-the-shoulder view of TRACE pointing towards the Sun.
ITEM 1a: IMAGES OF TRACE SPACECRAFT
TRACE processing at the Goddard Space Flight Center, Greenbelt, Md.
ITEM 1b: TRACE PROCESSING AT VANDENBERG
ITEM 1c: INTERVIEW - ALAN TITLE, PRINCIPAL INVESTIGATOR, LOCKHEED MARTIN
ITEM 1d: INTERVIEW - DICK FISHER, PROJECT SCIENTIST
For more information contact Donna Drelick at (301) 286-7995 or Don Savage at (202) 358-1727.

ITEM 2: AVOIDING THE TERRAIN
ITEM 2a: INTERVIEW - BOB SEVERINO, PRES., DUBBS & SEVERINO
ITEM 2b: INTERVIEW - MERLE MCKENZIE, MANAGER, JPL'S COMMERCIAL TECHNOLOGY PROGRAM.
For more information contact Don Nolan-Proxmire at (202) 358-1983 or Stephanie Zeluck at (818) 354-0040.

Video news file today at noon, 3, 6, and 9 p.m. EST.

NASA Television is available on GE-2, transponder 9C at 85 degrees West longitude, with vertical polarization. Frequency is on 3880.0 megahertz, with audio on 6.8 megahertz.

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March 31, 1998

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RELEASE: 98-52

NASA PROGRAM SPAWNS NEW SAFETY SOFTWARE FOR PILOTS

Two new software packages enabling pilots to use laptops to avoid hazardous terrain and find their place on maps are the latest success stories of a NASA program bringing together entrepreneurs and space engineers.

Pilots of small planes, for whom such tools have been largely unavailable until now due to cost and the sheer size of bulky hardware, may soon be able to carry onboard the personal computer equivalent of collision-avoidance systems now used by the military and commercial airlines.

"TerrAvoid" and "Position Integrity" combine Global Positioning Satellite (GPS) data with high-resolution maps of the Earth's topography. Dubbs and Severino, Inc., based in Irvine, CA, has developed software that allows the system to be run on a battery-powered laptop in the cockpit.

The packages, designed primarily for military sponsors and now positioned to hit the consumer market in coming months, came about as the result of the Technology Affiliates Program at NASA's Jet Propulsion Laboratory's (JPL), Pasadena, CA. Intended to give American industry assistance from NASA experts and to facilitate business use of intellectual property developed for the space program, the Technology Affiliates Program introduced the start-up company of Dubbs and Severino to JPL's Dr. Nevin Bryant four years ago.

Dubbs and Severino had an idea for mapping software to help private airplane pilots, inspired in part by the fatal crash of a pilot friend of company president Bob Severino. The twist: the package was to be completely software-driven, instead of requiring expensive hardware, as was the norm up to that time.

-more-

Bryant's Cartographic Applications Group at JPL had developed GeoTIFF, an architecture standard providing geo-location tools for mapping applications. GeoTIFF proved to be the crucial key that the start-up company needed to bring the idea to fruition, allowing the firm to develop low-cost software packages.

GeoTIFF is now in the public domain, and its use for commercial product development has evolved into an industry standard over the last year. Through the Technology Affiliates Program, Dubbs and Severino obtained JPL's assistance early on and thus gained a jump-start in adapting the architecture for their products' specific needs. "JPL gave us a demonstration and opened up the red carpet. It was a match made in heaven," says Severino.

Merle McKenzie, manager of JPL's Commercial Technology Program, said that Dubbs and Severino's ability to utilize technology originally developed for NASA provides a strong example of the many advantages of technology transfer programs. "This is a win-win partnership through which yet another American business gets a boost from the space program," McKenzie said.

"TerrAvoid" is a terrain avoidance system that graphically shows pilots if they are flying dangerously close to mountains: safe sections can be seen in green, while hazardous sections show up in red, with those proportions changing in real time as the pilot moves through hilly terrain. In a sense, the system "looks" out over a plane's flight path, sweeping 360 degrees, warning the pilot if there are any upcoming hazards. Ithe software integrates GPS tracking data with maps on CD-ROM, and is approximately 1/20th the cost of its nearest competitor.

"Position Integrity," which also co-registers real-time GPS data with local maps on CD-ROM, is a moving map detailing the exact position of the pilot. Because of the unique features of GeoTIFF, this software can be adapted to operate with any map, chart or photo image in the world, while comparable versions are limited solely to either military, scientific or commercial maps. GeoTIFF also enables the package to feature four windows at once, a useful and unique option for pilots who need to work simultaneously with maps, charts, photo images and sketches at different scales and zoom levels.

Further details about JPL's technology transfer activities, including the Technology Affiliates Program, are available online at **http://techtrans.jpl.nasa.gov/tu.html**
JPL is a division of the California Institute of Technology.

-end-