

The Year in Review

DISCOVERIES AND NEW CHALLENGES FOR NASA

A rock, a record, a rover and a new rocket were among the top NASA stories for 1996. Background material, video and still images are available to news media to illustrate these stories, with supporting material also available via the Internet and the World Wide Web.

LIFE ON MARS? TANTALIZING CLUES FROM AN ANCIENT ROCK

In an announcement that caused all humankind to take pause, NASA Administrator Daniel S. Goldin and a team of scientists revealed in August that a meteorite from Mars strongly suggested that primitive life may have existed on that planet more than 3 billion years ago. In a press conference at NASA Headquarters, a research team showed the world pictures of the first organic molecules thought to be of Martian origin; several features characteristic of biological activity, and possible microscopic fossils of primitive, bacteria-like organisms inside the ancient meteorite. In vowing to pursue the investigation of this historic discovery, Goldin said "The evidence is exciting, even compelling, but not conclusive. It is discovery that demands further scientific investigation. NASA is ready to assist the process of rigorous scientific investigation and lively scientific debate that will follow this discovery." Goldin invited governments from around the globe to participate in the continuing investigation of the meteorite.

LUCID SETS U.S. RECORD FOR STAY IN SPACE

Astronaut Dr. Shannon Lucid set a new record for an American living in space and broke the world's record for a woman living in space by spending 181 days aboard the Russian Mir Space Station. Lucid, who conducted microgravity and life sciences experiments aboard the Mir with two Russian cosmonauts, returned to Earth aboard Space Shuttle Atlantis in November. President Clinton presented Lucid with the Congressional Space Medal of Honor in an early December ceremony, citing Lucid "for her contributions to

international cooperation in space ... Shannon Lucid is an explorer in the best tradition of those who dare to challenge the unknown." Lucid's stay on Mir was part of continuing U.S. - Russian space cooperation, which is setting the foundation for the International Space Station.

TWO PROBES LAUNCHED TO STUDY THE RED PLANET

In a continuing effort to learn more about Mars, the United States launched two new spacecraft to the Red Planet in 1996. The Mars Global Surveyor and the Mars Pathfinder missions were both successfully launched from NASA's Kennedy Space Center, FL. Mars Global Surveyor, due to rendezvous with Mars in September 1997, will spend four months dipping into Mars' atmosphere using a technique called "aerobraking." Starting in 1998, the Surveyor will begin compiling a systematic database as it surveys the Martian landscape and photographs unique features, such as polar caps and Mars' network of sinuous, intertwining river channels. Mars Pathfinder, set to land on Mars July 4, 1997, is designed to test the feasibility of a new low-cost method of delivering a spacecraft, science payload and free-ranging rover to the surface of the Red Planet. Once deployed, the lander will transmit back to Earth science data collected during descent through Mars' atmosphere. The rover, named Sojourner, will then activate an onboard camera and send back images to Earth, signifying the start of its exploration.

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GALILEO UNRAVELS MYSTERIES OF JUPITER AND ITS MOONS

Mars was not the only planet to reveal startling new secrets in 1996. NASA's Galileo spacecraft, in its flyby and probe deploy at Jupiter, revealed many previously unknown facts about our Solar System's largest planet. Galileo's Probe, which was successfully sent into Jupiter's violet atmosphere in December 1995, provided new discoveries for NASA scientists. New information on the extent of water, clouds, and the chemical composition of Jupiter's atmosphere was revealed. As Galileo sped by Jupiter's moons, new details of the satellites began to emerge. On Ganymede, Jupiter's largest moon, scientists were intrigued by three-dimensional pictures of giant, icy fissures and evidence of a magnetic field. Galileo also reported that "warm ice" or even liquid water may have existed, and perhaps still exists, beneath the cracked icy crust of the moon Europa. Galileo found that the volcanically-active moon Io had noticeably changed since it was last observed 17 years ago by the Voyager spacecraft. In November, Galileo flew by Jupiter's moon Callisto, investigating the strange, pockmarked fourth moon, so different from its other active siblings.

HUBBLE SPACE TELESCOPE CONTINUES TO AMAZE ASTRONOMERS

Living up to its role as one of the "Great Observatories," the Hubble Space Telescope showed images of galaxies colliding, the surface of Pluto, and the birth of stars during 1996. In April, Hubble sent back dramatic of gigantic tadpole-shaped objects surrounding a dying star. The "cometary knots" are probably the result of a dying star's final outbursts, seen in the Helix nebula. The Space Telescope continues on track for measuring the expansion of the universe, sending back information that fine-tunes the Hubble Constant. Scientists are using the telescope to try and place the Hubble Constant to within a ten percent accuracy. Compiling a "cosmic Movie" of the Crab Nebula, Hubble found the Nebula even more dynamic than previously understood. Hubble measured the diameters of a special class of pulsating star called Mira variables, which rhythmically change size.

At 11 billion light-years away, they existed during the epoch when it is commonly believed galaxies started to form. Hubble concluded the gigantic, old stars are not round but rather egg-shaped. That discovery may preview the fate of our Sun five billion years from now. Hubble also surveyed the "homes" of quasars, showing that they live in a remarkable variety of galaxies, many of which are violently colliding. The complicated image Hubble sent back suggests there may be a variety of mechanisms for "turning on" quasars, the universe's most energetic objects. Hubble introduced us to images of what may be galaxies under construction in the early universe, being made out of a long sought ancient population of "galactic building blocks." Those images show a grouping of 18 gigantic star clusters that appear to be the same distance from Earth, and close enough to each other that they will eventually merge into a few galaxy-sized objects. In October, Hubble followed the spectacular dance of Jupiter's aurora, allowing astronomers to map Jupiter's immense magnetic field and better understand how it generates such phenomena.

NEXT GENERATION LAUNCH VEHICLE CHOSEN FOR DEVELOPMENT

In a quest for a faster, better, cheaper access to space in the 21st Century, Vice President Al Gore and Administrator Goldin announced that Lockheed Martin was selected to build the X-33 technology demonstrate vehicle, a one-half scale prototype of the Reusable Launch Vehicle which will be used to demonstrate advanced technologies that will dramatically increase reliability and lower the costs of putting payloads into space. Lockheed Martin will design, build and conduct the first test flight of the X-33 test vehicle by March 1999, and conduct up to fifteen flights by December 1999. NASA has budgeted \$941 million for the project through 1999, with Lockheed Martin contributing over \$200 million. Called "VentureStar," the unpiloted vehicle will launch vertically like a rocket and land horizontally like an airplane.