NASA Briefs

Global Surveyor to image 'Face on Mars'

NASA's Mars Global Surveyor spacecraft soon will begin a summer-long set of scientific observations of the red planet. Several attempts will be made to take images of features of public interest ranging from the Mars Pathfinder and Viking mission landing sites to the Cydonia region. "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 Cunningham, Surveyor project manager at NASA's Jet Propulsion Laboratory.

NASA spawns new pilot safety software

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 data with high-resolution maps of the Earth's topography. The packages, designed primarily for military sponsors and now expected to hit the consumer market in coming months, came about as the result of the Technology Affiliates Program at NASA's Jet Propulsion Laboratory.

New class of dust ring around Jupiter

Scientists have found evidence for a new ring of dust that occupies a backward orbit around Jupiter, based on computer simulations and data from NASA's Galileo spacecraft, it was reported in the April 3 issue of Science magazine. A team led by researchers at the University of Colorado at Boulder reported that a faint, doughnut-shaped ring of interplanetary and interstellar dust some 700,000 miles in diameter appears to be orbiting the giant planet. Evidence comes from computer simulations that correlate with data collected by a dust detector aboard the Galileo spacecraft has detected this ring by capturing some of its dust. Surprisingly, the researchers say, most of the interstellar and interplanetary dust particles appear to be in a "retrograde" orbit—that is, moving in the opposite direction of the rotating planet and its moons.

NASA starts work on Space Infrared Telescope Facility

NASA Administrator Daniel S. Goldin Thursday authorized the start of work on the Space Infrared Telescope Facility, 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. Scheduled for launch in December 2001 on a Delta 7920-H rocket from Cape Canaveral, Fla., 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."

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.

The SIRTF Science Center, at the California Institute of Technology in Pasadena, Calif., 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.

JSC Photo S98-04105

NASA Office of Space Flight Chief Joe Rothenberg, left, visits with Pomona (Calif.) College student Curt Johanson about JSC's undergraduate zero-gravity research program during a recent visit. Flight Crew Operations' Aircraft Operations Chief Bob Naughton also followed the discussion.

Blood drive draws 426 units of blood

The second of five JSC On-site Blood Drives in 1998 collected 426 donations in two days.

Dan Mangieri, co-chair of the blood drive committee, said this was, "the best turnout yet outside of those drives we've had on Total Health and Safety Days."

The next blood drive is scheduled for June 2-3 in the Teague Auditorium lobby. For those interested, the blood drive schedule is now posted on the HRO homepage under Employee Activities. Potential donors are encouraged to bookmark the location for future reference.

No appointment is needed to donate whole blood, but appointments are encouraged for those donating plasma or platelets.

For those who have never donated blood, the process is pretty simple. It starts with a blood sample. Afterwards, one pint of blood is drawn. Drawing whole blood takes seven to 10 minutes, with the overall process usually taking around 45 minutes including screening. The donated blood undergoes several tests, including the tests for hepatitis and HIV. If there are reactive test results donors are notified by mail. All results are kept confidential.

For more information about the JSC on-site blood drive call Dan Mangieri at x33003.To schedule an appointment call Donna Stuart at x33032.

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, a NASA spacecraft, and LAGEOS II, a joint NASA/Italian Space Agency 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 Goddard Space Flight Center, and the University of Maryland at Baltimore County.

"General relativity predicts that massive rotating objects should drag space-time around themselves as they rotate," Pavlis said. "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 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."

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 measurements required the use of an extremely accurate model of the Earth's gravitational field, called the Earth Gravity Model 96. It was developed over a four-year period using tracking data from approximately 40 spacecraft.

LAGEOS II, launched in 1992, from the shuttle *Columbia* 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.

Sharp's full report available on Internet

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1961, the agency has received $61 billion in funding, much of which went directly into the Houston-area economy. JSC is the largest of NASA's 11 major U.S. installations, with a budget of $3.5 billion in 1997. In terms of total dollars spent by NASA, Texas ranks second only to California, Sharp said.

A 1995 study by the University of Houston-Clear Lake's Center for Economic Development and Research estimated that JSC indirectly generates more than 36,000 additional jobs in the Houston area, Sharp said.

"Having NASA and JSC as a neighbor has been a boon to Texas schools and universities. JSC funds education programs at every level, from elementary school to post-doctoral study. Sometimes students and faculty get to work hand in hand with NASA experts.

At the university level in 1997, he said, NASA spent almost $40 million in Texas on a variety of research and educational programs, including $4.5 million at the University of Houston, $3.9 million at Rice University, $5.1 million at Prairie View A&M, and close to $1 million each at UH-Clear Lake, UT Health Science Center in Houston, and Texas Southern University.

Sharp also noted the wide variety of consumer products that have sprung from the space program.

"All-in-all, more than 30,000 earthly uses for space technology have been discovered," he said. "Discovering commercial uses for space technology helps strengthen the economy and reduces the cost of space exploration to taxpayers."

"The spirit of adventure and the quest for knowledge that have launched Americans into space time and time again have not waned," Sharp said. "We should make certain NASA's spirit of exploration and innovation remains right here in Texas where it belongs. The missing ingredient is a commitment from state and local governments to provide NASA and JSC the support they need to keep this installation strong and growing," Sharp said.

The full text of Fiscal Notes is available on the Internet at: http://www.window.state.tx.us/comptrol/fnotes/

Space News ROUNDUP

The Roundup is an official publication of the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas, and is published every other Friday by the Public Affairs Office for all space center employees. Deadline for the submission of articles is Friday, three weeks before the desired date of publication.

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JSC Annual Report shows good health in face of changes

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assets, from $6 billion in FY 1996 to $12 billion in FY 1997—a 100 percent increase. This growth is due primarily to the Space Flight Operations Contract and the increase in International Space Station hardware elements."

"Fiscal Year 1997 was an exciting year for the Johnson Space Center," Draper concluded. "The financial state of health at Johnson Space Center is good. We are well prepared for the challenges facing us in the future."

The full text of the report and the photos used to illustrate center activities are available on the JSC Web at http://www.jsc.nasa.gov/.

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